Beltyukov-Tcvetkov Bibliographic LENR Index of 1989-1990 Articles in Refereed Journals with Abstracts

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UDC 539.12/.7

Low temperature nuclear fusion. Bibliographic index / Compiled by Igor Leonidovich Beltyukov, checked by Sergei A. Tcvetkov, p. Zarechny, “SORUS company” / centre “HYDRACT” 1990.-87 p. -(300 libraries).

This collection presents abstracts of articles published in scientific and popular science periodicals. They reveal the background and development of events around the phenomenon of “cold” nuclear fusion in 1989, the directions of experimental and theoretical research in laboratories around the world.

With the exception of Beltyukov and Tcvetkov's own articles, the abstracts were written by a Russian abstract service.

This collection is unique because it encompasses many references in this research from the Soviet/Russian literature.

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UDC: Universal Decimal Classifier

VINITI RZH: Abstract Journal (RJ) of the All-Union Institute of Scientific and Technical Information of the USSR Academy of Sciences.

I. "A NUCLEAR STORM" IN A TEST TUBE OF WATER

1. Nuclear fusion in vitro. Nuclear fusion in a test tube / Cookson S. / Financial Times, -1989 March 23, - p. 8. - English.

Report on the sensational press conference of Stanley Pons (Dean of the Faculty of Chemistry at the University of Utah, USA) and Martin Fleishman (Professor of Electrochemistry at the University of Southampton, UK), held on March 23, 1989, in Salt Lake City (USA). For 100 hours, in a setup with two platinum and palladium electrodes immersed in heavy water at room temperature, they maintained the fusion reaction of deuterium nuclei, which was accompanied by a significant release of heat. According to S. Pons, 1 litre of sea water can release energy equal to the energy of burning 300,000 litres oil.

2. Electrochemically induced nuclear fusion of deuterium. Electrochemically induced nuclear fusion of deuterium/ Fleischmann Martin, Pons Stanley //J. of Elecroanal. Chem. -1989.-Vol.261, No.2a-pp.301-308.-English.

UDC 539.12/.17

In university States Utah (USA) carried out an experiment aimed at detecting

$$d + d \rightarrow {}^3He(0{,}82МэВ) + n(2{,}45МэВ),$$
$$d + d \rightarrow T(1{,}01МэВ) + p(3{,}02МэВ)$$

the occurrence of nuclear reactions

under conditions where deuterium is embedded in the metal lattice of palladium, which means “an effective increase in the pressure bringing the deuterons together due to chemical forces,” which increases the probability of quantum mechanical tunnelling of deuterons through the Coulomb barrier of the DD pair in the interstices of the palladium lattice. The electrolyte is a solution of 0.1 mol LiOD in water with the composition 99.5% D_2O + 0.5% H_2O. Palladium (Pd) rods with a diameter of 1÷8 mm and a length of 10 cm, wrapped in platinum wire (Pt-anode), were used as a cathode. The current density was varied 0.001÷1 A/cm^2 at a voltage on the electrodes of 12 V.

$$p + n \rightarrow d + \gamma(2{,}23МэВ)$$

Neutrons in the experiment were recorded in two ways: 1) scintillation - a dosimeter with boron BF3 counters Harwell Dose Equivalent Monitor (efficiency $2 \cdot 10^{-4}$ for neutrons of energy 2.5 MeV), 2) registration of gamma quanta produced when a neutron is captured by a hydrogen nucleus of ordinary water surrounding an electrolytic cell

The detector was an NaI(Tl) crystal, and the recorder was a multichannel amplitude analyser ND-b. Background correction was carried out by subtracting the spectrum obtained at a distance of 10 m from the water bath. Tritons (T) were extracted from the electrolyte with using a special type of absorber (Parafilm film) and then their b-decay was recorded on a Beckman scintillation counter (efficiency 45%). The best results were achieved on a Pd cathode with a diameter of 4 mm and a length of 10 cm at a current density through the electrolyser of 0.064 A/cm^2. Neutron radiation with an intensity of $4 \cdot 10^4$ neutrons/s was recorded, 3 times higher than the background. The presence of a maximum in the gamma spectrum in the energy region of 2.2 MeV was established, and the counting rate of gamma quanta was $2.1 \cdot 10^4$ s^{-1}. The presence of tritium was detected with a formation rate of $2 \cdot 10^4$ at/s. During the electrolysis process, a 4-fold excess of the released energy over the total expended (electrical and chemical) was recorded, which reached 4 MJ/cm^3 of the cathode during 120 hours of the experiment. In the case of a 1x1x1 cm bulk Pd cathode, its partial melting was observed (Tm=1554°C). Based on experimental data on tritium nuclei and gamma rays, the probability of a fusion reaction was found by the authors to be equal to 10^{-19} s^{-1} per DD pair. At the same time, the authors note that if nuclear reactions involving deuterons are considered the main reason for the increased energy yield, then the neutron yield would be significantly higher (by 11÷14 orders of magnitude). According to the authors, in the case of electrolysis of a D_2O+DTO+T_2O solution, the heat release can increase to 10 kW/cm^3 of the cathode.

VINITI RZh 18V Nuclear physics. -1989.-6.-ref.6B1.

3. Claims of in vitro synthesis have been met with scepticism. Claims for the test tube fusion meet scepticism /Jouse S.//New Sci.-1989.-Vol.121, No.1658.-p.18.-Eng.

UDC 539.12/7

According to the author, great doubts were raised by the message of S. Pons and M. Fleishman from the University of St. Utah. Details of the experiment were not given, and the paper was announced to be published in the journal Nature in May, but the paper had not yet been submitted to the journal before the press conference. Fleishman and Pons claim that the heat released was 4 times the energy expended and was accompanied by the formation of neutrons and tritium. Deuterons accumulated, as Fleischmann and Pons believed, on palladium, were tightly packed and could be synthesized in the metal lattice. The author of the article cites the statement of S. Dean (Fusion Power Associates), who classifies the observed effect as a rare event (the quantum-mechanical effect of deuteron tunnelling through the Coulomb barrier of a DD pair) that does not provide energy production. According to R. Park (American Physical Society), neutrons can be confused with X-rays, and in

order to verify the presence of fusion reactions, it is necessary to determine the energy spectrum and direction of neutron emission; In addition, the DD synthesis reaction is realized through two channels.

VINITI RZh 1VV Nuclear Physics. -1989.-6.-ref.6B3.

4. The experiment on nuclear fusion in a test tube was repeated. Test tube fusion experiment repeated /Hall N., Beard J.// New Sci.-1989.-Vol.121, No. 1659.-r.18.-Eng.

UDC 539.12/.17

The recent report by S. Pons and M. Fleischmann that the electrolysis of heavy water produced a nuclear fusion reaction at room temperature was confirmed in the work of the American nuclear physicist Stephen Jones, known for his studies of muonic catalysis of the fusion of deuterium and tritium nuclei. Unlike Pons and Fleischmann, S. Jones was able to measure the spectrum of emitted neutrons. According to his data, the DD fusion reaction produces approximately 200 neutrons/hour, so the experiment required a highly sensitive detector. The neutron energy spectrum had a peak at 2.5 MeV - this is a characteristic value indicating the fusion of deuterium nuclei. S. Jones emphasized that no gamma radiation was detected in his experiments and the thermal output was extremely small (13 orders of magnitude less than the value reported by Pons and Fleischmann). Thus, making a report to CERN, Fleishman cited his estimates, according to which the measured temperature increase indicates the release of 20 W/cm^3 by the Pd electrode. According to Fleishman, this is more than any conceivable chemical process can produce, and he is forced to admit the existence of nuclear fusion reactions. Apparently, Pons and Fleischmann were able to detect gamma rays of 2.2 MeV, but there is no indication that they were emitted specifically from the cell. According to CERN physicists, the measured radioactivity of tritium is significantly lower than would be expected from a nuclear fusion reaction. It is not yet clear why the two groups of researchers obtained different results. Only detailed, careful measurements will clarify the situation. Even if “piezonuclear fusion” (the term was introduced by S. Jones) does not have practical applications, physicists and chemists will certainly discover something new and important for fundamental science.

VINITI RZh 1VV Nuclear Physics-1989.-6, -ref.6B4.

5. Observation of cold nuclear fusion in condensed bodies. Observation of cold nuclear fusion in condensed matter. / Jones S.E., Palmer E.R., Czirr J.B., Decker D.L.,

Jensen G.L., Thorne J.M., Taulor S.F., Rafelsky J. //Nature. - 1989, Vo1.338, No.621B.-pp.737-740.-Eng.

UDC 539.12/.17

Details of an experiment conducted at Brigham Young University are reported, in which, according to the authors, cold nuclear fusion was observed during the electrolysis of heavy water. Palladium or titanium foil was used as the cathode (gold foil was the anode). The current density was varied from 0.01 to 0.5 A/cm^2 at a voltage across the electrodes of 3-5 V. Eight electrolytic cells with a volume of 160 cm^3 were used in the experiment. 0.1 grams of various salts were added to D_2O ($FeSO_4 \cdot 7H_2O$; $TiOSO_4 \cdot H_2SO_4 \cdot 8H_2O$; $Li_2SO_4 \cdot H_2O$; $Na_2SO_4 \cdot 10H_2O$; $NiCl_2 \cdot 6H_2O$; $PdCl_2$, $CaCO_3$, $CaH_4(PO_4)_2 \cdot H_2O$) and a little AuCN. To detect neutrons, we used a spectrometer specially designed for experiments on cold nuclear fusion (CNF) with a liquid organic scintillator VS-505 with a ^6Li additive (the detection efficiency of neutrons with an energy of 2.5 MeV is 1%). A comparison of the measured spectra with the current through the electrolyser turned on and off allowed the authors to assert that a neutron flux of energy 2.5 MeV with an intensity of 0.041 neutron/s is recorded, corresponding to 10^{-8} W, 3÷5 times higher than the background. It is assumed that the $D(d,n)^3He$ reaction channel was observed with a probability of fusion of a pair of deuterons of 10^{-23} s^{-1}. The authors proposed a new method for catalysing nuclear fusion reactions. If in the molecular deuterium D_2 ion the electron is replaced by a particle with an effective mass several times greater than the electron mass, then the rate of fusion reactions occurring due to the tunnelling effect increases to 10^{-20} s^{-1} per DD pair. It has been suggested that quasi-molecular states can be realized in systems of atomic deuterium implanted into a palladium or titanium crystal lattice. (See also Repr. Univ. Arizona AZPH-TH89-18-2).

VINITI RZh 18V Nuclear Physics. -1989, -6.-ref.6B2.

6. On the issue of publications on cold nuclear fusion. Cold fusion print. //Nature. - 1989.-Vol.338, No.6217.-p.604.-English.

UDC 539.12/.17

The reasons why S. Pons and M. Fleischman withdrew their article from the journal “Nature” are discussed. It is reported that S. Jones sent his article to the editor on March 23, and Pons and Fleischman - on March 27, 1989. After review, Jones's article took on a form that suited the interested parties, and Pons and Fleischman, citing being busy with new experiments, did not find an opportunity quickly took into account the reviewers' comments and retracted the article.

“Nature” emphasizes that the results of S. Pons and M. Fleischmann are considered by the editors as less reliable.

VINITI RZh 18B Nuclear Physics. -1989.-7, -ref.7B1

7. Nuclear embarrassment. //Moskovskaya Pravda. - 06.20.1989.-p.3

UDC 539 12. /17

With reference to International Business Week for May 8, 1989, a statement by S. Jones is given about the background to the events that unfolded. Two groups of pcs. Utah was doing the same thing, but had a very rough idea of each other’s research. Until December 1988, when the results of the next experiments of Pons and Fleischmann were reviewed by Jones (Brigham Young University, Provo, Utah, USA). He invited his neighbours to come to his laboratory and get acquainted with his work - similar experiments. Such a visit took place, according to S. Jones, on February 23, 1989. A little later, for the first time, the phrase flashed about what smelled like billions of dollars and the Nobel Prize. At the same time, Pons and Fleischman said that they would prefer to devote another year and a half or even more to their experiments, but Jones said that he could not delay the publication of his results later than until May 1, 1989, when the session of the American Physical Society would take place, where he promised to make a report on this topic. Jones was confident that there was a gentleman's agreement between them to publish the results simultaneously. However, on March 22, Jones heard that Pons and Fleischman were holding a press conference the next day to announce the sensational discovery. Jones said he was shocked and devastated by the news and is now displaying his lab journals to prove the independence of his research.

8. The announcement of the discovery of fusion electrifies scientists. Fusion clay electrifies scientists. /Amato I.//Sci. News. -1989.-Vol.135, No. 13.-p. 196.-English

UDC 539. 12/. 17

One of the first reports in popular science periodicals about a press conference on March 23, 1989, in Salt Lake City (USA), at which S. Pons and M. Fleischman announced the discovery of the fusion reaction of deuterium nuclei during the electrolysis of heavy water using palladium electrode.

VINITI RZh 18V Nuclear Physics, -1989, -9.-ref.9B1.

9. Anomalous heat release during the "cold" fusion reaction. Interview Prof. Martin Fleischmann "Anomale Wärmeentwicklung – das ist die wichtigste Frage" Fusion (BRD). -1989.-Vol. 10, No. 3.-pp.30-32.-German.

UDC 621.039.6

As part of an interview with M. Fleischman, who for the first time, together with S. Pons, carried out a "cold" nuclear fusion reaction (CNF), some features of CNF are highlighted, including anomalous heat release during the reaction. The scientific, environmental and socio-political aspects of CNF are also considered. At the same time, in response to the negative attitude of ecologists towards CNF, attention is drawn to the fact that if the results of the experiment on CNF, and later also theoretical justifications and developments regarding the fact of additional heat release in the absence of significant harmful radiation, except for ^{4}He, are finally confirmed, then it is not clear what kind of damage can we talk about from the use of chemical nuclear weapons? It was noted that in addition to palladium, other structural materials for the cathode were also considered. The opinion has been expressed that the phenomenon of interaction of deuterium ions with the metal lattice of the cathode, when the Coulomb barrier of repulsive forces has been overcome, should perhaps be considered not as a chemical nuclear reaction, but as a special type of nucleonics.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref. 12U525

10. Theoretical justifications for the "cold" nuclear fusion reaction. Revolutioniert die "kalte" Fusion die Wassenschaft/Schauerhammer R.//Fusion (BRD). -1989.-Vol. 10, No. 3.-pp.33-34.-German.

UDC 621.039.6

Much attention is currently being drawn to the CNS effect discovered by Pons and Fleishman. By passing an electric current in an electrolyser with D_2O, an anode made of Pt and a cathode made of Pd, they discovered an additional heat release of up to 4 MJ/cm^3 for 100 hours, accompanied simultaneously by the emission of tritium, ^{3}He, neutrons, and gamma radiation. It is emphasized that the number of emitted neutrons is 10^9 times less than if this additional heat release occurred as a result of a thermonuclear fusion reaction. An attempt has been made to theoretically substantiate the CNF. It is noted that, along with the experimental discovery of quasicrystals and superconductivity at high temperatures over the past 5 years, the discovery of CNF can make revolutionary changes in the theoretical foundations of chemistry and physics, especially since representatives of both the first and second fields of science exclude the justification of CNF by chemical and nuclear processes. In

this regard, it is shown that, because modern theories cannot explain the presence of such “catalytic” nuclear reactions on the Pd crystal lattice; in the case of a chemical nuclear reactor, apparently, we can only talk about some as yet unknown physical phenomenon, and it is possible that now it will be necessary to consider the configuration of the electric field near the nucleus not as a simple spherical, but a more complex geometry, which, in turn, may lead to a change in the concepts of the relativistic-time theory and a different interpretation of the presentation of quantum dynamics.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U526.

11. Scientists claim in vitro synthesis. Scientists claim fusion in a test tube//Mod. Power Syst.-1989.-Vo1.9.-No.5-p.3.-Eng.

UDC 621.039.6

A brief report is given on the experiments of Pons and Fleischmann at the University of St. Utah (USA), during which, during the electrolysis of heavy water in an installation with a palladium cathode, significant heat generation associated with thermonuclear reactions was observed.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U516.

12. Breakthrough in synthesis. Fusion breakthrough announced//Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.12.-p.1.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039.6.

Two researchers from the University of St. Utah (S. Pons and M. Fleishman) announced that they had found a simple way to carry out the nuclear fusion reaction at room temperature. Their installation consists of an electrode (one is a thin Pd rod, the other is a wire wound around a Pt rod). When electrodes are immersed in D_2O and an electric current is passed through them, they record the release of helium, tritium and neutron radiation. In addition, heat release was recorded (for 1 W of introduced electrical power, 4 W of thermal power is released). At the same time, another group of researchers led by S. Jones from Brigham Young Univ. (Utah, USA) reported that they obtained approximately similar results.

VINITI RZh 22U Nuclear energy -1989.-12.-ref. 12U514.

13. Cold fusion in vitro. Keine “kalte Fusion” im Reagenzglass /Baier W. //ETZ: Electrotech.Z.-1989.-Vol.110, No.15.-pp.774-775, -German.

UDC 621.039.6

It was reported that 2 electrochemists from the USA, during an experiment with the electrolysis of heavy water, received 4 times more energy than was expended, which allowed them to draw a conclusion about a new type of controlled thermonuclear fusion. This discovery is widely discussed throughout the scientific world, causing the most controversial assessments. Based on various experimental and theoretical studies, a range of opinions on the problem of cold nuclear fusion is given.

VINITI RZh 22U Nuclear energy. -1990.-5.-ref.5U4b3.

14. Furore over synthesis. Furor over fusion/Fischer A./Pop. Sci.-1989.-Vol.234 No. 6.-pp.9-10.-Eng.

UDC 539.12/.17

A popular message about the discovery of the CNF phenomenon by S. Pons and M. Fleischmann, about which physicists remain in great doubt.

VINITI RZh 1VV Nuclear Physics. -19V.-1989.-10.-ref.10B6.

15. Cold fusion in solids? Koude kernfusie in de vaste stof?/Goedkopf J.A.//Ehergyspectrum.-1989.-Vol.13, No.6.-pp. 156-162.-Netherland.

UDC 539.12/.17

A detailed popular description of the experiments of S. Pons-M. Fleischmann and S. Jones, a presentation of their results, indicating the possibility of carrying out the fusion reaction of deuterium nuclei in palladium electrodes.

VINITI RZh 1VV Nuclear Physics. -1989.-10.-ref. 10B5.

16. Cold fusion, fact or fantasy? /Coey J.M.D. //Technol. Irel. -1989. -Vol.21.- No.2. -pp.41-43.-English

UDC 539.12/.17

A popular science article that discusses various ways of nuclear fusion for the purpose of producing energy, as well as reports of CNF in metals saturated with

deuterium during the electrolysis of D_2O, and in this regard, possible explanations for CNF,

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9VV

17. Solid state fusion? //Phys. World. -1989, May. -pp. 15-16. -English

UDC 539.12/.17

A popular description of the experiments of S. Pons-M. Fleischmann and S. Jones, who reported the discovery of fusion reactions of deuterium nuclei during the electrolysis of heavy water on palladium or titanium electrodes.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9B9

18. Cold water //New Sci.-1989.-Vol.122, No. 1658.-p.16.-Eng.

UDC 539.12/.17

The results of S. Pons and M. Fleischmann, who managed to observe the fusion reaction of deuterium nuclei in palladium metal at room temperature, are popularly presented. Considerable attention is paid to “pseudo-scientific” problems of chemical nuclear weapons.

VINITI RZh 1B8 Nuclear Physics. -1989, -11.-ref.11B13

19. Cold cheer for fusion scientists//Chetn. Brit. -1989.-Vol.25.-No.6.-pp.564-565.-Eng.

UDC 539.12/.17

A popular summary of the first reports by S. Pons and M. Fleischmann on the discovery of the synthesis of deuterium nuclei during the electrolysis of heavy water.

VINITI RZh 18V Nuclear Physics. -1990.-2. -ref.2B17

20. Cold nuclear embarrassment. Kalte Kern-Konfusion /Alexander K.F.//ISS und Fortschr. -1989.-Vol. 39.-No.9.-pp.225-228.-German

UDC 539.12/.17

Popular account of the discovery of nuclear fusion by electrolysis of D_2O by Pons and Fleischmann, as well as the results obtained in several other laboratories.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B18

21. Hopes fade for test tube fusion /Mulvihill M.//Technol. Irel. -1989.-Vol.21, No.5.-pp. 16-17.-English

UDC 539.12/. 17

A brief popular review of the events that took place after the announcement by Pons and Fleischmann about the discovery of a chemical reactor during the electrolysis of heavy water on a palladium cathode. It is noted that further research led to serious disappointment.

VINITI RZh 18V Nuclear physics. -1990. -2. -ref. 2B16

22. Cold nuclear fusion? / Chuyanov V. // Nature(USSR). -1989. -5. -With. 128

UDC 539. 12/. 17

A popular science account of the first events around CNF. The mechanisms of this phenomenon are discussed, but it is noted that the release of heat currently has no reasonable explanation.

23. Cold thermonuclear fusion in a test tube. //Science and life. -1989.-6.-p.154-155.

UDC 539. 12/. 17

A popular science description of the experiment of Pons and Fleischmann to detect the occurrence of fusion reactions of deuterium nuclei in a metal matrix during the electrolysis of heavy water. In order for the nuclear fusion observed by Pons and Fleischmann to occur, deuterium nuclei must be brought together to a distance of at least 0.03 nm.

24. Press "Financial Times" //NTP, problems and solutions. -1989.-No. 8(95).–p. 2.

UDC 539. 12. / 17

The results of the work of laboratories around the world to test chemical nuclear materials are reported. Sani S. Pons and M. Fleishman believe that if a

mixture of deuterium and tritium were used in the experiment, the amount of energy released should be significantly higher (up to 10 kW/cm^3). They explain this by the possibility of a fusion reaction occurring with the formation of 4He, while 3He is formed in a conventional thermonuclear reactor.

25. Feeling the depths of the sun? Le isoleil au fond d'une eprouvette /Sarah L.//Ind. Meg. -1989. -No. 59.-pp.36138-39.-French

UDC 621.039. 6

A popular exposition of the comparative merits of "hot" fusion in systems with magnetic and inertial confinement and "cold" nuclear fusion.

VINITI RZh 22U Nuclear energy. -1990. -4. -ref. 4U412.

26. The experiments of Fleischmann and Pons are partially confirmed, but the debate continues. Fusion in a jar partially substarttiated out controversy continues //Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.15.-pp.1-2.-Eng.

Storage location of the State Public Library for Science and Technology of the USSR.

A number of reports received in connection with the experiments of Pons and Fleischmann on CNF are presented. In a message from researchers from the University of St. Texas (USA) indicate that the heat release they recorded exceeds the input energy by 60-80%, but this value is significantly lower than the value reported by Pons and Fleischman. It has been suggested that the additional heat release is associated with chemical reactions, and not with nuclear fusion reactions. In the university Washington, two graduate students conducted experiments with ordinary and heavy water. It has been reported that an element with a mass equal to the mass of tritium was detected in cells with heavy water. R. Kuzmin from Moscow State University. M.V. Lomonosov (USSR) reported that he had conducted 20 experiments proving the existence of CNF. Strong doubts regarding the implementation of CNF in the experiments of Pons and Fleischmann were expressed by H. Furth (USA), one of the leaders of the controlled thermonuclear fusion program based on magnetic plasma confinement. L. Lidsky from MIT (USA) suggested that heat is released when the palladium crystal lattice is destroyed when deuterium atoms are introduced into it. At the same time, P. Hagelstein, the inventor of the X-ray laser, sent a paper to the American Physical Society that proposed a theory of CNF occurring without neutron radiation. It is reported that his theory of CNF is based on quantum, collective and coherent effects.

VINITI RZh 22U Nuclear energy. -1989.-12. -ref. 12U543.

27. Prospects for the “cold” fusion reaction. Kalte Fusion: Beginnt das Zeitalter der unbegrenzten Energie? /Nogies N. //Fusion (BRD). -1989.-Vol.10.-No.3.-pp.20-26.-German.

UDC 621.039.6

A retrospective of the development of fusion energy is given, from its use in the hydrogen bomb and controlled fusion devices with magnetic confinement of plasma, to fusion reactions using catalytically acting negatively charged muons and “cold” nuclear fusion, the observation of which was reported by Pons and Fleischmann. This experiment was rechecked in March 1989, in particular, at Brigham Young University, which confirmed their results, although the cathode was made of titanium. It was noted that the energy of the emitted neutrons was at the level of 2.5 MeV (corresponding to the energy of the emitted neutrons released during the fusion of two deuterons), and the amount of thermal energy released turned out to be much less. It has been hypothesized that the heat release in the earth's crust is based on the CNS process. The details of the experiment are also reported: the electric current is 8.64 and 512 mA, the equivalent force of attraction of deuterium ions to the Pd cathode corresponds to 10^{25} MPa (it is assumed that such a huge compression was the cause of the CNS), diameter 2.1 and 4 mm, thermal release The energy at the cube-shaped cathode was so great that the latter melted. Since the number of synthesized nuclei (determined by the neutron flux and equal to $2\cdot10^{4}$ s^{-1}) is much less than their number calculated on the basis of modern scientific ideas about thermonuclear fusion ($10^{11}\div10^{14}$ s^{-1}), it was concluded that most of the released thermal energy is generated due to processes unknown to modern science.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U523

28. Tantalizing prospects of cold fusion. Confirmation messages are received. Dispute about primacy. Prospect of achieving cold fusion tantalizes. Confirmation reports tricle in. Dispute over primacy. //Nature. -1989.-

Vol.338.-No.6216.-r.529-Eng.

UDC 539.12/.17

A brief summary of the chronology of reports of experiments repeating the experiments of Pons and Fleischmann. The authors of some of them claim to have obtained results confirming the thermal effect (Charles Martin's group, University of Texas, USA) and neutron emission (James Mahaffey's group, University of Georgia,

USA). The history of the conflict between two groups from the University of St. Petersburg is briefly outlined. Utah and Brigham Young University regarding priority in opening a CNF.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9V11

29. Cold fusion repeated in Texas. Texas repeats cold fusion/New Sci.- 1989.-Vol.122.-No.1660.-r. 19.-English

UDC 539.12/.17.

At the Texas A&M University, College Station, USA, the experiment of Pons and Fleischmann was repeated, during which 60-80% more energy was released than was expended. C. Marsh (Director of the University's Centre for Thermodynamic Research) noted that he could not completely discount the possibility that what was observed was a chemical reaction rather than a nuclear fusion reaction. The Texas group currently does not have any other experimental evidence, other than heat release, that it was CNF that was observed.

VINITI RZh 18V Nuclear Physics. -1989.-7-ref.7B13

30. Cold thermonuclear fusion, does it exist? La fusion froide aura-t-elle lieu? /Amatore Ch. //Recherche. -1989.-Vol.20.-No.211.-pp.816-818.-French.

UDC 621.039.6

An integrated approach is given from three points of view: an electrochemist (Amatore Ch.), a theoretical specialist in plasma physics (Buy Laval) and a specialist in solid state physics (J. P. Burger) present their thoughts on the experiment of Pons and Fleischmann. In the process of controlled thermonuclear fusion, two light elements merge with the release of energy in the form of heat and radiation, for example, the combination of hydrogen isotope nuclei to form helium. The process requires the presence of ultra-high temperatures or pressures necessary to bring the nuclei together. Under normal conditions, the probability of fusion of deuterium nuclei is on the order of 10^{-70} s^{-1} per DD pair. Pons and Fleishman reported on the implementation of nuclear fusion by electrochemical means. Carrying out electrolysis of D_2O, they discovered that the reaction proceeds with a positive energy balance (heat release is 4 times higher than the supplied electrical energy). As of April 24, 1989, only three research groups managed to obtain reliable results in attempts to reproduce the experiments of Pons and Fleischmann. The laboratory in Frascati (Italy) recorded the neutron flux emitted by titanium saturated with deuterium by a purely physical method (from the gas phase), but the result has not yet been officially

published. Group J. Machaffey from the University of St. Georgia (USA) recorded a neutron flux during electrolysis but explains this by equipment error. Two specialists in thermodynamics (V. Gammon and K. March) and an electrochemist (C. Martin) from the University of St. Texas (USA) obtained thermal efficiency of 109-140%. One of the members of the Texas group obtained a similar result by replacing heavy water with regular water.

VINITI RZh 22U Nuclear energy. -1989. -12, -ref. 12U530

31. Confirmations fuel the prospect of cold fusion. Confirmations heat up cold fusion prospect/Pool R. //Science. -1989.-Vol.244.-No. 4901. -p. 143.-English

UDC 539. 12/. 17

Three weeks after the first report by Pons and Fleischmann on the discovery of the CNS process in the electrolysis of D2O, confirmation of the reality of this phenomenon was received. In a number of laboratories, a significant release of heat was observed (although not as large as in the first experiments of Pons and Fleischmann). In most cases, the ratio of energy released to energy consumed is no higher than 1.6-1.8. These results are not proof of the reality of the CNF process: it is possible that the release of heat is due to some unknown chemical processes. Great difficulties arise when trying to reconcile the found value of the released energy with a relatively small neutron flux.

VINITI RZh 18B Nuclear Physics. -1989, -12. -ref. 12V2

32. View from CERN. A view from CERN /Morrisori D. //Phys. World. -1989.-May. -p.499.-English.

UDC 539. 12/. 17

A brief report from a seminar at CERN, at which M. Fleischman and S. Jones reported on the observation of the reaction of a chemical reactor during the electrolysis of heavy water. Also mentioned are reports from Frascati (Italy) on the observation of the emission of neutrons when titanium is saturated with gaseous deuterium.

VINITI RZh 18V Nuclear Physics. -1989. -9. -ref. 9B10

33. The emergence of experiments and theories related to cold nuclear fusion. Fusion Fury: Experiments, Theories Grow/Amato I. //Sci. News. -1989.-Vol. 135.-No.16.-p.244.-Eng.

UDC 621.039.6

A brief report is presented on the report of S. Pons from the University of St. Utah (USA) on the detection of nuclear fusion reactions during the flow of electric current in a system containing a Pd electrode. It is noted that reports have been received of similar experiments in a number of countries (Italy, USSR), in which confirmation of the results of Pons and Fleischmann. To explain the results of experiments on CNS, a number of theoretical models have been proposed (P. Hagelstein and K. Johnson, Massachusetts Institute of Technology, USA).

VINITI RZh 22U Nuclear energy. -1989. -12. -ref. 12U529

34. Cold fusion. Chronology. Kalte Fusion-eine Chronologie//Fusion (BRD).-1989.-Vol.10.-No.3.-pp.26-29.-German.

UDC 621.039.6

The results of an experimental re-verification of the CNF effect discovered in the first experiment of S. Pons and M. Fleishman during March-May 1989 in a number of scientific laboratories and universities in some countries of the world are presented. In most cases, the effect of CCN was confirmed, although the data obtained during the experiments differed somewhat in the following: lower level of energy released (10^{-6} W, Brigham Young University, USA); less excess of released energy over supplied energy (thermal efficiency 120-180%, Texas A&M University, USA); a large number of fast neutrons (3-5 times greater than expected, M.V. Lomonosov Moscow State University, USSR); refusal of electrolysis, instead of which deuterium was used in the gas phase, diffused in the metal lattice of the Ti electrode (Centre for Nuclear Physics, Frascati, Italy); the rate of increase in the amount of tritium during the electrolysis process (after 48 hours, 10^9 atoms after 100 hours, 20 times more, University of Florida, USA). It was noted that the Dechtma Institute (Germany) and Frein Universitat (Berlin) based on the results of experimental re-checking made the following conclusions: the registered processes have nothing to do with controlled thermonuclear fusion; neutrons and gamma radiation accompanying the experiment are counted as background radiation; the appearance of tritium atoms is due to the fact that it was part of D_2O from the very beginning; The release of energy was explained by the spontaneous catalytic oxidation of deuterium dissolved in the palladium lattice upon its interaction with air O_2.

VINITI RZh 22y Nuclear energy. -1989. -12. -ref. 12U52435.

35. Cold fusion: hopes and doubts. Hope and hesitation on the fusion frontier /Hall N., Joyce C. //New Sci.-1989.-Vol.122.-No.1662.-p.22.-Eng.

UDC 539. 12/. 17

The results of experiments on CNF undertaken in various laboratories around the world are popularly discussed. More than 100 groups around the world are trying to replicate CNF. Most of them have so far been unsuccessful. The accumulated data is contradictory. The group of R. Huggins (Stanford University, USA) carried out comparative experiments with ordinary and heavy water. According to their data, a cell with heavy water releases 2 times more heat than a cell with ordinary water. The group of M. Barsoum (University of Philadelphia, USA) carried out similar experiments and obtained different results. In a cell with ordinary water, after passing an electric current for 20 hours, an increase in temperature was observed, which was not observed in a cell with heavy water. According to unverified data, in the group of C. Pons it was found that heat is released in both cases. At the Institute of Alternative Energy Sources (Frascati, Italy), experiments were carried out on chemical nuclear reactors without electrolysis; gaseous deuterium was in contact with titanium at 77 K and a pressure of 10 atm. A neutron flux was obtained that was 10÷20 times higher than the background. At room temperature and a pressure of 100 atm, it was possible to observe flows 500 times higher than the background. The energy output in the experiments is negligible. Most nuclear physicists are sceptical. Negative results were obtained in Harwell (UK), Massachusetts Technologist. Institute, Brookhaven, Oak Ridge, Livermore, Sandy wood National. laboratories (USA).

VINITI RZh 18V Nuclear Physics. -1989. -7. -ref. 7V10

36. Growing scepticism around cold fusion. Scepticism grows over cold fusion /Pool R. //Science. -1989.-Vol.244.-No.4902.-pp.284-285.-Eng.

UDC 539. 12/. 17

A popular message noting that an attempt to reproduce cold nuclear fusion (CNF) has encountered significant difficulties, which has led many researchers to doubt its existence.

VINITI RZh 18V Nuclear physics. -1989. -10. -ref. 10B10

37. Nuclear fusion of hydrogen isotopes in metals, Isotopic hydrogen fusion in metals / Rogers V. C., Sandquist G. M. // Fusion Technol.-1989.-Vol.16.-No.2.-pp.254-259.-Eng.

UDC 621.039.6

A review of experiments on chemical nuclear reactions carried out at the University of St. Utah by the Fleischmann and Pons group and at Brigham Young Univ. Jones group. The results of the experiments are discussed, contradictions between the results of the experiments and existing theoretical concepts are revealed. Possible explanations for the reasons for the discrepancies are given and possible directions for further research are proposed, as well as possible industrial applications of CNF. The process of introducing deuterium atoms into the palladium crystal lattice is examined in detail. The possibility of using previously unknown nuclear reactions, as well as various chemical reactions, to explain the experimental results is discussed.

VINITI RZh 22U Nuclear energy. -1990.-8.-ref. 8U474.

39. Cold fusion: search for hidden helium. /Amato I. //Sci. News. -1989.-Vol.135.-No.20.-p.311.-English.

UDC 539. 12/. 17

In the university Utah (USA) is expected to conduct a new series of experiments to detect helium, which is one of the products of the chemical nuclear reaction. It is still unclear whether helium accumulates in the electrode or whether helium immediately leaves the electrode during deuteration, in connection with which one of the stages of the experiment will be a chemical analysis of palladium electrodes. The discovery of helium would be direct confirmation of the XRC reaction.

VINITI RZh 18V Nuclear Physics. -1989.-11.–ref. 11B6

40. Experiments on cold nuclear fusion. //Energy Rept. -1989.-Vol.16.-No.4.-pp.3-4.- English.

UDC 621.039.6

It is noted that previous reports regarding CNF leave open the question of the possibility of using this phenomenon to generate energy. There are indications that if CNF took place, it is of only academic interest and will never have practical significance. According to Fleishman, the total amount of energy received exceeds the supplied energy by 10 times; the power output in the most successful experiments reached 20 W/cm^3 of the cathode. He claims that the CNF reaction was maintained for 100 hours. Proof of the implementation of CNF is the fact of registration of neutrons and tritium.

VINITI RZh 22U Nuclear energy, - 1989. -12. -ref. 12U537

41. Is the Utah experiment really a synthesis? The Utah experiment, is it real fusion? /Blake M. //Nucl. News (USA). -1989.-Vol.32.-No.7.-pp. 84-87.- English

UDC 621.039.6

It is noted that interest in the possibility of implementing nuclear fusion with special force appeared after the report of Pons and Fleischmann that these experimenters realized CNF during the electrolysis of D_2O. The scepticism of specialists involved in thermonuclear fusion was noted, based on the fact that chemists Pons and Fleischman could incorrectly interpret their results and claim the presence of CNF without sufficient evidence. The idea of muon catalysis and the differences between this idea and the ideas of magnetic and inertial plasma confinement are described. It is noted that attempts have been made to repeat the results of S. Pons and M. Fleischmann. It is indicated that some reports stated that the original results were confirmed, while others indicated that confirmation was not received. University staff Utah states that success depends on certain features of electrolysis, which are not always reproducible. Unfortunately, the optimal conditions for conducting the experiment have not been determined.

VINITI RZh 22U Nuclear energy. -1989. -12. -ref. 12U520

42. Storm in vitro. Storm in test tube rumbles on /New Sci.-1989.-Vol.122.-No.1666. -p.34.-eng.

UDC 621.039.6

Specialists from Los Alamos National. laboratories (LANL, USA) began to verify the results on cold nuclear fusion obtained by Pons and Fleischman at the authors' installation. Researchers from the University of Texas (USA), who managed to obtain the thermal output, plan to test the presence of helium in palladium electrodes. It is reported that Pons and Fleischman also sent their electrodes to test the presence of helium to a number of metallurgical laboratories.

VINITI RZh 22U Nuclear energy. -1989. -eleven. -ref. 11У517

43. Cold fusion – end of the quest? //Metal Bull, Mon.-1989.-No.222.-p.17.-Eng. Storage location of the State Public Safety Library

UDC 621.039.6

A brief report on the status of work on chemical nuclear fuel is given. Particular attention is paid to the issue of the need to use palladium in experiments on chemical nuclear reactions and to what extent it is possible to replace expensive palladium with cheaper metals (for example, Ti).

VINITI RZh 22U Nuclear energy. -1990.-8.-ref. VU467

44. On the issue of cold fusion / Zakharova V.P., Kotelnikov G.A. // Atomic technology abroad. - 1989.-9.-ss.28-31.

UDC 539.12/.17

A review of the results obtained at the initial stage of studying the fusion reaction of deuterium nuclei in metal matrices at room temperature. The Pons-Fleischmann experiments, in which phenomena associated with the reaction of a chemical reactor were observed for the first time, are examined in detail. The results of other authors are briefly reported. These results are controversial, since in a number of experiments the conclusions of Pons and Fleischmann were not confirmed. In particular, the conclusions about the large heat release during the electrolysis of D_2O were not confirmed. Partial confirmations came from India (I. Gandhi Centre for Nuclear Research - electrolysis of D_2O on a Ti electrode, 30% excess of the neutron flux above the background); Great Britain (University of Birmingham, weak neutron radiation); Brazil (Physical Institute of Sao Paulo - neutron radiation twice the background, ^3He detected); Italy (Institute of Alternative Energy Sources in Frascati - neutron radiation from gaseous deuterium in contact with the Ti surface at a temperature of 77 K and a pressure of 40 atm, 10÷20 times higher than the background, at 100 atm - 500 times). The final section of the review presents theoretical models proposed to explain the results of studying CNF: deuteron tunnelling through the Coulomb barrier; vibrations of deuterium nuclei in a crystal lattice; contraction of deuterons in the lattice by means of an electron located in the middle between them; muon catalysis; transfer of energy of the excited $^4He^*$ nucleus (from the reaction $D + D \rightarrow {}^4He^*$) directly to the palladium crystal lattice (by analogy with the Mössbauer effect).

45. Is it thermonuclear? // Scientific and technological revolution, problems and solutions. -1989.-No.8(95).-p.1

UDC 539. 12/. 17

April 9-10, 1989, at the Faculty of Physics of Moscow State University. M.V. Lomonosov under the guidance of Doctor of Physical and Mathematical Sciences.

R.N. Kuzmin carried out electrolysis of D_2O on a Pd cathode (Pt anode). The current was varied 0.01-0.5 A at a voltage at the electrodes of 3÷25 V, i.e. power consumption varied from 0.03 to 12.5 W. Sometime after the start of current transmission from the installation, a weak neutron flux was recorded, exceeding the background value by 3÷5 times. According to experts, the flow corresponds to the power developed as a result of CNF (10^{-8} W). If we recalculate this power, taking into account only the share of electricity spent on producing reacting deuterium atoms, it turns out that the process is energetically favourable. After electrolysis stopped, the neutron flux did not disappear immediately, but with some delay. If the Pd sample was saturated with hydrogen without passing a current, then the effect was not observed.

46. "Cold" nuclear fusion: a view from Moscow // Echo of the Planet. -1989.-28.-p.46.

UDC 539.12/.17

April 9-10, 1989, the group of Professor R.N. Kuzmina (M.V. Lomonosov Moscow State University) at the D_2O electrolysis installation (Ti cathode) recorded a weak neutron flux during the nuclear fusion reaction. No heat measurements were taken. R.N. Kuzmin: "Nuclear fusion at room temperature, in principle, can be used as an energy source. However, this requires further research to fully understand the mechanism of this reaction." In 1981, R.N. Kuzmin together with associate professor at the Kyiv State University. University V.I. Vysotsky published the article "Controlled Fusion Reaction in Crystalline Targets," and a year later the co-authors came up with a paper devoted to the optimization of CCN in crystals, for the first time substantiating the possibility of a CCN reaction with a positive energy balance.

47. Russians confident about fusion experiment // New Sci.-1989.-Vo1.122.-No.1661.-p.27.-Eng.

UDC 539.12/.17

The Pons-Fleischmann experiment was repeated at Moscow State University M.V. Lomonosov in the laboratory of solid-state physics. Head of work R.N. Kuzmin is convinced that a CNF was observed. Two series of experiments were carried out with different types of electrodes (Ti-Pd and Ti-Ti). A neutron flux 3-5 times higher than the background was recorded. Rector of Moscow State University, academician A.A. Logunov noted the importance of such research. MSU plans to launch extensive fundamental research in this area.

VINITI RZh 18V Nuclear physics. -1989.-7.-ref.7B15

48. Test of discovery. About cold nuclear fusion and superconductivity of ideas. //Izvestia. -15.04. 1989.-p. 6

UDC 539.12/.17

Academician Yu.A. Osipyan: “The USSR Academy of Sciences will actively support a variety of directions and approaches in work on chemical nuclear forces. Naturally, special attention will be paid, first of all, to research in the field of electrochemistry, as well as in related areas related to the behaviour of metals that are intensely saturated with hydrogen or deuterium. It has been experimentally shown that some metals, in particular palladium and titanium, can contain 200% hydrogen. In this case, its atoms are 2 times larger than the atoms of the base metal, and if they are also subjected to external pressure, this may also turn out to be one of the ways to create a strong internal electric field that promotes CNF. In short, not only the electrochemical approach needs to be tested. That is why we will expand research on CNF. For the same reason, it is premature to create any program. We are still at the stage of obtaining primary results in a variety of ways. And when such results are consistently obtained both here and, in the world, when, let’s say, one of the diverse paths requires more technical effort, then such a program will be formed.

49. Mixed success in East /Rich V.//Nature. -1989. Vol.331.-No.6217.-p.607.-Eng.

UDC 539.12/.17

The scientific centres of the socialist countries are listed, from where reports of successful repetition of experiments on CNF were received. D. Csikai and T. Staričkai (Lajos Kossuth University, Debrecen, Hungary) reported the detection of neutron flux in their experiments. In Poland, two groups reported success: one from the University of Wroclaw, the other from the Technical Institute in Klawice. At the Institute of Plasma Physics in Warsaw, work on CNF is being carried out so far without positive results. The leader of the group from Wroclaw, Professor L. Ryadowski, is cautious in the final assessment of his results. Confirming messages have been received from the USSR: low-temperature nuclear fusion at 77-1200 K has been obtained at Moscow State University and KIPT.

VINITI RZh 18V Nuclear Physics.-1989.-7.-ref.7B14

50. Confirmation of the effect of the “cold” nuclear fusion reaction in the GDR. Kernfusion gelungen /Schlegeger W.E./Radio-Fernsehen-E1estron.-1989.-Vol.38.-No.7.-p.432.-German.

UDC 621.039.6

The results of studies of experiments of the GDR (research institutions of Dresden) are presented, which rechecked the priority experience of Pons and Fleischman and confirmed the effect of CNF. It was noted that the experiments were carried out many times, and in all cases the release of fast neutrons with an energy of 2.45 MeV was recorded. It is shown that the reliability of this fact cannot be in doubt, since the background cosmic neutron fluxes were greatly limited due to the type of neutron spectrometer used and the measurement technique used.

VINITI RZh 22U Nuclear energy. -1989.-12,-ref.12U527

51. Cold fusion: between performance and science. “Kalte fusion” zwischen spektakel und wissenschaft /Schauerhammer R.//Fusion (BRD). -1989.-Vol.10.-No.4.-pp.52-53.-German.

UDC 621.039.6

A popular science review of the results of the work of laboratories around the world to test cold nuclear fusion and a brief summary of the chronology of events.

VINITI RZh 22U Nuclear energy. -1990.-2.-ref.2U469

52. The Japanese repeat cold fusion. Japanese mimic cold fusion //New Sci.-1989.-Vol. 121.-No. 1659.-r.19.-Eng.

UDC 53912/.17

With reference to the Japanese newspaper “Ninon Kesai Shimbun” it is reported that at the Faculty of Engineering of the Tokyo Agricultural and Technological University, in the group of N. Kayama, the reaction of chemical nuclear reactors at room temperature was repeated. A technique similar to that of the group from the University of St. Petersburg was used. Utah (USA). The reaction was accompanied by a significant release of heat, and gamma radiation was recorded. It is planned to carry out joint work with the Institute of Atomic Energy (Japan) to register neutrons, the emission of which has not yet been confirmed in the experiments of this group.

VINITI RZh 18V Nuclear Physics. -1989.-6.-ref.6B5

53. The Japanese fail Efforts abandoned in Japan /Swibanks D. //Nature. -1989.-Vol. 339.-No. 6221.-r. 167.-English

UDC 539.121.17

Research on CNS in Japan is briefly reported. On April 1, 1989, a message was received about the successful repetition of CNS from Tokyo A&M Univ., where significant heat generation was observed, and gamma quanta were recorded during the electrolysis of D_2O on a Pd electrode. However, subsequent experiments to record the flux of neutrons, tritium and ^4He, carried out jointly with the Japan Institute of Atomic Energy, gave a negative result. Other groups with experience in the field of nuclear fusion and neutron detection have similar results. Nevertheless, interest in the problem of cold nuclear fusion in Japan is still great.

VINITI RZh 18V Nuclear Physics. -1989, -8.-ref. B89

54. Reflections on the fever associated with cold nuclear fusion. Thinking about the cold fusionfever /Kitsunezaki A./Atoms Jap. -1989.-Vol.33.-No.5.-pp.16-18.-Japanese.

UDC 539.12/.17

The first reports of the observation of the reaction of chemical reactants during the electrolysis of D_2O raised unfounded hopes for the prospects for creating effective and safe energy sources of a new type. These reports were not based on serious scientific arguments. The results of the first experiment, in which a large release of energy was observed during the electrolysis of heavy water, were subsequently not confirmed. More than 20 different experiments were carried out at the Japanese Institute of Atomic Energy (some of them lasted up to 600 hours). None of them provided confirmation of the occurrence of the CNS reaction in deuterated metals. The possibility of such a reaction should be considered unlikely. There are no reasonable grounds to assume that a situation could arise in a solid in which the probability of a fusion reaction of deuterium nuclei would become large enough to be observed.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V21

55. Discussion of the problem of low-temperature nuclear fusion reaction. Discussions concerning low temperature nuclear fusion/Kurihara S., Ouama N.//ONM.-1989.-Vol.76.-No.9.-pp.51-55.-Japanese.

UDC 539.12/.17

Issues related to the possibility of carrying out nuclear reactions of CNF at low temperatures are discussed. The results of experiments on the electrolysis of heavy water using palladium electrodes are considered.

VINITI RZh18V Nuclear Physics. -1990. -4.-ref.4B10

56. Scientific seminars on the study of cold nuclear fusion /Takeda T. //Isot.-News.-1990.-No.423.-pp.9-10.-Japanese.

UDC 539.12/.17

After the publication of the report by Pons and Fleischman on the first results on the study of CNF in March 1989, sessions of a number of scientific seminars were held. The first of them took place on May 1-2, 1989, in Baltimore (USA), the second on May 23-25, 1989 in Santa Fe (USA). In Japan, a workshop on CNF took place on May 15, 1989. A brief overview of the papers presented at this seminar is given.

VINITI RZh 18V Nuclear physics. 1990.-6.-ref.6B3

57. Theory and practice of cold nuclear fusion //Nihon no Kagaku to Gijutsu.=Jap.Sci. and Techno1.-1989.-Vol.30.-No.255.-pp.20-21.-Japanese.

UDC 539.12/.17

On May 15, 1980, a seminar on CNF was held at the Institute of Atomic Energy (Japan), in which 230 scientists took part. A brief overview of the results obtained by scientists from Japan, the USA, the USSR, and China is given.

VINITI RZh 18V Nuclear Physics. -1990.-6.-ref.6B4

58. Workshop on cold nuclear fusion //Nihon Butsuri Gakkaishi. -1989.-Vol.44.-No.8.-p.615-Japanese.

UDC 539.12/.17

The results of searches and studies of chemical nuclear materials have been systematized. In most experiments, techniques related to neutron detection were used to detect and study CNF. The results obtained by various authors are contradictory. If the first Pons-Fleischmann experiment reported neutron emission intensities of $10^4 \div 10^5$ s^{-1}, then in the experiments of other authors the maximum observed intensities do not exceed $10^1 \div 10^3$ s^{-1}. In many cases, researchers have not

been able to detect neutron emission at all with intensities higher than $10^{-2} \div 10^{-1}$ s^{-1}. Possible theoretical explanations for CNF are discussed.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12B1

59. Special Symposium of the American Chemical Society on Low-Temperature Nuclear Fusion / Oyama N. / Kagaku to koge = Chem. and Chem Ind.-1989.-Vol.42.-No.6.-pp.1056-1057.-Japanese.

UDC 539.12/.17

Brief report on a special symposium of the American Chemical Society, which took place on April 12, 1989, in Dallas (USA). At the symposium, 6 reports were heard on various experimental and theoretical aspects of CNF. New research is planned to record neutrons and gamma radiation, measure thermal energy and emission of tritium and helium.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B2

60. Chemists meeting fans the flames of fusion debate /Jouse S.//New Sci.-1989.-Vol.121.-No.1661.-r.27.-Eng.

UDC 539. 12/. 17

On April 12, 1989, the annual meeting of the American Chemical Society was held in Dallas (USA). S. Pons made a presentation in which he presented experimental evidence of nuclear fusion at room temperature (a heat release of 21 W/cm^3 of the Pd cathode was recorded). In the most recent experiments, 3 times more heat was obtained. Gamma rays with an energy of 2.2 MeV were recorded. After turning off the electric current, gamma quanta were not recorded. According to S. Pons, the electrolytic cell emitted $4 \cdot 10^4$ neutrons/s, which was 3 times higher than the background. In one experiment, charging a Pd electrode with a current of 1.5 A at a voltage across the electrodes of 5 V for several months led to the sudden destruction of the electrode and electrolytic cell. In the most recent experiments, charging the electrodes for 800 hours released 50 MJ. S. Pons argues that such heat release cannot be explained by chemical processes and believes that nuclear fusion was observed. Critics of Pons noted that during a fusion reaction, the neutron flux should be much more intense, reproaching Pons and Fleischmann for haste and negligence, and pointing out the need to carefully check the results and carry out control measurements. A group from the University of Technology. Georgia (USA), which previously announced a successful repetition of the experiments, abandoned its results. Hypotheses put forward by various authors regarding the mechanism of the

observed phenomenon are discussed. M. Fleishman and S. Pons have already received four patents, one of them for the application of the effect.

VINITI RZH 18V Nuclear Physics. -1989.-7.-ref.7V11

61. Discovery or delusion? /In the world of science (Scientific American).-1989.-8.-pp. 38-39

UDC 539.12/.17

Nobody, of course, considers Fleischmann and Pons to be hoaxers, but many believe that they were apparently mistaken. Opponents point out that the published paper (scrutinized by two reviewers just a few days later) contains few details of the methodology and analysis, and the neutron number measurements are particularly questionable. Scientists are also unhappy that S. Pons and M. Fleishman did not conduct control experiments before their report. Analyses of the cathodes to determine the content of helium, the presumed product of CNS, were made only subsequently, when experiments were carried out using ordinary water, in which synthesis does not occur. R. Garvin (T. Watson Research Centre, IBM, USA) suggests that Pons and Fleischmann could have been misled by insufficient mixing of the electrolyte or local chemical reactions near the electrode.

62. Cold fusion: not everything is clear yet. Scientific look at cold fusion inclusive //Nature. -1989.-Vo1.338.-No.6217.-p.605.- English.

UDC 539.12/.17

A meeting of the American Chemical Society held in Dallas discussing the Pons-Fleischmann experiments is briefly reported. Pons made a presentation at the session. At the same time, in Italy, at a scientific forum with a less representative number of participants, Fleishman and Jones spoke. A number of scientific centres are mentioned where confirmation of CNF was obtained. It is reported that the Naval Research. The US centre financed the work of S. Pons' group in the amount of 400 thousand dollars for a period of 32 months.

VINITI RZh 18V Nuclear Physics. -1989.-7.-ref.7B12

63. Discussion of problems associated with cold nuclear fusion at meetings of the American Physical Society in April-May 1989 / Bull. Amer. Phys. Soc.-1989.-Vol.34.-No.7.-p.1625.-Eng.

UDC 539. 12/. 17

Chase Peterson (President of the University of Utah, USA) announced the proposed creation of a Cold Fusion Institute at the university and requested $25 million from the American Physical Society to finance the initial stage of the new institute. It is possible that no less amount will be allocated from government funds: it was proposed to transfer the unit to the university. Utah $5 million in controlled fusion program funds. However, an increasing number of researchers express doubts about the reality of “cold” fusion and believe that the discovery of S. Pons and M. Fleischmann is a myth that is destined to have a short life. There continue to be reports of unsuccessful attempts to replicate the Pons-Fleischmann results. The scepticism towards these results is due to the fact that the authors themselves admitted that some of their results were erroneous.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref. 12V24

64. Discussion of the cold fusion program in the US Congress. Cold fusion before congress//EOS. -1989.-Vol.70.-No.18.-p.833.-Eng.

UDC 621.039.6

The US Congress heard a speech by Pons and Fleischmann on the possibility of carrying out nuclear fusion at room temperature. Jones confirmed that his experiments show the possibility of nuclear fusion in metals at room temperature, but with different nuclear reactions that produce 109 times less energy than the reactions proposed by Pons and Fleischman. It is noted that thermonuclear fusion experts’ express scepticisms that the Pons-Fleischmann results can be interpreted as CNF.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U532

65. Hearings on cold fusion in the US House of Representatives. House committee hears cold fusion research /Nucl. News (USA). -1989.-Vol.32.-No.8.-pp.129-130,133-136.-English.

UDC 621.039.6

A report on hearings in the House of Representatives of the US Congress on work on chemical nuclear forces is presented. The central speech was by Charles Peterson (president of the University of Utah), according to whom, in order to conduct research in the development of the idea of Pons and Fleischmann, it is necessary to create an institute with an annual budget of 12.5 million dollars. According to Fleishman, it will take 10-20 years for the engineering implementation of CNF, but this period can be reduced if government funding is provided at an early

stage. A number of experts in the field of controlled thermonuclear fusion have expressed criticism of the CNF idea. The results presented by Pons and Fleischman contradict well-established facts. M. Saltmarti (OKNL, USA) spoke in Favor of waiting to open a special institute, because, in his opinion, in the next 1-2 months the issue of CNF will become clearer.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U513

66. Utah hopes to get cash for cold fusion from the US Congress. Utah looks to congress for cold fusion cash/Science. -1989.-Vo1.244.- No.4904.-pp. 522-523.- English

UDC 539.12/.17

A hearing was reported on April 26, 1989, before the House Committee on Science, Space and Technology regarding the request of the U.S. Utah about the allocation of 25-40 million dollars for the construction of a Centre for Chemical Nuclear Forces Research. However, in

During the hearing, a number of sceptical statements were made, and the question of financing the University of St. Utah was postponed "pending clarification of the circumstances."

VINITI RZh 18V Nuclear Physics. -1989.-10.-ref. 10B7

67. Spring session of the American Physical Society dedicated to cold fusion. American Physical Society 1985 spring meeting special sessions on cold fusion. Baltimore, Maryland; 1-2 Mau 1989 // Bull. Amer. Phys. Soc.-1989.-Vol.34. No.8.-pp.1859-1865.

UDC 539. 12/. 17

Abstracts of the reports of the session of the American Physical Society, dedicated to the results of the study of CNF, held on May 1-2, 1989, in Baltimore (USA). In order to detect the fusion of deuterium nuclei, measurements were taken of neutron fluxes, gamma radiation, the release of thermal energy during the deuteration of metals, as well as the probabilities of the formation of tritium and helium atoms. The experimental results are contradictory. In many experiments, negative results were obtained, and therefore, in a number of reports, the reality of CNF in the deuteration of metals has been called into question. Several reports were devoted to the consideration of various options for a theoretical explanation of the possibility of the fusion reaction of deuterium nuclei in metals at room temperature.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B1

68. Criticism of the results of experiments on cold nuclear fusion. Utah works under attack, confirmations questioned /Blake M. //Nucl. News (USA). -1989.-Vo1.32.-No.8.-pp.118-120.-Eng.

UDC 621.039.6

At the annual meeting of the American Physical Society in early May 1989, the results of the Utah researchers came under severe criticism. A description is given of experiments confirming the results of S. Pons and M. Fleischmann, as well as experiments in which refuting results were obtained. Differences in experimental methods that could lead to contradictions are indicated.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U515

69. More than scepticisms. More than scepticisms / Lindley D.//Nature. -1989.-Vol.339.-No.6219.- p.4.-Eng.

UDC 539. 12/. 17

A brief report on the session of the American Physical Society dedicated to the problems of chemical nuclear reactions. Participants in the session sharply criticized the results of the experiment of Fleischmann and Pons, pointing out errors and, in the opinion of the speakers, an incorrect interpretation of the results. Jones's results were criticized in person, but his message was met more favourably at the session. At the end of the session, the participants left, according to the author, with the feeling that cold nuclear fusion was “closed,” excluding the small effects that Jones observed.

VINITI RZh 18V Nuclear physics. -1989.-7.-ref.7B5

70. “Cold thermonuclear” under fire from criticism // Atomic technology abroad. -1989.-10.-p. 47

UDC 539. 12/. 17

Physicist D. Morrison (CERN) called the attempts of most European scientists to reproduce the experiment of Pons and Fleischmann ineffective and unsuccessful. This statement also reflects the opinion of scientists who gathered in Baltimore at a session of the American Physical Society three weeks after the publication of the article by Pons and Fleischmann. The harshest criticism came from three groups of physicists and chemists. Moshe Guy, on behalf of Yale University and Brookhaven

National Laboratory, said they had made "every effort possible," including using a beta emitter from a home smoke detector to stimulate a cold fusion reaction. S. Kunin (California Institute of Technology, USA) reported that his group unsuccessfully tried to electrochemically induce a CNS reaction, using palladium obtained from four different suppliers, changing the pH value of the electrolyte pH = 0.0-13.0 and increasing the duration of the experiment is up to two weeks. R. Boyd (University of Ohio, USA) indicated that his group received negative results. J. Rafelski (University of Arizona, USA) took a special position, pointing out that if Pons and Fleischmann had been present (they declined the offer), they would have been able to respond to the criticism. However, emerging reports indicate that the scientific community considers the data obtained at the University of St. Utah, the result of experimental errors, for example: measuring temperature too close to the electrode surface; lack of electrolyte stirring; registration of gamma radiation from radon ^{222}Rn present in the environment; There is also mention of strong political and social pressures that may have played a role.

71. “Synthesis in vitro” does not pass the last test. Test tube fusion fails the final test //New Sci.-1989.-Vol.124.-No. 1695.- p.**18.-Eng.**

UDC 539.12/.17

Two proof-of-concept experiments on CNS have been reported with negative results. The group of N. Lewis (Caltech, USA) carried out careful calorimetric measurements and claim that the heat generation observed in their D_2O electrolysis experiments did not exceed the expected value due to the flow of current in the circuit. The authors point out the probable methodological errors of Pons and Fleischmann. A group of researchers from Harwell, led by D. Williams, carried out calorimetric measurements and registration of neutrons with a detector 10^6 times more sensitive than Pons and Fleischmann, and received a negative result.

VINITI RZh 18V Nuclear physics. -1990.-5.-ref.5B13

72. Physicists are suing two chemists for widely promoting erroneous results on cold fusion. Physicists say claim of room-temperature by chemists is a widely publicized mistake /McDonald K.//Chron. Higher Educ.-1989.-Vo1.35.-No.35.-pp. A4-A8.-Eng.

UDC 539.12/.17

Report on the session of the American Physical Society, which considered the problems of CNF. A professor of physics at the Californian Institute of Technology

sharply criticized the results of Pons and Fleischmann. institute Stephen Kunin, who presented a report containing the results of scientific work indicating the presence of significant errors in the measurements and calculations of thermal energy by Fleischmann and Pons. Nathaniel Lewis (team leader from CAL TECH) expressed confidence that the results of Fleischmann and Pons are not related to thermonuclear fusion. Stanford University professor W. Meyerhoff expressed the opinion that the results of Fleischmann and Pons were clearly overestimated due to the fact that the temperature sensor used was located too close to the hot central electrode. Negative results were reported by representatives of the Massachusetts Institute of Technology (USA), laboratory named after. Lawrence University Ohio, Bell, AT&T. The session participants expressed serious concern about the fact that at the University of St. Utah plans to continue scientific research in this direction, for which funds will be requested from the US Congress. According to many scientists who took part in the session, it is necessary to create a body that would carry out an appropriate examination of such messages, after which their authors would be given the right to appeal to public or federal bodies, or a decision would be made on the illegality of such appeals.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref. 12V25

73. Rivals and friends. Slants & friends //Fusion Power Report. -1989.-Vol.10.-No.4.-pp.25-32.-Eng.

UDC 621.039.6

From the controlled thermonuclear fusion program ($30.2 million in 1989), $5 million was allocated to finance work on chemical nuclear reactors. Funding decisions will be made by a special committee of nine members who have developed criteria for evaluating CNF experiments.

VINITI RZh 22U Nuclear energy. -1989.-10.-ref.10U464

74. Physicists fight back in cold fusion debate. Physics community strikes back in debate over cold fusion /Jouse S.//New Sci.-1989 -Vol.122.-No.1663.-pp.26.-Eng.

UDC 539.12/.17

A session of the American Physical Society was reported at which the problems of CNF were considered. Unlike the American Chemical Society, where chemists came out in support of their colleagues from the state. Utah, physicists literally laughed at the results of Pons and Fleischmann. “We are victims of incompetence and possible deception on the part of Doctors Pons and Fleischmann,”

said Professor Stephen Koonin. He suggested that the source of gamma radiation recorded in the experiments of Pons and Fleischmann were ^{222}Rn nuclei with an emitted gamma ray energy of 2.204 MeV, present in granite and uranium ores common in Utah. N. Lewis announced unsuccessful attempts to repeat the CNF. However, Pons stands his ground.

VINITI RZh 18V Nuclear Physics. -1989.-8.-ref.8B1

75. Synthesis, vanity and quarrels. Fusion, afussin and afightin //VS News and world Rept.-1989.-Vol.106.-No. 19.-p. 13.-English

UDC 539 12/.17

A brief summary of the fleeting history of cold fusion, the final chapter of which appears to have been written at a session of the American Physical Society in Baltimore. It is noted that one should be careful about scientific messages given through the mass press.

VINITI RZh 18Nuclear Physics. -1989.-10.-ref. 10B13

76. Low-temperature nuclear fusion - American research / Osa T., Kozawa A. // Какаку то когё = Chem. And Chem. Ind.-1989.-Vol.42.-No.6.-pp. 1054-1055.-Japanese.

UDC 539.12/.17

A brief report on the annual meeting of the American Electrochemical Society and special session on the topic “Electrochemical Nuclear Fusion”, which took place May 8-12, 1989, in Los Angeles (USA). Nine reports were heard, the first of which was prepared by Pons and Fleischman.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B3

77. Conference on cold fusion problems. Separate conferences discuss nuclear power in the age of global warming and the phenomena of cold fusion // Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.43.-pp. 2-4.-English Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039.6

A brief report is given about the meeting of the American Electrochemical Society, at which the results of the study of the CNS mechanism were discussed. However, according to a number of specialists from SNL and LANL (USA), the

observed effects could not be associated with nuclear reactions. According to Fross from the laboratory. Lawrence (Berkeley, USA), Fleishman and Pons erroneously interpreted the effects associated with the presence of lithium in palladium rods as the effects of cold nuclear fusion.

VINITI RZh 22U Nuclear energy. -1990.-7.-ref.7U463

78. Scientists confirm cold fusion. Cold fusion claims reasserted by scientists // Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.19.-pp.8-9.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039. 6

At a meeting of the American Electrochemical Society on May 8, 1989, Fleischman and Pons reported that in recent experiments on CNS, the heat output exceeds the energy expended by 10-50 times. Fleischman admitted that their previously published report on the experiments gave incorrect data on the neutron yield. At the same meeting, Professor R. Huggins (Stanford University) reported that a comparison of experiments with heavy and ordinary water shows that in an electrolytic cell with heavy water the heat release is 20-40% greater. He hesitated to call it nuclear fusion, but he said with certainty that something real was happening in a cell with heavy water. R. Huggins also suggested the reasons for the failures of other attempts to repeat the Pons-Fleischmann experiments.

VINITI RZh 22U Nuclear energy. -1989. -12. -ref. 12U539

79. There is still no clarity. Still no certain /Lindley D.//Nature. -1989.-Vol.339.-No. 6220.-r. 84.-English

UDC 539. 12/. 17

Report on the meeting of the American Electrochemical Society, which discussed the problems of chemical nuclear reactors. Pons and Fleischmann made a presentation in which they retracted some of their earlier statements, but still insisted on the validity of their calorimetric measurements and presented a video recording of one of their experiments in which intense bubble formation was visible. Added to the cell, phenolphthalein was well mixed within 20 seconds. Fleischman stated that their experiments on recording synthesis products should be reconsidered, and repeated measurements are planned. Their announcement of the registration of ^{4}He, made at a press conference on April 17, 1989, was also called premature. Speaker R. Huggins (Stanford University, USA) and representatives of Texas A&M Univ. presented their data comparing the heat release in cells with heavy

and ordinary water. These groups confirm CNF. Jones pointed out the need to register synthesis products. According to him, heat release alone does not prove that a nuclear process is taking place. Pons reported on the preparation of an experiment to determine helium in the electrode used in his work. He did not name the laboratory where this work will be carried out. The session participants did not come to a common point of view. According to Pons and Fleishman, they are preparing a paper on thermal measurements for publication.

VINITI RZh 18V Nuclear Physics. -1989.-8.-ref.8B6

80. Electrochemists fail to heat up cold fusion. Electrochemists fail to heat up cold fusion /Rool R. Heppenheimer T. A.//Science. -1989.-Vol.244.-No.4905.-p.467. -English

UDC 539. 12/. 17

Abstracts of 10 reports, including a report by Pons and Fleischmann, at the session of the American Electrochemical Society on CNF. Most studies have not confirmed the thermal effect attributed to thermonuclear fusion during electrolysis. A group of 17 physicists and chemists from CALTECH concluded that Pons and Fleshman's report of excess heat was due to experimental errors. N. Lewis, who leads this group, stated: “One of the main phenomena that we have identified ..., is the ease of self-deception and the belief that there is an effect in cases where there is actually none. In all cases, we find erroneously large numbers.”

VINITI RZh 18VE Nuclear Physics. -1989.-10.-ref.10B11.

81. Pons and Fleischmann reignite passions around cold fusion. Pons and Fleischman stir the fusion-in-a-bottle debate again // Bess. Week. - 1989.-No. 3106.-p.123.-Eng.

UDC 539. 12/. 17

“Do not rush to write off cold nuclear fusion,” insisted S. Pons and M. Fleishman at a session of the American Electrochemical Society, held on May 8-12, 1989, in Los Angeles (USA). According to the first reports, in their experiments, 4 times more energy was released than was expended, and now it is 10-50 times, “I am sure that they are exaggerating,” said Professor S. Kunin.

VINITI RZh 18V Nuclear physics. -1989.-8.-ref.8B7

82. What can we say about cold fusion? What to say about cold fusion / Maddox J. // Nature. -1989.-Vol.338.-No.6218.-p.701.-Eng.

UDC 539. 12/. 17

There has been enormous interest from the scientific community and the press in the reports of Pons and Fleischmann and Jones about the successful implementation of CNF. Society has not seen such an increase in interest in scientific topics since the time of man landing on the Moon. Making a brief popular review of the available facts, the author notes that most experts are sceptical, and the most likely outcome is the “closure” of cold nuclear fusion.

VINITI RZh 18V Nuclear Physics. -1989.-7.-ref.7B4

83. Nuclear weapons manufacturers are interested in fusion. Bomb-makers search for the fast road to fusion // New Sci.-1989.-Vol.122.-No.1660.-p.18.-Eng.

UDC 539. 12/. 17

The US Department of Energy's plans to produce enough tritium to meet the needs of nuclear weapons manufacturers are being discussed. Nuclear fusion reaction at room temperature, reported from the state. Utah is mentioned as one of the alternative options.

VINITI RZh 18V Nuclear Physics. -1989.-7.-ref.7B16

84. Australian dreams of a “Columbus egg” in nuclear fusion. Australische trauma von “Ei des Kolumbus” in der Kernfusion //Chem.Rdsch. (Schweiz.). -1989.-Vol. 47.-No.20.-p. 56.-German

UDC 539. 12/. 17

It is reported that in Sydney (Australia), 60-year-old engineer Stefan Horvath has been operating a car for 10 years, driven by energy released by the fusion reaction of hydrogen nuclei. Its owner does not provide details of the design of the 33 cm^3 reactor, but claims that subatomic particles, so-called muons, are necessary for its operation.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B9

85. Palladium is becoming more expensive. Palladium spurt //Mining J.-1989.-Vol.312.-No.8013.-p.263.-Eng.

UDC 539. 12/. 17

Interest in experiments on CNF, the first reports of which came from the state Utah contributed to rising market prices for palladium, used to make the electrodes in these experiments. The increase was $5 on the London market, $5.5 per troy ounce (31.1035) on the Zurich market, and prices rose to $155 and $155.5, respectively (the highest price since May 1987).

VINITI RZh 18V Nuclear Physics. -1989.-7.-ref.7B17

86. Palladium electrodes for cold fusion experiments. Palladium cathodes for cold fusion experiments //Phys. Today. -1989.-Vol.42.-No.6.-p.91.-Eng.

UDC 539. 12/. 17

J.M. Company Neu Co. reports that it can urgently, within two days, supply cathodes (99.9% Pd) in the form of 1-, 2- and 4-mm rods and 2-mm plates for cold fusion experiments.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B15

87. Cold nuclear fusion and CTS programs based on magnetic confinement. Cold and magnetic fusion experiments encouraged to continue // Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.20.-p.3.-Eng.

UDC 621.039.6

It is reported that Fleischman and Pons have decided not to participate in the DOE CNF conference, which is scheduled to take place at the end of May 1989 in Santa Fe, New Mexico, USA. It is expected that several hundred researchers from laboratories around the world will take part in this conference. Representative of the University of St. Utah said Fleischman and Pons have completed a new series of experiments and are currently preparing a report and scientific publication. A resolution of the US Congress was reported, which recommended that the DOE take immediate steps to establish the existence of cold nuclear fusion and its potential capabilities. If CNF proves to be a reality, DOE should submit recommendations to Congress regarding funding for CNF research, as well as recommendations regarding traditional controlled fusion programs.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U533.

88. Heated debate around “cold fusion” // Echo of the Planet. - 1989.-28-pp.44-47.

UDC 539. 12/. 17

The results of the work of laboratories around the world to verify the message of Fleischmann and Pons about CNF are reported. At a symposium May 23-25, 1989, at Los Alamos National. laboratory (LANL, Santa Fe USA) H. Menlove, a representative of LANL, announced a positive result: a titanium rod cooled to a very low temperature was dipped into heavy water and gradually warmed up, while recording “flashes” of neutrons.

89. Discussion of the problems of cold nuclear fusion contributes to the unification of efforts. Cold fusion gathering is incentive to collaboration / Lindley D. //Nature. -1989.-Vol. 339.-No.6222.-p.323.- English.

UDC 539. 12/. 17

A meeting was reported on May 23-25, 1989, at LANL on CNF issues. The main focus of the debate was on the presence and origin of the neutron flux reported in Jones's work. The heat release data of Fleischmann and Pons were practically not discussed. Reports were heard from groups from the University of Texas on recording heat and tritium. H. Menlove from LANL reported that his experiments detected small fluxes of pulsed neutrons and was convinced that under certain conditions the interaction of certain metals with deuterium produces neutrons. The results of S. Jones and H. Menlove are difficult to compare, since the latter had a detector efficiency 100 times higher and the pulse that Menlove sees, which usually contains 100-200 neutrons, was recorded by Jones as one particle. However, the average neutron yield in these two experiments is similar in value. A number of meeting participants outlined a joint program of work on cold nuclear fusion.

VINITI RZh 18V Nuclear physics. -1989.-8.-ref.8B2

90. Cold fusion confirmed. Cold fusion confirmed / Hively W. // Amer. Sci.-1989.-Vol.77. No.4.-r. 27.-English

UDC 539. 12/. 17

The results of H. Menlove's group (LANL) on recording neutron “flashes” and individual neutrons in experiments using the Jones scheme are discussed. The neutron detection method used made it possible to detect “flares” containing about 100 neutrons in an interval of less than 50 μs. Flashes were observed both during electrolysis and deuteration of titanium alloys under pressure. A thorough study of neutron flares is planned. Hopes for this are connected with cooperation with M. Guy (Yale University, USA), who has a special neutron detector. According to S. Jones, the presence of neutron “flares” confirms the discovery of CNF.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B11

91. Confirmation of cold nuclear fusion was received at Los Alamos. Los Alamos finds evidence of cold fusion, g.e. to collaborate with university of Utah // Atom. Energy Clearing House (Publ.). -1989.-Vol.35.-No.26.-pp.6-7.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621 .039.6

Scientists from LANL announced that they were able to find confirmation of the implementation of CNF in electrochemical experiments. E. Storms stated that in two electrolytic cells, after two weeks of operation, the presence of tritium was detected, the amount of which was 100 times higher than usual. According to him, the experiments were repeated twice after the first successful experiment: once with a positive result, the second with a negative result. Representatives of General Electric stated that between them and the university. Utah, where M. Fleischman and S. Pons work, has concluded an agreement on joint work in CNF research.

VINITI RZh 22U Nuclear energy. -1990.-2.-ref.2U466

92. Tritium production in cold fusion experiments at Los Alamos. Los Alamos gets tritium: g.e. Utah to collaborate / Nucl. News. -1989.-Vol.32.-No. 10.-rr.137.-eng.

UDC 621.039.6

The results of experiments on the detection of tritium in systems similar to those used by Pons and Fleischmann are reported. It was noted that in experiments with heavy water during electrolysis, a tritium content was recorded that was almost 100 times higher than the natural tritium content. General Electric announced the start of cooperation with the University of St. Utah.

VINITI RZh 22U Nuclear energy. -1990.-4.-ref.4U416.

93. Events in the game with cold fusion. Following the bouncing fusion ball //New Sci.-1989.-Vol.136.-No.2.-p.31.-Eng.

UDC 539.12/.17

Los Alamos National Energy Department laboratory (LANL, USA) announced the termination of negotiations with the authors of the discovery of cold nuclear fusion S. Pons and M. Fleischman. since the latter did not respond to the proposal to conduct research. At Los Alamos, in the process of searching for a chemical nuclear

reaction, an excess tritium content was discovered, which, in principle, can be associated with the fusion reaction of deuterium nuclei. The final conclusion can be made after repeating the experiment and carefully checking alternative causes of excess tritium.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12B26.

94. Lack of agreement at the Santa Fe meeting. No consensus reached at Santa Fe meeting //Nucl. News (USA). -1989.-Vol.32.-No.9.-p.88.-Eng.

UDC 621.039.6

The results of the meeting in Santa Fe (May 23-25, 1989), which was attended by about 500 specialists, showed that the CNF phenomenon did not receive reliable experimental confirmation that would allow us to confidently speak about the possibility of achieving the goals that were indicated in the first works, dedicated to "cold" nuclear fusion.

VINITI RZh 22U Nuclear energy. -1990.-4.-ref.4U419

95. A meeting at the US Department of Energy calls for more research into cold fusion. DOE panel still sceptical about cold fusion calls for moderate additional research // Fusion Power Report. -1989.-Vol.10.-No.11.-p.84.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039.6

A meeting at DOE dedicated to the problems of chemical nuclear weapons was reported. It is concluded that the results obtained to date have not provided convincing evidence that phenomena associated with CNF can be a useful source of energy. It is emphasized that experiments with electrolytic cells indicate a contradiction between the obtained data and the entire status of the problem of nuclear reactions, which was widely discussed in the second half of the twentieth century, and that it may be necessary to include completely new nuclear processes in the consideration. The meeting recommended adopting a wait-and-see policy in the field of funding research on cold fusion.

VINITI RZh 22U Nuclear energy. -1990.-5.-ref. 5U459

96. Double blow to cold fusion. Double blow for cold nuclear fusion /Lindley D./ Nature. -1989.-Vol.339.-No. 6226.-p.567.-Eng.

UDC 539.12/.17

It is reported that after three months of work to test the effect of CNF, which involved 10 scientists from the laboratory in Harwell (UK) and spent 320 thousand pounds sterling, it was decided to stop the experiments in which nothing unusual was found. Los Alamos National Leadership The laboratory reported that attempts to establish cooperation with Pons and Fleischmann in order to verify reports of successful experiments on CNF ended in vain.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9B17

97. Work on cold nuclear fusion has been stopped in Harwell (UK). The U.K.s Harwell lab has halted its cold fusion studies //Nucl. News (USA). -1989.-Vol.32.-No.9.-pp.19-20.-Eng.

UDC 621 .039.6

It has been reported that the Harwell laboratory has ceased research on CNF. 125 experiments were carried out (320 thousand were spent), in which no heat release, neutron flux or gamma rays were recorded. It was noted that contacts between LANL and the University of St. Petersburg have been stopped. Utah because the required information was not provided.

VINITI RZh 22U Nuclear energy. -1990.-4.-ref.4U415

98. Great Britain stops experiments on cold nuclear fusion. U.K. ends cold fusion research program – no repeat of Utah results / Hance N. //Nucl. Fus. -1989.-Vol.9.-No.7-8.-p.71.-Eng.

UDC 621 .039.6

Having completed an extensive research programme, the UKAEA laboratory at Harwell has decided to cease research into CNF in electrochemical experiments. It was noted that work in this direction was started due to the great potential and great scientific interest in the problem of chemical nuclear fuel, as well as due to the government's requirement to provide the necessary information and recommendations on this issue. However, the results of all the experiments performed were disappointing. The Harwell research program began on 13 March 1989. The research team included 6 electrochemists and 4 nuclear physicists. Equipment worth 4 million pounds sterling was used for the research; the cost of the experiments was 320 thousand pounds sterling. The work was carried out over three months, including weekends. The average working time per person was 80 hours a

week. More than 30 different electrolytic cells were used, in more than 100 experimental conditions. Control experiments were carried out to exclude the influence of cosmic rays. Palladium, titanium, platinum, gold, uranium and cerium electrodes were used in the experiments. Electrodes and electrolytes have been studied to detect lithium, tritium, and helium. None of the experiments provided statistically significant evidence of a cold fusion reaction.

VINITI RZh 22U Nuclear energy. -1989.-12.-ref. 12U536

99. Cold shower for cold fusion. Harwell stops experimenting. Cold water on cold fusion. Harwell stops experiments / Dettmer R. //IEE Rev.-1989.-Vol. 35.-No.7-p.256.-Eng.

UDC 539. 12/. 17

A group at the Harwell Nuclear Research Centre of 6 chemists and 4 nuclear scientists led by David Williams, after three months of continuous experiments, stopped their work to find evidence of chemical reactions in the electrolysis of heavy water. More than 100 experiments were performed with 30 electrolytes. cells, 16 calorimeters with a volume of 50 cm^3 and a neutron registration installation (56 boron BF3 counters), capable of recording 0.01 neutrons/s, were used. The experiments did not reveal any statistically significant indications of the CNS process.

VINITI RZh 18V Nuclear Physics. -1989.-10.-ref.10B12

100. Termination of cold fusion experiments at Harwell. Harwell ends cold fusion research program // Energy Rept.-1989.-Vol.16.-No.7.-p.1.-Eng.

UDC 621.039.6

After completing an extensive program of electrochemical experiments in Harualla, it was decided to stop research in the field of chemical nuclear reactors. A significant number of experiments were devoted to recording neutron and gamma radiation, characteristic of all known nuclear reactions. It was established that in all experiments the intensity of neutron radiation does not exceed 10^{-2} neutrons/s. Considerable efforts have been made to eliminate the influence of cosmic rays and other background effects. A variety of electrolytic cells with varying sizes, shapes, and metallurgical properties of the electrode system have been investigated. Not a single experiment recorded reliable evidence of nuclear reactions of CNF.

VINITI RZh 22U Nuclear energy. -1990.-2.-ref.2U467

101. The end of the soap bubble. Die geplatzte Sei fenblase // Techn. Rdsch. -1989.-Vol.81.-No.50.-pp. 28-29.- German

UDC 539. 12/. 17

The events that followed the report by Pons and Fleischmann in March 1989 of their discovery of the phenomenon of CNS in the process of electrochemical deuteration of palladium are discussed. In the first months, a number of authors published data confirming the results of Pons and Fleischmann, but subsequent careful measurements carried out in laboratories in various countries did not confirm these results. It should be assumed that the phenomenon of CNS does not exist, and the results presented by Pons and Fleischmann are erroneous. Some scientific and moral aspects of the events associated with the message of Pons and Fleischmann are discussed.

VINITI RZh 18V Nuclear Physics. -1990.-6.-ref.6B1

102. Subtext of events related to “cold fusion”. The implications of “cold fusion” //J. Chem. Educ.-1989.-Vol.66.-No.5.-p.36.-Eng.

UDC 539. 12/. 17

In connection with the events that followed the reports of the discovery of the CNF process, some problems of the relationship between science and society are discussed. The first announcement of the discovery was made at a press conference and published in newspapers. The message contained advertising statements about the prospects of using a new phenomenon to create inexhaustible sources of cheap energy. These claims, it was later determined, were not based on sound scientific evidence. This method of publishing results is not natural for science but reflects some features of the status of a scientist in modern society. In most cases, society is only interested in practical results, while the subject of science is a deep study of phenomena and obtaining new knowledge about nature. Economic considerations sometimes force scientists to neglect considerations of scientific ethics, however, genuine scientific discoveries are always the result of individual research, and scientific truth is not born in newspaper polemics.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B14

103. Cold nuclear fusion in the light of X-rays. Cold fusion as seen with X-ray vision / Trower P. // Phys.Today. -1989.-Vol.42.-No.7.-pp. 13-14.- English

UDC 539.12/.17

In connection with the controversial situation that arose after the report of Pons and Fleischmann on the discovery of CNR in deuterated metals, a parallel is drawn with the history of the discovery of X-rays by R. Roentgen, who published his results after careful verification. His first publication provided all the details of the measurement technique, which made it possible to reproduce the results in other laboratories. The message from Pons and Fleischmann was declarative in nature. The publications of these authors lacked the information necessary to repeat the experiments by other researchers. In pursuit of sensation, they used methods that were not typical for the normal generally accepted procedure for presenting scientific research.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B9

104. About synthesis, Nobel Prizes and decency. On fusion, Nobels and nobility / Hall N.// New Sci.-1989.- Vol.122.-No.1663.-pp.28-29.-English.

UDC 539.12/.17

The author criticizes S. Pons and M. Fleischmann, who, in pursuit of priority and fame, chose an unusual way for scientists to notify the public about their results on CNF - through a press conference, and not through a scientific journal publishing peer-reviewed article. According to the author, the reason for this act, which threatened the loss of reputation of two famous electrochemists, was the desire to get ahead of S. Jones, with whom they had a preliminary agreement to send an article about their results to the scientific journal “Nature” simultaneously on March 24, 1989.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9V16

105. Unfounded scientific claims were dashed in the rush to confirm the results of cold fusion. Scientific thoroughness takes a beating in the rush to confirm cold fusion results / Research and Development. -1989.-Vol.31.-No.5.-pp.25-26.-Eng.

UDC 621.039.6

A number of research groups have reported that their earlier statements about repeating the experiments of S. Pons and M. Fleischmann on CNF are erroneous or insufficiently substantiated. It is indicated that many researchers were victims of their ardent desire to repeat these experiments. It is noted that perhaps one of the reasons for this is the premature widespread publication of the first experiments of Pons and Fleischmann. In general, it is noted that recent reports raise

serious doubts regarding the possibility of cold nuclear fusion during the electrolysis of D_2O with Pd or similar electrodes.

VINITI RZh 22U Nuclear energy. -1989. -12.-ref. 12U535

106. Stumbled on cold fusion. Star Wars physicists stumble on cold fusion / Hecht I. // New Sci.-1989.-Vol.124.-No.1695.-p.10.-Eng.

UDC 539.12/.17

It is reported that P. Hagelstein, a young theoretical physicist who previously worked on the “Star Wars” program, and who proposed the CNF theory in April 1989, is having problems when elected to a position at the Massachusetts Institute of Technology (USA). Currently, most physicists believe that “cold” fusion does not exist and at MIT. in-those formed opposition to the election of P. Hagelstein as one of the participants in this company.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref. 5B14

107. Will science recover from the furore surrounding cold fusion? Will science ever recover from the cold fusion? //Research and Development. -1989.-Vol. 31.-No.7.-pp.33-34.-Eng.

UDC 539.12/.17

The report by Pons and Fleischmann on the discovery of the fusion reaction of deuterium nuclei during the electrochemical deuteration of palladium continues to be the focus of attention of the scientific community. Unfortunately, the main results of Pons and Fleischmann were not confirmed in subsequent carefully conducted experiments, and therefore many physicists tend to regard the message of Pons and Fleischmann as an inappropriate joke.

VINITI RZh 18V Nuclear physics. -1989.-12.-ref.12V29

108. Works of scientists in the field of cold nuclear fusion. // Abstract collection. Scientific personnel. -1990.-Issue-p.34-36.

UDC 539.12/.17

One of the most serious problems of CNF, considered at the sessions of the American Physical and Electrochemical Society, is the need to explain how such a strong release of heat together with insignificant neutron fluxes. In the Laboratory of

Alternative Energy Sources in Frascati (Italy), under the direction of F. Scaramusi, CNS was demonstrated under conditions more suitable for quantitative interpretation. The results of F. Scaramusi provide an example of “physical” synthesis (saturation of titanium shavings with deuterium from the gas phase) and, from the point of view of theorists, are more reasonable than “chemical” synthesis, in which a large amount of heat was observed with a small number of neutrons. At a meeting of the ERAB committee at the end of June 1989, H. Menlove (LANL, USA) presented new evidence for the existence of a process, possibly nuclear fusion. He successfully repeated the experiment of F. Scaramusi. Later, H. Menlove built electrolytic cells similar to the devices in the Pons-Fleischmann experiment. Almost all cells emitted slow neutron radiation, and at least one of them produced an intense flash. Positive results were obtained only with cathodes made of titanium alloy with aluminium, vanadium and tin. All experiments in which neutrons were obtained are characterized by highly uneven conditions with flows of energy and matter. After several cycles of operation, the devices lost their ability to generate neutrons. H. Menlove believes that the fusion leading to the production of neutrons occurs due to the acceleration of particles in the inhomogeneities of the cathode. In other experiments at LANL, the emission of electrons and positively charged particles was detected (based on materials //New Sci. - 1989.-Vol.122.-No.1671.-p.34.-English).

109. Again about cold thermonuclear fusion // In the world of science. -1989.-10.-p.101

UDC 539. 12/. 17

Criticism of Pons and Fleischmann intensified after LANL announced in June 1989 that a previously planned joint work program with the University of St. Utah is cancelled due to the latter's refusal to participate. N. Hackerman (honorary president of Rice University) and J. Schrieffer (University of California), who headed the US government-funded conference on CNF in Santa Fe, believe that the likelihood of a weak fusion reaction “at the Jones level” is moderate. Meanwhile, the ERAB Energy Research Advisory Committee formed a CNF subcommittee, which began visiting laboratories.

110. Interest is cooling... //In the world of science. 1989.-11.-p.75

UDC 539. 12/. 17

Older physicists increasingly recall a lecture given in 1953 by Nobel Prize winner in chemistry Irving Langmuir (of General Electric), who, speaking of discoveries that are not discoveries, listed several characteristic features of this type

of scientific work: 1) the maximum effect is created some “exciter” having a weakly detectable intensity; 2) this effect has a magnitude close to the limit of the capabilities of the equipment; 3) researchers usually claim that the measurement accuracy is extremely high; 4) incredible theories are created that contradict experimental data; 5) they respond to criticism instantly with pre-formulated arguments; 6) the ratio of the number of supporters to the number of opponents reaches 50%, and then slowly falls until the event falls into oblivion. The spirit of Langmuir himself seems to hover over the preliminary report on CNF, presented in July 1989 by a 22-member commission established by the energy research advisory board ERBA. Although the commission members visited several laboratories where anomalous thermal effects were reported to have been recorded, they were never able to observe an experiment that actually generated excess heat. Instead, as one of the chairmen of the commission, J. Heizenga, says, they were offered various kinds of apologies for the inability to demonstrate a positive result confirming the possibility of implementing the CNF.

111. Despite doubts about the results of cold fusion, patenting continues. Cold fusion results still in doubt but rush to patent continues //Atom. Energy Clearing House (Publ.).-1989.-Vol.35.-No.23.-pp. 2-3.-English Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039.6

The results of a visit to the laboratory of S. Pons and M. Fleischmann at the University of St. Utah (USA) by a group of 7 scientists representing a commission created by ERAB to review applications for the implementation of CNF. After inspecting the laboratory, the group's opinions ranged from highly sceptical to moderately optimistic. L. Faulkner (University of Illinois, USA) believes that heat outbreaks cannot simply be disavowed. A. Bard (University of Texas, USA) believes that the most important question when assessing the performance of Pons cells is the issue of heat release calibration, to which he received very vague answers from Pons. Despite significant doubts about the reality of CNF, in the U.S. The Patent and Trademark Office has already received about 50 patent applications. During the week (July 2-9, 1989), only one message was received about successful experiments in the implementation of CNF. Researchers from Hokkaido University (Japan) reported that in their experiments they observed a neutron flux 6-7 times higher than the background.

VINITI RZh 22U Nuclear energy. -1990.-2.-ref.2U468

112. Use of cold nuclear fusion energy. Advanced energy conversion method for cold fusion /Prelas M.A.//Fusion Technol.-1989.-Vol.16.-No.2.-pp.240-242.-Eng.

UDC 621.039.6

Various methods of recycling CNF energy are considered. It is noted that the use of CNF energy carried out in electrolytic fuel cells is associated with significant difficulties, and, probably, in such a scheme it will be difficult to achieve sufficient efficiency in converting synthesis energy into electrical energy. Bearing in mind reports of the implementation of CNC in experiments on the implantation of deuterium ions from Maxwellian plasma into palladium or titanium, as well as when placing titanium samples with a polished surface in gaseous deuterium at high pressure, efforts have been made to develop effective methods of energy conversion (including direct converting the energy of the products of nuclear reactions of CNF through photochemical and photoelectric reactions).

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.4U475

113. Electrochemical D-T nuclear fusion reactor. Electrochemically induced deuterium-tritium fusion power reaction – preliminary design of a reactor system /Oka Y., Koshizuka S., Kondo S.//Fusion Technol.-1989.-Vol.16.-No.2.-pp. 260-262.-English

UDC 621.039.6

A preliminary design of an electrochemical D-T thermonuclear reactor TNR is presented. The basis of the TNR is palladium fuel cells assembled in a package, similar to how it is done in PWR. Fuel elements are placed in a blanket cooled by a Li_2O coolant, which simultaneously ensures the reproduction of tritium. The accumulated tritium is removed by a helium flow. The electrical power of such a nuclear reactor should be 1000 MW. (University of Tokyo, Japan).

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U478

114. Electrochemical D-D nuclear fusion reactor. D_2O-fueled fusion power reactor using electrochemically induced D-Dn, D-Dp and deuterium-tritium reactions – preliminary design of a reactor system /Oka Y., Koshizuka S., Kondo S.//Fusion Technol.-1989.-Vol. 16.-No.2.-pp. 263-267.-English

UDC 621.039.6

A project for a power thermonuclear reactor (TNR) based on DD fusion, taking place under the conditions of heavy water electrolysis, has been proposed. The thermal power of such a nuclear reactor should be 3,100 MW, and the electrical

power – 1,000 MW. A design for palladium fuel cells has been proposed that provides a large cathode surface area and efficient heat removal (University of Tokyo, Japan).

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U477

115. Cold fusion is still in a state of uncertainty. Cold fusion still in state of confusion /Poo1 R. //Science. -1989.-Vol. 245.-No. 4915.-p.256.-Eng.

UDC 539.12/.17

A brief description of the state of affairs in various laboratories studying the problem of “cold” nuclear fusion on July 11, 1989.

VINII RZh 18V Nuclear physics. -1990.-2.-ref.2B19

116. Cold nuclear fusion a year later // Science and life. -1990.-3.-pp. 18-24.

UDC 539.12/.17

A popular overview of the events that took place during the year following the press conference of Pons and Fleischmann in March 1989, at which they announced the opening of the CNF. The author of the article discussed possible mechanisms for the fusion reaction of two deuterium nuclei in a metal lattice of palladium or titanium; they expressed preference for the “accelerator” model. Synthesis occurs at defects (microcracks) in the lattice. The author notes that the term “cold” in relation to this kind of synthesis has a very conventional meaning. It reflects only the fact that the crystal in which the reaction occurs is at room temperature, and the deuterium ions introduced into it during electrolysis (or from a gaseous environment under pressure) have low energy (several eV). As for the microscopic conditions for the fusion of accelerated deuterium nuclei, they correspond, of course, to high effective temperatures of $10^7 \div 10^8$ K (1÷10 eV).

117. The secret of the authors of the synthesis. Mustere autor de la fusion /Baron Pierre //Sci. et avenir. -1989.-No.597.-pp.90-91.-Fr.

UDC 621.039.6

VINITI RZh 22U Nuclear energy. -1989.-12.-ref.12U540

118.Cold fusion. Uncertain output. Cold fusion. Noncommittal outcome. / Lindley D. // Nature.-1989.-Vol.341.-No.6244.-p.679.-English.

UDC 621.039.6

A report is presented of a meeting convened by the US National Science Foundation and the Electric Power Research Institute EPRI on December 16-18, 1989, to discuss CNF issues. It is noted that, despite the presence of some new data, complete agreement in their interpretation has not been achieved. The purpose of the meeting was to develop a further research program for this problem. E. Teller proposed partially replacing palladium electrodes with electrodes made of uranium 235U, which will make it possible to clarify the mechanism of neutron formation during the operation of electrolytic cells with deuterium. The Council of Experts recommended that the Department of Energetic (DOE) provide modest financial support for CNF work through normal channels.

VINITI RZh 22U Nuclear energy. -1990.-5.-ref.5U464

119. Cold fusion: end of the first act. Cold fusion: End of Act 1 /Pool R. // Science. - 1989.- Vol. 244.-No.4908.-pp.1039-1040.-Eng.

UDC 621.039.6

The main results of work on chemical nuclear reactions carried out during 1989 are presented. It is concluded that the main problem at present is the reliable reproduction of experimental results. According to the author, during 1989 the desire for sensations prevailed, while real scientific research into “cold” nuclear fusion should begin in the near future.

VINITI RZh 22U Nuclear energy. -1990.-4.-ref.4U414

II. EARLY WORKS

120. New - well-forgotten old (instead of a review of the article by F. Paneth and K. Peters 1926) / Zelentsov V.V. // Coord. Chemistry. -1989.-vol. 15.-No.9.-p.1296

UDC 539.12/.17

It is possible that the process of fusion of deuterium nuclei during the electrochemical deuteration of palladium was first carried out more than 60 years ago. Attention is drawn to the article by F. Paneth and K. Peters “On the conversion of hydrogen into helium” in “Communications of the German Chemical Society” (F. Paneth, K. Peters // Ber. -1926.-Vol.59.-No.8. -p. 2039. -German) in which the spectrometric detection of helium during the hydrogenation of metal palladium was reported. The authors used different forms of finely dispersed palladium and natural (non-deuterium-enriched) hydrogen. Helium lines were detected in the optical spectra of the gaseous products released during the hydrogenation process. The authors estimate that 10^{-10} g of helium was accumulated.

VINITI RZh 18V Nuclear Physics. - 1990.-1.-ref.1B11

121. Cold fusion in the 20s, opening and “closing”. Cold fusion 20-s: discovery, retraction / Dickman V.// Nature. - 1989.-Vol.338.-No.6218.-p.692.

UDC 539.12/.17

The works of 1926/27 are commented on. German physicists F. Paneth and K. Peters, who passed hydrogen through a heated Pd capillary and detected helium (later it turned out that helium was detected without heating). No heat generation was detected. The authors later refuted their results and announced an experimental error. The detected helium, according to the authors, was not the result of nuclear fusion, but was released from the glass parts of the installation.

VINITI RZh 18V Nuclear Physics. - 1989.-7.-ref.7B6

122. How cold fusion happened twice. How cold fusion happened - twice /Pool R. //Science. -1989.-Vol. 244.-No.4903.-p.420.-Eng.

UDC 539.12/.17

A brief popular summary of the history of the experiments of Pons and Fleischmann that led to the discovery of cold fusion. In this regard, mention is made

of the 1927 work of the Swedish physicist J. Tandberg, who may have observed a similar phenomenon.

VINITI RZh 18V Nuclear Physics. -1989.-10.-ref.10V8

123. Cold fusion is not news? No new fusion under the Sun / Wilner B. // Nature. -1989.-Vol.339.-No.6221.-p.180.-Eng.

UDC 539.12/.17

B. Willner (Royal Institute of Technology, Sweden) reports on work in the 1930s. his father T. Willner, devoted to the problems of heat generation during electrolysis using a Pd electrode. Experiments were carried out with ordinary and heavy water. The high-voltage capacitance was discharged through a thin Pd rod, previously saturated with deuterium using electrolysis. According to B. Willner, the lack of proper diagnostic equipment at that time did not allow us to draw clear conclusions.

VINITI RZh 18V Nuclear Physics. -1989.-8.-ref.8B11

124. Tub... of cold thermonuclear fusion. Reflections after one discovery / Lagovsky V. // Socialist industry. -05.25.1989.-p.6

UDC 539.12/.17

Interview with V.P. Alikin (Ph.D. of Perm State University), who in the early 70s. carried out electrolysis of sulfuric acid on steel plates, while registering neutrons and heating of the electrolyte solution. The report on the scientific work did not find due attention within the walls of the USSR Academy of Sciences.

125. Glowing cold //3knowledge-power.-1985.-10.-ss. 14-16.

UDC 539.12/.17

At the All-Union Scientific Research Institute of Physio-Technical and Radio Engineering Measurements, the phenomenon of cryoluminescence was discovered - the emission of light during the rapid freezing or cooling to low temperatures of transparent, lightly coloured liquids A.M. Trokhan A.I. Lapshin). It turned out that the phenomenon is observed for all transparent, slightly coloured liquids, organic and inorganic solvents, solutions and melts. Most connections glow very faintly but are perceptible to electronic devices. The addition of luminol (a substance that glows at room temperature if there are free radicals in the liquid) did not increase the glow -

which means that some new phenomenon is observed, and not just chemiluminescence. There is no theory for this phenomenon yet. Research has shown that cryoluminescence is always associated with the phase transition of a liquid into a solid. However, the luminescence energy is 3-4 orders of magnitude higher than that released during the phase transition. The authors find the only explanation is that the glow is formed only in some parts of the experimental volume. As a mechanism for local energy accumulation, the authors of the discovery named: sparking during crack formation on the ice surface; release of energy at some points during the ordering of a set of crystalline nuclei into the structure of a solid; huge local internal mechanical stresses during rapid crystallization. The mechanism of nuclei and dislocations is also indicated by the fact that the glow also occurs during sudden thawing. It is characteristic that the intensity of the glow depends on the cooling rate. The faster it goes, the stronger the flashes of light. The authors also propose introducing gas into the surface of a solid body cooled to low temperatures, then the gas should go through two phase transitions at once: gas-liquid-solid.

126. On the possibility of nuclear reactions during the destruction of solids / Deryagin B.V., Klyuev V.A., Lipson A.G., Toporov Yu.P./Colloid Journal. -1986.-1.-pp. 12-14.

UDC 539.375:539.1

An attempt was made to register the emission of neutrons during the impact destruction of heavy ice. The destruction of the ice was carried out by a metal striker, accelerated in the barrel of a gas gun to speeds of 100-200 m/s. The target was a lead plate with a conical depression, which was filled with heavy water, followed by freezing in liquid nitrogen. The ice ball was closed with a thin brass lid. A block of proportional sensors NWI-62 (7 pieces), immersed in a tank with oil, was used as a neutron detector. The information was output to an AI-256-6 amplitude analyser and an S8-17 storage oscilloscope. As a result of experiments, it was established that the count of neutrons when shooting at targets made of heavy ice exceeds the count when shooting at targets made of ordinary ice: averaged over 75 shots, minus the cosmic neutron background, 0.11 counts/s or 0.17 counts/round, these values are 0.40±0.08 and 0.15±0.06 count/shot.

127. Neutron emission during plastic deformation under pressure of solids containing deuterium/Yaroslavsky M.A.//Reports of the USSR Academy of Sciences. -1989.-vol. 307.-No. 2.-pp. 369-370.

UDC 539.89

Yaroslavsky's group (Institute of Physics of the Earth, Moscow) in 1986 conducted an experiment simulating a rheological explosion that is actually feasible in the thickness of the earth's crust. The sample was a cylinder 1 mm high and 10 mm in diameter made of natural chalk containing grains of beryllium bronze weighing about 0.5 mg, soaked in heavy water. The sample, cooled to liquid nitrogen temperature, was placed between two anvils, compressing them with a force of 300 kN. One of the anvils was rotated at an angular speed of 0.5 rpm. In this case, the average pressure in the sample was 38 kbar. The neutron detection system consisted of two parallel-connected SI13N neutron counters, coated with a 2-cm layer of paraffin and a 5-mm-thick aluminium casing, located at a distance of 20 cm from the sample; a 2-cm-thick steel plate was additionally placed between the sensor and the sample. Taking into account the geometric factor and counter efficiency (1%), 106 neutrons/s were obtained in the experiment. The possibility of carrying out the $D(d,n)^3$ He reaction is assumed.

128. Nuclear reactions initiated by temperature changes and phase transitions in condensed bodies / Yaroslavsky M.A. // Reports of the USSR Academy of Sciences. - 1989. - volume 307. - No. 3 - p. 600.

UDC 539.8

Group M.A. Yaroslavsky in 1986 conducted an experiment - a study of neutron emissions from deuterium dioxide when the temperature changed from room temperature to the temperature of liquid nitrogen. The sample consisted of 7 g of D_2O mixed with 10 mg of natural chalk powder, located in an aluminium cylinder with a wall thickness of 0.15 mm, immersed in liquid nitrogen. Neutron detection system, as in [127]. When samples were frozen in liquid nitrogen, powerful trains of pulses lasting up to several hundred microseconds, containing about 103 pulses, were recorded. During exposure to liquid nitrogen, single pulse emissions continued. The amplitudes of the various pulses varied by more than 20 times. During the heating of the samples to 293 K (in 15 minutes), several powerful trains were recorded, associated by the author with the melting of the sample, short trains with a duration of 10-30 μs, containing 10-100 pulses, and many individual pulses. The author concludes that the $D(d,n)^3$ He reaction was observed with an intensity of 10^6 neutrons/s.

Articles [127, 128] were submitted to the editors of the journal on September 19, 1989.

129. On the possible mechanism of initiation of nuclear reactions during temperature changes and phase transitions / Yaroslavsky M.A. //Reports of the USSR Academy of Sciences. -1989.-vol. 308.-No. 1.-pp.95-97.

UDC 539.89

In 1986, in the experiments of M. A. Yaroslavsky, the effect of neutron emissions was discovered during the freezing and heating of D_2O solutions in the range of 77-293 K. The effect depends on the kinetics of freezing-thawing of the solution composition. During the freezing process, ions with different capture coefficients are separated at the moving crystallization boundary and an electric field arises that balances the osmotic forces. As a result, an electric field is frozen into the crystal with a relaxation time of the order of weeks, reaching large values and determined by the rate of crystal growth (freezing rate) and the type of impurity ions. Calculations show that the typical sizes (0.1÷1 μm) of ellipsoidal pores arising in the crystal due to thermoelastic stresses and the electric field strength under conditions of deuteron acceleration in the pores provide energies of the order of tens of keV, sufficient for a nuclear fusion reaction with a noticeable yield.

III. EXPERIMENTS

130. On the issue of the gamma spectrum in the experiment of M. Fleishman. Problems with the γ-ray spectrum in the Fleischmann et al experiment / Petrasso R.D., Chen X., Wenzel K.W., Parker R.R., Li S.K., Fiore S. //Nature. -1989.-Vol.339. -No.6221.-pp.183-185. –Eng.

UDC 539. 12/. 17

The authors of the article, employees of the Massachusetts Institute of Technology, based on their own measurements of the background gamma spectrum, analysis of the gamma spectrum in Fleischman's work and an experiment on the capture of neutrons by hydrogen nuclei using a neutron source, prove that Fleischman's statement about the observation of the 2.22 MeV line is unfounded. According to the authors, the line width in Fleischmann's spectrum is 2 times smaller than the resolution of the spectrometer he used can allow: the Compton edge is absent in the given spectrum, and the rate of neutron production is overestimated by 50 times; Fleischman took the line 2.49 MeV as the line 2.22 MeV. The article presents and interprets spectra from the Massachusetts Institute of Technology.

VINITI RZh 18V Nuclear physics. 1989.-8.- ref. 8B3

131. Measurement of cold fusion gamma radiation. Measurement of □-ray from cold fusion / Fleischmann M., Pons S., Hawkins M., Hoffman R.J., Petrasso R.D., Chen X., Wenzel K.W., Parker R.R., Li S.K., Fiore S. / Nature. -1989.-Vol.339.-No.6227. -pp.669.- English

UDC 539. 12/. 17

Two letters to the editor of Nature: 1) Fleishman et al., in response to criticism [130] of their data on the gamma spectrum, provide the background and working gamma spectra. In the latter, an additional peak appears at 2.496 MeV (the authors note that its interpretation is difficult) and a strong increase in intensity behind the peak at 2.615 MeV (208Tl). 2) Response letter from Petrasso R.D. et al. contains an analysis of this spectrum, which shows that the latter identification is incorrect, and that the peak at 2.496 MeV and those following it are experimental artefacts. This spectrum is shown to lack the 2.22 MeV peak, resulting in an upper limit for neutron emission that is 50 to 100 times smaller than the value reported by Pons and Fleischmann.

VINITI RZH 18V Nuclear Physics. -1989.-10.-ref. 10B12

132. Upper limits for neutron and gamma ray emission due to cold fusion. Upper limits on neutron and □-ray emission from cold fusion / Gay M., Rugari S.L., France R.N., Zhao Z., Lund B.J., Isaats H.S., Davenport A., Lynk K.B. // NNature. -989.-Vo1.340.-No.6228.-pp. 29-34.-English

UDC 539.12/.17

An attempt was made at Brookhaven National Laboratory (BNL, USA) to detect neutrons and gamma radiation through cold fusion of various deuterated metals. The measurements were performed using an assembly of low-background, highly sensitive neutron (6 NE213 liquid scintillators 10 cm thick with PMT and special gamma background suppression electronics; counting efficiency 1%) and gamma detectors (2 NaJ(Tl) crystals with a diameter of 12.5 cm). The entire installation is surrounded by plastic veto detectors to suppress cosmic backgrounds. Electrolytic cells with Pd or Ti electrodes in a LiOD electrolyte with heavy water were placed between the detectors. Powdered Ti-alloy deuterated at high pressure was also studied. No statistically significant excesses above the background were found. The upper limit for the neutron flux is 50 times less than that reported by Jones.

VINITI RZh 18V Nuclear physics. -1989.-10.-ref.10B1

133. Abramov A.I., Kazansky Yu.A., Matusevich E.S. Fundamentals of experimental methods of nuclear physics. - M.: Energoatomizdat, 1985.-p. 356.

UDC 539.1.08(075.8)

The use of inorganic crystals, such as NaJ(Tl) and CsJ(T1), is not always possible if the gamma radiation being studied is accompanied by neutrons. Neutrons, absorbed in iodine (the cross section for radiative capture of neutrons with an energy of 100 keV is 0.1 barn), create photons with an energy of up to 6 MeV. In addition, neutrons with energies above 0.5 MeV during inelastic scattering also form photons (the scattering cross section reaches approximately 1 barn, i.e., comparable to the cross section for the interaction of photons with atoms). Therefore, inorganic crystals cannot always be used for photon spectroscopy if they are accompanied by neutrons whose fluxes are comparable to photon fluxes.

134. Search for the cold fusion reaction of deuterium nuclei in palladium. Search for cold fusion in palladium / Baurichter A., Eyrich M., Frank M., Kreische W., Gohr H., Schiller G.-A. // Z. Phys. B.-1989.-Vol.76.-No.1.-pp.1-2.- English.

UDC 539.12/.17

An attempt was made to detect neutrons and gamma quanta accompanying the fusion reaction of deuterium nuclei during the electrochemical deuteration of palladium (weighing 19.5 grams). A plastic scintillator was used to detect neutrons. The gamma ray spectrum was measured using a germanium detector over a period of 85 hours. Within the limits of the achieved measurement accuracy, no indications of the presence of radiation that could be associated with the fusion reaction of deuterium nuclei were obtained. The upper limit for the neutron emission rate is 20 s^{-1}.

VINITI RZh 18V Nuclear Physics. - 1989.- 12.-ref. 12B4

135. Experimental data on cold nuclear fusion obtained in an experiment under the Gran Sasso massif. Experimental evidence of cold nuclear fusion in a measurement under the Gran Sasso massiv / Bertin A., Bruschi M., Capponi M., De Castro S., Marconi U., Moroni C., Piccinini M., Trombini A., Semprint- Cesari N., Vilate A., Zoccolli A., Jones S.E., Czirr J.B., Jensen G.L., Palmer E.P. // Nuovo Cim.A.-1989.-Vol.101.-No.6.-pp.997-1004.-Eng.

UDC 539.12/.17

The observation of 2.5 MeV neutron emission during the electrochemical deuteration of titanium is reported. The measurements were carried out under conditions of low neutron background. Neutrons were detected by liquid scintillators. To reduce the gamma radiation background, a signal discrimination technique based on the pulse shape was used. Neutron emission was observed within 3 hours after voltage was applied to the electrodes. Three electrolytic cells were used simultaneously, each containing a 1-gram Ti electrode. The total number of registered neutrons over 10 hours of measurements was 300-400, which corresponds to a total emission intensity of 900 neutrons/hour. The results are considered by the authors as confirmation of data on the possibility of the fusion reaction of deuterium nuclei in palladium or titanium.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B1

136. Neutron emission under particularly nonequilibrium conditions from palladium and titanium electrolytically saturated with deuterium. Neutron emission under particular non-equlibrium conditions from Pd and Ti electrolytically charged with deuterium / Perfetti P., Cilloco F., Felici R., Carozi M., Ippoliti A. // Nuovo Cim.D.-1989.-Vol.11.-No.6.- pp.921-926.-English.

UDC 539.12/.17

The observation of the emission of neutrons, which are formed during the fusion of deuterons during the electrochemical deuteration of Pd and Ti, has been reported. To register neutrons, proportional counters filled with ^{3}He at 20 atm were used. A slight excess of the count rate above the background was observed 1 hour after the current was turned on and in the first 5-10 minutes after it was turned off. A significant increase in the neutron count rate was detected 2-3 minutes after short-term heating of deuterium-saturated Pd or Ti to temperatures above 100°C. In this case, the neutron count rate exceeded the background by 3-5 times. It is assumed that intense neutron emission accompanies a sharp change in the volume of palladium during the transition from the β-phase to the α-phase upon heating. The probability of the fusion reaction of deuterium nuclei under these conditions is $1,3 \cdot 10^{-21}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref. 11B2

137. Searches for low-temperature fusion of deuterium nuclei in palladium. Searches for low-temperature nuclear fusion of deuterium in palladium / Lewis N.S., Barnes C.A., Heben M.J., Kumar A., Lunt S.R., McManis G.E., Miskelly G.M. et al // Nature. -1989.-Vol.340.-No. 6234.- pp.525-530.-Eng.

UDC 539.12/.17

A review of the results of experiments conducted by a group from CALTECH (USA) to verify the message about the possibility of fusion reactions of deuterium nuclei during the electrolysis of heavy water. To detect this reaction, techniques related to recording nuclear radiation, measuring heat release and accumulation of helium and tritium, electrolysers of various designs and electrolytes of various compositions were used. Before the experiment, the electrodes were subjected to metallurgical and thermal treatment. All experiments gave negative results. Possible causes of errors in experiments of this type are discussed. Attention is drawn to the need for strict documentation of all experimental conditions and a sufficiently complete presentation of the relevant data when publishing the results.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12B5

138. Search for neutrons emitted during cold fusion. Search for neutrons from cold nuclear fusion / Alber D., Schwarz C., Hilscher D., Spellmeyer B. // Z. Phys.-1989.-Vol.333.-No.3.- pp.319-320.- English

UDC 539.12/.17

An attempt was made to detect the emission of neutrons during the electrochemical deuteration of Pd. The measurements were carried out with electrolysers of various types. Three scintillation and two boron BF3 detectors were used to detect neutrons. The simultaneous use of several detectors was considered as an important condition for the reliability of the experiment. The count rate of neutrons with energies of 0.6÷3.3 MeV was measured. The total duration of the experiments was 210 hours. The upper limit for the neutron emission rate is 0.05 neutron/s.

VINITI RZh 18V Nuclear physics. -1989.-12.-ref. 12V8

139. Upper limits on the probability of “cold fusion” in electrolytic cells. Upper bouds on “cold fusion” in electrolytic cells / Bailey M., Findley D.J.S., Croft S., Craston D.H., Hooton B.M., Jones C.P., Taylor R.I., Sene M.R., Kucepnak A.R.J., Mason J.A. //Nature.-1989.-Vol.342.-No.6248. – pp. 375-384.-Eng.

UDC 539.12/.17

A series of experiments on the electrolysis of heavy water on Pd or Ti electrodes was carried out. No differences were found in the heat release during the electrolysis of heavy and ordinary water. The upper limit for the emission rate of 2.5 MeV neutrons was found to be 0.015 $s^{-1}\cdot g^{-1}$ Pd and 0.003 $s^{-1}\cdot g^{-1}$ Ti. Variations in tritium concentration in the electrolyte can be explained by differences in electrolysis rates for different hydrogen isotopes. Possible sources of systematic errors are discussed.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B6

140. Experimental studies of cold nuclear fusion in palladium. Experimental investigation of cold fusion phenomena in palladium / Baur H., Baberro C., Bertl W., Blaser J.-P., Daniel H., Signer P., Hartmann J., Haas O., Mathias M., Baumann P., Lou K., Hechtl E., Ackerbauer P., Kammel P., Scrinzi A., Zmeskal H., Kozlowski T., Kipfer R. // Chimia.-1989.-Vol.43.-No.9. -pp.262-268.-English

UDC 539.12/.17

A series of experiments on the electrolysis of heavy water on Pd cathodes was carried out. A search was made for the excess of heat release, neutron and gamma radiation emission, as well as an increase in the concentration of helium and tritium. All experiments gave negative results. For a Pd cathode with a diameter of 2 mm and a length of up to 40 cm, the excess of thermal energy is not higher than 0.18 W. The rate of emission of fast neutrons and gamma rays does not exceed 0.14 s^{-1} and 0.1 s^{-1},

respectively. No increase in the concentration of tritium and helium isotopes was detected during the electrolysis process.

VINITI RZh 18V Nuclear Physics. -1990.- 2.-ref.2B8

141. Search for neutron emission from deuterated palladium. Search for neutron emission from deuterium loaded palladium / Kashy E., Bauer W., Galonsky A., Chen Y., Gaudiello J., Maier M., Morrissey D.J., Pelak R.A., Tsang M., Yurkon J. / Phys. Rev. C.-1989.-Vol.40.-No.1.-pp. R1-R2.-Eng.

UDC 539.12/.17

Using liquid scintillation detectors, the intensity of the neutron flux during the electrochemical deuteration of Pd (weighing 15 g) was measured. A solution of LiOD in D_2O was used as an electrolyte. Comparative experiments were carried out with ordinary water. Achieved D/Pd=0.6. No increase in neutron flux intensity was detected during the electrolysis process. The upper limit for the rate of neutron emission is 2.10^{-3} $s^{-1}\cdot g^{-1}$ Pd. No time correlation was found between the moment of registration of a neutron and the moment of passage of cosmic muons through the volume of the electrolyser. No pulses of several neutrons were detected.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B3

142. Search for cold fusion by detecting X-ray radiation. Search for cold fusion using X-ray detection / Deakin M.R., Fox J.D., Kemper K.W., Myers E.B., Shelton W.N., Skofronick J.G. // Phys. Rev. C.-1989.-Vol.40.-No.5.-pp. R1851-R1853.-Eng.

UDC 539. 12/. 17

The fusion reaction of deuterium nuclei during the electrolysis of D2O with a Pd electrode should be accompanied by the emission of X-ray radiation associated with the excitation of Pd atoms by fast protons. Spectrum measurements (in the energy range 15-30 keV) were carried out over 330 hours during the saturation of Pd with deuterium from the Li/D_2O electrolyte. There was no increase in the counting rate of X-ray quanta compared to the background. The rate of emission of fast protons does not exceed 1.8 s^{-1}. The upper limit for the reaction rate of CNS is $1.6\cdot10^{-20}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B6

143. Evidence of fusion increasing the neutron background in deuterium adsorbed on palladium. Evidence for a background neutron enhanced fusion in deuterium absorbed palladium / Shani G., Cohen C., Graevsky A., Brokman A. // Solid State Commun. -1989.-Vo1.72.-No.1.-pp.53 -57.-English

UDC 539. 12/. 17

The question of the correlation between the background neutron intensity and the rate of the cold nuclear fusion reaction (CNF) of deuterium absorbed in palladium has been studied. Measurements were performed using a liquid scintillation detector based on NE213. For the rate of uncontrolled synthesis under natural conditions, 10^{-24} s^{-1} per DD pair was obtained. According to the authors, this result indicates the practical absence of CNF. At the same time, an increase in the reaction rate was discovered when a Pd-D cell was irradiated with an external neutron AmBe source. A similar result was obtained for compressed D in the gas phase. It is noted that in this case, the increase in the reaction rate of the CNF can be explained by the influence of the nuclear recoil mechanism when interacting with fast neutrons. However, an attempt to use this mechanism to analyse processes in a Pd-D cell gave unsatisfactory results (the discrepancy between the experimental and theoretical values of the cold fusion rate reaches three orders of magnitude).

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B4

144. On the possibility of deuterium fission in electrochemically compressed D on a palladium cathode. On the possibility of deuterium disintegration in electrochemically compressed D in a palladium katode / Ragneb M., Miley G.H. // Fusion Technol.-1989.-Vol.16.-No.2.-pp. 243-247.

UDC 621.039.6

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U470

145. Attempt to measure cold fusion neutrons (preliminary results). A preliminary attempt to measure neutrons from cold fusion / Takata N., Kaneko H., Nozaki K., Sakuta K., Tanimoto M. // Denshi gijutsu sogo knekyujo iho = Bull. Electrotech. Lab.-1989.-Vol.53.-No.12.-pp.12-26.-Eng.

UDC 539.172.13 /.16

An attempt is described to detect cold DD fusion neutrons during the electrochemical deuteration of a Pd rod 1 cm in diameter and 10 cm in length. A solution of 1.1 mol D_2SO_4 and 0.5 mol Li_2D in heavy water was used as an electrolyte.

The degree of saturation of the cathode with deuterium was determined by the change in the ratio of the volumes of D_2 and O_2 released during electrolysis. The electrolytic cell, along with the neutron 3He counter, was placed in the centre of the tank with the H_2O moderator. The detection efficiency of neutrons from a ^{252}Cf source placed in a cell is 1.8% at a background count rate of 0.005 s^{-1}. During the experiment, no signals were recorded indicating the occurrence of CNC. The upper limit of the CNS reaction rate was found to be $1.6.10^{-25}$ s^{-1} in the range of 3 σ.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.191

146. Evidence of neutron background-increasing fusion in deuterium adsorbed on palladium. Evidence for a background neutron enhanced fusion in deuterium absorbed palladium / Shani G., Cohen C., Graewsky A., Brokman A. // Solid State Commun. -1989.-Vol.72.-No.1.-pp.53 -57.-English

UDC 539. 12/. 17

The question of the correlation between the background neutron intensity and the rate of the cold nuclear fusion reaction (CNF) of deuterium absorbed in palladium has been studied. Measurements were performed using a liquid scintillation detector based on NE213. For the rate of uncontrolled synthesis under natural conditions, 10^{-24} s^{-1} per DD pair was obtained. According to the authors, this result indicates the practical absence of CNF. At the same time, an increase in the reaction rate was discovered when a Pd-D cell was irradiated with an external neutron AmBe source. A similar result was obtained for compressed D in the gas phase. It is noted that in this case, the increase in the reaction rate of the CNF can be explained by the influence of the nuclear recoil mechanism during interaction with fast neutrons. However, an attempt to use this mechanism to analyse processes in a Pd-D cell gave unsatisfactory results (the discrepancy between the experimental and theoretical values of the cold fusion rate reaches three orders of magnitude).

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B4

147. Data on the occurrence of interconnected generation of heat and nuclear reaction products during the electrolysis of heavy water with palladium. Evidence for associated heat generation and nuclear products release in palladium heavy water electrolysis / Gozzi D., Cignini P., Petrucci L., Tomellini M., Ghio F., De Maria G., Frallani S., Garibaldi P., Jodice M. . // Nuovo Cim. A.-1990.- Vol.103.-No.1.-pp.143-154.-English.

UDC 539. 12/. 17

The processes accompanying the electrochemical deuteration of palladium have been studied. An electrode obtained by pressing powdered Pd was used; A solution of LiOD in heavy water was used as an electrolyte. After 150 hours of electrolysis at a current density of 200 mA/cm^2, pulsed neutron emission was observed, which was accompanied by a sharp increase in the cathode temperature (from 30°C to 120°C). Within 4 minutes, 36 neutrons were detected, which corresponds to an increase in the count rate by 180 times compared to the background. After the experiment, a significant increase in tritium concentration was detected in the electrolyte. The total number of emitted neutrons per pulse was found to be $7.2 \cdot 10^5$; the excess of tritium in the electrolyte is $2.14.10^{11}$ atoms T. The excess thermal energy found, equal to 176 J, is 3 orders of magnitude higher than the energy calculated from neutron emission.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B3

148. Search for cold fusion in electrochemically deuterated palladium. Tests for cold fusion in electrochemically deuterized palladium / Isagawa S., Kanda Y., Kondo K., Miyajima M., Sasaki S., Suzuki T., Yukawa T.// KEK Report. -1989.- Vol.89-15 .-pp.1-16.- English

UDC 539. 12/. 17

An attempt was made to detect the occurrence of the fusion reaction of deuterium nuclei during the electrochemical deuteration of palladium. Electrolysers containing electrolytes of different compositions and Pd electrodes of different shapes and weights were used. To detect the reaction, the intensity of the neutron flux and the concentration of tritium in the electrolyte were measured. None of the experiments revealed an increase in the neutron count rate during the electrolysis process. The increase in tritium concentration in the electrolyte after electrolysis can be explained by the different probability of the introduction of D and T into palladium during electrolysis. The upper limit for the intensity of neutron emission is 0.07 neutron$\cdot s^{-1} \cdot cm^{-3}$.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B3

149. Study of “cold fusion” in deuterated titanium by passing high-density current. A study of “cold fusion” in deuterated titanium subjected to high-current densities / Campbell R.B., Perkins L.J. // Fusion Technol.-1989.-Vol.15.-No.3.-pp.383-387.-Eng.

UDC 539. 12/. 17

An attempt was made to observe the influence of high-density electric current on the probability of the fusion reaction of deuterium nuclei in titanium deuteride $TiD_{0,9}$. Using neutron detectors located close to the deuteride sample, the neutron count rate was measured in the process of passing a current density of up to 50 A/cm^2 through the deuteride. For comparison, similar measurements were carried out with titanium hydride $TiH_{0,9}$. No measurable effect of electric current on the neutron count rate was detected. It is concluded that the current density should not have a significant effect on the results of experiments on CNS during electrochemical deuteration of Ti.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B10

150. Fusion of deuterium nuclei in metals at room temperature. Deuterium nuclear fusion in metals at room-temperature / Tomas P., Blagus S., Hodko D., Kremar M., Miljanic D. // Fizika (Yugoslavia). -1989.-Vol.21.-No.2.- pp.209-214.-English

UDC 539. 12/. 17

An attempt was made to detect neutron emissions during the electrochemical deuteration of Pd. The measurements were carried out with electrodes of different designs. Neutron spectra were measured with a 2 mm thick scintillation detector (thermal neutron detection efficiency 98%). To slow down the emitted neutrons, a 5 cm thick polyethylene moderator was used. The spectrum measured during the electrolysis process was periodically compared with the background spectrum. The rate of neutron emission does not exceed 7.10^{-4} neutrons/s.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V6

151. Search for neutrons produced during the electrolysis of heavy water on palladium electrodes. Search for neutron production during heavy water electrolysis on palladium electrodes / Tomas P., Blagus S., Hodko D., Kremar M., Miljanic D. / Z. Phys. A.-1989.-Vol.333.- No.3.-pp. 321-322.-English

UDC 539. 12/. 17

The results of experiments aimed at detecting the emission of neutrons during the electrochemical deuteration of Pd are presented. The measurements were carried out with electrodes of different shapes and masses. A solution of 0.1 mol LiOD in heavy water was used as an electrolyte. The neutron spectrum was measured using a highly efficient 6Li scintillation detector. 4 experiments were carried out lasting 50-170 hours. No statistically significant difference was found between the

spectra measured during the electrolysis process and the background spectrum. The rate of neutron emission did not exceed 0.01 neutron. $s^{-1}.g^{-1}$ Pd.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V9

152. Nuclear effects in the electrolysis of heavy water. Nuclear effects in the electrolysis of heavy water /Dudu D., Mo1ea M., Paskalau I., Pitici I., Vata I. // Rev. Room. Phys.-1989.-Vol.34.-No.2.-pp. 229-232.-English

UDC 539. 12/. 17

It has been confirmed that electrolytic deuteration of palladium or titanium is accompanied by the emission of neutrons. The neutron flux intensity was measured using a spectrometer with a liquid scintillator. The measurements were carried out with an electrolyser containing a Pt anode and a cathode made of Pd weighing 16 g or Ti weighing 7 g. The electrolyte consisted of D_2O and LiCl. The neutron count rate during electrolysis was periodically compared with the background (which was measured when replacing the existing electrolyser with a similar one with zero current). The duration of the experiment was 26 hours. Throughout the experiment, an increase in the intensity of the neutron flux during electrolysis was observed compared to the background, which is interpreted as a result of the emission of neutrons in the fusion reaction of deuterium nuclei. The number of fusions in the experiment was found to be 0.33 for Ti and 0.21 s^{-1} for Pd cathodes.

VINITI RZh 18V Nuclear Physics. -1990.-1.-ref.1B7

153. Does cold nuclear fusion exist? / Preprint JINR, Dubna, - 1989. - D15-89-314. - 7 pp.

UDC 539. 12/. 17

The results of studies of chemical nuclear reactors on Pd are presented, both during the electrolysis of D_2O and a mixture of D_2O+H_2O (1:1), and when it is saturated with deuterium from the gas phase. The possibility of the existence of this phenomenon was investigated by measuring the characteristic X-ray radiation Pd excited by charged products (^{3}He, p, t). The upper limit (at the 95% confidence level) was found to be 0.02 neutron/ ($s \cdot cm^3$ Pd) and 0.002 gamma quantum/($s \cdot cm^3$ Pd).

154. Once again about cold nuclear fusion. /Brudanin V.B., Bystritsky V.M., Egorov V.G., Shamsutdinov Sh.G., Shishkin A.L., Stolugin V.A., Yutlandov I.A. // Preprint JINR, Dubna, - 1989, - D15-89-347. - 10 pp.

UDC 539. 12/. 17

The results of experiments on the search for chemical reactants in chemically pure titanium are presented both in the case of electrolysis of heavy water D_2O and when it is saturated with gaseous D_2. Ti saturation was carried out at 77 K and pressure of 50 and 150 atm. A series of measurements was performed with temperature variations from 77 to 300 K and pressure from 1 to 600 atm. The limit values (at a 95% confidence level) of the partial rate of the nuclear reaction of dd-fusion with the formation of neutrons per deuteron were obtained: $4 \cdot 10^{-25}$ s^{-1} (experiment with electrolysis) and $7 \cdot 10^{-28}$ s^{-1} (experiment with gaseous D_2).

155. Cold nuclear fusion / Kuzmin R.M.//Fundam. science and intensive. pr-va: abstracts of reports of the republican seminar, Ivanovo, October 17-19. 1989.-Moscow, 1989-pp.18-27.

UDC 539. 12/. 17

The problems associated with the implementation of the fusion reaction of deuterium nuclei at low temperatures are discussed. The results of a study of this reaction obtained at the Faculty of Physics of Moscow State University are presented. Neutron radiation was observed during the electrochemical deuteration of Ti or Pd 3-5 times higher than the background. In experiments with Pd electrodes, neutron radiation appeared several minutes after the current was turned on. For the Ti electrode, emission was observed only at elevated temperatures; in this case, the emission of neutrons was of a pulsed nature and was observed after the termination of electrolysis. Some theoretical models explaining the possibility of fusion of deuterium nuclei in metals are considered.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B7

156. About neutron and mass spectrometric measurements in experiments on the electrochemical introduction of deuterium into palladium. / Borovoy M.A., Budnikov A.T., Zuber V.M., Vinograd E.L., Danilov A.P., Galunov N.Z., Katrich N.P., Shishov N.I., Kartamyshev G.A., Krainov I.P., Slyusar S.N., Seminozhenko V.P., Tarasov V.A. // Preprint of the All-Russia Research Institute of Single Crystals.-1989.-No.5.-16 pages.

157. Search for neutron flux from hypothetical cold nuclear fusion. /Alfimenkov V., Rusakov T., Strelkov A.// Preprint JINR, Dubna. -No.3-89-513

UDC 539. 12/. 17

An experiment carried out at JINR to search for a neutron flux from hypothetically possible thermonuclear reactions occurring during the electrolysis of D_2O on a Pd cathode when Pd is heated by an electric current in a deuterium atmosphere is described. To register neutrons, we used an SNM-17 sensor with protection made of cadmium and polyethylene with boron. In this case, the neutron background amounted to 0.25 neutrons/s. The Pd sample (99.99%) was a foil 0.05 mm thick, twisted into a rod with a diameter of 2 cm and a length of 9 cm. The current value in the experiment was 0.8 and 1.0 A. In both cases, no neutron yield was detected, exceeding 0.11 and 0.02 neutron/s, respectively.

158. Experimental verification of the effect of stationary cold nuclear fusion / Danilov M.M., Zarubin A.B., Katarzhanov Yu.D., Kushin V.V., Nedopekin V.G., Nesterov N.A., Plotnikov S.V.., Radkevich I.A., Rogov V.I. // Preprint of the Institute of Theoretical and Experimental Physics, Moscow. -1989.-No.167.-p.1-8.

159. Detection of neutron yield during chemical reactions of metal reduction / Arzhannikov A.V., Kezerashvili G.A., Smirnov I.I., Yakimova N.V. / Preprint of the Institute of Nuclear Physics of the Siberian Branch of the USSR Academy of Sciences. -1989.-No.152.-13 pp.

160. Registration of fast neutrons by dielectric track detectors in an electrolytic cell of palladium-deuterium-tritium water. /Rusov V.D., Zelentsova T.N., Semenov M.Yu., Radin I.V., Babikova Yu.F., Kruglyak Yu.A.// Letters in ZhTF. -1989.-vol.15. -No.19.-p.9-13

UDC 539. 172.13/. 16

The process of electrolytic saturation of Pd or Ti with deuterium, accompanied by neutron emission, was studied. Deuterium water and tritium water diluted in bi distillate were mixed in equal volumes. A 72%Pd+25%Ag+3%Au alloy plate was used as a cathode. The anode was a Ti plate. The applied potential difference was 200 V. The integral neutron flux from possible nuclear reactions (d,d), (d,t), (t,t) was recorded by a CR-39 detector. The sensitivity to neutrons with energies of 2.3 and 14 MeV was $1 \cdot 10^{-4}$ and $5.5 \cdot 10^{-4}$ tracks/neutral, respectively. The detector exposure time was $9 \cdot 10^3$ s. Tracks of protons and recoil nuclei in CR-39 are shown. An estimate of the neutron flux intensity at a density of 20 tracks/cm^2 gives 8±4 neutrons/s. When

using a CN-85 cellulose nitrite detector, three-rayed “stars” were recorded, indicating a $^{12}C(n,n)3^4He$ reaction caused by neutrons with energies above 10 MeV.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4V173

161. About additional heat release during the electrolysis of heavy water with a palladium cathode / Shapovalov V.L.// Letters in ZhTP. -1989.-vol. 50.-No.3.-p.109-111.

No additional heat generation was detected in the calorimetric experiment on the electrolysis of heavy water compared to ordinary water.

162. On electrochemically stimulated radiation of metals /Kovalchuk E.P., Aksimentyeva E.M., Pazdersky Yu.A., Babey A.E., Romaniv O.N., Kovalchuk A.E. // Phys.-Chem. Fur. Material. -1989.-vol.25.-No.3.-pp.119-120.

UDC 539. 12/. 17

The radiation effect was recorded during the electrolysis of D_2O on Ni and steel cathodes at 298 K. At a current of 0.5 A, the number of interaction events was 20 s^{-1} and increased to 40 s^{-1} with a doubling of the current. Similar data were obtained on steel 40X12 at a current of 0.5 and 1 A. Electrolysis with the same electrode, but replacing D_2O with H_2O, did not lead to a radiation effect. In the case of using D_2O, radiation began after a certain induction period, the length of which depended on the polarization current density, the shape and size of the material, the method of pre-treatment of the electrode, and the relative position of the electrodes.

163. Are cracks in titanium responsible for neutrons? Titanium fracture yields neutrons? / Derjaguin B.V., Lipson A.G., Kluev V.A., Sakov D.M., Toropov Yu.P. // Nature. -1989.-Vol.341.-No.6242.-p.492.-English.

UDC 539. 172.13/. 16

A letter from Soviet scientists from the Institute of Physical Chemistry of the USSR Academy of Sciences (Deryagin B.V. et al.) to the editor of “Nature” was published, which mentions that back in 1986, when conducting experiments to study the mechanical effects on samples of lithium deuteride and heavy ice, an increased neutron yield compared to the background. In connection with reports that appeared in the press about the observation of the dd-fusion reaction during the electrolysis of D_2O using Pd and Ti electrodes, an experiment was carried out to measure the neutron yield when Ti chips were placed in a vibrating mill. In the case when the

shavings were placed directly into a 10% D_2O solution or a 4-5% solution of deuterated polypropylene, the neutron yield intensity was observed to be 6-7 times higher than the background. After 3-4 vibration cycles of three minutes each, the neutron yield was compared with the background value. 7 proportional counters located in an oil moderator were used as a neutron detector. The reasons for the increased neutron yield related to the possibility of the dd reaction occurring in materials that adsorb deuterium and have a developed surface are discussed.

164. Electrochemical experiments on cold nuclear fusion. E1ectrochemical experiment in cold nuclear fusion / Cargill S.S., Marwick A.D., Ziegler J.F., Zabel T.H. //Phys. Rev.Lett. -1989.-Vol.62.-No.25-pp.2923-2929.

UDC 539.12/.17

The fusion reaction of deuterium nuclei during the electrolysis of D_2O on Pd electrodes should be accompanied by the emission of protons with an energy of 3.02 MeV. Electrolysers of a special design with thin Pd electrodes were used. To register charged particles, a silicon surface barrier detector was used (efficiency about 100%). Several experiments lasting 250 hours were carried out. The emission of any charged particles during the electrolysis process was not detected. The upper limit for the rate of proton emission is 0.005 $s^{-1}.cm^{-3}$ Pd.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V10

165. Search for cold nuclear fusion in palladium deuteride. Search for cold fusion in palladium-deuterium /Schrieder B., Richter A., Wipf H. //Z.Phys.B.-1989.-Vol ,76.-No.2.-pp.141-142.-English.

UDC 539.12/.17

An attempt was made to detect proton emissions (3.02 MeV) during the electrolysis of D_2O. Pd foil with a thickness of 17.3 μm was used as an electrode. Proton detection was carried out using a 300 μm thick silicon surface barrier detector located close to one of the electrode surfaces. Spectra of charged particles were measured during the electrolysis process and compared with spectra measured at zero current through the electrolyser. No increase in particle count rate was detected. The upper limit for the rate of proton emission was found to be 0.074 $s^{-1}\cdot cm^3$ Pd or $3\cdot10^{-24}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V11

166. Vain attempts to confirm the reality of "cold nuclear fusion". Vergebliche Versuche zum Nachweis der "ka1ten Kernfusion" /Wenzl N. //Phus. Bl.-1989.-Vol.45. No.10.-pp.408-409.-German.

UDC 539. 12/17

Attempts have been made to detect the products (^{3}He, p, t, n) of the fusion reaction of deuterium nuclei during the deuteration of Pd or Ti at room temperature. Reliable confirmation of the reality of the CNF was not received. According to the results of the most accurate measurements, the intensity of the neutron flux in Pd at room temperature does not exceed 10^{-25} s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B9

167. Experiments with metal-hydrogen systems in order to study the reality of "cold nuclear fusion". KFA-experiments on metal-hydrogen systems analyzing the chain of "cold nuclear fusion" events //Ber.Kernforschungsanlage Julich. -1989.-No.2294.-pp.1-116.-Eng.

UDC 539. 12/17

Report from the Institute for Nuclear Research (Jülich, Germany) on the results of an experimental test of the reality of the process of fusion of deuterium nuclei in metal matrices. None of these experiments provided any indication of the occurrence of fusion of deuterium nuclei during the deuteration of Ti or Pd.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B9

168. Calorimetric studies of the electrolysis of heavy water with palladium cathodes. Calorimetric evalution of D_2O electrolysis with Pd cathodes // Ber.Kernforschungsanlage Julich. -1989.-No.2294.-pp.1-87.-Eng.

UDC 539. 12/17

A verification of reports of large heat release during the electrochemical deuteration of palladium was undertaken. The measurements were carried out using precision calorimetric installations. A solution of 0.1 mol LiOD in heavy water was used as an electrolyte. During the measurements, the release rates of gaseous electrolysis products and the concentration of D in Pd were monitored. The heat kurtosis averaged 0.3 W/cm^3 Pd, which is almost 100 times less than in the experiment of Pons and Fleischmann. The observed excess heat release can be explained by chemical processes. The results do not confirm the reality of the course of CNF.

VINITI RZh 18V Nuclear Physics.1990.-2.-ref.2B10

169. Experiments to detect “cold fusion” neutrons. /A1efeld B., Divisek J., Mund M., Schober T., Hempelmann R., Schatzler R., Werges F., Wilms W. // Ber.Kernforschungsanlage Julich. -1989.-No.2294.-pp. 88-106.-English

UDC 539.12/.17

An attempt to register neutron radiation accompanying CNF is described. Assuming that the number of detected neutrons is very small, a detection installation was created that combines high detection efficiency and low background level (a cell with a Pd electrode is placed in the center of a neutron radiometer consisting of 9 boron sensors equipped with passive background protection made of boron-containing plastic and a cadmium coating). Due to the long operating time of the installation, special measures were taken to ensure the stability of its main operating parameters. The method of statistical processing of primary experimental data under conditions of “poor” sampling statistics is described in detail. The results obtained indicate that it is not possible to observe “cold” fusion neutrons within the sensitivity of the installation. The upper limit of the synthesis rate was found to be $2 \cdot 10^{-26}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B8

170. Analysis of samples of palladium and electrochemically deuterated palladium for helium. Helium analysis of palladium and electrolytically charged Pd(D) specimens /Jung P., Vassen R. // Ber.Kernforschungsanlage Julich. -1989.-No. 2294.-pp. 107-110. -English

UDC 539. 12/. 17

An attempt was made to detect helium isotopes that could be products of chemical reactions during the electrochemical deuteration of palladium. Gaseous electrolysis products were purified from active gases (H_2, O_2) and studied using a mass spectrometer. A comparison was made of the helium concentration in palladium samples before and after the deuteration process. No increase in the concentration of helium isotopes was detected after electrolysis. The upper limit for the excess helium concentration in palladium after electrolysis is $3.5.10^{-11}$.

VINITI RZh 18V Nuclear Physics - 1990.-2.-ref.2B11.

171. Determination of tritium in heavy water after cold fusion experiments. Determination of tritium in heavy water from "cold fusion" /Erdtmann G., Petri N., Souka W. // Ber. Kernforschungsanlage Julich. -1989.No. 2294.-pp. 111-113.-English

UDC 539.12/17

The tritium concentration in D_2O samples was determined in experiments on the electrochemical deuteration of palladium. The radioactivity of heavy water mixed with liquid scintillator was compared with the radioactivity of tritium-free heavy water and with a known tritium concentration of heavy water. No increase in the radioactivity of D_2O samples after electrolysis was detected. The specific activity of the samples before and after electrolysis was 281±8 and 271±8 Bq/ml, respectively.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B12

172. Search for the emission of fast neutrons from titanium deuterides: repetition of the "Frascati experiment". Search for fast neutron emission from Ti deuterides: repetitions of the "Frascati experiment" / Schober T., Dieker C., Conrads J., Hoenen F. // Ber. Kernforschungsanlage Julich. -1989.-No.2294.-pp.114-116.-English

UDC 539. 12/17

An attempt was made to reproduce the results of an experiment in which the emission of fast neutrons was observed after deuteration of Ti at high pressure of gaseous deuterium (up to 50 bar), which ensured a deuterium concentration in titanium of up to 60 at.%. After deuteration, the sample was cooled to 77 K and quickly moved to the ionization chamber, which was used as a neutron detector. Measurements of the rate of neutron emission at 77 K and during the gradual heating of the sample to room temperature. No increase in the neutron count rate compared to the background was observed. The upper limit for the probability of a deuterium nuclear fusion reaction is 10^{-25} s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990-2.-ref.2B13

173. Testing cold nuclear fusion using various methods. Various arrears for cold fusion exmination /Ouama N., Ohsaka T., Natozaki O., Yamamoto N., Kurasawa Y., Kasahara S., Takeoka S., Imai Y., Oyama Y., Shibata T., Nakamura T. , Imamura M., Uwamino Y., Gama T. //Denki kagaku oebi koge butsuri kogaku.-1989.-Vol.57.-No.9.-pp.A6-A7.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 539. 12/. 17

Experiments on the deuteration of Ti, Pd and $LaNi_5$ were carried out both by the electrochemical method and by gaseous deuterium (at different pressures and temperatures). The intensity of the neutron flux, the concentration of tritium in the electrolyte, the concentration of helium isotopes in the gaseous products of electrolysis, and the excess of thermal energy during the electrolysis of various electrolytes were measured. No products of possible nuclear reactions of CNF were detected. The excess thermal energy during electrolysis depends on the experimental conditions and can be explained by chemical phenomena not related to cold nuclear fusion.

VINITI RZh 18V Nuclear Physics.1990.-7.-ref.7B6

174. Negative results and positive artifacts observed during the search for "cold fusion" neutrons using an underground multi-detector system. Negative results and positive artifacts observed in a modern search for neutrons from "cold fusion" using multidetector system located underground / Ewing R. I., Butler M.A., Schirber J.E., Ginley D. S. //Fusion Technol.-1989.-Vol. .16.-No.3.-pp.404-407.-Eng.

UDC 539. 12/. 17

Experiments on detecting neutrons accompanying CNF are described. The experimental setup consists of two identical assemblies of 11 3He counters with a diameter of 2.5 cm and a length of 40 cm. Each assembly is placed in a polyethylene moderator with dimensions of 38x24x7.6 cm, coated with a cadmium shell. The counter outputs are connected to form three output channels with 11, 6 and 5 counters. The count rate ratio in the channels, determined using a ^{252}Cf source, is 1:0.57:0.49. An electrochemical or gas cell will be placed between the assemblies. The system makes it possible to measure continuous neutron emission with intensities above 100 s-1 and individual pulses with more than 35 neutrons. The experiment was carried out at a depth of 50 m, providing a 200-fold reduction in background. Anomalous increases in counting were observed in individual channels, but in none of the cases did these increases occur in all three channels simultaneously, which would indicate the emission of CNF neutrons. These results give reason to conclude that CNF neutrons are artifacts caused by fluctuations of the cosmic background and equipment for amplifying and analysing pulses.

VINITI RZh 18V Nuclear Physics. -1990. -8.-ref.8B7

175. Evidence of neutron emission from the titanium-deuterium system. Evidence of emission of neutrons from the titanium-deuterium system / Scaramuzzi F., Podda

S., Frattolillo A., Lo11obattista G., Mori L., Martinis M. // Europhys. -1989.-Vol.9.-No. 3.-pp.221-224.-Eng.

UDC 539.12/.17

Experiments have been reported in which neutron emission was observed during deuterium saturation from the gas phase under pressure and degassing of Ti chips. In an experiment conducted on April 15-16, 1989 at the Institute of Alternative Energy Sources (Frascati, Italy), 3 hours after the start of pumping deuterium from a vessel with 100 g of Ti chips pre-deuterated at 40 atm and heating it from the temperature of liquid nitrogen to room temperature neutron emission began and lasted 20 hours. At the maximum, 1000 counts/hour were observed, which, with a counter efficiency of $5 \cdot 10^{-5}$, corresponds to an intensity of 5000 neutrons/s. The thermal effect was not determined. It is argued that electrolysis is not necessary to emit neutrons through possible DD fusion. At the same time, it is necessary to create thermodynamically nonequilibrium conditions in the metal-deuterium system.

VINITI RZh 18V Nuclear Physics.-1989.-9.-ref.9B2

176. Neutron emission as a consequence of titanium-deuterium interaction. Emission of neutrons as a consequence of titanium-deuterium interaction / Scaramuzzi F., De Ninno A., Frattolillo A., Lo11obattista G., Podda S., Martinis L., Martine M., Mori L. // Nuovo Cim. A.-1989.-Vol.101.-No.5.-pp.842-844. -English

UDC 539.12/.17

The results of an experiment on measuring the neutron yield during the absorption of deuterium from the gaseous state by titanium filings are presented. The gas pressure was chosen to be approximately 50 bar, and titanium was saturated with deuterium at the temperature of liquid nitrogen. Analysis of experimental data has shown that an increase in the neutron yield above the background value can be observed not only during the electrolysis of heavy water, but also during the absorption of gaseous deuterium. A necessary condition, according to the authors, is the nonequilibrium state of D in Ti. The fusion of two deuterium nuclei becomes possible through the process of absorption or release of D by titanium.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B7

177. A method for carrying out a low-temperature nuclear fusion reaction. / Bondarenko N.B., Kadnikov V.P., Maltsev A.G., Safonov V.M., Shentsev V.S., Tsvetkov S.A.//Application No. 4714410/25-071629 dated May 23, 1989.

UDC 539.12/.17

Claims: 1. A method for carrying out the reaction of low-temperature nuclear fusion of hydrogen isotopes, which consists in saturating a volume of metal dissolving deuterium (tritium), characterized in that, in order to increase the overall energy yield of the reaction, saturation is carried out directly from the gas phase, when the temperature of the metal changes and gas pressure in such a way that the “metal-deuterium (tritium)” system is transferred from the single-phase region to the heterophase region. 2. The method according to claim 1, characterized in that the temperature and pressure are changed cyclically, ensuring a periodic transition of the “metal-deuterium (tritium)” system from a single-phase region to a heterogeneous one and back.

178. Search for neutron emission from deuterated palladium. A search for neutron emission from deuterated palladium /Serge S.E., Batistoni R., Bertalot L., Bettinali L., Martone M., Rodda S. //Rapp.Tesn./ENEA.-1989.-No.12.-pp.1-30.

UDC 539.12/.17

An attempt was made to observe the influence of phase transformations in deuterated Pd on the probability of a CCN reaction. Deuteration of Pd rods with a diameter of 2 mm was carried out in an atmosphere of gaseous deuterium at different pressures. The deuterium concentration in deuterides PdDx varied within the range of $0.2<x<0.6$. The temperature varied in the range of 77-600 K. The change in D at various combinations of temperature, pressure and concentration (which corresponded to different phase compositions of the deuteride) did not exceed 3 neutrons/s per 1 g of Pd. No variations in the neutron flux that could be compared with phase transformations in deuteride were detected.

VINITI RZh 168 Nuclear physics.-1990.-7.-ref.7B8

179. Search for neutron emission from the deuterium-titanium system. Search for neutron emission from a deuterium-titanium system /Bruschi L., Santini M., Torzo G., Nardelli G.//Europhys.Lett. -1990.-Vol.11.-No.4.-pp.303- 308.-eng.

UDC 539. 12/. 17

The results of experiments undertaken to verify reported observations of neutron emission during the deuteration of titanium in an atmosphere of pressurized deuterium gas are reported. Changes in the neutron flux were carried out with TiD_x deuterides ($x<1.65$) in the temperature range of 77-1100 K. Deuteration was carried out at pressures of 10^1-10^5 Pa. The neutron count rate was measured for samples

with different D concentrations under both equilibrium and nonequilibrium conditions. It was found that the neutron count rate does not depend on the deuterium concentration and does not change with changes in temperature and pressure. No increase in the neutron count rate was detected during deuteration. The upper limit for the probability of a CNS reaction was found to be $2 \cdot 10^{-22}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B9

180. Search for a cold fusion reaction during the introduction of D2 into metal titanium and palladium and their deuterides. Search for cold fusion in high-pressure D2-loaded titanium and palladium metal and deuteride / Schirber J.E., Bit1er M.A., Gin1ey D.S., Ewing R.I.// Fusion Technol.-1989.-Vol.16.-No .3.-pp.397-400.-eng.

UDC 539. 12/. 17

An attempt was made to detect the emission of neutrons during the deuteration of Pd and Ti (as well as PdD_x and TiD_x) in an atmosphere of gaseous deuterium at pressures up to 2.4 kbar and temperatures of 570-1170 K. Count rate measurements were carried out at various combinations of temperatures and pressures and at various concentrations deuterium in metals. The duration of each experiment was 3-200 hours. No increase in the intensity of the neutron flux (compared to the natural background) was detected. There were also no cases of pulsed neutron emission during short time intervals. It is concluded that previously published data on the observation of neutron emission during the deuteration of metals in gaseous deuterium can be explained by incorrect processing of experimental data.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B11

181. An attempt to observe induced neutron emission from the titanium-deuterium system. Trials to induce neutron emission from a titanium-deuterium system /Werle N., Fieg G., Lebkucher J., Moschke M. // Fusion Technol.-1989.-Vol.16.-No.3.-pp.391- 396.-English

UDC 539. 12/. 17

An attempt was made to reproduce the results of experiments in which neutron emission was observed during the deuteration of Ti under nonequilibrium conditions (with changes in temperature or pressure). The neutron flux was changed using proportional detectors located close to the samples under study inside a

polyethylene moderator. The neutron count rate was measured at various temperatures and pressures (up to 50 bar). During the entire experiment, no change in the neutron count rate compared to the background was detected. For a titanium sample weighing 24 g, the neutron flux intensity did not exceed 0.6 s^{-1}.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B12

182. Search for neutrons emitted by the titanium-deuterium system. Search for neutrons from the titanium-deuterium system /Kamm G.M., Ehrlich A.S., Gillespie D.J., Powers W.J. // Fusion Technol.-1990.-Vol. 16.-No.3.-pp.401-403.-Eng.

UDC 539. 12/. 17

In order to detect the reaction of CNS in metal matrices, variations in the neutron flux during the deuteration of titanium in an atmosphere of gaseous D_2 at pressures up to 62 bar were studied. The measurements were carried out in the temperature range 77-300 K. In different experiments, deuteration was carried out at different pressures and temperatures. Some experiments involved cycling the temperature of deuterated titanium. No increase in the neutron count rate (compared to the background) was detected. The possible influence of the crystal structure of titanium deuterides on the probability of CCN reactions is discussed.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B13

183. Study of neutron emission from palladium alloys saturated with deuterium. / Govorov B.V., Gryaznov V.M., Eremin N.V., Karavanov A.N., Roshan N.R., Tulinov A.F., Tyapkin I.V.//Zh. Phys. chemistry. -1990.-vol. 64.-No.2.-p.539-540.

UDC 539. 12/. 17

Confirmation of neutron emission during heat treatment of Pd alloys (20 wt.% Sm and 6 wt.% Ru) saturated with deuterium was obtained. The excess of the neutron flux over the background was 1.8±0.3 for the Pd-Sm alloy and 1.9±0.3 for the Pd-Ru alloy.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B14

184. Search for the emission of energetic charged particles from deuterated Ti and Pd foils. Search for energetic-charged-particle emission from deuterated Ti and Pd foils / Rice R.V., Barwick S.W., Williams W.T., Porter J.D. //Phus. Rev. Lett.-1989.-Vol.63.-No.18.-pp.1926-1929.-English.

UDC 539.172.13/.16

Experiments were carried out aimed at searching for charged particles from CCN reactions during the diffusion of deuterium from the gas phase or during electrolysis in Ti and Pd foils. Registration of charged particles was carried out using a CR-39 plastic track detector. Using TiD_2 and PdD_x samples (x>0.4) placed in gas columns with deuterium at a pressure of 1-15 bar and a temperature of 77-300 K, an upper estimate of the DD synthesis rate was obtained, amounting to 0.7 $cm^{-3} \cdot s^{-1}$. For the electrolysis process using $PdD_{0,8}$ electrodes, the upper estimate of the DD synthesis rate was 0.0018 $cm^{-3} \cdot s^{-1}$.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8V190

185. Limitation on the number of neutrons emitted from gas-saturated Ti-D systems. Neutron limits from gas-loaded Ti-D systems /Eberhard V., Neeringa W., K1ages N.O., Mashuw R., Volker G., Zeitnitz B.//Z. Phys. A.-1989.-Vol.334.-No.3.-pp. 357-358. -English

UDC 539. 172. 13/. 16

The results of an experiment on changes in the neutron yield during deuteration of Ti samples from the gas phase are presented. Registration of neutrons was carried out using four liquid scintillation Ne213 detectors (efficiency 6%), surrounding on all sides a chamber in which Ti shavings (weighing 100 g) were placed. To isolate the cosmic component, a plastic scintillator detector with a volume of 70x40x20 cm^3 was located under the installation, turned on in the anti-coincidence mode with Ne213 detectors. Several cycles of neutron yield measurements were carried out, during which chips were annealed in a vacuum at a high temperature, deuterated at liquid nitrogen temperature, followed by heating in two stages - at room temperature and at a temperature of 120^0C. No sources of neutrons with an intensity greater than 0.6 neutrons/s were detected.

VINITI RZh 18V Nuclear Physics. -1990.-6.-ref.63226

186. Search for neutron emission from the palladium-deuterium system. Search for emission of neutrons from a palladium-deuterium system /Botter F., Boucher J., Collot J., Kajfasz E., Lefievre V., Lesquou E., Stutz A., Tistchenko S., Zulberajch S. //Phus. Lett. V.-1989.-Vol.232.-No.4.-pp.536-538.-English.

UDC 539. 12/. 17

In an underground laboratory with a low level of neutron background, experiments were carried out on changing the neutron count rate in the process of deuteration with increasing pressure and in the process of desorption of deuterium with decreasing pressure with samples of palladium black (with grain sizes of 1÷30 microns) weighing 50 g. Control experiments were carried out with ordinary (light) hydrogen. The excess of the neutron count rate in experiments with deuterium (compared to ordinary hydrogen) was 0.1 neutrons/hour. Taking into account the efficiency of the detectors, the upper daily limit for the probability of neutron production in the experiment was found to be 10 neutrons/hour.

VINITI RZH 18V Nuclear Physics. -1990.-5.-ref.5B1

187. Results of studying cold nuclear fusion at the Atomic Research Centre named after. Woman. Cold fusion results from BARC /Iuendar R.K.//Curr.Ssi.- 1989.- Vol.58.-No.18.-p.999.-Eng.

UDC 539. 12/. 17

At the BARC Centre (Bombay, India), data on the flow of chemical reactions were obtained, both during electrochemical and in experiments with the deuteration of metals with gaseous deuterium at high pressures. The main product of the reaction is tritium. The ratio of the number of emitted neutrons to the number of tritium atoms formed does not exceed $1 \cdot 10^{-8}$. In some experiments, pulsed neutron emission was observed. Neutron radiation pulses with a duration of about 100 μs correspond to a DD reaction rate of 10^{10} s^{-1}. Using autoradiography, it has been shown that titanium contains small areas in which CCN reactions occur particularly intensely. It is assumed that these regions correspond to regions of high concentration of defects in the titanium lattice.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B6

188. Search for neutron production in niobium deuteride. Search for the neutron production in niobium deuteride /Demanins F., Graziani M., Kaspar J., Modesti S., Rosei R., Raisihc F., Tommasini F., Trovarelli A.//Solid State Commun. -1989, - Vol.71.-No.7.-pp.559-561.-Eng.

UDC 53912/.17

An attempt was made to detect the emission of neutrons caused by the reaction of the chemical reactor during the formation and decomposition of niobium deuteride. Niobium metal powder was saturated with deuterium from the gas phase at pressures up to 50 bar. Niobium deuteride was formed by gradually heating the

powder to 650 K. An increase in temperature to 750 K was accompanied by the decomposition of the deuteride and the removal of deuterium from the metal. The neutron flux intensity was measured using a scintillation detector during the formation and decomposition of deuteride, as well as during cooling of the deuteride to a temperature of 77 K and subsequent gradual heating to room temperature. No increase in the intensity of the neutron flux was detected compared to the background. The neutron emission rate does not exceed $7 \cdot 10^{-25}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B3

189. Cold nuclear fusion in a plasma discharge with a palladium cathode. A novel apparatus to investigate the psychology of plasma-assisted cold fusion / Ruzic D.N., Schatz K.D., Nguyen P.L. // Fusion Technol.-1989.-Vol.16.-No.2.-pp. 251-253. - English

UDC 621.039.6

A new approach to the study of chemical nuclear reactors is proposed, based on the creation of a plasma discharge in deuterium gas with a Pd cathode. In this case, it becomes possible to control the density and temperature of deuterium, as well as the discharge current. Diagnostics of possible reaction products is supposed to be carried out using a standard charged particle detector, calibrated on a ^{235}U alpha particle source with a maximum sensitivity in the range of 3 MeV. In addition, a BF_3 neutron detector and a Geiger counter were used. The installation parameters allow you to vary the deuterium pressure and plasma current over a wide range. To date, experiments have been carried out for a small range of available parameters, and no signals exceeding background values have been recorded (University of Illinois, USA).

VINITI RZh 22U Nuclear energy. -1990.-6.-ref. 8У468

190. Preliminary experimental study of cold nuclear fusion using deuterium gas and deuterium plasma in the presence of palladium. Preliminary experimental study on cold fusion using deuterium gas and deuterium plasma in the presentation of palladium /Gu A.G., Teng R. K.F., Miller M.S., Sprouse W.J. //Fusion Techno1.-1989.-Vol.16.-No.2.-pp.248-250.

UDC 621.039.6

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U649

191. Nuclear fusion in a solid state. Nuclear fusion in solid /Nishizawa K., Wada N.//Jar. J. Appl. Phys. Pt.2.-1989.-Vol.28.-No.11.-pp. L2017-L2020.-Eng.

UDC 539. 12/. 17

During the saturation of the surface layers of Pd as a result of bombardment with deuterium ions during a high-voltage discharge in gaseous D_2, spontaneous emission of neutrons was observed (within 63 seconds after the termination of the electric discharge, the neutron count rate was $2 \cdot 10^4$ times higher than the background). Following the main neutron emission pulse, pulses of lower intensity were observed. It is assumed that under the conditions of this experiment, a very high concentration of deuterium is realized in the surface layers of Pd, which contributes to the formation of deuterium microbubbles. The sharp increase in the probability of a CNF reaction is due to the high internal pressure in deuterium bubbles.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B4

192. A large number of neutrons observed during cold fusion experiments. Large number of neutrons observed in cold fusion tests //Atoms JAR. -1989.-Vol.33.-No.12.-pp. 16-17.-English

UDC 539. 12/. 17

The results of experiments conducted at the universities of Nagoya and Osaka (Japan) are reported. One group of researchers reported the observation of neutron pulses 2.10^4 times higher than background when conducting experiments with Pd electrodes placed in a deuterium gas mixture under a pressure of 1 atm under a high-voltage discharge for 10 minutes. Another group of researchers reported that a neutron flux of $2 \cdot 10^6$ times the background was observed when using positive Pt and negative Pd electrodes. When measuring the temperature inside the Pd electrode, it was found that the temperature increases quite gradually as deuterium is absorbed. At a temperature of 110°C, palladium begins to free itself from absorbed deuterium, lowering its temperature to 80°C, and then the process is repeated.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B10

193. Experiments on cold nuclear fusion in Pd and Ti saturated with deuterium by ion implantation. / Zelensky V.F., Rybalko V.F., Morozov A.N., Tolstolutskaya G.D., Kulish V.G., Pistryak S.V., Martynov I.S. // Issue of atomic science and technology. Ser. Physics of radiation confirmations and radiation materials science. -1990.-Vol. 1(52).-pp.65-77.

UDC 539.172.8: 539.172.13: 539.2

Experiments were carried out on the saturation of deuterium by the method of ion implantation of Pd and Ti targets and the study of the emission of neutrons and charged particles from irradiated targets. Pd films 150–600 nm thick deposited on oxidized nickel substrates and Ti foils 300 μm thick were irradiated with 25 keV deuterium ions at a temperature of 100 K. An increase in the neutron count rate was detected when cooling deuterium-saturated targets from 100 to 77 K after cessation of irradiation, as well as when heating samples in the temperature range 77-1300 K. The maximum intensity of a hypothetical neutron source is 10^2 neutrons/s. Under the same conditions as for neutrons, the emission of charged particles (3He,t,p) was recorded, the intensity of which is more than an order of magnitude lower than that of neutrons.

194. Study of gases released from palladium, nickel and copper irradiated with D2 ions, from palladium saturated with gases during the electrolysis of heavy water and when heated in a deuterium atmosphere / Budnikov A.T., Danilov P.A., Kartamyshev G.A., Katrich N.P., Seminozhenko V.P. // Issues of atomic science and technology. Ser. Physics of radiation damage and radiation materials science. - 1990.-Issue. 1(52).-p. 81-88.

UDC 539. 172.8: 539.172.13: 539.2

Using a super vacuum installation, the composition of the gaseous medium formed during the electrolysis of heavy water using Pd, Ni, Cu electrodes was studied using the method of mass spectroscopic measurements and selective pumping in a closed volume of chemically active and inert gases. Thermal desorption of gases was studied: from palladium electrodes saturated with gases during 10 hours of electrolysis, from palladium samples saturated with deuterium from the gas phase at a pressure of 1 atm and 600 K, from Pd, Ni and Cu during irradiation with doses of 10^{19} cm^{-2} D_2 ions with E=15÷20 keV. It has been shown that the thermal desorption spectra of gases from Pd electrodes saturated with deuterium from the gas phase, as well as the thermal desorption spectra of gases from Pd, Ni and Cu irradiated with deuterium ions, consist of di- and triatomic molecules of hydrogen isotopes recombined on the metal surface. In the listed studies, the release of 3He, 4He and tritium did not exceed 10^{-8} g/s.

195. Experimental studies of cold nuclear D-D fusion during ion implantation / Zelensky V.F., Bozhko V.P., Golovnya V.Ya., Oleynik S.N. // Issues of atomic science and technology. Ser; Physics of radiation damage and radiation materials science. - 1990.-Vol. 1(52).-p.91-93.

UDC 539. 172.8: 539.172.13 : 539.2

Based on the experimental stand of the NG-200 neutron generator, a technique was created for studying the processes of cold DD fusion during ion implantation. Pd and Ti samples were studied, saturated at a temperature of 80 K with deuterons with energies in the range of 80÷140 keV to doses of 10^{18}÷10^{19} cm^{-2}. Implantation control was carried out by recording accompanying α, p, n radiation; Synthesis events were studied at the stage of sample annealing using mainly the proton channel. For a Pd sample in the mode of cyclic annealing in the temperature range of 80÷150 K, the upper limit of the CNC probability value of $8 \cdot 10^{-22}$ s^{-1} per DD pair was obtained.

196. On the registration of tritium and neutrons during and after irradiation of palladium with accelerated deuterium ions /Budnikov A.T., Zuber V.M., Kartamyshev G.A., Katrich N.P., Seminozhenko V.P.//Preprint VNII single crystals. -1989.-No.4.-12 p.

UDC 539.172.13

The results of an experiment on measuring gases D_2, T_2, HD, ^{3}He, DT, released during and after irradiation of Pd samples with accelerated deuterium ions using a mass spectrometric technique, are presented. During the experiment, an ultra-high (10^{-10} mm Hg) vacuum was maintained in the chamber. Pd targets were irradiated with beams of deuterium ions with an energy of 15÷18 keV and a current of 5÷10 μA/cm^2 for 5 hours. Data are provided on the composition of gases in the chamber before and during irradiation, as well as data on the dependence of the rate of isothermal desorption of gases on time. An attempt was made to register neutrons using ^{10}B+ZnS(Ag)-, LiF(Eu)- and LiF(TiO_2)-scintillation detectors. It has been shown that the rate of tritium release is no less than 10^9 times higher than the rate of neutron emission.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12B289

197. Search for evidence of the occurrence of a cold nuclear fusion reaction during the direct introduction of deuterium into palladium and indium. A search for evidence of cold fusion in the direct implantation of palladium and indium with deuterium / Durocher J.J.G., Gallor D.M., Kwor S.V., Mathur M.S., Mauer J.K., Mckee J.S.S., Mirzai A., Smith G.R., Yeo Y.N., Sharma K.S., Williams G. // Can. J. Phys.-1989.-Vol.67.-No.6.-pp.624-631.-Eng.

UDC 539. 12/. 17

The intensities of neutron fluxes arising during implantation of Pd and In with molecular deuterium ions with energies up to 60 keV were measured. The targets were irradiated for several hours at a current of 100 μA. In the experiment with an indium target, the generation of fast neutrons was also detected by measuring the spectrum of gamma radiation accompanying the inelastic scattering of neutrons by ^{115}In nuclei. During the implantation process, a significant increase in the neutron count rate was observed. In the gamma-ray spectrum, a line of 331.3 keV was observed, corresponding to the energy of the first excited state of the ^{115}In nucleus. For a Pd target after irradiation for 10 hours, the increase in the rate of neutron production reached 800 s^{-1}. These results should not be taken as an indication of the occurrence of a CNS reaction. The increase in neutron flux can be explained by the "hot" fusion reaction during the interaction of deuterons of suprathermal energies.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B2

198. Search for fusion reactions of deuterium atoms embedded in titanium. Search for fusion reaction between deuterium atoms implanted into titanium / Moller W., Behrisch R., Roth J., Scherzer B.N.M. // Nucl. Fusion. -1989.-Vol.29. No.7.-pp.1187-1190.-Eng.

UDC 539. 12/. 17

An attempt was made to detect protons with an energy of 3.02 MeV as a result of the fusion reaction of deuterium nuclei in Ti foil. The measurements were carried out with thin layers of titanium deuteride ($5 \cdot 10^{19}$ cm^{-2} D ions). A large area surface barrier detector was used to detect protons. The measurements continued for 30 hours. No statistically significant excess of the proton count rate above the background was detected. The upper limit for the number of protons recorded by the detector during the entire experiment is 2 s^{-1}. The probability of the fusion reaction of deuterium nuclei in titanium does not exceed $8 \cdot 10^{-24}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V7

199. Fusion reactions during titanium implantation with deuterium at low energies. Fusion reactions during low energy deuterium implantation into titanium /Behrisch R., Moller W., Roth J., Ottenberger W. // Nucl. Fusion. -1990.-Vol.30.-No.3.-pp. 441-446. -English

UDC 539. 12/. 17

The intensity of the emission of protons, which are formed as a result of the D(d,p)T reaction during the introduction of deuterons into titanium, was measured. The introduction of deuterium ions with energies of 0.3-6.0 keV was carried out at a

temperature of 140 K and at room temperature. The dose of introduced ions varied within the range of $1.8 \cdot 10^{17}$-$6.8 \cdot 10^{19}$ cm^{-2}. The intensity of proton emission was measured during the implantation process and for 65 hours after completion of the implantation process. At energies above 2 keV, the measured proton intensity corresponded to the known dependence of the D(d,p)T reaction on the deuteron energy. At lower energies during implantation, as well as after completion of implantation, no proton emission was detected. The upper limit for the reaction rate of CNS in $TiD_{1.8}$ is $1 \cdot 10^{-23}$ s^{-1} per DD pair.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B5

200. Fusion at the Brookhaven Ion Cluster. C1aster-ion fusion at Brookhaven //Fusion Pert.-1989.-Vol.10.-No.9.-pp.67-68.-Eng. Storage location of the State Public Library for Science and Technology of the USSR.

UDC 621.039.6

A report is presented on the observation of single events of thermonuclear fusion during the bombardment of a solid target containing deuterium with an ion cluster (CI) containing from 25 to 1300 D_2O molecules with energies of 200÷345 keV. In the experiments, thermonuclear ^3He (0.75 MeV), p (3 MeV) and t (1 MeV) were recorded. It is planned to continue experiments on firing a solid target with a CI using a Van de Graaff accelerator, which allows accelerating CI to energies of 5÷8 MeV.

VINITI RZh 22U Nuclear energy. -1990.-4.-ref.4U421

201. A new alternative experiment in the field of nuclear fusion. Neue Experimente zur alternative Kernfusion /Schmocker S. //Phus.Akad.Wiss.DDR.-Wiss. Informationzentrum Berlin. -1990.-B.16, No.2.-pp.1÷3.-German.

UDC 539. 121. 17

The interaction between deuterium nuclei during collisions of molecular ions $(D_2O)_n$ with a target made of deuterated titanium has been studied. Ions with a certain mass (containing 25÷130 D_2O molecules) were isolated using a mass separator and accelerated to an energy of 200÷325 keV. The reaction products of the chemical nuclear reactor were detected (protons with an energy of 3 MeV and tritium nuclei with an energy of 1 MeV). The effective cross section for the CCN reaction is maximum for ions containing 100÷500 D_2O molecules. The effective cross section for the CCN reaction is practically independent of the ion energy. It is assumed that the probability of a CNS reaction is determined by the compression and local heating of ions during their interaction with the target.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B5

202. Synthesis during cluster bombardment. C1aster-impact fusion / Beuhler R.J., Friedlander G., Friedman L. // Phys. Rev. Lett. -1989.-Vol.63.-No.12.-pp.1292-1295.-English.

UDC 539.172.13/.16

The process of fusion of deuterium nuclei upon irradiation of a Ti-D target with clusters consisting of D_2O molecules and accelerated to an energy of 325 keV is studied. Registration of protons - products of the D(d,p)T reaction - was carried out using a semiconductor surface-barrier detector. Analysis of the experimental results showed that the observed peaks in the energy spectra of reaction product particles are associated with collisions of $(D_2O)_n$ clusters with the target surface, and not with collisions of D or D_2 ions that may be present in the cluster beam. The measured dependences of the proton yield from the reaction under study on the energy and size of the molecular cluster are discussed. A possible reason for the increased yield of protons during the fusion of deuterium nuclei in such a low energy region, according to the authors, is associated with the process of local heating of the target and the formation of shock-type thermal waves during collisions of molecular clusters with the surface of a solid body.

VINITI RZh 18V Nuclear Physics. -1990.-6.-ref.6B228

203. Synthesis with heavy ions //In the world of science (Scientific American).-1989.-No.12.-pp. 14÷15.

UDC 539. 12/. 17

It is proposed to generate miniature thermonuclear explosions using a beam of accelerated charged particles of lead or another heavy element directed at capsules with hydrogen isotopes. Heavy ion fusion is a type of inertial plasma confinement fusion in which hydrogen explodes under the impact of various types of radiation.

204. Search for neutrons with an energy of 2.5 MeV when exposed to high-intensity muon and pion beams on D_2O electrolytic cells. Search for 2.5 MeV neutrons from D2O electrolytic cells stimulated by high-intensity muons and pions /Davies J.D., Rule G.J., Squier G.T.A., Bertin A., Bruschi M., Piccinini M., Vitale A., Zoscoli A., Jones S.E., Arler B., Bom V.R., De Haan N., Van Eijk S.W.E., Craston D.N., Jones S.R.,

Williams D.E., Anderson A.N., Eaton G.H. //Nuovo Cim.A.-1990.-Vol. 103.-No.1.-pp. 155-162.-English

UDC 549. 172.5/.6

A study was carried out of the emission of neutrons with an energy of 1.9÷3.0 MeV from deuterium-charged Pd- and Ti-cathodes under the influence of a beam of muons and pions with an intensity of $2 \cdot 10^4$ muon/s and $1 \cdot 10^4$ pion/s. A D_2O solution containing 0.1 M LiOD for the Pd cathode and 0.1 M D_2SO_4 for the Ti cathode served as a source of deuterons. To create electrons, ultrapure Pd and Ti foils with a thickness of 250 microns and 400 microns, respectively, were used. The current density during electrolysis was 100 mA/cm^2 for Pd and 300 mA/cm_2 for Ti electrodes. The characteristic diffusion time is 2 hours. A Ne213 liquid scintillator (12x12x7 cm) was used to detect neutrons. The emission of 2÷3 neutrons per 1000 stopped muons and pions was detected.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8V154

205. More about cold fusion. More on cold fusion /Chatter jee L.//Nature.-1989.-Vol.342.-No.6247.-p.232.-Eng.

UDC 539. 172. 17

The results of an experiment in which the effect of irradiation of deuterated Pd with negative muons on the intensity of neutron emission was studied are discussed. The negative result of this experiment means that the emission of neutrons during the deuteration of metallic Pd cannot be explained by muon catalysis involving cosmic muons. Attention is drawn to the fact that in Pd the interaction of D nuclei with muons can be weakened due to the strong interaction of muons with positively charged ions of the metal matrix. To evaluate this effect, it is proposed to study the intensity of neutron emission during the interaction of muons with liquid deuterium.

VINITI RZh 18B Nuclear Physics. -1990.-7.-ref.7B23

206. A new method for obtaining nuclear fusion in metals. A new method of testing nuclear fusion in metals / Itoh N. // Res.Ret. /Inst. Plasma Phys. Nagoua Univ.-1989.-No.915.-pp.1÷5.-Eng.

UDC 539. 12/. 17

One of the main parameters that determine the rate of the reaction of a chemical nuclear reactor is the energy of deuterons. In experiments with electrochemical deuteration of Pd or Ti, this energy is not controlled. A method for

studying CCN reactions is proposed, based on increasing the average energy of deuterium nuclei by local heating by pulsed laser radiation. It is proposed to use particles of deuterated metal weighing about 1 μg embedded in a glassy matrix. With appropriate selection of the matrix and wavelength of laser radiation, it is possible to provide short-term heating of metal particles without transferring thermal energy to the matrix. With a laser pulse power of 1 J and a pulse duration of 1 μs, the temperature of the D nuclei can be increased to 1 keV.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12B3

207. High-flux neutron generator with a long-lived target. Générateur de neutrons a haut flux avec cible a grande durée de vil. Application 2630251 France, MKI G 21 K 5/00; G 01 N 23/00 /Verschoore G., S.A. D'Etudes et realizations nucleaires. - No.8805147; Declared 04/19/89; Published 10/20/89.

UDC 539. 172. 13

To achieve a high neutron yield in neutron generators that use the interaction of accelerated D and T ions with D and T nuclei in the target, the nuclei of heavy hydrogen isotopes are fixed in a crystal lattice of a metal, for example, titanium. Such targets, however, are short-lived due to the erosion of titanium when the concentration of hydrogen isotopes in it increases. A target design has been proposed to reduce the erosion effect and increase life expectancy. The target consists of a metal substrate with high thermal conductivity and low volatility (for example, Mo), onto which several active layers of titanium are deposited, isolated from each other by diffusion barriers. Diffusion barriers are formed using nitriding, oxidation, ion implantation and other methods. The design of a neutron generator using a layered target is described.

VINITI RZh 18V Nuclear Physics.1990.-6.-ref.6V538P

208. On the initiation of DD reactions during friction in the titanium-deuterated polymer system/Lipson A.G., Klyuev V.A., Toporov Yu.P., Deryagin B.V., Sakov D.M. // Letters to ZhTF. -1989.-vol.15.-N.17.-p.26-29.

UDC 539. 12/. 17

The possibility of a CNS reaction occurring during the mechanical interaction (friction) of titanium with deuterated polyethylene immersed in heavy water has been studied. During the friction process (during rotation of the Ti cylinder), the emission of neutrons was observed. The maximum intensity of the neutron flux was observed at a cylinder rotation speed of 500-1500 rpm (3÷7 times higher than the

natural background). A necessary condition for the occurrence of a neutron flux is cooling of the friction unit with liquid nitrogen. The emission of neutrons was observed during the first 2÷3 minutes after the start of the experiment. In addition, an increased neutron count rate was observed within 12÷15 minutes after the cylinder stopped rotating. It is assumed that the emission of neutrons is associated with the formation of titanium deuteride during friction. The CCN reaction is caused either by the acceleration of D nuclei in microcracks, or by the compression of deuterium in microcavities formed during the interaction of Ti with D.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B9

209. On the possible mechanism of cold nuclear fusion / Karpov S.Yu., Myachin V.E., Kovalchuk Yu.V., Pogorelsky Yu.V.//Letters in ZhTF. -1990.-vol. 16.-N.5. -p.91-94.

UDC 539. 12/. 17

An experiment was carried out to detect neutrons during the dissolution of hydrogen bromide in a saturated solution of potassium iodide in D_2O. In one of the five reactions tested, a short-term emission of neutrons was observed with an intensity 2 times higher than the background value. In a control experiment using the same reagents, but replacing deuterium with hydrogen, no neutron emission was observed. It is assumed that the emission of neutrons is a consequence of the fusion reaction of deuterons during a chemical reaction. The increase in the probability of a chemical reaction is due to electronic screening during the penetration of ions into the internal electronic shells of heavy elements and thermal activation of D ions under the influence of energy released during chemical reactions.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B4

IV. THEORIES, HYPOTHESES

210. First steps towards understanding cold nuclear fusion. First steps toward an understanding of cold nuclear fusion /Bressani T., Del Guidice E., Prerarata G.//Nuovo Cim.A.-1990.-Vol.101.-No.5.-pp.845-849.- English

UDC 539. 12/. 17

The purpose of the work was to search for ways to a theoretical understanding of CNF and its main characteristics. The main problems that arise in this case are: 1. why and how a Pd or Ti lattice can "catalyse" the process of nuclear fusion; 2. why and how synthesis occurs not as *in vacuo*, i.e. without the emission of neutrons, the authors try to overcome this by using the collective interactions of atoms and electrons as plasma through a quantized electromagnetic field to describe the condensed phase. This made it possible to find a natural mechanism for reducing the Coulomb repulsion and suppressing conventional nuclear fusion channels compared to the direct transfer of excess energy directly to the electrons of the metal, and the corresponding reaction rate constant can be increased from 10^{-29} to 10^{-20} s^{-1} if the deuterons are in nonequilibrium conditions.

VINITI RZH 18V Nuclear Physics. -1989.-9.-ref.9B3

211. Cold fusion in metals (deuterons in palladium). Cold fusion in metals (deutrons/palladium) / Parmenter R.N., Lamb W.E. (Jr.) // Proc.Nat.Asad.Ssi.USA. -1989.-Vol.86.-No.22.-pp.8614 -8617.-English

UDC 539. 12/. 17

The Thomas-Fermi method is used to calculate the screening of the charge of D nuclei by conduction electrons in metal matrices. The calculations took into account the collective effects associated with the delocalization of the valence electrons of Pd and D. It was shown that the redistribution of electron density in the conduction band during screening can have a significant effect on the permeability of the Coulomb barrier between D nuclei. Numerical calculations were carried out for D nuclei in the Pd matrix. The probability of the fusion reaction of D nuclei in Pd can reach a value of 10^{-30} s^{-1}.

VINITI RZH 18V Nuclear Physics. -1990.-6.-ref.6B7

212. Shielding effect for impurities in metals: a possible explanation for the process of cold nuclear fusion. Screening effect of impurities in metal and the Russian

explanation of the process of cold nuclear fusion /Vaselli M., Maritn M.A., Palleschi V. Savetti S.// Nuovo Cim.D.-1989.-Vol.11.-No .6.- pp. 927-932. -English

UDC 539. 12/. 17

The influence of electronic screening on the equilibrium distance between deuterium ions in Pd-D solid solutions with a high deuterium concentration is considered. Calculations of the screening length were carried out within the framework of the Thomas-Fermi model and the Debye model. Conduction band electrons were considered within the framework of the free electron approximation. It was found that the screening length for D ions in Pd can be significantly less than the distance between deuterium nuclei in a free D_2 molecule. Under real nonequilibrium conditions, fluctuations in the distance between deuterium ions are possible, which can lead to a sharp increase in the probability of fusion of some part of the interstitial deuterium ions.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B5

213. The role of combined electron-deuteron screening in the fusion reaction in metals. The role of combined electron-deuteron screening in d-d fusion in meta1s / Vaidua S.N., Mauua Y.S. // Paper: J. Phys.-1989.-Vol.33.-No.2.-pp.343-346.-Eng.

UDC 539.12/.17

The influence of screening of the nuclear Coulomb potential on the probability of the fusion reaction of D nuclei in Pd is considered. A model is proposed that takes into account the high mobility of D ions in Pd. Calculations were carried out by the Thomas-Fermi method for a particle system consisting of negatively charged fermions (electrons) and positively charged bosons (deuterons). It was found that combined electron-deuteron screening of the nuclear potential is more effective than electron screening. For the system considered, the probability of a CNS reaction can reach $10^{-16} \div 10^{-14}$ s^{-1} per DD pair. The efficiency of electron-deuteron screening can increase under the influence of the electrostatic potential during the electrochemical deuteration of palladium.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B17

214. The theory of the influence of shielding on the acceleration of the D-D fusion reaction in metals. Theory of screening enhanced D-D fusion in meta1s / Vaidua S.N., Mauua Y.S. //Jar. J. Appl. Phys. Pt.2.-1989.-Vol.28.-No.12.-pp. L2258-L2260.-Eng.

UDC 539. 12/. 17

The influence of electrostatic interactions on the probability of a CNS reaction in deuterated metals is considered. A model is proposed according to which a transition metal containing a high concentration of D can be considered as a system consisting of two interacting subsystems: fermionic (electrons) and bosonic (deuterons). The correctness of the model is determined by the high mobility of D ions, which allows us to consider deuterons as completely delocalized particles. Within the framework of the proposed model, electronic shielding sharply increases the probability of a CNS reaction (from 10^{-27} to $2.5 \cdot 10^{-6}$ s^{-1} per DD pair), however, at low temperatures the considered model may be incorrect due to a decrease in the mobility of deuterium ions.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B2

215. The theory of cold nuclear fusion in deuterated palladium. A theory of cold nuclear fusion in deuterium-loaded palladium / Ghosh S.K., Dhara A.K., Sadhukhan N.K. // Pramana: J. Phys.-1989.-Vol.33.-No.2.-pp. L339-L342.-Eng.

UDC 539. 12/. 17

The influence of electron screening on the probability of fusion reactions of D nuclei in Pd is considered. A model has been proposed according to which D in Pd is in the state of bosonic plasma, formed under the influence of strong internal pressure at high concentrations of D. It has been found that within the framework of this model, electronic screening sharply increases the permeability of the Coulomb barrier between D nuclei in the D_2 quasi-molecule. The probability of a CNS reaction can exceed 10^{-18} s^{-1} per DD pair, which is sufficient for direct observation of CNS products.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B15

216. Study of electronic screening of nuclear reactions at sub barrier energies. Search for electronic screening of nuclear reactions at sub-Coulomb energies / Schroder U., Engstler S., Neldner K., Rolfs S., Somorjai E. // Nucl. Instrum. andMeth. Phys. Res. V.-1989.-Vol.40-41, Pt.1.-pp.446-469.-English.

UDC 539.172.13/.16

The reaction $^3He(d,p)^4He$ at energies of 6÷42 keV was experimentally studied. Beams of D, D_2, D_3 ions and a ^3He gas target, as well as a beam of ^3He ions and a D_2 gas target were used. The results demonstrate for the first time the electron shielding

effect for low-energy fusion reactions, i.e. an almost exponential increase in the cross section compared to the cross section on a bare core. For the case of a D_2 target, this increase is approximately 2 times less due to the molecular structure of the target.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B184

217. Increase in the rate of cold fusion reaction under the influence of electronic polarization in deuterated palladium. Enhancement of cold fusion rate by electronic polymerization in palladium deuterium solid / Feng S. // Solid State Commun. -1989.-Vol.72.-No.2.-pp.205-209.-Eng.

UDC 539. 12/. 17

The probability of the fusion reaction of D nuclei in Pd can be significantly increased (compared to this probability in free deuterium molecules) under the influence of electron density redistribution and screening of the Coulomb potential. The permeability of the Coulomb barrier between D nuclei in the Pd-D system is considered within the framework of the random phase approximation. It was assumed that the high dielectric constant of the Pd-D system with a high deuterium concentration contributes to effective shielding of the nuclear charge, which is accompanied by a sharp increase in the permeability of the Coulomb barrier. The probability of a CNS reaction can increase to 10^{-40} s^{-1}, which is 20 orders of magnitude greater than the probability of a reaction in a free molecule. The found reaction probability value is still too small for direct observation of the CCN reaction in experiments with deuterated palladium.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B7

218. Chemical interactions associated with deuterium atoms embedded in palladium. Chemisa1 forces associated with deuterium confinement in palladium / Mintmire J.M., Dunlar B.I., Brenner D.W., Ladouceur N.V., Mowreu R.S., Schmidt R.R. // Phys.Lett. -1989.-Vol.138.-No.1-2.-pp.51-59.-Eng.

UDC 539.12/.17

A theoretical analysis of the stability of various configurations of D atoms in solid solutions of the Pd-D system with a high deuterium concentration was carried out. Electron density distribution functions and potential density surfaces or using model interaction potentials for clusters containing 108 palladium atoms. It was assumed that the concentration of D is high enough to fill all octahedral or tetrahedral interstices in the palladium lattice. It is shown that in the system considered there are no stable configurations in which the distance between

neighbouring atoms D would be less than this value in a free deuterium molecule. The calculation results do not confirm the model of the reaction mechanism of the CNS reaction, according to which quasi-molecules D_2 with an equilibrium distance between nuclei D equal to 0.03 nm are formed in the Pd lattice.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B4

219. Cold Fusion: How close to each other can the deuterium atoms in palladium be located? Cold fusion: how close can deuterium atoms come inside palladium? / Sun Z., Tomanek D. // Phus. Rev. Lett. -1989.-Vol.63.-No.1.-pp.59-61.-Eng.

UDC 539. 12/. 17

The local density functional method is used to calculate the total energy of the electronic structure and interatomic distances in a hypothetical crystal. Calculations were carried out within the framework of pseudopotential theory taking into account electronic correlations and exchange interaction. The functions of the density of electronic states, the distribution functions of the electron density, and the bond length in D_2 quasi molecules are determined. It was found that even at very high concentrations of D in Pd, which correspond to the considered PdD_2 crystal, the equilibrium distance between D nuclei exceeds this distance in a free D_2 molecule. It is concluded that the reaction of CNS in deuterated Pd is an extremely unlikely process.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B9

220. The influence of electronic shielding on the probability of cold nuclear fusion. Effest of electronics screening on cold nuclear fusion rates /Delleu V.//Europehus.Lett.-1990.-Vol.11.-No.4.-pp.347-352.-Eng.

UDC 539.12/.17

The influence of electron screening on the probability of the fusion reaction of D nuclei in deuterated transition metals is discussed. The probability of a CNS reaction was calculated using the local density functional formalism for clusters containing D atoms in octahedral and tetrahedral interstices of the crystal lattice. Electronic screening increases the permeability of the Coulomb barrier at small distances between nuclei. At the same time, shielding leads to a weakening of the chemical bond in the D_2 quasi-molecule, which is accompanied by an increase in the bond length. These two effects, to a first approximation, cancel each other out. It is concluded that electronic shielding should not significantly increase the probability of

a chemical reaction in metal matrices. The theoretical estimate for the upper limit of this probability is 10^{-50} s^{-1} per DD pair.

VINITI RZh 1VV Nuclear Physics. -1990.-7.-ref.7V1V

221. H-H interactions in Pd. N-H interactions in Pd / Christianen O.B., Ditlevsen R.D., Jacobsen K.W., Stoltze R., Nie1sen O.N., Norskov J.K. // Phys. Rev. V.-1989.-Vol.40.-No.3.-pp.1993-1996.-English.

UDC 537.1131

In connection with the problem of “cold” thermonuclear fusion, calculations of the interaction and equilibrium distance between a pair of D atoms in metallic Pd were carried out. To describe the influence of metal band electrons, the local electron gas density approximation was used. The effect of the lattice was described in the harmonic approximation. It is discussed that repulsion at short distances is significantly enhanced in a metal compared to a free H_2 molecule. Lattice polarization results in small attractive interactions over large distances. In general, they confirm the hypotheses about the convergence of dissolved H atoms.

VINITI RZh 18N Physics of Solid State. -1990.-6.-ref.6N69

222. Interactions of hydrogen atoms in PdHn (1<n<4). Hydrogen interactions in PdHn (1<n<4) / Wahg X.W., Louie S.G., Cohen M.L. // Phus..Rev.B.-1989.-Vol.40.-No.8.-pp.5822-5825.-Eng.

UDC 537.311.31

In connection with the discussion of the possibility of CNS, calculations of the interaction of hydrogen atoms dissolved in Pd at high concentrations were carried out. We used the self-consistent method of pseudopotentials “from first principles” in the local density functional approximation. It was assumed that the H atoms are located in the octahedral interstices of the fcc matrix. The calculated dissolution energies, effective H-H interaction potentials and electron density distributions do not confirm the possibility of a significant approach of H nuclei in the d-metal matrix, in particular, due to the screening of Coulomb repulsion by “heavy” d-electrons.

VINITI RZh 18N Physics of Solid State. -1990.-6.-ref.6N70

223. Increasing the probability of cold fusion in metal “hydrides” by screening the proton and deuteron charges. Enhancement of cold fusion in metal “hudrides” bu

screening of proton and deuteron charges / Burrows A. // Phus..Rev.B.-1989.-Vol.40.-No.5.-pp.3405-3408.- English

UDC 539.12/.17

The influence of electronic screening of the nuclear charge of a proton or deuteron in a Pd matrix on the probability of the fusion reaction of two deuterons or a deuteron with a proton is discussed. Electronic screening is most effective in transition metals with a high density of electronic states in the conduction band. It is shown that the screening length, which determines the efficiency of the Coulomb barrier between the H and D nuclei, in Pd can be significantly less than the nominal distance between the atoms. The exponential dependence of the barrier permeability on its length determines the strong dependence of the CNS probability on the screening length (0.03÷0.04 nm), the probability of nuclear fusion reaction D increases by 12 orders of magnitude. However, to explain the experimental data, which correspond to a large excess of thermal energy during palladium deuteration, the screening length must be significantly less than the indicated values.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B7

224. The nature of short-range interaction between D atoms in Pd. Nature of short range interaction between deuterium atoms in Pd / Liu F., Khanna S.N., Rao V.K., Jena R.// Solid State Commun. -1989.-Vol.72.-No.9.-pp.891- 894.-English

UDC 539.12/.17

In connection with the problem of CNS, the interaction between D atoms in the Pd metal matrix is considered. The radial dependence of the energy of a pair of atoms D is calculated. Calculations were carried out by the LCAO MO method within the framework of the local density functional approximation or the Hartree-Fock approximation. Numerical results were obtained for the Pd_6D_2 cluster; the arrangement of D atoms in the cluster corresponded to their location in the octahedral interstices of the Pd crystal lattice. The minimum potential energy for a D-D pair corresponds to a distance of 0.11 nm, which exceeds the length of the covalent bond in a free D_2 molecule. At small distances, the interaction between D in Pd is practically no different from this interaction in a free molecule. It is concluded that in Pd (as well as in other metal matrices) there are no factors that could significantly affect the probability of a CCN reaction.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B16

225. Analytical wave function of the deuteron. Analytical deutron wave func- tion /Oteo J.A. // Can.J.Phus.-1988.-Vol.66.-No.6.-pp.478-481.-Eng.

UDC 539.141/.142

A parameterization of the deuteron wave function in the form of a sum of exponentials is proposed

$$U(r) = A_s \cdot \left(1 - e^{\gamma r}\right) \cdot e^{-\alpha r} \cdot \sum_{i=0}^{n} C_i \cdot e^{-\alpha_i r}$$

and similarly for the d-wave function w(r). Parameterization allows one to obtain analytical expressions for the electric and magnetic form factors, quadrupole moment, root mean square radius, etc. The values of the parameters C_i, α_i, A_s that determine U(r) and w(r) are given.

VINITI RZh 18V Nuclear Physics-1990.-6.-ref.6B19

226. Hypothetical D-D bonded states in solid palladium. Nuropetical D-D bound states in solid palladium / Petelenz R. //Asta Phys. Pol. A.-1989.-Vol.75.-No.6.-pp.929-933.-English.

UDC 539.12/.17

The fusion reaction of D nuclei into Pd can become observable if the distance between the D nuclei turns out to be significantly less than this distance in the free D_2 molecule. The approach of D nuclei to short distances can be explained if we take into account the presence of vacancies in the palladium lattice. The Pd atom donates at least 2 electrons to the conduction band, so a Schottky-type vacancy can be considered as a center with a double negative charge. The Hamiltonian of the "vacancy-two neutrons" system is equivalent to the Hamiltonian of the helium atom with the mass of the electron replaced by the mass of the deuteron. The average distance between nuclei D in such a system is very small (10^{-4} nm), and the probability of fusion of two deuterons is very high. The considered model contains serious simplifications but can be used to qualitatively explain the high probability of the fusion reaction of D nuclei in metals.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V15

227. On the possibility of nuclear reactions occurring between deuterium nuclei in the electron shells of metal ions / Karasevsky A.I., Matyushov D.V., Gorodysky A.V. //Ukr. chem. zh.-1989.-vol. 55.-N.10.-pp.1036-1039.

UDC 539. 12/. 17

It is shown that in the electron shell of metal ions, effective attraction arises between two D nuclei, which can lead to their approach to distances at which tunnelling nuclear reactions between them are possible.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B14

228. Possible mechanism of cold nuclear fusion. A possible mechanism of cold fusion / Bhattacherjee J.K., Satratu L., Waghmare Y.R. // Ramana: J. Phys.-1989.-Vol.32.-No.6.-pp.1841-1844.-English.

UDC 539.12/.17

The influence of the electronic structure of Pd on the probability of a chemical reaction is considered. It is assumed that at a high deuterium concentration, D atoms in the Pd crystal lattice form an ordered system to which the Bloch theory of electron waves in waves is applicable. The electrons of D atoms localized in interstices form a common conduction band with the external electrons of the matrix atoms. The features of the electronic structure of Pd determine the possibility of the formation of electronic states with a large effective mass. An increase in the effective mass contributes to the screening of the positive charge D, which is equivalent to a sharp decrease in the Coulomb barrier in the space between the nuclei D. Within the framework of the strong binding model, an expression for the overlap integral of electronic wave functions is obtained.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B6

229. Influence of solid-state effects on the tunnelling probability for the d+d reaction at room temperature. Solid state effects on tunnelling probability for d+d nuclear fusion at room temperature / Matsunami N. // Radiat. Eff. and Defects Solids. -1990.-Vol.112.-No.4.-pp.181-188.-English.

UDC 539. 12/. 17

The probability of a chemical reaction in deuterated metals has been calculated. The calculations took into account the dependence of the permeability of the Coulomb barrier between deuterium nuclei on the effective electron mass and on the degree of efficiency of Coulomb screening of the nuclear charge by conduction band electrons. It is concluded that the combined influence of these two factors can increase the probability of a CNS reaction to values sufficient for the experimental study of this reaction. The probability of a CCN reaction increases if the interaction

between D nuclei occurs in one of the excited vibrational states of the D_2 quasi molecule.

VINITI RZh 18V Nuclear Physics. -1990.-.7-ref.7B19

230. Fluctuation increase in the transparency of quantum mechanical and wave barriers and some physical consequences / Altaysky M.V., Artekha S.N., Barts B.I., Baryakhtar V.G., Moiseev S.S. // Issues of atomic science and technology. Ser. Physics of radiation damage and radiation materials science. - 1990 - Issue. 1(52).- p.78-80.

UDC 539.17.01

It has been shown that fluctuations in barrier parameters caused by fluctuations in the solid (thermal displacements, the influence of heavy ions on the density of screening electrons, defects in the crystal, etc.) lead to the appearance of an additional factor $\exp(I_0^2.E_0^2/2)$ in the transmission coefficient , where E_0^2 is the noise dispersion, $I_0=2/\hbar. \int Dr \sqrt{2MU_0(r)}$ - determines the passage of the potential barrier U_0 in the absence of fluctuations. The appearance of this factor is closely related to the appearance of the well-known Debye-Waller factor in the theory of solids. The exponent is the ratio of two small parameters that characterize the level of fluctuations of the E_0^2 correlator and the Planck constant, which determines the purely quantum tunnelling effect. As a result, the ratio may not be small, and the increase in barrier transparency due to fluctuations in its parameters may be significant.

231. New model of elastic scattering of deuteron on deuteron. A new model for elastic deuteron-deuteron scattering / Etim E., Satta L. // Nuovo Cim. A.-1989.- Vol.102.-No.4.-pp.1024-1040.-English.

UDC 539.172.13/.16

Data on elastic deuteron-deuteron scattering cast doubt on the direct application of Glouber's theory of multiple scattering. These doubts are expected to be removed through an improved representation of the ground state wave function as a mixture of S and D waves. Within the framework of the proposed model, detailed knowledge of the ground state wave functions is not required.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B226

232. On the possibility of nuclear transformations in chemical reactions / Mazitov R.K. // Dokl. USSR Academy of Sciences. -1989.-vol.307.-N.5.-p.1158-1160.

UDC 539.12/.17

The fundamental possibility of synthesizing nuclei in a hydrogen molecule when they are introduced or interact on the surface with metals and alloys containing atoms with d- or f-electrons is considered. Hybridization of the wave functions of hydrogen with the wave functions of metal electrons leads to the “weighting” of electrons in orbitals near hydrogen, which leads to a decrease in the size of the orbitals. If these orbitals cover two H nuclei, then this decrease brings the nuclei closer together. The latter can be accompanied by a tunnel reaction of fusion of H nuclei. To carry out nuclear fusion at room temperatures, reactions of interaction of hydrogen molecules with alloys of rare earth elements and actinides have been proposed.

VINITI RZh 18V Nuclear Physics-1990.-1.-ref. 1B3

233. Coordinated structure of S- and D-pairs. Self-consistent structure of S and D pairs / Da N.L., Li M.Y. // Genshikaku kenkyu.-1989.-Vol.33.-No.6.-pp.173-181.

UDC 539.141/. 142

A new method for self-consistent construction of correlated nucleon pairs with moments L=0;2 is proposed. The structure of Hamiltonians of systems of S- and D-pairs is considered, taking into account the interaction between them, as well as taking into account blocking effects. A method for introducing a modified S-pair production operator and an operator for increasing the Seniority number in a given j-shell is described, and their connection with the nucleon production operator is established.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B79

234. Theoretical consideration of the process of cold nuclear fusion in a condensed medium. Theoretical synthesis on the cold nuclear fusion in condensed matter / Parmgiani F., Sona R.G. // Nuovo Cim. D.-1989.-Vol.11.-No.6.-pp.913-919.-Eng.

UDC 539.12/.17

The fundamental possibility of implementing CNS when Pd is saturated with deuterium is discussed. The probability of such a process strongly depends on the distance between the nuclei D in the deuterium molecule. To observe the fusion reaction products, it is necessary that this distance does not exceed 0.02-0.03 nm.

The formation of a quasi-molecule with such an equilibrium distance is possible under conditions when the concentration of D in Pd exceeds the equilibrium concentration corresponding to the solid solution in the Pd-D system. The sharp decrease in the distance between D atoms may be due to the hybridization of the wave functions of deuterium s-electrons and palladium d-electrons.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B3

235. Possible explanation of cold nuclear fusion / Davydov A.S. //Ukr. Phys. female - 1989. -vol.34.- N.9.-pp.1295-1300.

UDC 539.12/.17

Possible reasons for the increase in the probability of the fusion reaction of D nuclei upon saturation of metal Pd with deuterium are discussed. The influence of Pd on the reaction rate is determined by the high density of D in Pd and the high mobility of D atoms (close to the mobility of atoms in liquids). It is assumed that during the interaction of D atoms with matrix atoms, hybrid orbitals with a large effective mass of quasiparticles are formed. The formation of bipolar states is possible, in which the Coulomb repulsion between nuclei is greatly reduced due to the screening effect of negative quasiparticles. The formation of such states can be accompanied by the convergence of D nuclei due to the displacement of nuclei from their equilibrium positions in the lattice.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B10

236. On the question of the physical mechanism of the so-called cold nuclear fusion / Kulakov A.V., Orienko E.V., Rumyantsev A.A. // Izv. Academy of Sciences of the USSR. Energy and transport, -1990.-N.1.-pp.153-160.

UDC 539. 12/. 17

The mechanism of nuclear dd reactions occurring in the palladium crystal lattice is considered. It is shown that the action of exchange forces can explain the selective nature of fusion reactions with a reduced neutron yield.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B1

237. Effect of screening corrections on the probability of cold fusion of deuterium nuclei. Screening correction in cold deuterium fusion rates / Rolfs S., Langanke K., Assenban N.J. // Z. Phus.A.-1989.-Vol.333.-No.3.-pp.317-318.-Eng.

UDC 539.12/.17

The effect of electron screening on the permeability of the Coulomb barrier in the fusion reaction of D nuclei in the D_2 molecule and in the D_2 molecular ion has been calculated. The effective height of the Coulomb barrier significantly depends on the characteristics of the electron density distribution in space between the D nuclei. Under reasonable assumptions about the nature of the nuclear density distribution, taking into account screening increases the probability fusions by 6-14 orders of magnitude in the D_2 molecule and by 5-10 orders of magnitude in the D_2 ion. Electronic shielding should have a significant impact on the likelihood of muon catalysis.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref. 12B16

238. Exotic particles will decorate the path to the cold fusion reaction. Exotic pieces adorn the path to cold fusion //New Sci.-1989.-Vol.121.-No.1659.-p.19.-Eng.

UDC 539.12/.17

For 40 years, physicists have been trying various exotic methods of achieving nuclear fusion at low temperatures. In the last 5 years, S. Jones has also been working on this problem, solving the problem of fusion of deuterium and tritium nuclei using mu mesons as catalysts. Soviet theorists showed that at a certain density and temperature of deuterium, the reaction is significantly accelerated due to energy exchange processes.

VINITI RZh 18V Nuclear Physics. -1989.-6.-ref.6B6

239. Cold nuclear fusion / Jan Rafelsky, Stephen Jones // In the world of science (Scientific American).-1987.-N.9.-pp.52-58.

UDC 539. 12/. 17

The mechanism of muon catalysis of the fusion of D and T nuclei and the results of studies carried out at the muon factory of the Los Alamos National Laboratory LAMPF (LANL, USA) are considered. A test of the resonance model of catalysis showed that the rate of muon catalysis depends on temperature, and the most efficient process will be at a temperature of about 1200 K (in one case, 150 reactions of CNS to a muon were obtained).

240. Muon catalysis of nuclear fusion. Muon catalysed fusion: 4 Int. Workshop on Cross Sect. Fusion and Other App1., College Station, Tech., Nov. 3-5, 1988 / Cohen J.S. //Nucl. Instrum. and Meth. Phys. Res.B.-1989.-Vol.42.-No.4.-pp.419-425.-Eng.

UDC 621.039.6

A review of the current state of theoretical and experimental research in the field of muon catalysis is presented. Great interest in this kind of research is due to the possible practical significance of cold nuclear fusion, carried out using muon catalysis, and the fundamental nature of the research object itself. The D-T reaction involving a muon is examined in detail, and the main characteristics of this reaction are indicated.

VINITI RZh 22U Nuclear energy. -1990.-5.-ref.5U448

241. Synthesis with muon catalysis. Muon catalysed fusion / Pititiean S. // Fusion Eng. and Des.-1989.-Vol.1-2.-No.11.-pp.254-264.-Eng.

UDC 539.172.5/.6

The resonance mechanism of formation of a dtμ molecule is considered. Recent measurements (LAMPF, USA) have revealed a dependence of the probability of CNF on temperature and density. The results for the sticking effect are somewhat inconsistent and indicate lower values than theoretically expected. The reactivation of the μd system can make a decisive contribution to the reduction in adhesion.

VINITI RZh 18V Nuclear Physics, -1989.-11.-ref.11V156

242. Theorists join the cold fusion debate. Theocratists move in fusion debate / Hall N. //New Sci.-1989.-Vol.122.-No.1662.-pp.22-23.-Eng.

UDC 539.12/.17

Possible mechanisms of CNF, in particular muon catalysis, are popularly discussed. According to S. Jones, it is a mechanism similar to muon catalysis that takes place in Pd. P. Hagelstein (Massachusetts Institute of Technology, USA) hypothesized that two D nuclei form a ^{4}He nucleus, without emitting a neutron. This hypothesis was confirmed by S. Walling (colleagues of S. Pons and M. Fleischmann), who reported the registration of ^{4}He using a mass spectrometer. It has been suggested that cosmic ray muons may be the cause of the observed CNF, and variations in their intensity lead to the irreproducibility of laboratory results.

VINITI RZh 18V Nuclear Physics. -1989.-7.-ref.7B7

243. International meeting on muon catalysis // Atomic Energy. - 1989. - Volume 66. Issue 2. - pp. 149-151.

UDC 539.172.5/.6

A brief report on the international meeting in May 1989 in Fort Myers (USA), where V. Filchenkov (JINR, Dubna) presented a report on measuring the rate of formation of dtμ-molecules in high-density gaseous deuterium. It was noted that there was no dependence (with an accuracy of 2%) of the rate of formation of dtμ-molecules on deuterium pressure in the range of 40-150 MPa, which is consistent with the theory. The rate of formation of such molecules is $(2.4\pm0.3).10^{-6}$.

244. Measurement of the rate of formation of dtμ-molecules in deuterium at high pressure (0.4÷1.5 kbar). The measurement of dtμ-molecular formation rate at high deuterium pressure (0.4÷1.5 kbar) / Wustritsky V.M., Dzelerov V.R., Filchenkov V.V. et al. // Muon-Catalyzed Fusion: Meet., Sanibel Island, Fla, Mau 1-6, 1988. - New York, 1989. - pp. 17-22. - English.

UDC 539.172.5/.6

The rate of formation of dtμ-molecules in gaseous deuterium was measured at pressures of 390, 825, 1490 bar in the temperature range 20-300 K. The experiments were carried out on the muon channel of the positron of the Joint Institute for Nuclear Research (Dubna) using a total absorption neutron spectrometer (Scintillation Ne213 detector) to register neutrons 2.45 MeV. The electronic discrimination threshold of the detector used was 50 keV. To monitor the muon beam, plastic and CsJ(Tl) scintillation detectors were used. The values (λ=0.36; 0.63; 0.88) were determined from the analysis of the electronic spectra of muon decay, both without taking into account the real values of the efficiency of the neutron detectors used, and with the values estimated using the Monte Carlo method. The values obtained by both methods lie within the range of experimental errors. The results obtained in this work are compared with the data available in the literature at lower densities.

VINITI RZh 18V Nuclear Physics. -1990.1.-ref.1B198

245. Energy distributions of the reaction products of the synthesis of meso molecules dt and dd / Fesenko G.A., Shablov V.L. // Calculation. research let's experiment and energy installations. -Obninsk.-1989.-pp.102-110.

UDC 539.172.5/.6

The energy spectra of the products of the fusion reaction of light nuclei in muon catalysis ($dt\mu \rightarrow \alpha+n+\mu$ and $dd\mu \rightarrow {}^3He+n+\mu$) were calculated and the question of the influence of the Coulomb interaction in the final state on the shape of these spectra was investigated.

VINITI RZh 18V Nuclear Physics.1990.-3.-ref.3B251

246. Transfer of muons in heavy hydrogen in an electrostatic field. Motion of muons in heavy hydrogen in an applied electrostatic field / Ness K.F., Robson R.E. //Phus. Rev.A.-1989.-Vol.39.-No.12.-pp.6596-6599.-English.

UDC 539.172.5/.6

The reactive properties of a muon beam in a deuterium gas to which an electrostatic field is applied were analysed using the Boltzmann equation in a wide range of values E/n_0 (the ratio of the applied electric field E to the gas density). The calculations neglected the finite lifetime of muons. It turned out that with an applied field the rate of muon capture is 20 times greater than without it, and the recoil rate of $dt\mu$ molecules is 10 times greater as E/n_0 increases from 1 to 10^4.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B247

247. Formation of muonic molecules under laser irradiation and in a cluster ionic molecule (the effect of adding protonium in the reaction cycle during fusion during muonic catalysis). Muonic molecular formation under laser irradiation and in the clustered ion molecular (The effect of protonium additive on the muon catalysed fusion wort) / Takahashi N. // Muon-Catalysed Fusion: Meet., Sanibel land, Fla, Mau 1-6 1988. - New York, 1989. - pp. 185-198. - English.

UDC 539.172.51.6

The influence of direct exposure to laser radiation with molecular deuterium ions was taken into account. In this case, the intensity of laser radiation necessary to increase the rate of the fusion reaction (up to 10^{-9}) can be reduced to 108 W/cm^2.

VINITI RZh 18V Nuclear Physics. -1990.-1.-ref. 1B199

248. Nuclear reactions at room temperatures. Te cold fusion family / Cohen J.S., Davies J.D. // Nature.-1989.-Vol.338.-No.6218.-pp.705-707.-Eng.

UDC 621.039.6

The main attention is paid to the idea of muon catalysis. The source of muons is cosmic rays. The number of muons captured under conditions characteristic of CNF experiments is estimated. However, the rate of neutron production (0.002 neutrons/s) is significantly less than the value obtained by S. Jones' group. It has been suggested that the implementation of nuclear reactions of CNF may be associated with fusion reactions due to deuterons accelerated in electric fields formed during the destruction of the crystal.

VINITI RZh 22U Nuclear energy.1989.-10.-ref.10U467

249. The rate of nuclear fusion in isotopic hydrogen molecules and the problem of cold fusion. Fusion rates for hydrogen isotopes molecules of relief for "cold fusion" / Szalewicz K., Morgan J.D., Monhorst N.J. //Phus. Rev.A.- 1989.-Vol.40.-No.5.- pp.2824-2827.-English.

UDC 539.12/.17

Various factors influencing the probability of a nuclear fusion reaction in molecules of hydrogen isotopes, as well as in the molecular ion D_2, are considered. The dependences of the effective cross section of the CNF reaction on the effective mass of the electron, the reduced mass of nuclei, and the degree of revival of vibrational states are discussed. Each of these factors significantly influences the likelihood of CYA. The effective cross section for a CCN reaction depends especially strongly on the effective mass of the electron; however, the probability of the reaction does not exceed 10^{-25} s^{-1}, even if the effective mass of the electron is 3 times greater than its nominal mass. For diatomic molecules or for quasi-molecular systems that can be formed during the deuteration of metals, such a large increase in effective mass is not expected.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B6

250. On the possibility of cold nuclear fusion. On the feasibility of cold fusion / Lee A.R., Kalotas T.M. // Nuovo Cim.A.-1989.-Vol.102.-No.4.- pp.1177-1181.-English.

UDC 539. 12/. 17

The low probability of nuclear fusion in the D_2 molecule at room temperature is determined by the vanishingly low permeability of the Coulomb barrier. It has been suggested that when Pd is introduced into the lattice, conditions are created under which the permeability of the barrier increases sharply under the influence of two

factors: screening of the nuclear charge by conduction band electrons and high-frequency vibrations of atoms in the crystal lattice. The permeability of the Coulomb barrier was calculated under various assumptions about the shape of the screened potential. Reducing the screening length from 1/8 to 1/32 of the lattice constant leads to an increase in permeability from 10^{-64} to 10^{-23} s^{-1}. Correlated vibrations of deuterium atoms with frequencies of 10^{14} Hz determine the high probability of deuterium nuclei approaching each other and their penetration through the potential barrier (up to 10^{-10} s^{-1} per DD pair in the Pd lattice).

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B1

251. Possible mechanism of cold fusion reaction in transition metal hydrides. A rossible mechanism for bulk cold fusion in transition meta / Petrillo S., Sacchetti F. / /Europehus.Lett.-1989.-Vol.10.-No.1.-pp.15-18.-Eng.

UDC 539.12/.17

The influence of the peculiarities of atomic dynamics in transition metal deuterides on the probability of a chemical reaction is considered. The CCN reaction can become observable if the permeability of the Coulomb barrier between D nuclei turns out to be significantly higher than in the deuterium molecule. Such an increase in permeability (and a corresponding increase in the probability of nuclear approaches at short distances) can occur in crystals if localized modes with low vibrational energies are present in the phonon spectrum of atoms. Such vibrational modes were discovered experimentally in niobium and tantalum deuterides. It is assumed that in palladium deuteride the most favourable conditions for observing CCN reactions should correspond to the region of the phase transition between the alpha and beta phases of the Pd-D system.

VINITI RZh 18V Nuclear Physics. -1990.-1.-ref.1B9

252. Efficiency of tunnelling and the problem of cold fusion. Tunnelling efficiency and the problem of cold fusion // Czechosl. J. Phys. V.-1989.-Vol.39.-No.7.-pp.793-795.-English.

UDC 539. 12/. 17

To implement the CCN reaction in metals, a significant increase in the permeability of the Coulomb barrier between nuclei in the crystal lattice is necessary. It has been shown that the interaction of nuclei with a thermal reservoir (lattice) can lead to the formation of excited states with high permeability through the potential barrier. A model of a particle in a Coulomb potential with two minima is considered.

Quantum mechanical oscillations between states in two potential wells and the interaction of particles with the lattice lead to a sharp increase in the probability of tunnelling through the potential barrier.

VINITI RZH 18V Nuclear Physics. -1989.-12.-ref.12B4

253. The exact value of the upper limit for the probability of penetration through a barrier in many-particle systems. Application to "cold fusion". Exhaust upper bound on barrier penetration probabilities in many body systems. Application to "cold fusion" / Legget A.J., Baum G. // Phys. Rev. Lett.-1989.-Vol.63.-No.2.-pp.191-194.-English.

UDC 539. 12/. 17

An exact value has been obtained for the upper limit of the probability of a nuclear fusion reaction in a multiparticle ensemble of deuterium atoms. The calculations were carried out in a non-relativistic approximation without any special assumptions about the nature of the interaction between atoms and without using the Born-Oppenheimer approximation. It was assumed that the effective reaction cross section is determined by the permeability of the Coulomb barrier between deuterium atoms. It was found that the probability of a CNS reaction cannot exceed the value of 3.10^{-47} s^{-1}. This result does not mean that there should not be such an increase in the probability of a CNS reaction in deuterated metals, which would be sufficient for direct observation of the reaction.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B8

254. Cold nuclear fusion in dense electron gas. Cold fusion in a dense electronic gas / Blaizot J.-R., Balian R., Bonshe R. // J. Phys. (Fr.).-1989.-Vol.50.-No.17.-pp.2307-2311.-Eng.

UDC 539. 12/. 17

The Coulomb factor is calculated to overcome the potential barrier between two deuterons located in a dense homogeneous electron gas. The screened deuteron interaction potential was determined in the Born-Oppenheimer approximation using linear response theory. It was concluded that to increase the CCN to the observed value, either a screening length of 0.1 nm is required, i.e. the density of the electron gas must be 10^3 times higher than the average in metal Pd, or the kinetic energy of deuterons must be at least 100 eV.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2B5

255. Intramolecular nuclear fusion in molecules of hydrogen isotopes. Intramolecular nuclear fusion in hydrogen-isotope molecules / Shirmamura I. / Progr. Theor. Phys.-1989.-Vol.82.-No.2.-pp.304-314.-Eng.

UDC 539.172.51.6

The CN rates in the ground and excited states of molecules and molecular ions of hydrogen isotopes have been calculated. The values were in the Born-Oppenheimer approximation. For HD, $\lambda=3\cdot10^{-56}$ s^{-1} was obtained. Calculations were performed with the replacement of the electron mass me by the effective mass meff>me, incl. on meff=mμ (muon mass). The fusion rate of 10^{-23} s^{-1} per DD pair measured in experiments with a deuterated Ti electrode is achieved in the D_2 molecule at m_{eff} = 4.2 m_e, and in the D_2 ion at m_{eff} = 5.6 m_e.

VINITI RZh 18V Nuclear Physics.-1990.-3.-ref.3B255

256. The reaction rate of cold nuclear fusion in a condensed medium. Phenomenological analysis. Cold nuclear fusion rates in condensed matter and phenomenological analysis / Henis Z., Eliezer S., Zigler A. // J. Phys. G.-1989.-Vol.15.-No.10.-pp.L219-L223. -English

UDC 539. 12/. 17

The probability of a CNF reaction in condensed media at high deuterium concentrations has been calculated. It was assumed that the real interaction between nuclei can be represented by a potential, which is a superposition of the screened Yukawa potential and the potential of a harmonic oscillator. The dependence of the reaction probability on the electron screening radius and on the distance between the deuterium nuclei D was obtained. It was found that this probability can exceed the value of 10^{-23} s^{-1} per DD pair only if the sum $R_0+14,3\cdot R_e$ does not exceed a value of 0.15 nm (which is difficult to achieve for real solids).

VINITI RZh 18V Nuclear Physics.-1990.-5.-ref.5B10

257. Fusion rate for a compressed deuteron pair. The fusion rate of a confined deuteron pair / Cottinghan W.N., Greenwood D.A. // J. Phys. V.-1989.-Vol. 15.-No.8.-pp.L157-L161.-Eng.

UDC 539.172.13/.16

An estimate is given for the rate of the dd reaction with deuterons contained in the potential of a harmonic oscillator $V_c=e^2 \cdot r^2/r_0^3$. For a nuclear reaction to occur, the deuteron must tunnel through the barrier from $r=r_0$ to r=R=5 fm. It is assumed that the reaction rate during tunnelling is proportional to $u(R)^2$, where u(R) is the wave function at r=R. Calculations were carried out for various values of the "confinement" parameter r_0 from 0.01 to 0.1 nm. Calculations show that to be able to observe CCN in condensed matter, values of $r_0<0.02$ nm are required.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref.2V281

258. How some experimental results on cold nuclear fusion can be explained using the Schrödinger equation with a rectangular potential. New and rectangular potential in Schrodinger's equation cold explain some experimental results on cold nuclear fusion / Schneider J.H. // Fusion Technol.-1989.-Vol.16.-No.3.-pp.377-378.-Eng.

UDC 539. 12/. 17

Calculations of the permeability of the Coulomb barrier for deuterium nuclei in the D_2 quasi molecule in a metal matrix were carried out in the nonrelativistic approximation within the framework of the rectangular potential model. The permeability of the barrier strongly depends on the distance between the nuclei D, however, for distances exceeding 10^{-3} nm, the permeability remains too small for direct observation of CCN reactions.

VINITI RZh 18V Nuclear Physics. -1990. -7.-ref.7B20

259. Fusion rates for compressed and shielded hydrogen nuclei. Fusion rate of squeezed and screened hydrogenic nuclei / Venesh S.J., Vary J.R. // Phys. Rev. S.-1989.-Vol.40.-No.2.-pp.R495-R496.-Eng.

UDC 539. 12/. 17

Fusion rates are calculated for hydrogen isotope ions confined in a potential well using the semiclassical approximation. The permeability factor is expressed through the ion-ion interaction potential, which is expressed as $V(r)=(K/2).r^2+e^{-\lambda r} \cdot r^{-1}$, where r is the distance between the ions, K is the characteristic lattice constant, λ - shielding length. The calculation results turn out to be very sensitive to the values of the parameters and λ and r_0, where r_0 is the value of the equilibrium distance between the nuclei, expressed in terms of K and λ. At the same time, to reproduce

the experimental results reported in the original works on CNS, it is necessary to use less realistic parameters.

VINITI RZh 18V Nuclear Physics.1990.-5.-ref.5B15

260. Metastable bound states of deuterium in palladium and their role in cold nuclear fusion / Gann V.V., Pokhodchiy V.I. // Issues of atomic science and technology. Ser.: Physics of radiation damage and radiation materials science. -1990. -Issue 1(52).-p.89-90.

UDC 539.17.01

The possibility of the emergence of metastable bound states of two deuterium atoms placed in a quasi-homogeneous gas of “heavy” electrons with an increased density is analysed. The conditions for the realization of such bound states in a palladium crystal are discussed. The rates of nuclear fusion reaction D are calculated within the framework of the proposed model, for example, $W = 10^{-21}$ s^{-1} for the electron gas density n = 2 and the effective electron mass $m_{eff} = 2m_e$.

261. On the possibility of a fluctuation increase in the transparency of a quantum mechanical barrier and consequences for TNF / Altaysky M.V., Barts B.I., Moiseev S.S. // Preprint IKI AN USSR, Moscow. -1989.-N.1542.

262. Fluctuation increase in the rate of cold fusion. Enhancement of cold fusion rates by fluctians / Koonin S.E. // Preprint. Univ. of California (USA) NSF-ITP-89-55 (1989).

263. Sub barrier fusion of complex nuclei / Permyakov V.P., Shilov B.M. // Phys. elementary particles and the atomic nucleus-1989.-vol. 20.-N.6.-pp.1396-1438.

UDC 539. 172. 17

The review examines the results of theoretical studies of reactions of sub-barrier and near-barrier fusion of not too heavy nuclei satisfying the condition $Z_1.Z_2<2000$. The main attention is paid to the manifestation of the complex structure of interacting nuclei on the process of sub barrier fusion. A multichannel model with boundary conditions in the form of only a converging wave inside the core and strong coupling of channels in the peripheral region, which is a natural theoretical basis for describing this complex process, is discussed in detail. Dynamic changes in the

potential barrier zone during the reaction and their influence on the increase in the sub barrier fusion cross section are also considered. Processes inverse to fusion (spontaneous decay and decay of excited states of nuclei with the emission of heavy clusters) are discussed. The asymmetry of the permeability of the Coulomb barrier in decay and fusion is demonstrated when taking into account the internal structure of nuclei. A visual method is proposed for a qualitative explanation of this effect. Bible 110.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B327

264. Nuclear fusion reaction $^{3}H(d,n)^{4}He$ at very low energies. The nuclear fusion for the reaction $^{3}H(d,n)^{4}He$ at very low energy / Scalia A. // Nuovo Cim. A.-1989.-Vol.102.-No.4.-pp.1101-1104.-Eng.

UDC 539.172.131.16

An elastic model for sub barrier nuclear fusion at very low energies is applied to the dt reaction. A comparison of cross sections calculated using the generalized elastic model with those previously published in the literature is provided.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B298

265. Nuclear fusion reaction $^{2}H(d,n)^{3}He$, $^{2}H(d,n)^{3}H$ at low energies. The nuclear fusion for the reactions $^{2}H(d,n)^{3}He$, $^{2}H(d,n)^{3}H$ at low energy / Scalia A./ Nuovo Cim. A.-1989.-Vol.102.-No.4.-pp.1105-1116.-Eng.

UDC 539.172.13/16

The elastic model for sub barrier nuclear fusion is applied to the D+D system at very low energies. A comparison of cross sections calculated using the generalized elastic model with those previously published in the literature is provided.

VINITI RZh 18V Nuclear Physics.-1990.-3-.ref.3V299

266. Fusion of deuterium nuclei at room temperature. Inequalities that determine the permeability of the Coulomb barrier. Deuterium nuclear fusion at room temperature. A pertinent in equally on barrier penetration / Rosen G. // J. Chem. Phys.-1989.-Vol.91.-No.7.-pp. 4415-4416. -English

UDC 539. 12/. 17

The influence of the palladium crystal lattice on the probability of the CNS reaction in deuterated Pd is discussed. This probability can increase sharply when D atoms are localized in one lattice interstitial site. Under these conditions, strong

compression of the quasi-molecule in the interstitial site can lead to a sharp decrease in the distance between deuterium nuclei. Taking into account the excitation of vibrational states of quasi-molecules, inequalities are obtained that relate the permeability of the Coulomb barrier to the total energy of the system and the equilibrium distance between the nuclei. It is concluded that the localization of two atoms in one interstitial site is, in principle, possible and that in this case the probability of a CCN reaction can increase to values sufficient for direct observation of the reaction.

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B5

267. On the issue of the fusion reaction of deuterium nuclei at ordinary temperatures / Ryabov R.A., Saliy V.I. // Vladimir Polytechnic Institute. - Vladimir, 1990. - 7 pp. - Bible. 15 titles - Russian - Deposited in VINITI 01/15/90.-N. 229-B90.

UDC 539. 12/. 17

Postulating that the synthesis of deuterium nuclei in a metal at ordinary temperatures can occur in the interstices of the crystal lattice, the authors estimate the probability of the meeting and fusion of D nuclei in the interstices, which, in turn, makes it possible to estimate the yield of energy and neutrons under these conditions. With double-sided deuteration of a 1 mm thick Pd plate, the upper limit of the released specific power is estimated at 107 W/m^3 (the most probable 0.1 W/m^3), and the specific neutron yield at 10^{19} $s^{-1}.m^{-3}$ (and 10^{11} s^{-1} $.m^{-3}$ respectively).

VINITI RZh 18V Nuclear Physics. -1990.-5.-ref.5B17

268. Energy of pair interaction of hydrogen isotopes in metal lattices. Estimation of fusion rates. Pair interaction energy of hydrogen isotopes in metallic lattices. Estimate of fusion rates / Magchesoni F., Presilla S., Sachetti F. // Europhus. Lett.-1989.-Vol.10.-No.5.-pp.493-495.-English.

UDC 539. 12/. 17

Taking into account the polarization of metal electrons obtained within the linear response approximation, the potential for pair interaction of hydrogen isotope nuclei along the direction creating octahedral interstices in the Pd lattice was calculated. The potential has a minimum at $5.34 \cdot a_0$ with a binding energy of 1.23 eV. Calculations of the fusion rate for three reactions depending on the activation energy showed that its value is significantly lower than the experimental estimates obtained so far. Similar results were obtained for the case of interaction of nuclei located in octahedral positions on the surface and in vacuum.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B22

269. The influence of electric fields on cold nuclear fusion. Electric field control for cold nuclear fusion - a suggestion / Hietschold M. // Wiss. Z. Techn.,Univers. Karl-Marx-Stadt.-1989-Vol.31.-No.4.-pp.635-636.-English

UDC 621.039.6

The design of an experimental setup for studying CNS in an electrochemical cell with palladium film electrodes is described. It is expected that the experiment will provide answers to the following questions: does the external electric field and the polarity of the electrodes affect the CNS process, whether the process is superficial or volumetric.

VINITI RZh 22U Nuclear energy. -1990.-5.-ref.5U466

270. Nonequilibrium distribution of kinetic energy in inhomogeneous materials. Kinetic energy imbalance in in homogenous materials / Zhu S.-V., Lee J., Robinson G.M. /Chem. Phys. Lett.-1989.-Vol.161.-No.3.-pp.249-252.-English.

UDC 539. 12/. 17

Features of the dynamics of deuterium atoms in the palladium crystal lattice can have a significant impact on the probability of the fusion reaction of D nuclei at room temperature. The distribution function for the kinetic energy of nuclei D was calculated for the case of a square lattice of Pd atoms, in the interstices of which D atoms are located. It was found that the distribution differs significantly from the canonical Maxwell distribution. The strong interaction between light and heavy atoms causes an increase in the probability density in the high energy region. Atoms with low mass (D atoms) as a result of this interaction are periodically accelerated and with a high probability acquire an energy many times greater than the average thermal energy of the lattice. This phenomenon is local in nature, which leads to strong spatial heterogeneity in the distribution of kinetic energy. It is concluded that the considered features of atomic dynamics can significantly affect the probability of a CNS reaction during Pd deuteration.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B5

271. Possible explanation for nuclear fusion at room temperature. A possible explanation of the room temperature nuclear fusion / Huag Z. // Beijing Shifan Daxue Xuebao = J. Beijing Normal Univ. Nat. Sci.-1989.-No.2.-pp. 43-44.-English

UDC 539. 12/. 17

A model has been proposed to explain the possibility of the CNS reaction occurring in deuterated palladium at room temperature. It is assumed that at high deuterium concentrations, D atoms in the metal matrix form a sublattice, which is in a nonequilibrium state during deuteration. The dynamics of atoms in this sublattice is determined by the interaction of the D sublattice with the Pd crystal lattice. Such a system is characterized by strong spatial heterogeneity of energy distribution. As a result of random redistribution of energy in time, significant kinetic energy can be concentrated on a small number of D atoms. An increase in kinetic energy may be sufficient to sharply increase the probability of passage of D nuclei through the Coulomb barrier.

VINITI RZh 18V Nuclear Physics.-1990.-8.-ref.8B3

272. Theoretical study of cold nuclear fusion within the framework of the model of penetration through the Coulomb barrier. A theoretical study of cold nuclear fusion using barrier application approach / Gurta S.K., Gurta R.K. // Preprint Int. Cent. Theor. Phys.-1989.-No.123.-pp.1-8.-Eng.

UDC 539.12/.17

A model has been proposed to explain the high probability of fusion of deuterium nuclei under conditions of saturation of metal palladium with deuterium. It is assumed that D in Pd is present in the form of quasi-free atoms, the kinetic energy of which can be on the order of several electron volts. The corresponding theory can be communicated to deuterium atoms as they move in an electric field during electrolysis. As a result of the approach of two such atoms, a D_2 quasi-molecule is formed, in which the potential barrier separating deuterium nuclei is significantly lower than in an ordinary D_2 molecule. A decrease in the potential barrier is accompanied by an increase in the probability of nuclear fusion D by 10 orders of magnitude. Taking into account the electronic shielding of the nuclear charge, the probability of the reaction of a chemical nuclear reactor was found to be equal to 10^{-21} s^{-1} per DD pair. A further increase in this probability can occur if the interaction of atoms produces a quasi-bound resonance state with a lifetime of 10^{-8} s.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B11

273. On the relationship between solid-state and nuclear energy scales. A possible theoretical approach to explain cold fusion in palladium and other transition elements. On a competition between solid state and nuclear scale energies. A

possible theoretica1 approach to cold fusion in palladium and other transitional elements / Arostol M., Dorobantu I.A. / Rev. Room. Phys.-1989.-Vol.34.-No.2.-pp.233-239.-English.

UDC 359. 12/.17

The initial energy of protons or deuterons during electrochemical hydrogenation of Pd is close to the ionization energy, which is too low for effective penetration through the Coulomb barrier between nuclei D. It is assumed that a sharp increase in the kinetic energy of nuclei can be achieved as a result of acceleration in the Coulomb field of electrons captured in the hydrogenation process vacant states of the Pd d-band. An atomic model is proposed, based on the consideration of transitions of D nuclei between quasi-stationary states in the Coulomb field of an electron in the localized d-state of a Pd crystal: during such transitions, the nuclear energy can reach values sufficient for effective penetration through the Coulomb barrier. Such a process must be accompanied by the emission of electromagnetic radiation in a wide range of wavelengths.

VINITI RZh 18V Nuclear Physics. -1990.-1.-ref.1B8

274. Cold fusion: is it a solid-state effect? Cold fusion: Is there a solid-state effect? / Kumar N. // Curr.Sci. (India).-1989.-Vol.53.-No.15.-pp.833-935. -English

UDC 359. 12/. 17

The concentration of the effective electron mass in a deuterium quasi-molecule in a metal matrix is not applicable at small distances between nuclei. The formation of compact deuteron pairs in metals, in which the distance between nuclei is significantly less than in a free D_2 molecule, is also unlikely. A possible mechanism for increasing the probability of a CCN reaction should be considered the acceleration of deuterium nuclei in relaxing defects of the crystal lattice. During relaxation of defects, transformation of macroscopic stored energy into kinetic energy of particles is possible. Acceleration of D nuclei to energies of $10^2 \div 10^3$ eV would lead to a sharp increase in the probability of a CCN reaction.

VINITI RZh 18V Nuclear Physics. -1990.-4.-ref.4B8

275. About the possibilities of “cold enhancement” of nuclear fusion. On the possibilities of “cold enhancement” of nuclear fusion / Goldanskii V.J., Dalidshik F.I. // Phys. Lett. V.-1990.-Vol.234.-No.4.-pp.465-468.-English.

UDC 539.12/.17

A relation has been obtained that determines the lower limit for the effective cross section for the reaction of nuclear dd fusion in metal matrices. The following mechanisms for increasing the probability of a CNF reaction are considered: an increase in the permeability of the Coulomb barrier under the influence of screening of the nuclear charge by conduction electrons; Oppenheimer-Phillips effect; the existence of a resonant excited state of the ^{4}He nucleus near the threshold of decay into two deuterons. It is concluded that none of these mechanisms can ensure an increase in the effective cross section to the required limit. A more realistic mechanism is the acceleration of nuclei by local electric fields arising in microcracks in the matrix, but the mechanism of the formation of such fields in a metal matrix remains unknown.

VINITI RZh 18V Nuclear Physics. -1990.-6.-ref.6B5

276. The mechanism of nuclear fusion in solids. Mechanism of solid-state fusion / Goldanskii V.J., Dalidchik F.I. //Nature.-1989.-Vol.342.-No.6247.-p.231.

UDC 539.12/.17

Possible reasons for the increase in the probability of a chemical reaction in solids are briefly considered. Factors such as electronic screening, the Oppenheimer-Phillips effect, and the formation of resonant excited states are not sufficient to significantly increase the probability of a nuclear reaction. A necessary condition for direct observation of reaction products is an increase in the kinetic energy of the deuteron to a value of about 10 keV. It is assumed that such an increase in energy may be due to the concentration of the destructive energy of the lattice in microcracks or other types of defects. One possible variant of such a mechanism is the acceleration of deuterons by electrostatic fields that arise during local destruction of the crystal lattice of metals.

VINITI RZh 18V Nuclear Physics. -1990.-7-ref.7B25

277. New theory to explain cold fusion. New theory to explain cold fusion / New Sci.-1989.-Vol.122.-No.1670.-r.31.-Eng.

UDC 539. 12/. 17

A brief popular science report on the experiments of B.V.'s group. Deryagin (Institute of Physical Chemistry, USSR Academy of Sciences) in 1985, which demonstrated the emission of neutrons during the destruction of deuterium-containing solids (LiD, heavy ice), as well as recent experiments of this group on the destruction of titanium in the presence of heavy water, which was also accompanied

neutron emission. Possible mechanisms of the phenomenon are discussed (the appearance of a high potential at the edges of cracks, etc.), which may also be responsible for the emission of neutrons during the electrolysis of D_2O.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9B6

278. Is it thermonuclear? // Scientific and technological revolution, problems and solutions. -1989.-N.8.-p.1

UDC 539. 12/. 17

Back in 1952, corresponding member of the USSR Academy of Sciences B.V. Deryagin studied a phenomenon recognized in 1984 as a discovery and registered under number 290: “The previously unknown property of freshly formed surfaces of solids to emit high-energy electrons in a vacuum, caused by the separation of like charges during the formation of juvenile (newborn) surfaces, leading to the emergence of strong electric fields with intensity up to 10^7 V/cm^2. At such high voltages, vacuum breakdown occurs. The field capabilities contribute to the convergence of D nuclei near fresh microcracks.

279. Miracle in a glass of water // Knowledge is power. -1989.-N.6.

UDC 539. 12/. 17

During the hydrogenation process, metal hydrides can crack, creating accelerating electric fields. At a deuteron energy of 10^{-20} keV, the probability of a CNS reaction reaches 10^{-21} s^{-1} per DD pair. The formation of micro capacitors with a high charge density is hindered by the flow of charges along the edges of cracks. In metals (Ti, Pd) the conductivity is many orders of magnitude greater than that of dielectrics, and the drainage process is very intense. For good micro capacitors to arise, the conductivity of the freshly formed crack surface must be low.

280. The mechanism of the fusion reaction of deuterium nuclei accelerated by an electric field in microcracks. Fracto fusion mechanism / Takeda T., Takizuka T. // J.Phus. Sos. Jar.-1989.-Vol.59.-No.9.-pp.3073-3076.-Eng.

UDC 539.12/.17

The high probability of a CCN reaction in deuterated metal matrices can be explained by the acceleration of deuterons by an electric field in microcracks. The probability of this reaction was calculated using a model based on the assumption of

the possibility of the formation of microcracks in metals that are stable for time intervals of at least 10^{-10} s. A potential difference of 10^{-30} keV is created between the walls of such microcracks, which is sufficient to accelerate D nuclei to energies of the order of 10 keV. Under these conditions, the probability of a CNF reaction can reach 10^{-23} s^{-1}.

VINITI RZh 18V Nuclear physics. 1990.-5.-ref.5B4

281. On high-energy processes during the destruction of solids / Klyuev V.A., Lipson A.G., Toropov Yu.P. // Letters in ZhTF.-1989.-volume 21.-Issue 1.-pp.1333-1337.

UDC 539.172.13/.6

282. On the possible mechanism of cold nuclear fusion / Golubnichiy P.I., Kurakin V.A., Filonenko A.D., Tsarev V.A., Tsarik A.A. // Reports of the USSR Academy of Sciences. -1989.-volume 307.-N.1.-pp.99-101.

UDC 539.12/.17

A mechanism of chemical nuclear reactions in a condensed medium has been proposed and justified, in which the energy required to overcome the Coulomb barrier (according to the authors, 380 eV) is imparted to deuterons in the process of acceleration by electric fields generated during mechano-emission phenomena in microcracks that arise during the “hydrogenation” of hydride-forming materials type Pd and Ti, due to the lower plasticity of the hydride layer compared to metal. Hydrogen is capable of accumulating near defects in the crystal lattice of the metal, reaching abnormally high concentrations, 10^{3}÷10^{5} times higher than normal values. Using transmission electron microscopy, data were obtained on the size of micropores in Pd deuteride (10^{-4}÷10^{-5} cm) and the concentration of D atoms in them (10^{10}÷10^{11} cm^{-3}). (See also Preprint // Physical Institute of the USSR Academy of Sciences. - 1989.-N.113.-8 pp.)

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B10

283. The mechanism of neutron emission during the interaction of deuterium nuclei embedded in metals. A mechanism for neutron emission from deuterium trapped in metals / Serge S. E., Atzeni S., Briguglio S., Romanelli F. // Europhus.Lett.-1990.-Vol. 11.-No.3.-pp.201-206.-Eng.

UDC 539. 12/. 17

One of the possible mechanisms for increasing the probability of a CNS reaction in deuterated transition metals is considered. It is assumed that D nuclei can be accelerated in electric fields that arise when gas bubbles form in metals with a high concentration of deuterium. The formation of such bubbles is especially likely under non-equilibrium conditions (when temperature or pressure changes, when the conditions for electrolysis of heavy water change). The formation of gas bubbles must be accompanied by local destruction (or deformation) of the crystal lattice, which can lead to the emergence of local electric fields with strengths of up to 10^7 V/cm^2. In such fields, D nuclei can be accelerated to 10÷100 keV. The conditions under which the considered acceleration mechanism should be especially effective are formulated.

VINITI RZh 18V Nuclear Physics. -1990.-7.-ref.7B24

284. The mechanism of neutron emission during interaction between deuterium nuclei embedded in metals. A mechanism for neutron emission from deuterium transport in metals / Segre S.E., Atzeni S., Brigugio S., Romanelli F. // Rapp. Tecn. /ENEA.-1989.-No.9.-pp.1-15.-Eng.

UDC 539.12/.17

One of the possible mechanisms for increasing the probability of a CNS reaction in deuterated metals with a high deuterium concentration is considered. It is assumed that structural relaxation of the crystal lattice during deuteration may be accompanied by the formation of microscopic deuterium bubbles. The formation of bubbles should lead to local deformation and destruction of the crystal lattice, which in turn should give rise to strong local electric fields. The acceleration of D nuclei in these fields is the main reason for the increase in the probability of a CNF reaction. The estimates obtained show that the mechanism considered is sufficient to explain the results of those experiments in which the fusion of D nuclei in metals at room temperature was observed.

VINITI RZh 18V Nuclear Physics. -1990.-8.-ref.8B1

285. Isn't cold fusion hot? Is cold fusion hot? / Cohen J.S., Davies J.D. // Nature.-1989.-Vol.342.-No.6249.-pp.487-488.-Eng.

UDC 539. 12/. 17

The reason for the emission of fast neutrons during the deuteration of Pd or Ti may not be the fusion reaction of deuterium nuclei, but the interaction of accelerated deuterium nuclei with tritium nuclei. Deuterium nuclei can be

accelerated in local electric fields in microcracks that form in metals during deuteration. Two mechanisms of acceleration of deuterium nuclei are considered: acceleration associated with local heating and the formation of hot plasma in microcracks and direct acceleration of deuterium nuclei. The reaction of their fusion with tritium nuclei may be more likely than the fusion reaction of deuterium nuclei.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3B12

286. Cold fusion produces more tritium than neutrons. Cold fusion productions more tritium than neutrons / Rajagoralan S.R. //Curr. Sci.-1989.-Vol.58.-No.19.-pp.1059-1062.-Eng.

UDC 539. 12/. 17

Experimental data on the probabilities of neutron emission and tritium formation in CCN reactions during the deuteration of Pd or Ti are discussed. A number of experiments have revealed a high concentration of tritium in the gaseous reaction products and in metals after their deuteration. A comparison of these data with data on the intensity of neutron emission showed that the probability of tritium formation is anomalously high and does not correspond to theoretical estimates of the relative probabilities of various reaction channels for the interaction of nuclei D. Alternative mechanisms of nuclear processes that could lead to the formation of tritium during determination are considered. It is assumed that nuclei can be accelerated in strong electric fields that arise in cracks and other macroscopic defects during the deuteritization of a metal. The collapse of accelerated nuclei D leads to the release of neutrons, which can interact with the nuclei of neighbouring atoms. One of the products of such interactions is tritium.

VINITI RZh 18V Nuclear Physics. -1990.-2.-ref. 2B4

287. Cold fusion, what is happening? Cold fusion: what's going on? / Premuda F. // Nature. -1989.-Vol.338.-No.6218.-pp.711-712.-Eng.

UDC 539. 12/. 17

The article combines a selection of letters to the editor of “Nature” from specialists with their points of view on the message on CNF. In particular, J. Carpenter (reviewer of the article by S. Jones) notes that the effects caused by the neutron cosmic background are comparable to the described effects in CNS, and they must be taken into account and carefully taken into account when setting up an experiment and analysing the results obtained. Other authors propose to take into account the effects associated with the muon cosmic background or the formation of quasi-

molecules from two nuclei and an electron. F. Premuda (Italy) pointed out the anomalousness of the neutron flux in the Fleischmann-Pons experiment, due to the fact that fusion reactions occur in localized regions with a high deuterium density and, accordingly, with a greater optical thickness, so that neutrons are absorbed within these regions.

VINITI RZh 18V Nuclear physics. -1989.-7.-ref.7B9

288. Natural sources of fast neutrons in “cold fusion” experiments. Conventional sources of fast neutrons in “cold fusion” experiments / Criber M., Spiro M., Favier J. // Phys. Lett. V.-1989.-Vol.228.-No.1.-pp.163-166

UDC 539.12/.17

Emission of fast neutrons in experiments with electrochemical deuteration in electrodes and electrolytes of natural radioactive isotopes. Isotopes of polonium ^{212}Po, ^{222}Po and radon ^{220}Rn, ^{222}Rn emit alpha particles, the energy of which is sufficient to split deuterons into a proton and a neutron. The fast neutrons emitted by such a reaction are difficult to distinguish from the neutrons emitted by the fusion of two deuterium nuclei. The most likely source of fast neutrons should be considered the reaction of deuteron splitting by alpha particles of radon isotopes. Radon is present in the air and can be effectively absorbed by the materials that make up electrochemical cells. During electrolysis, absorbed radon partially dissolves in heavy water, which sharply increases the likelihood of alpha particles interacting with deuterons. The processes of absorption and desorption of radon by electrodes determine the observed time dependence of the neutron flux intensity.

VINITI RZh 18V Nuclear Physics. -1990.-3.-ref.3V1Z

289. On the possible mechanism of nuclear chemical transformations in the palladium matrix during the electrolysis of heavy water / Timashev S.F. / /AND. physical chemistry. -1989.-vol. 63.-N.8.- pp.2283-2284.

UDC 539.12/.17

It is assumed that at a high concentration of D in Pd, the capture of an electron by the deuterium nucleus with the formation of a dineutron is possible. In the second stage of the process, a dineutron interacts with another nucleus D. As a result, tritium and a neutron are formed. The high probability of such a process is due to the high dineutron binding energy of 3÷6 MeV. It is usually assumed that the existence of a dineutron is incompatible with the isotopic invariance of nuclear interactions. However, the small difference in the rest energies of the neutron and proton and the

relatively low binding energy of the dineutron allows us to assume that isotopic invariance is realized beyond the energy uncertainty of 3÷4 MeV. In this case, the existence of a stable dineutron does not contradict the isotopic invariance of nuclear forces.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref.12V17

290. The cold fusion results await explanation. Cold fusion results still unexplained / Jackson J.S. // Nature. -1989.-Vol.339.-No.6222.-p.345.-Eng.

UDC 539.12/.17

V. Fowler (California Technol. Institute, USA) suggests that when two D nuclei merge in the described CNS experiments, a 4He nucleus is formed, which can explain the significant heat release at low neutron fluxes, provides estimates of the relative intensities of possible channels, in which ^{4}He is formed (d+d $\rightarrow$ ^{4}He+electron-positron pair, d+d $\rightarrow$ ^{4}He+γ) and shows that the ratio of the width of the energy level of the electron-positron pair to the width of the energy level of the gamma quantum is 0.015. J. Jackson (Cambridge University, UK) puts forward a hypothesis according to which the energy release in the Fleischmann-Pons experiments is of nuclear origin, but not associated with nuclear fusion, but with a chain reaction of radiative capture of neutrons by palladium nuclei. Neutrons, according to Jackson, are produced by the photodisintegration of deuterons.

VINITI RZh 18V Nuclear Physics. -1989.-8.-ref.8B4

291. Nuclear fusion in metal lattices through virtual states. Virtual-state internal nuclear fusion in meta1 lattices / Bussard R.W. // Fusion Technol.-1989.-Vol.16.-No.2.-pp.231-236.-Eng.

UDC 621.039.6

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U471

292. A possible explanation of the process of cold nuclear fusion by the interaction of three deuterons. Triple collision reaction of deuterons as a possible expansion of cold nuclear fusion / Besker E. // Naturwissenschaften.-1989.-Vol.76.-No.5.-p.214. -English

UDC 539.12/.17

A possible explanation is proposed for the results of studying the process of nuclear fusion during the electrochemical deuteration of palladium. Consideration of the known reactions accompanying the fusion of deuterium nuclei leads to a contradiction, since it turns out to be impossible to reconcile the small observed neutron flux with the large heat release. This contradiction is eliminated when considering the fusion reaction of three deuterons. As a result of this reaction, an excited state of the ^{6}Li nucleus is formed, which can decay into a deuteron and ^{4}He. The energy released in this process is close to 24 MeV. A necessary condition for the effectiveness of this process is the formation in Pd of clusters containing at least three deuterons.

VINITI RZh 18V Nuclear physics. -1989.-12.-ref.12V18

293. Resonant D-D reactions at low energies. On the Possibility of a nuclear mass-energy response in D+D reactions at low energy / McNally J.R. // Fusion Technol.-1989.-Vol.16.-No.2.-pp.237-239.-Eng.

UDC 621.039.6

The possibility of explaining experiments on CNS using concepts of resonant excitation of helium atoms is discussed. Data on the spectrum of excited states of helium are presented. It is noted that one of the excited states with an energy of 24.4 MeV has a level width of several MeV and thus overlaps with a state at 23.85 MeV, which is closely related to the DD reaction. The possible influence of the internal structure of palladium on the reaction rate of CCN is discussed. Bible 13.

VINITI RZh 22U Nuclear energy. -1990.-8.-ref.8U473

294. Doubts and reticence about cold fusion. Cold fusion doubts controls / Cranberg L., Irvine J.M., Riley S. //Nature. -1989.-Vol.339.-No.6225.-p.515. -English

UDC 539. 12/. 17

Two letters to the editor of “Nature”. The first authors are J. Irving and S. Riley, employees of the Department of Theoretical Physics of the Massachusetts Institute of Technology. in-ta, based on cosmological estimates of the probability of fusion of deuterium nuclei, they obtained the packing density of deuterium in the electrolyser electrode necessary to explain the thermal effect reported by Pons and Fleishman due to CNF (10^{7} mol/cm^{3}) and note that the media covering this problem, generated more heat than all deuterium electrochemical cells. In the second letter, P. Cranberg (USA) criticizes the experiments of Pons and Fleischmann, Jones from the point of view of determining the neutron background and detecting tritium.

VINITI RZh 18V Nuclear Physics. -1989.-9.-ref.9B5

295. Some doubts about the observation of electrochemically induced fusion of deuterium nuclei. Some doubts about the occurrence of electrochemically induced nuclear fusion of deuterium / Horanyj G. // Elestroshim. Asta.-1989.-Vol.34.-No.6.-pp.889-890.-English.

UDC 539.12/.17

A critical analysis of some conclusions and assumptions contained in the first report on the observation of the reaction of CNS during the electrochemical deuteration of Pd. The large heat release reported in this work may not be due to nuclear processes. The most likely source of thermal energy should be considered a chemical reaction of the synthesis of heavy water from deuterium and oxygen, which are released at the electrodes. The electrolyser used in Pons and Fleischmann's work allows for intense mixing of deuterium and oxygen. The cathode and anode materials (palladium and platinum) are effective catalysts for the heavy water synthesis reaction. The calculation of the internal pressure that acts on deuterium atoms in palladium is also incorrect. The abnormally high value of this pressure obtained by the authors is due to the use of an erroneous relationship between the cathode and anode potential and pressure.

VINITI RZh 18V Nuclear Physics. -1989.-12.-ref. 12V20

296. Cold fusion explained. Explanations of cold fusion / Rauling L., Boskris J. // Nature. -1989.-Vol.339.-No.6620.-p.105.-Eng.

UDC 539.12/.17

The hypothesis of L. Pauling, which explains the calorimetric results of Pons and Fleischmann, is discussed. Pauling believes that the electrolysis of heavy water produces an unstable compound PD_2, which can decompose either slowly, resulting in increased heat, or instantly, as was apparently observed by Pons and Fleischmann when the electrode collapsed. J. Bockris puts forward a hypothesis that can explain the irreproducibility of the experiments of Pons and Fleischmann. Deuterium in metals tends to accumulate near defects in the metal lattice. After some time, when the concentration of deuterium reaches a certain level, some interaction occurs, possibly a fusion reaction of deuterium nuclei. If the electrode was hydrogenated before the saturation of Pd with deuterium, then the deuterium concentration may never reach the required value, and the effect will not be observed. If this hypothesis

is correct, then to successfully repeat experiments on CNS with a Pd electrode, preliminary removal of hydrogen from palladium is required.

VINITI RZh 18V Nuclear Physics. -1989.-8.-ref.8B5

297. Eight explanations of the Fleischmann-Pons effect from a chemical point of view. Eight schemes of the Fleischmann-Pons efficiency / Kaithla R.S., Szklarczyk M., Kaba L., Velev O., Paskham N.J.S., Wass J.S., Voskgis J.O.M. /Int. J. Hydrogen Energy. -1989.-Vol.14.-No.11.-pp.771-775.-Eng.

UDC 621.039.6

VINITI RZH 22U Nuclear energy. -1990.-5.-ref.5U465

298. Ideas about cold fusion. Cold fusion ideas //Nature. -1989.-Vol.340.-No.6229.-pp.105-106.-Eng.

UDC 539.12/.17

Letter to the editor discussing alternative mechanisms to explain the thermal effect and tritium release during heavy water electrolysis.

VINITI RZh 18V Nuclear Physics-1989.-10.-ref.10B4

299. On the possible mechanism of “cold” nuclear fusion / Pokhodenko V.D., Golodets G.I., Korol E.N.// Preprint Institute of Nuclear Research. USSR Academy of Sciences. -1989.-N.24.

UDC 539.12/.17

The physicochemical aspects of the chemical reaction occurring during the electrolysis of heavy water on palladium are considered. The concept of “nuclear catalyst” and selectivity for nuclear fusion was introduced. The possibility of this synthesis occurring through a mechanism involving energy chains is discussed. The influence of deuterium concentration on the course of the process, as well as the influence of the reaction medium on the “nuclear catalyst”, is considered. A number of requirements for such a catalyst have been formulated.

VINITI RZh 18V Nuclear Physics. -1989.-11.-ref.11B11

300. Mechanical nature of gravitational and intranuclear forces / Eidlin S. //Inventor and innovator. -1990.-N.9.-pp.46-47.

UDC 539.12/.17

After Newton and Einstein - great explorers of the universe and the smallest matter - the same ambiguities remained regarding the origin of gravitational forces at the macro and micro levels. The article attempts to explain the forces contributing to CNF, based on the modern cosmological theory of the expanding universe. When the speed of a body changes under terrestrial conditions, its speed simultaneously changes relative to the masses of the conventional (displayed) hemispheres of the Metagalaxy, moving away from us in diametrically opposite directions. Since the internal energy of a rotating elementary particle is contained in its linear speed of rotation, it is precisely this factor that should cause the forces of mutual attraction of particles in artificially created conditions for this. The close coupling moment represents the collision at maximum translational speed, which instantly becomes zero; the amount of kinetic energy of two protons relative to the centres of mass of the hemispheres of the Metagalaxy instantly decreases. The released energy can be converted into other types of energy, including heat, which do not cause any dangerous radiation.

SOURCES VIEWED

1, VINITI RZH 18V Nuclear Physics, 1989-1990 (NN. 1÷8)

2. VINITI RZH 18H Physics of Solids, 1989-1990 (NN. 1÷8)

3. VINITI RZH 22U Nuclear energy, 1989-1990 (NN. 1÷8)

4. Issues of atomic science and technology. Series: Physics of radiation damage and radiation materials science, 1990, N.1

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11, Preprint JINR, N. D 15-89-347

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13. Preprint KIPT AN Ukrainian SSR, N. 89-61

14. In the world of science (Scientific American), 1989-1990 (NN. 1÷6)

15. Inventor and innovator, 1989-1990 (NN. 1÷9)

16. Science and life, 1989-1990 (NN. 1÷6)

17. Knowledge is power, 1985 (N. 10), 1989-1990 (NN. 1÷6)

18. Nature, 1989-1990 (NN. 1÷6)

19, Scientific and technological revolution, problems and solutions, 1989-1990 (NN. 1÷6)

20. Echo of the Planet, 1989-1990 (NN. 1÷6)