USACHEV, I.N

25(0) PHASE I BOOK EXPLOITATION SOV/1389

Akademiya nauk SSSR. Institut fizicheskoy khimii

Teoriya i praktika elektroliticheskogo khromirovaniya (Theory and Practice of Electrolytic Chromium Plating) Moscow, Izd-vo AN SSSR, 1957. 231 p. 5,000 copies printed.

Resp. Eds.: Vagramyan, A.T., Professor, N.T. Kudryavtsev, Professor, and M.A. Shluger, Candidate of Technical Sciences; Ed. of Publishing House: Yegorov, N.G.; Tech. Ed.: Pavlovskiy, A.A.

PURPOSE: This book is for engineers, industrial workers, members of scientific research institutions and teachers concerned with modern methods of electroplating and the manfacture of corrosion-resistant metallic instruments.

COVERAGE: The collection contains sixteen reports and the texts of several discussions presented before the March 1955 Conference on the Theory and Practice of Chromium Plating, sponsored jointly by the Institute of Physical Chemistry, AS USSR, and the Moscow Scientific, Engineering and Technical Society for Instrument Making. The reports reflect the conference's aim of a wide exchange of opinion on problems of chromium electrodeposition and offer solutions

Card 1/ 4

to the more essential problems in this field.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

Card 4/4

TM/gmp
5-4-59

137-58-6-12951

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 252 (USSR)

AUTHORS: Vagramyan, A.T., Usachev, D.N., Chervova, G.I.

TITLE: Polarization of the Cathode During the Electrolytic Deposition of Chromium (Polyarizatsiya katoda pri elektroosazhdenii khroma)

PERIODICAL: V sb.: Teoriya i praktika elektrolit. khromirovaniya. Moscow, AN SSSR, 1957, pp 8-26

ABSTRACT: The polarization of the cathode during electrolytic precipitation was studied, and a quantitative study of the different reactions taking place on the electrode was made. Data in the literature concerning the dependence of cathode polarization on the cathode cd are contradictory. It is shown that during reduction of CrO_3 reproducible results may be obtained only with a constant current intensity I in the circuit or with strictly constant electrode potential $\mathcal{E}$. 1) when I = const, the polarization curve consists of two stable segments wherein the ascending and descending branches do not coincide; there is a sharply defined hysteresis loop, 2) when $\mathcal{E}$ = const, the polarization curve has an anomalous shape, viz., if the polarization of the

Card 1/2

Polarization of the Cathode (cont.)

electrode is raised, beginning at a certain value, the intensity of the current falls sharply; the ascending and the descending branches then coincide. It is shown that the reduction of Cr^{6+} to Cr^{3+} corresponds to the first segment of the curve. The rate of this reaction is dependent upon the diffusion of Cr^{6+} toward the cathode. On the last segment three reactions take place simultaneously: separation of H_2, reduction of Cr^{6+} to Cr^{3+} and reduction to metallic Cr. Polarization curves for a constant ε value in the presence and in the absence of H_2SO_4 differ sharply from one another. The presence of H_2SO_4 favors the reduction of Cr^{6+} to Cr^{3+} on the first segment of the curve and sharply inhibits the reduction on the second segment. It is shown that upon an increase of concentration of H_2SO_4 the rate of reduction of H^+ decreases, whereas the rate of reduction of H_2CrO_4 to Cr increases sharply, and the rate of incomplete reduction increases steadily. Upon studying the changes in I with ε = const per unit of time it was established that a film forms on the cathode during electrolysis, which film is destroyed so soon as the current is switched on.

1. Chromium--Electrodeposition 2. Cathodes (Electrolytic cell) L.A. --Polarization

Card 2/2

137-58-6-12946

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 252 (USSR)

AUTHORS: Vagramyan, A.T., Usachev, D.N.

TITLE: Investigation of the Mechanism of Electrolytic Deposition of Chromium by the Method of Tagged Atoms (Issledovaniye mekhanizma elektroosazhdeniya khroma metodom mechenykh atomov)

PERIODICAL: V sb.: Teoriya i praktika elektrolit. khromirovaniya. Moscow, AN SSSR, 1957, pp 27-30

ABSTRACT: An investigation was carried out with the object of verifying the mechanism of the discharge of the Cr^{6+} ion during its reduction to metallic Cr. Use of the tagged atom of Cr^{51} afforded a means for the determination that the reduction of chromic acid to Cr takes place directly without formation of an intermediate Cr^{-3} (sic!) ion.

L.A.

1. Chromium--Electrodeposition 2. Chromium ions--Properties
3. Chromium isotopes (Radioactive)--Applications

Card 1/1

SOV/20-127-4-31/60

3(3)

AUTHORS: Usachev, D. N., Klimasenko, N. L., Vagramyan, A. T.

TITLE: On the Mechanism of Electrolytic Reduction of the Ions MnO_4', SeO_4'', ReO_4' at Simultaneous Precipitation With Chromium

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 830-833 (USSR)

ABSTRACT: For the reduction of hexavalent chromium to metal it is necessary that the cathode is covered with a film preventing the reduction of hexavalent to trivalent chromium. For the formation of this film, the presence of foreign ions in the solution is necessary (Refs 1, 2, 3). The mechanism of chromium reduction under these conditions is assumed in such a way that the discharging chromium enters the film as an anion to the other film-producing anions, and that these foreign anions are reduced on the cathode together with chromium. The examination of this assumption is carried out in the present paper. For this purpose, the reduction of a number of anions in chromic-acid solution was investigated with the addition of sulphuric acid. The choice of metals was small, for they had to form anions in the chromic-acid medium. The substances mentioned in the title

Card 1/2

On the Mechanism of Electrolytic Reduction of the Ions MnO_4', SeO_4'', ReO_4' at Simultaneous Precipitation With Chromium SOV/20-127-4-31/60

have this property. For [illegible], it [illegible] that it was precipitated at 0.05 [illegible] of H_2SO_4 [illegible] in the form of [illegible] precipitated [illegible] in the solution as a cation, it is not precipitated at all. By electrolytic precipitation, Se with Cr formed an alloy with a content of 37% Se and [illegible]3% Cr. Re also permitted this precipitation. The experiment failed for cations such as $H(AuCl_4)$, and [illegible] other anions. Only chromium was precipitated, i.e. simultaneous precipitation could not be carried out for all anions. There are 5 references, 2 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

PRESENTED: April 13, 1959, by P. A. Rebinder, Academician

SUBMITTED: April 13, 1959

Card 2/2

AUTHOR: Vagramyan, A. T., Kachev, T. N. 307/76-32-8-2/37

TITLE: The Mechanism of the Electrodeposition of Chromium (Mekhanizm elektroosazhdeniya khroma)

PERIOD: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 8, pp. 1900-1906 (USSR)

ABSTRACT: According to Gerischer (Gerischer) (Ref 4) the addition of SO_4^{2-} ions in the electrolysis of chromic acid prevents too rapid growth of the cathodic coating. Kolthoff (Kol'tgof) et al. (Ref 5) assumed that it is a layer of monomolecular thickness. According to the polarogram two reactions take place during the electrolysis, which are of different character. The changes occurring at the phase boundary electrode - solution taking place according to these two reactions are investigated. The reaction

$$Cr^{6+} \dashrightarrow Cr^{3+}$$

takes place in the presence of sulfuric acid at considerably higher positive potentials, and it depends to a great extent on the mixing of the electrolyte, as was shown by G. I. Chervova. In this reaction no coating is formed on the electrode

Card 1/2

whereas in the second, the reduction to the metal, a number of factors points to the fact that a coating layer is present. The authors found, for example, changes of the emf-time with time, which fact also served Gerischer (Ref 4), Sluger (Ref 10) as evidence of the existence of a coating layer. It is found that sulfuric acid forms intermediates with chromic acid, which reduce on the electrode. This was proved according to the method by I. A. Kazarinov and A. N. Frumkin (Ref 13) by using atomic hydrogen. Experiments demonstrated that the reaction

$$Cr^{6+} \longrightarrow Cr^{3+}$$

with atomic hydrogen takes place only in the presence of sulfuric acid, as is the case in the electrochemical reduction. There are 7 figures and 15 references, 11 of which are Soviet.

AUTHOR (S): [illegible] V. I., Institut Fizicheskoy Khimii, Moskva (V. I. [illegible], Institute of Physical Chemistry, Moscow)

SUBMITTED: March 2?, 1957

USACHEV, D. N.

A.

PHASE I BOOK EXPLOITATION SOV/2216

5(4)

Soveshchaniye po elektrokhimii. 4th, Moscow, 1956.

Trudy...[sbornik] (Transactions of the Fourth Conference on Electrochemistry; Collection of Articles) Moscow, Izd-vo AN SSSR, 1959. 868 p. Errata slip inserted. 2,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.

Editorial Board: A.N. Frumkin (Resp. Ed.) Academician, O.A. Yesin, Professor, S.I. Zhdanov (Resp. Secretary), B.N. Kabanov, Professor, S.I. Zhdanov (Resp. Secretary); S.M. Kabanov, Professor, S.I. Zhdanov, Doctor of Chemical Sciences; V.V. Losev, P.D. Ya. M. Kolotyrkin, Doctor of Chemical Sciences; V.V. Stender, Professor; Lukovtsev, Professor; Z.A. Solov'yeva; V.V. Stender, Professor; and O.M. Florianovich; Ed. of Publishing House: N.G. Yegorov; Tech. Ed.: T.A. Prusakova.

PURPOSE: This book is intended for chemical and electrical engineers, physicists, metallurgists and researchers interested in various aspects of electrochemistry.

COVERAGE: The book contains 127 of the 138 reports presented at the Fourth Conference on Electrochemistry sponsored by the Department of Chemical Sciences and the Institute of Physical Chemistry, Academy of Sciences, USSR. The collection pertains to different branches of electrochemical kinetics, double layer theories and galvanic processes in metal electrodeposition and industrial electrolysis. The majority of reports not included here have been published in periodical literature. No personalities are mentioned. References are given at the end of most of the articles.

USACHEV, D.N.; VAGRAMYAN, A.T.

Conditions for the electrolytic formation of alloys of chromium with other elements. Zhur.fiz.khim. 34 no.1:229-230 Ja '60. (MIRA 13:5)

1. Akademiya nauk SSSR. Institut fizicheskoy khimii, Moskva.
(Chromium-manganese alloys)
(Chromium-selenium alloys)
(Chromium-rhenium alloys)

S/076/61/035/003/018/023
B121/B206

AUTHORS: Vagramyan, A. T., Usachev, D. N., and Klimasenko, N. L.

TITLE: Effect of film composition on alloy formation during electrodeposition of chromium together with other elements

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 3, 1961, 647-650

TEXT: The effect of film composition on the electrodeposition of chromium together with other elements was studied. It was established that the deposition of metallic chromium depends on the composition of the film and not on the composition of the electrolyte solution. Investigation of the cathodic polarization in an electrolyte consisting of 2.5 moles/l of CrO_3 and 0.025 mole/l of selenic acid on a gold cathode showed that, in principle, the effect of selenic acid on the electroreduction of chromic acid is the same as that of sulfuric acid. An alloy of chromium with selenium forms on the cathode during this process. This alloy also forms when adding selenious acid instead of selenic acid. The reduction rate of the chromium ions is affected, not by the ion concentration in the electrolyte, but by the ion concentration in the film. The change of the composition of the Cr-Se alloy

Card 1/3

Effect of film ...

on a change of the concentration of selenic acid in a 2.5 M chromic-acid solution at a current density of 0.50 a/cm^2 and a temperature of 20°C was also investigated on platinum electrodes. The results showed that the percentage of selenium in the alloy rises to 0.15 mole/l with an increase of the selenium concentration in the solution. The composition of the Cr-Se alloy remains unchanged with a further increase of the selenium concentration. The same rule was also established for a replacement of selenic acid by selenious acid. During electroreduction the permanganate ion has no reducing effect on chromic acid. The ability of forming a film on the cathode thus depends first of all on the nature of the anions. The effect of the sulfuric-acid concentration on the percentage of selenium in the Cr-Se alloy during deposition from a solution with 2.5 moles/l of chromic acid and 0.1 mole/l of selenic acid was studied, and it was established that the selenium content in the electrolytic deposit decreases with increasing sulfuric-acid concentration. Partial exchange of sulfuric acid for selenic acid in the film results in a decrease of the reduction rate of the selenium ions. There are 3 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: C. Kasper, J. Res. Nat. Bur. Standards, 9, 353, 1932.

Card 2/3

Effect of film ...

S/076/61/035/003/018/023
B121/B206

ASSOCIATION: Institut fizicheskoy khimii Akademiya nauk SSSR (Institute of Physical Chemistry Academy of Sciences USSR)

SUBMITTED: July 13, 1959

Card 3/3

2768

S/076/61/035/009/013/015
B124/B101

5 1310

AUTHORS: Usachev, D. N., and Pavlova, N. A.

TITLE: Mechanism of electrolytic deposition of alloys of chromium with other metals

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 9, 1961, 2142-2143

TEXT: According to D. N. Usachev and A. T. Vagramyan (Ref.2: Zh.fiz. khimii 32, 1900, 1958), the reduction of chromate ions to metallic chromium is effected by products originating from a special cathode film containing anionic reducing agents, and not by ions present in the solution. A condition indispensable for the simultaneous deposition of chromium and other metals is the presence of an anionic coprecipitated substance in the chromic-acid electrolyte, which was experimentally proved by the deposition of Cr-Mn and Cr-Se alloys effected by introducing MnO_4^- and SeO_4^{2-} ions. The anions $[AuCl_4]^-$ and $[Fe(CN)_6]^{3-}$ were not reduced electrolytically under the conditions given. It follows that the simultaneous presence of various anions is not a sufficient condition for their simultaneous reduction with

Card 1/4

Mechanism of electrolytic...

chromate. The reduction of anions in chromic-acid solution takes place in two steps: 1) penetration of anions into the film, and 2) their reduction in the film. The penetration of anions into the cathode film is investigated by using anions which do not affect the electrolysis of chromic acid, are not subject to electrolytic decomposition, and are called neutral anions. These neutral anions may displace either chromate ions or chromate and foreign anions simultaneously, or only foreign anions on penetration into the cathode film. If neutral anions are capable of penetrating into the cathode film which forms during electrolysis of chromic acid in the presence of an amount of sulfuric acid corresponding to the maximum current yield of chromium, the current yield of metallic chromium will decrease; otherwise, it will be constant. Based on data given in Ref.3(E. Liebreich, Z. Elektrochem. 40, 73, 1934; E. Müller, Arch. Metallkunde 2, 110, 1948), the phosphate ion may be considered a neutral anion. The compounds $K_3[Fe(CN)_6]$, $H_7[P(MoO_4)_6]$, and $[AuCl_4]$ were studied under this aspect, and the dependence of the current density on the cathode potential in the presence and absence of sulfuric acid was investigated. The polarization curves were obtained on the chromium cathode using a potentiostatic method;

Card 2/4

the shape of the polarization curve does not change after the addition of the mentioned compounds in quantities of 0.2 to 0.4 equivalents per liter. The compounds investigated have no effect on the electrolytic reduction of chromic acid to trivalent chromium, and show no decomposition in the chromic-acid solution. As is shown by experiments performed at 20°C and a current density of 0.2 a/cm^2 (Fig.), the current yield of metallic chromium decreases with increasing concentration of neutral anions. Hence, it can be concluded that all anions investigated are capable of penetrating into the film together with the chromate and sulfate anions. The capability of ions of penetrating into the cathode film is determined by the negative sign of the ions, and is independent of their nature. There are 1 figure and 4 references: 3 Soviet and 2 non-Soviet.

ASSOCIATION: Moskovskiy tekhnologicheskiy institut legkoy promyshlennosti (Moscow Technological Institute of Light Industry)

SUBMITTED: January 2, 1961

Card 3/4

USACHEV, D.N., kand. khim. nauk, dotsent

Mechanism of the formation of Cr^3 during chrome plating. Nauch. trudy MTILP 25:33-39 '62. (MIRA 16:8)

1. Kafedra fizicheskoy i kolloidnoy khimii Moskovskogo tekhnologicheskogo instituta legkoy promyshlennosti.

USACHEV, D.N.

Mechanism of the formation of trivalent chromium in the chromium plating process. Zhur. fiz. khim. 36 no.6:1337-1339 Je'62 (MIRA 17:7)

1. Moskovskiy tekhnologicheskiy institut legkoy promyshlennosti.

ACCESSION NR: AP4036579

AUTHOR: Usachev, D. N. (Moscow)

TITLE: The nature of the film formed on the cathode during electrolytic deposition of chromium from chromic acid solution.

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 4, 1964, 927-931

TOPIC TAGS: chromium, electrodeposition, electroplating, chromic acid, trivalent chromium, chromium film formation, ion transfer, phosphoric acid, chromate ion reduction, hydrogen evolution

ABSTRACT: The following conclusions were drawn based on examination of the effect of various concentrations of H_3PO_4 on the current yield of H_2, Cr and Cr^{+3} (and the ratio of the Cr^{+3}/Cr) from electrolytes containing 150 or 250 gm/l CrO_3 and 2.5 gm/l H_2SO_4. In the process of electrodepositing chromium from CrO_3 solution the cathode surface becomes covered with a layer of adsorbed chromium ions of an intermediate stage of reduction (Cr^{+3}). This lends a positive charge to the surface which attracts any kind of anion to form an electrical double layer. The formation of metallic chromium occurs by discharge of the intermediate valency

Card 1/2

ACCESSION NR: AP4034579

chromium ions adsorbed on the cathode surface. Part of the chromium atoms are again covered by intermediate valency chromium ions originating from the catalytic reduction of chromate ions on these sites. The other chromium atoms become centers of hydrogen ion discharge. The evolution of hydrogen is due to the insufficient concentration of catalyst ions in the solution. Foreign anions not only facilitate the electrolytic reduction of chromic acid, but also interact with the chromium ions adsorbed on the surface, transferring them into the solution. Orig. art. has: 3 figures.

ASSOCIATION: [illegible]

SUBMITTED: [illegible]

ENCL: 00

SUB CODE: MM, GC

NO REF SOV: 016

OTHER: 010

Card 2/2

USACHEV, D.N.

Mechanism of the electrolytic reduction of chromic acid in the zone of low cathodic potentials. Zhur. fiz. khim. 39 no.2:483-485 F '65. (MIRA 18:4)

1. Institut tonkoy khimicheskoy tekhnologii imeni Lomonosova.

[Photography for students] Fotografiia dlia shkol'nika. Moskva, Gos. izd-vo "Iskusstvo," 1956. 191 p. (MLRA 9:10)
(Photography)

CHERTOK, L.; ZARECHKOVYY, G., brigadir-parketchik; USACHEV, I., brigadir-parketchik

Using staves of various size in parquet flooring. Na stroi. Mosk. 1 no.4:27 Ap '58. (MIRA 11:9)

1.Starshiy prepodavatel' rabot stroitel'nogo uchastka - 92 Moskovskoy obuvnoy fabriki (for Chertok) 2.Starshiy rabochiy [illegible] (for [illegible])

ZIMAKOV, P. V., BIKOV, A. G. and USACHEV, I. A. (Ministry of the Chemical Ind.)

"Radio Electrochromatographic Method of Analysis"

Isotopes and Radiation in Chemistry, Collection of papers of 2nd All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and Radiation in National Economy and Science, Moscow, Izd-vo AN SSSR, 1958, 380pp.

This volume published the reports of the Chemistry Section of the 2nd AU Sci Tech Conf on Use of Radioactive and Stable Isotopes and Radiation in Science and the National Economy, sponsored by Acad Sci USSR and Main Admin for Utilization of Atomic Energy under Council of Ministers USSR Moscow 4-12 Apr 1957.

L 39477-65
ACCESSION NR: AP5007795

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taking the drug averved toward the slow component. The latter individuals have a latent vestibular asymmetric instability and they should be given additional tests before [illegible] as pilots. [illegible]

NO REF SOV: 000 OTHER: 000

Card 2/2

USACHEV, I., [illegible]

Creative activity in the matter of an engineer. NTO 7 no.3:37-39 Mr '65. (MIRA 18:5)

1. Nachal'nik tsekha Chelyabinskogo truboprokatnogo zavoda.

BOYKO, V.I., inzh.; KRAVTSOV, P.N., inzh.; USACHEV, K.V., inzh.

Mechanical cleaning and painting of metal poles for electric transmission lines. Energetik 5 no.9:1-4 S '57. (MIRA 10:10)
(Electric lines--Poles)

ASTAKHOV, N.P., inzh.; USACHEV, K.V., inzh.

[illegible]

USACHEV, L.N.

[Equation covering the importance of neutrons, reactor kinetics, and the perturbation theory] Uravnenie dlia tsennosti neitronov, kinetika reaktora i teoriia vozmushchenii. Moskva, 1955. 21 p. (MIRA 14:7)

(Neutrons) (Nuclear reactors)

USACHEV, L.N.

AUTHOR STAVISSKIY, Yu. Ya., STUMBUR, E.A., UKRAINTSEV, F.I., USACHEV, L.N.

TITLE The Experimental Reactor for Fast Neutrons BF - 2.
(Eksperimental'nyy reaktor na bystrykh neytronakh BF -2-Russian)

PERIODICAL Atomnaya Energiya, 1957, Vol 2, Nr 6, pp 496-500 (U.S.S.R.)

ABSTRACT This reactor is intended to be used for physical investigations with fast neutrons. At first the active zone of the reactor is discussed. The heat-separating elements of the reactor BF-2 consist of plutonium rods of 10 mm diameter and 130 mm length. Besides the plutonium rods there are similarly constructed rods in the active zone which are made of poor uranium. Altogether there are 108 uranium- and plutonium rods which are mounted in a steel tube with an inner diameter of 130 mm. The reflector of the reactor consists of an uranium layer (outer diameter 700 mm) and a copper layer (outer diameter 1000 mm). The reactor is controlled by a control system and by an emergency system. The operating control organs are part of a screen which are located near the active zone. The control system also contains boron-ionization chambers, an electronic apparatus, and servofeeds. The emergency system enters into operation if the prescribed or assumed power of the reactor is exceeded. Circulating mercury is used for the system of heat conduction. This mercury is then cooled in a heat exchanger with water. The radiation protection of the reactor consists of the following parts:
a) a water layer of 300 mm thickness b) a cast iron layer of 400 mm

Card 1/2

[illegible] oscillator may be fitted. Three horizontal, and also a local use of conveying bundles of fast neutrons through the protective casing of the reactor. The reactor furthermore contains a thermal column of graphite, the dimensions of which are 1400 x 1400 x 2600 mm. In conclusion the applicability of this reactor is discusses; in particular physical constants are determined precisely. (3 illustrations).

ASSOCIATION Not Given.
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LEIJPUNSKIJ, A.I. [Leypunskiy, A.I.]; BLOCHINCEV, D.I. [Blokhintsev, D.I.]; ARISTARCHOV, I.N. [Aristarkhov, I.N.]; BONDARENKO, I.I.; KAZACKOVSKIJ, O.D. [Kazakovskiy, O.D.]; PINCHASIK, M.S.; STAVISAKIJ, Ju.Ja. [Stavisskiy, Yu.Ya.]; STUMBUR, E.A.; UKRAJINCEV, F.I. [Ukraintsev, F.I.]; USACEV, L.N. [Usachev, L.N.]; MEDONOS, S. [translator]

Soviet experimental reactor with fast neutrons BR-2. Jaderna energie 3 no.8:231-233 Ag '57.

LEYPUNSKIY, A.I.; ABRAMOV, A.I.; ANDREYEV, V.N.; BARYSHNIKOV, A.I.; BONDARENKO, I.I.; GALKOV, V.I.; GOLUBEV, V.I.; GUL'KO, A.D.; GUSEYNOV, A.G.; KAZACHKOVSKIY, O.D.; KOZLOVA, N.V.; KRASNOYAROV, N.V.; KUZ'MINOV, B.D.; MOROZOV, V.N.; NIKOLAYEV, M.N.; SMIRENKIN, G.N.; STAVISSKIY, Yu.Ya.; UKRAINTSEV, F.I.; USACHEV, L.N.; FEITISOV, N.I.; SHERMAN, L.Ye.

Studies in the physics of fast-neutron reactors. Atom. energ. 5 no.3:277-293 S '58. (MIRA 11:10)
(Nuclear reactors)

Card 1/8

AUTHORS: Lepunskiy, A. I., Abramov, A. I., Andreyev, V. K., Bondarenko, I. I., Galanin, A. D., Gurevich, L. E., Kolubev, V. I., Kramarov, N. V., Kuz'minov, B. D., Morozov, V. M., Nikolayev, M. N., Sairanskiy, G. M., Stavisskiy, Yu. Ya., Ukraintsev, V. F., Usachev, L. N., Petrov, M. I., Sherman, L. Ye.

TITLE: Investigations of the Physics of Reactors With Fast Neutrons. II (Issledovaniya po fizike reaktorov na bystrykh neytronakh. II)

(Continued from abstract 6/15)

PERIODICAL: Atomnaya energiya, 1958, Vol. 5, Nr 3, pp. 280-293 (USSR)

ABSTRACT: The reactivity and the kinetics of the reactor were measured. It could be shown that in the center of the active zone the weight of the 5 MeV neutrons is higher by ~15% than that of 250 MeV neutrons. The effective yield of the delayed neutrons in the reactor with a uranium shield exceeds that of a reactor with a copper shield by 1.4 times its amount.

Reactor [redacted] 1:
The active plutonium zone is the same as in reactor [redacted] 2. In the center of the reactor a water-uranium channel is provided, which is separated from the plutonium zone by a uranium layer of 8 cm thickness. The uranium-water lattice consists of cylindrical slugs of normal uranium, which have a diameter of 35 mm. The canning material is aluminum. The ratio between water and uranium is 0.15. The lattice spacing is 40 mm. Measurements carried out with the water-uranium lattice instead of with the pure uranium layer showed:
1) The conversion factor is reduced from 2.45 ± 0.10 to 1.7 ± 0.2.
2) In the case of a fixed power output of the active zone the velocity with which the total quantity of plutonium 239 and uranium 235 is formed was increased by 35%.
3) The velocity with which plutonium is produced increases to 1.8 times its amount.
4) In the case of a fixed power output of the active zone the total power output of the reactor is increased by 2.5 times its amount.

Card 2/8

Reactor [redacted] 2:
This reactor was described more in detail in references 12 and 13. Its nominal power output is 120 kW, the maximum output is 200 kW. In the active zone of the reactor [redacted] 2, which consists of plutonium rods, mercury is used as a coolant, which takes up ~17% of the total volume of the active zone. The regulating rods (interior of shield) are made from a copper-nickel alloy. The external shield consists of uranium slugs canned with stainless steel. Thickness ~25 cm. The uranium shield is surrounded by copper of 15 cm thickness.
The presence of mercury in the active zone leads to a decrease of the content of fast neutrons in the spectrum. The conversion factor was 1.5 ± 0.2.
Theoretically the kinetic equation for this reactor was calculated by G. I. Marchuk according to the method developed by V. S. Vladimirov. Theoretical calculation of the critical mass was carried out with an error of 4%, and that of the effective area of the regulating rods with an error of 8%. The effective yield of the delayed neutrons was found to amount to ...%, while the experimental value was 0.24 ± 0.04%. There are ... figures, 1 table, and 13 references, 9 of which ...

Card 1/8

USACHEV, L.N.

21(4) PHASE I BOOK EXPLOITATION SOV/2583

International Conference on the Peaceful Uses of Atomic Engergy. 2nd, Geneva, 1958.

Doklady sovetskikh uchenykh; yadernyye reaktory i yadernaya energetika. (Reports of Soviet Scientists; Nuclear Reactors and Nuclear Power) Moscow, Atomizdat, 1959. 707 p. (Series: Its: Trudy, vol. 2) Errata slip inserted. 8,000 copies printed.

General Eds.: N.A. Dollezhal, Corresponding Member, USSR Academy of Sciences, A.K. Krasin, Doctor of Physical and Mathematical Sciences, A.I. Leypunskiy, Member, Ukrainian SSR Academy of Sciences, I.I. Novikov, Corresponding Member, USSR Academy of Sciences, and V.S. Fursov, Doctor of Physical and Mathematical Sciences; Ed.: A.P. Alyab'yev; Tech. Ed.: Ye. I. Mazel'.

PURPOSE: This book is intended for scientists and engineers engaged in reactor designing, as well as for professors and students of higher technical schools where reactor design is taught.

COVERAGE: This is the second volume of a six-volume collection on the peaceful use of atomic energy. The six volumes contain the reports presented by Soviet scientists at the Second International Conference on Peaceful Uses of Atomic Energy, held from September 1 to 13, 1958 in Geneva. Volume 2 consists of three parts. The first is devoted to atomic power plants under construction in the Soviet Union; the second to experimental and research reactors, the experiments carried out on them, and the work to improve them; and the third, which is predominantly theoretical, to problems of nuclear reactor physics and construction engineering. Yu. I. Koryakin is the science editor of this volume. See SOV/2081 for titles of all volumes of the set. References appear at the end of the articles.

PART II. EXPERIMENTAL AND RESEARCH REACTORS

199

USACHEV, L. N., LEYPUNSKIY, A. I., KAZACHOVSKIY, O. D., [illegible], A. I., ALEKSANDROV, Y. A., ARISTARKHOV, N. N., BONDARENKO, I. I., KRASNOYAROV, K. V., MOROZOV, V. N., NIKOLAYEV, N. N., PINKHASIK, M. S., SMIRENKIN, G. N., STAVISSKIY, Y. Y., SALNIKOV, O. A., UKRAINTSEV, F. I.,

Physical charactistics of the Br-5 reactor

report submitted for the IAEA Seminar on the Physics of Fast and Intermediate Reactor, Vienna, 3-11 August 1961
(report presented by G. I. Marchuk)

Acad. Sci. USSr, Moscow

USACHEV, L.N.

13

21406
S/089/61/011/006/002/014
B102/B138

21.1000

AUTHORS: Leypunskiy, A. I., Abramov, A. I., Aleksandrov, Yu. A., Anikin, G. V., Bondarenko, I. I., Guseynov, A. G., Ivanov, V. I., Kazachkovskiy, O. D., Kuznetsov, V. F., Kuz'minov, B. D., Morozov, V. N., Nikolayev, M. N., Sal'nikov, O. A., Smirenkin, G. N., Soldatov, A. S., Usachev, L. N., Yutkin, M. G.

TITLE: Investigation of the BR-5 (BR-5) fast reactor (spatial and energy distributions of neutrons)

PERIODICAL: Atomnaya energiya, v. 11, no. 6, 1961, 498 - 505

TEXT: The fast research reactor BR-5 and its experimental equipment is described in brief and some of its neutron spectra are given and discussed. The following data are given: fuel - plutonium oxide; coolant - sodium; reflector - thin layer of natural uranium plus thick layer of nickel; power - 5000 kw. The reactor has many vertical and horizontal holes for technical and physical studies and is well supplied with experimental equipment. Leypunskiy gave a detailed description of the BR-5 reactor at

Card 1/6

the Second Geneva Conference (1958). Inside the core the neutrons have energies of more than 100 kev which they lose almost completely in passage through reflector and shield. In the outer layers of the shield, their mean energy does not exceed some tens of ev. In the kev range (E_n>50 kev) spectra were measured for the most important beams and channels. For the other cases, they were determined from threshold reactions. The soft part of the spectrum within the reflector was determined from the spatial distribution of neutrons with E_n≤5 ev, recorded with gold resonance indicators. The total neutron flux was determined only at the points where the Pu^{239} fission cross section was constant. Direct neutron spectrum measurements were carried out in a vertical (OK-70) and a horizontal (B-3) channel using (He^3+Ar)-filled ionization chamber in the first case and the neutron transmission method with n-hexane in the second. The neutron spectrum of the horizontal channel was also determined by photoemulsions. From the rates of indicator and fission reactions $Au^{197}(n,\gamma)$, $U^{235}(n,f)$ $Pu^{239}(n,f)$, $Th^{232}(n,f)$, $Na^{23}(n,\gamma)$ $Cu^{63}(n,\gamma)$, and $Al^{27}(n,\alpha)$ the abrupt

Card 2/6

Investigation of the...

drop in neutron energy in the Ni reflector was determined, and the activity caused by resonance neutrons (E_n = 4.9 ev). The fast neutron flux ($E_n > 1.4$ Mev) in the core center was found to be $(2.4 \pm 0.2) \cdot 10^{14}$, and total flux was $(8.2 \pm 0.3) \cdot 10^{14}$. Experimental results were verified by energy-group calculations (18 groups). Good agreement between theory and experiment was also found for the channel spectra. The authors thank D. S. Pinkhasik, N. N. Aristarkhov, and the reactor personnel for assistance. There are 10 figures, 2 tables, and 2 Soviet references.

SUBMITTED: August 17, 1961

Table 1. Reaction cross sections in the core center.

Legend: (1) Reaction; (2) experiment; (3) σ calculated, given in barns.

Fig. 7. Neutron transmission spectrum (n-hexane) for the horizontal channel B-3.

Card 3/3

S/869/62/000/000/002/012
B102/B186

AUTHORS: Petrov, E. Ye., Usachev, L. N.

TITLE: Spatial and angular distributions of neutrons emitted from a point source when scattering anisotropy is taken into account

SOURCE: Teoriya i metody rascheta yadernykh reaktorov; sbornik statey. Ed. by. G. I. Marchuk. Moscow, Gosatomizdat, 1962, 58 - 71

TEXT: Attempts are made to determine sufficiently exact neutron distributions at various distances from the source, including distances shorter than the mean free path. In order to eliminate the $\frac{1}{r^2}\delta(\mu-1)$ singularity, all neutrons that have not suffered even one collision are singled out, so that the source consists of neutrons that collided once. The problem is treated in a similar way to the isotropic case. The singularities in the neutron distribution after the first collision are treated separately from those after the second since the distribution function $\psi(\vec{r},\vec{n})$ is assumed to be the sum of the functions representing these singularities (subscripts 1,2) and a smooth function (subscript rem) not containing them. The authors

Card 1/4

Spatial and angular...

start from the transport equation

$$\frac{d\psi(r-sn,n)}{ds} + \Sigma_t\psi(r-sn,n) = \int_{4\pi}\psi(r-sn,n')\,\Sigma_s(\mu_0)d\Omega' \qquad (1)$$

which can be written as $\underline{L}\psi(r,\mu) = \int\psi(r,\mu')\Sigma_s(\mu_0)d\Omega'$ if the operator $\underline{L} = \mu\frac{\partial}{\partial r} + \frac{(1-\mu)^2}{r}\frac{\partial}{\partial\mu} + \Sigma_t$ is introduced that represents the differential part of the transport operator. The integro-differential equations for the above mentioned summands of

$$\psi(r,\mu) = \psi_0(r,\mu) + \psi_1(r,\mu) + \psi_2(r,\mu) + \psi_{r,n}(r,\mu) \qquad (4)$$

are derived and $\psi' = \psi_1 + \psi_2 + \psi_{r,n}$ - leads to

$$L\psi'(r,\mu) - \int_{4\pi}\psi'(r,\mu')\Sigma_s(\mu_0)d\Omega' = \frac{e}{4\pi r^2}\Sigma_s(\mu) \qquad (12);$$

here $\mu = \vec{nr}/r$, $\mu_0 = \vec{nn}'$, and $\Sigma_s(\mu_0)$ is the macroscopic scattering cross section through the angle θ; the vector $\vec{n}$ gives the direction of the

Card 2/4

Spatial and angular...

neutron motion. In order to overcome the difficulties due to the distribution singularities arising as $r \to 0$ and $\mu \to 1$, certain functions

$$Q_1(r,\mu) = L\tilde{\psi}_1 - \int_{4\pi} \psi_0(r,\mu')\Sigma_s(\mu_0)d\Omega', \qquad (13)$$

$$Q_2(r,\mu) = L\tilde{\psi}_2 - \int_{4\pi} \tilde{\psi}_1(r,\mu')\Sigma_s(\mu_0)d\Omega \qquad (14)$$

are chosen which have no singularities as $r \to 0$ and $\mu \to 1$ and which play the role of additional sources in the $\psi_{r,n}$-equation:

$$L\psi_{r,n}(r,\mu) - \int_{4\pi} \psi_{r,n}(r,\mu')\Sigma_s(\mu_0)d\Omega' - \int_{4\pi} \psi_2(r,\mu')\Sigma_s(\mu_0)d\Omega' - Q_1(r,\mu) - Q_2(r,\mu) \qquad (15).$$

Thus, $\psi_{r,n}$ compensates the deviations of $\tilde{\psi}_1$ and $\tilde{\psi}_2$ from the exact solutions ψ_1, ψ_2 and (12) has the solution $\psi'(r,\mu) = \tilde{\psi}_1(r,\mu) + \tilde{\psi}_2(r,\mu) + \psi_{r,n}(r,\mu)$. After the singularities 1 and 2 have been separated, (15) is replaced by

$$L\psi_{r,n}(r,\mu) - \int_{4\pi} \psi_{r,n}(r,\mu')\Sigma_s(\mu_0)d\Omega' = Q(r,\mu) \qquad (15')$$

Card 3/4

Spatial and angular...
and

$$Q(r,\mu) = \sum_{l=0}^{l=k} \frac{2l+1}{4\pi} \sigma_l P_l(\mu)\left[f_{ol}(r) + \frac{e^{-\Sigma_t(r)}}{4\pi r^2}\right] - Lf_o(r,\mu) \quad (24)$$

$$\sigma_l = 2\pi \int_{-1}^{+1} \Sigma_s(\mu) P_l(\mu) d\mu, \quad f_{ol} = 2\pi \int_{-1}^{+1} f_o(r,\mu) P_l(\mu) d\mu.$$

holds for the source. An approximate solution of (15') for a homogeneous medium in spherical geometry can be easily obtained by the method of spherical harmonics. There are 2 figures.

Card 4/4

S/903/62/000/000/020/044
B102/B234

AUTHORS: Koprov, V. M., Usachev, L. N.

TITLE: The problem of small-angle neutron scattering

SOURCE: Yadernyye reaktsii pri malykh i srednikh energiyakh; trudy Vtoroy Vsesoyuznoy konferentsii, iyul' 1960 g. Ed. by A. S. Davydov and others. Moscow, Izd-vo AN SSSR, 1962, 213-218

TEXT: A theoretical analysis is given of the role played by the various possible neutron interaction mechanisms at small angles (2-5°). The considerations are based on a Hamiltonian taking account of the potentials of the nucleus, of Schwinger interaction and of polarization:

$H = -\hbar^2\Delta/2m + U_{nucl} + U_{Schw} + U_{pol}$, where $U_{nucl} = U_0(r) + U_s(r)LS$, and

$U_{pol}(r) = \begin{cases} -\alpha Z^2 e^2/r^4 & r > R \\ 0 & r < R \end{cases}$ where R is the nuclear radius and α the neutron polarizability. The resulting cross section formula reads

Card 1/3

The problem of small-angle neutron scattering

$$\sigma(\theta,\varphi) = |f|^2 + |h|^2 + 2\mathrm{Re}\,(f^*h)\,Pn + \\ + \frac{e^2}{4}\mathrm{ctg}^2\frac{\theta}{2} - \frac{e}{2}\mathrm{ctg}\frac{\theta}{2}\,\mathrm{Im}\,f\,Pn - \frac{e}{2}\mathrm{ctg}\frac{\theta}{2}\,\mathrm{Im}\,h + \\ + 2\mathrm{Re}\,f f^{B}_{\text{пол}} + 2\mathrm{Re}\;h f^{B}_{\text{пол}}\,Pn + (f^{B}_{\text{пол}})^2. \qquad (*)$$

where $F = f_{\text{nucl}} + f_{\text{Schw}} + f_{\text{pol}}$, (пол = pol) and

$$f^{B}_{\text{пол}} = \frac{\gamma}{R}\cdot\frac{1}{2}KR\left[\frac{\sin KR}{(KR)^2} + \frac{\cos KR}{KR} + \sin KR\right].$$

$$\gamma = 2\alpha\lambda^2\frac{e^2}{\hbar c}\cdot\frac{mc}{\hbar},\quad K = 2k\sin\frac{\theta}{2}.\quad F = f + h\,Sn - i\frac{e}{2}\mathrm{ctg}\frac{\theta}{2}\,Sn + f^{B}_{\text{пол}}.$$

the first terms may be considered as linear in cos 9 up to about 20°. The third term represents the contribution to the differential scattering cross section in the case of a partially or completely polarized neutron beam,

where $P = \frac{2\mathrm{Re}\,(f^*h)}{|f|^2+|h|^2}\,n$, , $\vec{n}$ is the normal onto the scattering plane. The fourth term in (*) represents the contribution of Schwinger interaction and the

Card 2/3

fifth describes the interference between nuclear and Schwinger scattering which is nonvanishing for polarized neutrons. At small angles Im f(θ) is a weak function and

$$\frac{\theta}{2}\operatorname{ctg}\frac{\theta}{2}\operatorname{Im} f\,\mathrm{Pn}\cong\frac{\theta}{2}\operatorname{ctg}\frac{\theta}{2}\operatorname{Im} f(0)\,\mathrm{Pn}\cong\frac{\theta}{2}\frac{\sqrt{2}}{\sqrt{\xi}}\operatorname{Im} f(0)\mathrm{Pn}.$$

and, according to the optical model, Im f(0) = $\sigma_{tot}k/4\pi$. Under reasonable assumptions none of these terms may cause an observable effect and the σ(θ) anomaly may not be explained. In order to obtain the terms $\sim\vec{P}\vec{n}$ in greater accuracy measurements of the left-right assymmetry are necessary.

ASSOCIATION: Fiziko-energeticheskiy institut Gosudarstvennogo Komiteta Soveta Ministrov SSSR po ispol'zovaniyu atomnoy energii (Physics and Power Engineering Institute of the State Committee of the Council of Ministers of USSR on the Utilization of Atomic Energy)

USACHEV, L.N.

Perturbation theory for the fuel regeneration coefficient and other number ratios of various processes in a reactor. Atom. energ. 15 no.6:472-481 D '63. (MIRA 17:1)

L 13635-63 EWT(m)/BDS AFFTC/ASD

ACCESSION NR: AP3003125 S/0056/63/044/006/1950/1952

52

AUTHOR: Usachev, L. N.; Pavlinchuk, V. A.; Rabotnov, N. S.

TITLE: Determination of the fission threshold from experiments on the (d, pf) and (Gamma, f) reactions

SOURCE: Zhurnal eksper. i teor. fiziki, v. 44, no. 6, 1963, 1950-1952

TOPIC TAGS: fission thresholds, deuteron induced fission, gamma induced fission

ABSTRACT: The experimental data on the energy dependence of the cross sections of the reaction (d, pf) on the nuclei U sup 233, U sup 35, and Pu sup 239, at excitation energies lower than the neutron binding energy in the compound nucleus, are interpreted under the assumption that when the fission channel is fully open the fission width is much larger than the radiation width, in agreement with estimates made by the Bohr-Wheeler formula. It is shown that the converse assumption (fission width much smaller than radiation width), which was actually used previously in such an analysis, leads to fission threshold values that are lower than the true ones by several hundred keV. It is noted that to determine the threshold it is necessary to know much more accurately the energy dependence of the barrier penetrability, which furthermore can be different for different thresholds. All the considerations advanced in the article should also be applied to thresholds determined from the

Card 1/2/ results.

BONDARENKO, I. I.; KUZNETSOV, V. F.; NESTEROV, V. G.; PAVLINCHUK, V. A.; PROKHOROVA, L. I.; RABOTNOV, N. S.; SMIRENKIN, G. N.; USACHEV, L. N., Obninsk

"Effects of energy gap in channel spectrum on the fission process."

report submitted for Intl Conf on Low & Medium Energies Nuclear Physics, Paris, 2-8 Jul 64.

USACHEV, L. N.; NEVINNITSA, A. I.; TROYANOV, M. F.

"Some new aspects of adjoint function and perturbation theory applications in reactor and shielding calculations."

report submitted for 3rd Intl Conf, Peaceful Uses of Atomic Energy, Geneva, 31 Aug-9 Sep 64.

(2)

L 9106-65 ESD(t)/AFWL/RAEM(t)/SSD
ACCESSION NR: AT4048278 S/0000/64/000/000/0001/0004

AUTHORS: Bondarenko, I. I.; Kuznetsov, V. F.; Nesterov, V. G.; Pavlinchuk, V. A.; Prokhorova, L. I.; Rabotnov, N. S.; Smirenkin, G. N.; Usachev, L. N. B

TITLE: Effect of the energy gap in the channel spectrum on the fission process

SOURCE: Vliyaniye energeticheskoy shcheli v spektre kanalov na protsess deleniya 1964, 01-04 *

TOPIC TAGS: nuclear fission, fission cross section, fission product, fission neutron, angular distribution, uranium, plutonium

ABSTRACT: The experiments reported constitute a later stage of a study of the fission process (Yu. A. Blyumkina et al., Atomnaya energiya, v. 15, 64, 250, 1963), and are intended to clarify further the nature of the previously observed correlation between the irreg-

Card 1/3 *[No source given.]

L 9105-65
ACCESSION NR: AT4048278

ularities in the energy dependences of the fission characteristics. The angular distribution of the cross section $\sigma_f(\theta)$ of the fission of U^{233}, U^{235}, and Pu^{239} by neutrons with energies between 0.08 and 1.25 MeV was measured by a procedure described elsewhere (V. G. Nesterov et al., Atomnaya energiya 16, no. 6, 1964). The data obtained on $\sigma_f(\theta)$ confirm the earlier results of the authors (V. G. Nesterov et al., Atomnaya energiya 10, 620, 1961 and 11, 248, 1961) and show that the correlated increases and decreases in the asymmetry $\sigma_f(0°)/\sigma_f(90°)$ correspond to abrupt changes in the angular distributions of the fission fragments. The various irregularities in the angular distributions at different fissioning-neutron energies are interpreted as being connected with the opening up of new fission channels. In particular, the change in the character of $\sigma_f(\theta)$ when U^{235} is fissioned by neutrons with $E_n \lesssim 0.3$ MeV is due to the opening up of fission channels with $k = \frac{1}{2}$ (k -- projection of total angular momentum of the compound nucleus on the fission axis). It is also shown that, in contrast to earlier notions, new

Card 2/3

L 9106-65

ACCESSION NR: AT4048278

fission channels can open up at energies up to the excitation energy at the saddle point (E* = 2.5 MeV), where the energy gap of even-even nuclei is noticeable larger (~2.7 MeV) than in the equilibrium state. The presence of an energy gap in the level spectrum of the transition nucleus U^{236} can likewise explain the observed decrease in the number of secondary fission neutrons near 2.2 MeV. Other experimental data are interpreted in light of these results. Orig. art. has: 3 figures.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00

SUB CODE: NP NR REF SOV: 004 OTHER: 007

Card 3/3

USACHEV, L. N.; PAVLINCHUK, V. A.; RABOTNOV, N. S.

Analysis of the observable distributions of resonance widths in U^{233} and Pu^{239}. Atom. energ. 17 no.1:22-27 Jl '64. (MIRA 17:7)

L 20046-65 EWT(m) SSD/AFWL/ESD(t)/DIAAP EM
ACCESSION NR: AP5001270 S/0089/64/017/006/0479/0485

AUTHOR: Usachev, L. N.; Pavlinchuk, V. A.; Rabotnov, N. S.

TITLE: Channeling effects during fission of even-even compound nuclei

SOURCE: Atomnaya energiya, v. 17, no. 6, 1964, 479-485

TOPIC TAGS: channeling effect, compound nucleus fission, even parity nucleus, fission width, fission, compound nucleus, even even nucleus

ABSTRACT: The experimental data on fission of even-even compound nuclei in (d,pf), (r,f), and (n,f) reactions in the neighborhood of the threshold were analyzed. It was assumed that the average fission width is described by the Bohr-Wheeler formula. When analyzing the data of the (d,pf) reaction from this assumption, it unambiguously follows that, first, there are at least two sets of spins and parities of fission nucleus for which the fission thresholds differ by 0.6—0.8 Mev and, second, these thresholds are higher than formerly supposed. The data of the (γ ,f) reaction were analyzed with the supplementary assumption that the photoabsorption cross section depends very little

Card 1/ 3

on the energy in the range of the order of 1 Mev as compared with the exponential growth of fission width in the region $E_\gamma = 5 - 7$ Mev. Investigation also led to considerably higher values of photofission thresholds than those accepted heretofore; furthermore, the fission barrier at quadrupole photoabsorption is 0.6—1.0 Mev lower than the barrier of dipole photofission. On comparing the results of the (d,pf) and (γ,f) reactions, it can be said that the first rise in fission in the (d,pf) reaction corresponds to channeling of even parity while the second corresponds to channeling at odd parity. All these results are in agreement with the structure of fission channeling presented by O. Bohr if the distance between the rotational bands of even and odd parity $\Delta_1 \approx 0.6—1.0$ Mev. With such an arrangement of fission channeling, the Bohr-Wheeler formula describes quantitatively the experimental data for average fission widths of reaction (n,f) resonances, except data for the P^{239} nucleus. To explain the sharp deviation in the case of P^{239}, one must assume that the ground state of this nucleus has odd parity. Orig. art. has: 3 figures and 16 formulas.

ASSOCIATION: none

L 20046-65
ACCESSION NR: AP5001270

SUBMITTED: 12Dec63 ENCL: 00 SUB CODE: NP

NO REF SOV: 004 OTHER: 014 ATD PRESS: 3161

Card 3/3

L 1954-66 EWT(m)/EWA(h)
ACCESSION NR: AT5024113 UR/3158/65/000/012/0001/0012

AUTHOR: Rabotnov, N. S.; Smirenkin, G. N.; Soldatov, A. S.; Usachev, L. N.; Kapitsa, S. P.; Tsipenyuk, Yu. M.

TITLE: Angular photofission anisotropy and parity of the ground state of plutonium-239

SOURCE: Obninsk. Fiziko-energeticheskiy institut. Doklady, no. 12, 1965. Uglovaya anizotropiya fotodeleniya i chetnost' osnovnogo sostoyaniya plutoniya-239, 1-12

TOPIC TAGS: nuclear fission, plutonium, ground state, bremsstrahlung

ABSTRACT: The angular distributions of fragments resulting from the photofission of Pu^{239} were measured by γ quanta of the bremsstrahlung of a microtron in the range of limiting energies of E_{max}=5.4-7.9 Mev. At E_{max}=5.4, 5.65, and 5.9 Mev, anisotropic angular distributions of the form $W(\sigma) = a+b \sin^2\sigma$ were observed. The maximum anisotropy, which corresponds to $\frac{b}{a} = -0.192$, was recorded at E_{max}=5.65 Mev. Comparison of the results with data on the fission of Pu^{238} by neutrons permits the determination of the parity of the ground state of Pu^{239} relative to

Card 1/2

L 1954-66
ACCESSION NR: AT5024113

2

the parity of the ground state of the even-even nucleus. Data on the fission agree with the positive parity of the ground state of Pu^{239}, which follows from spectroscopic data. Orig. art. has: 2 figures, 1 table, 10 formulas.

ASSOCIATION: Fiziko-energeticheskiy institut GKIAE (Physics and Energetics Institute GKIAE); Institut fizicheskikh problem (Institute of Physical Problems)

SUBMITTED: 00 ENCL: 00 SUB CODE: NP

NO REF SOV: 003 OTHER: 009

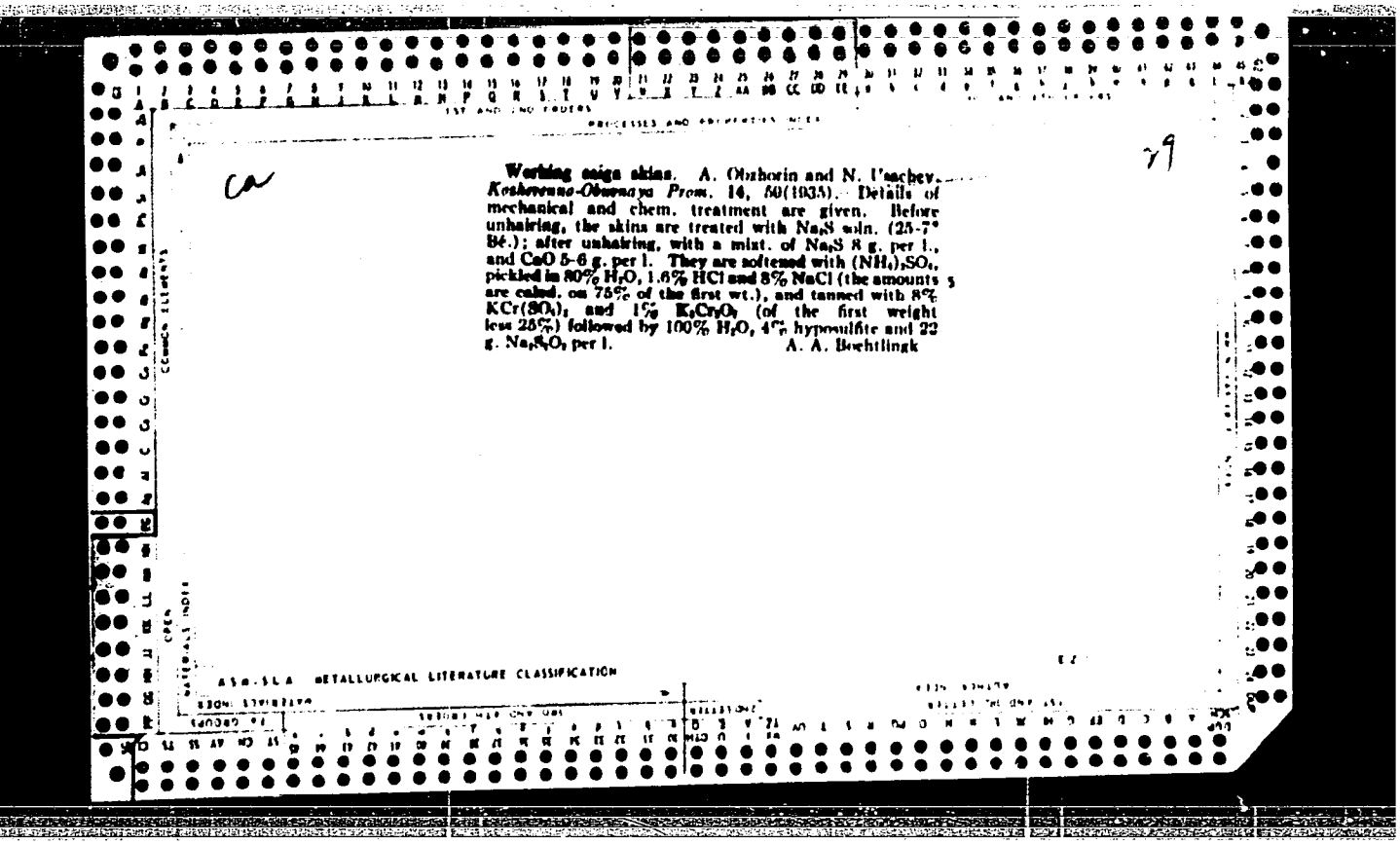
Card 2/2

SLAVIN, T.Yu., inzh.; [illegible], V.A., inzh.; [illegible], inzh.; USACHEV, M.G., inzh.

Compressor with graphite packing. Khim. i neft. mashinostr. no.4: 7-9 O '64. (MIRA 17:12)

USACHEV, M.T.

Use of radioactive iridium for gamma defectoscopy of welded joints in the construction of city gas pipelines. Avtom. svar. 10 no.5:112-114 S-O '57. (MIRA 10:12)
(Radioisotopes--Industrial applications) (Pipelines--Welding)



Working saiga skins. A. Obzhorin and N. Uvachev. *Koshevenno-Obuvnaya Prom.* 14, 50(1935). Details of mechanical and chem. treatment are given. Before unhairing, the skins are treated with Na_2S soln. (25-7° Bé.); after unhairing, with a mixt. of Na_2S 8 g. per l., and CaO 5-6 g. per l. They are softened with $(NH_4)_2SO_4$, pickled in 80% H_2O, 1.6% HCl and 8% NaCl (the amounts are calcd. on 75% of the first wt.), and tanned with 8% $KCr(SO_4)_2$ and 1% $K_2Cr_2O_7$ (of the first weight less 25%) followed by 100% H_2O, 4% hyposulfite and 22 g. $Na_2S_2O_3$ per l. A. A. Buchtilingk

USACHEV, N., dispetcher (g.Makhachkala)

Cloud ceiling meter. Grazhd.av.13 no.5:17 My '56. (MLRA 9:9)
(Aeronautical instruments)

GARIF'YANOV, N.S.; KOZYREV, B.M.; TIMEROV, R.Kh.; USACHEV, N.F.

Electron paramagnetic resonance in concentrated aqueous solutions of VO^{2-}. Zhur.eksp.i teor.fiz. 41 no.4:1076-1078 O '61. (MIRA 14:10)

1. Fiziko-tekhnicheskiy institut Kazanskogo filiala Akademii nauk SSSR.

(Paramagnetic resonance and relaxation) (Vanadium oxides)

USACHEV, N.I.

Method for the collection and quantitative analysis of phytoplankton. Trudy Gidrobiol. ob-va 11:411-415 '61. (MIRA 15:1)

1. Institut okeanologii AN SSSR, Moskva.
(Plankton research)

USACHEV, N.I.

Specialization in canneries of the Stalingrad Province.
Kons.i ov.prom. 15 no.4:39:40 Ap '60. (MIRA 13:6)

1. Gipropishcheprom.
(Stalingrad Province--Canning industry)

USACHEV, N.I.

Provide the canning industry of the Moldavian S.S.R. with all types of containers. Kons. i ov.prom. 18 no.3:33-35 Mr '63. (MIRA 16:3)

1. Gosudarstvennyy soyuznyy proyektnyy institut po proyektirovaniyu predpriyatiy pishchevoy promyshlennosti.
(Moldavia—Canning industry) (Moldavia—Container industry)

USACHEV, N.I.

Provide for a reliable source of raw materials for the canning plants of consumers' cooperatives. Kons. i ov.prom. 18 no.10: 1-2 O '63. (MIRA 16:11)

1. Gosudarstvennyy soyuznyy proyektnyy institut po proyektirovaniyu predpriyatiy pishchevoy promyshlennosti.

136-2-5/22

AUTHOR: Okunev, A.I., Usachev, N.M., Lutokhin, D.I., Kurts, V.V., Fedotova, Ye.I. and Vostryakov, A.A.

TITLE: Results of Industrial Tests on the Smelting of Roasted Collective Copper-Zinc Concentrates. (Rezultaty promyshlennykh ispytaniy plavki obozhzhennykh kollektivnykh medno-tsinkovykh kontsentratov)

PERIODICAL: Tsvetnyye Metally, 1957, No.2, pp. 22 - 31 (USSR)

ABSTRACT: The use of flotation for concentrating many Ural copper-zinc ores has led to the production of copper concentrates containing as much as 10-12% with copper contents of 8-10%. The aim of the present work was to test the smelting of roasts of such concentrates in a full-scale reverbatory furnace to give a zinc slag. The experimental furnace used was at the Sredneural'skiy Works and had a hearth area of about 8 m^2, chrome-magnesite walls and hearth and silica roof and was fired with coal dust. The following main results were obtained in 2.5 - 3 months' work with concentrates containing 7-9% Cu and 6 - 15% Zn to give slags with 14-15% Zn. The results of laboratory investigations on zinc distribution between slag and matte in relation to their compositions were confirmed. When mattes contained 40 - 50% Cu, the zinc content in the slag was about 1.6 - 1.8 times greater than in the matte. The

1/3

136-2-5/22

Results of Industrial Tests on the Smelting of Roasted Collective Copper-zinc Concentrates.

optimal compositions of matte (45% Cu) and slag as well as the degree of de-sulphurisation were determined. Deep roasting is one of the main requirements, even when roasting and smelting are carried out in one unit. With deep roasts 80% of the zinc goes from the solid charge into the slag, 8.9% into the matte and 8-12% into the gas. With a 45-50% Cu matte the copper content of dumped slags was 0.7%; extraction of copper into the matte depends on the copper content of the concentrate and can be 90-93% with return of dust to the smelter, and up to 96-97% with treatment of the zinc slag. Extraction of noble metals was about the same as with raw or lightly-caloried charge. Average dust production is 4.5% of the charge weight and there can be up to 20-24% zinc in it (depending on the zinc content of the charge). Optimal sulphur content of the roast is 9-10% (2.0 - 2.5% sulphate sulphur); de-sulphurisation during smelting is 48-56%. Good separation of smelting products was always obtained, but observations on the state of the hearth suggest desirable design changes. Besides tabulation of materials analysis and metals balance graphs of zinc distribution vs matte copper content, of copper content in matte and slag vs time and of product temperatures vs time are given.

2/3

136-2-5/22

Results of Industrial Tests on the Smelting of Roasted Collective Copper-zinc Concentrates.

Information on productivity, fuel rates and behaviour of refractions is included.

3/3 There are 3 figures, 5 tables and 3 references, of which 1 is Slavic.

ASSOCIATION: Unipromed', and the Sredneural'skiy Copper Smelting Works. (Unipromed' i Sredneuralskiy Medeplavilnyy Zavod)

AVAILABLE: Library of Congress

MAKOVSKIY, Daniil Pavlovich, prof.; USACHEV, N.N., otv. red.; NOVOSELOVA, L., red.

[Development of commodity and monetary relations in the agriculture of the Russian state in the 16th century] Razvitie tovarno-denezhnykh otnoshenii v sel'skom khoziaistve Russkogo gosudarstva v XVI veke. Smolensk, Smolenskii gos. pedagog. in-t in. Karla Marksa, 1963. 558 p. (MIRA 17:6)

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Bearings (Machinery)

Use of fixtures for bearing assembly. Podshipnik, No. 4, 1952.

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PAVTSOV, A.; USACHEV, P.

Preventing the deterioration of the shell of a rotary meat pie oven.
Mias.ind. SSSR 25 no.6:37-38 '54. (MLRA 8:1)

1. Ivanovskiy myasokombinat.
(Meat industry)

USACHEV, P., polkovnik v otstavke

Voluntary participation in social group work. Komm.Vooruzh.Sil 3 no.21:65-68 N '62. (MIRA 15:10)

(Russia—Army—Military life)
(Social group work)

ALEYNIKOV, M.A.; USACHEV, P.A.; GOLOVANOV, G.A.

Flotation of iron oxides by synthetic carboxyl acids. Gor.zhur. no.9:60-63 S '60. (MIRA 13:9)

1. Kol'skiy filial AN SSSR (for Aleynikov, Usachev).
2. Olenegorskoye rudoupravleniye (for Golovanov).
(Iron ore) (Flotation--Equipment and supplies)

USACHEV, P. I.

1964

Oceanology

c. '63

SHAKHMATOV, S.S., gornyy inzh.; USACHEV, P.A., gornyy inzh.; YEFREMOV, A.G., gornyy inzh.; ZELENOV, P.I., gornyy inzh.; BERDICHEVSKIY, R.I., gornyy inzh.

Using flotation and settling for dressing nonmagnetic ores. Gor. zhur. no.7:60-62 Jl '64. (MIRA 17:10)

1. Kol'skiy filial AN SSSR (for Shakhmatov, Usachev, Yefremov). 2. Olenegorskiy gornoobogatitel'nyy kombinat (for Zelenov, Berdichevskiy).

AID P - 2690

Subject : USSR/Mining

Card 1/1 Pub. 78 - 8/21

Authors : Teslyuk, Ye. U., Usachev, P. M. and Shevtsov, A. A.

Title : Combined action on the zone adjacent to the well bottom in a hydraulic breakthrough of the bed

Periodical : Neft. khoz., 33, 5, 37-41, My 1955

Abstract : The author discusses the method of secondary recovery by means of pumping a viscous 'salt-acid liquid through the well bottom to achieve a breakthrough of the bed adjacent to the well bottom. Different factors are analysed in order to ascertain the proper viscosity of the fluid pumped.

Institution : None

Submitted : No date

LESIK, N.P.; MOSEYENKOVA, I.G.; USACHEV, P.M.

Determining the location of fractures in the hydraulic process.
Trudy VNII no.16:44-63 '58. (MIRA 11:12)
(Oil wells--Hydraulic fracturing)

USACHEV, P.M.; LESIK, N.P.; OVNATANOV, G.T.; YECHEISTOV, A.I.; BELOV, V.I.; GENS, M.A.; MISHAKOV, V.N.

Hydraulic fracturing of strata and the underground investigation of fractured zones. Neft. khoz. 36 no.5:28-37 My '58. (MIRA 11:6)
(Oil wells--Hydraulic fracturing)

MOSEYENKOVA, I.G.; LESIK, N.P.; USACHEV, P.M.

Determining the location of hydraulic fractures by means of marker balls. Neft. khoz. 38 no.10:14-17 O '60.
(MIRA 13:9)
(Oil wells--Hydraulic fracturing)

USACHEV, P.M.

Location and width of fractures in hydraulic fracturing.
Trudy VNII no.35:22-29 '61. (MIRA 15:1)
(Oil wells--Hydraulic equipment)

USACHEV, P.M.

Analysis of the results of an experiment in hydraulic fracturing and tapping the zone of fracturing in a mine. Trudy VNII no.35: 50-60 '61. (MIRA 15:1)

(Petroleum mining)

ROMANYUK, F.I.; KUZ'MENKOVA, O.M.; POCHAREV, K.I.; USACHEV, P.M.; BOL'SHAKOV, L.A.

Exclusion of bottom waters with petroleum-paraffin solutions. Trudy VNII no.35:61-67 '61. (MIRA 15:1)
(Oil fields--Production methods)

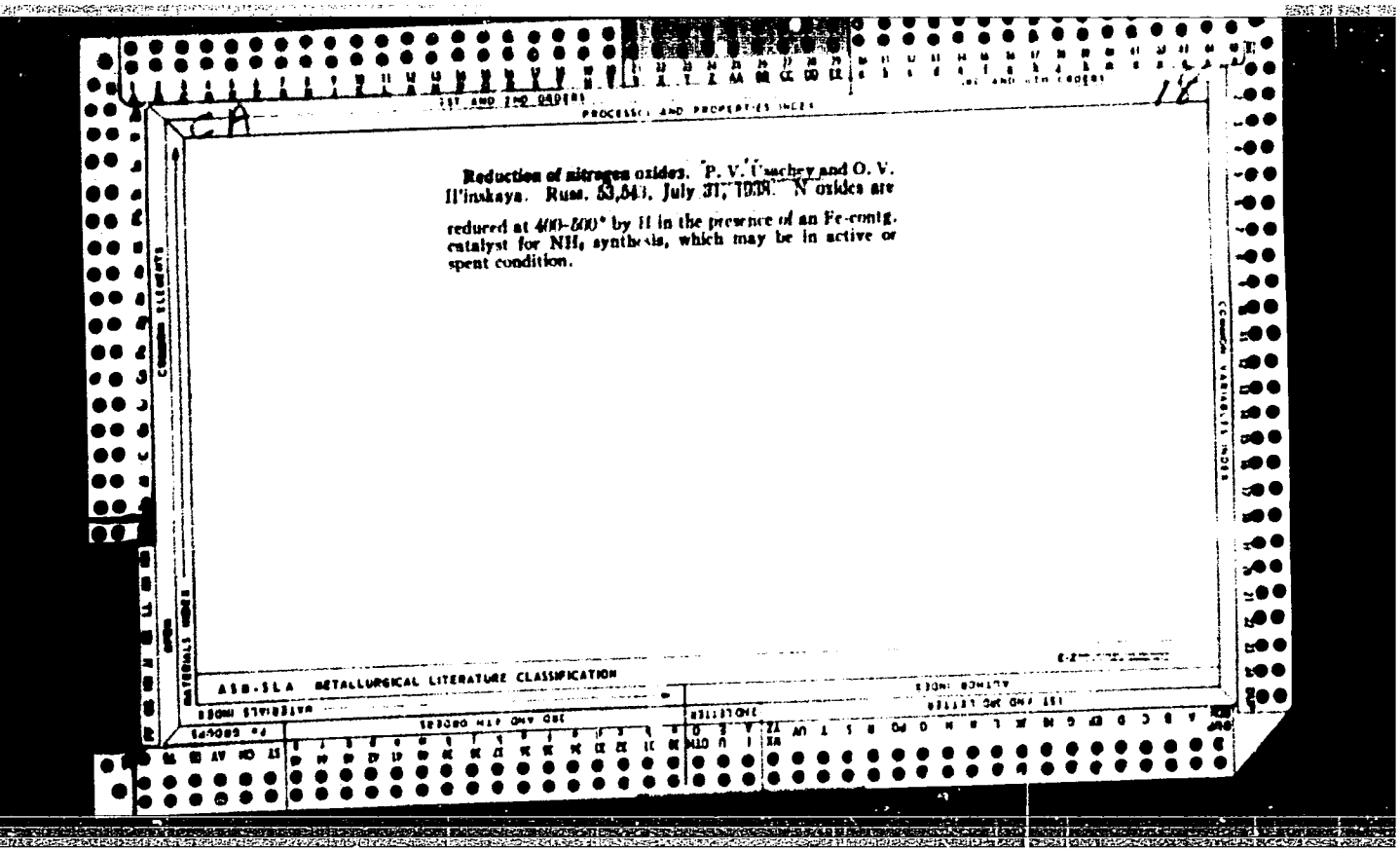
MUSHIN, A.Z.; SELYUNINA, T.N.; USACHEV, P.M.; LESIK, N.P.

Results of laboratory studies and field tests of asphaltite as a fluid loss additive for hydraulic fracturing. Neft. khoz. 40 no.7:43-49 Jl '62. (MIRA 17:3)

LESIK, N.G.; USACHEV, P.M.; SAVELOV, A.A.; GALYSEN, A.N.; [illegible], A.V.

VG-1 deep rotor for sand jet perforators. Mash. i neft. obor. no.11:12-16 '65. (MIRA 18:11

1. Vsesoyuznyy neftegazovyy nauchno-issledovatel'skiy institut i Gosudarstvennyy komitet neftedobyvayushchey promyshlennosti pri Gosplane SSSR.



Reduction of nitrogen oxides. P. V. Tuschev and O. V. Il'inskaya. Russ. 53,543, July 31, 1939. N oxides are reduced at 400–500° by H in the presence of an Fe-contg. catalyst for NH_3 synthesis, which may be in active or spent condition.

USACHEV, P. V.

"The Mechanism of the Catalytic Synthesis of Ammonia."

Zhur. Fiz. Khim., Vol. 14, No. 9-10, 1940.

25660
S/080/60/033/012/017/024
D209/D305

5.2200 1087, 1273, 1530

AUTHORS: Usachev, P.V., Golubkov, A.V., and Volosamova, N.S.

TITLE: Synthesis of HgSe and HgTe

PERIODICAL: Zhurnal prikladnoy khimii, v. 33, no. 12, 1960, 2771 - 2772

TEXT: Since little information has been published on the synthesis of HgSe and HgTe, this question is considered in some detail by the authors. Examination of the relevant literature shows that methods for synthesizing HgSe and HgTe were respectively developed by A.I. Blum et al (Ref. 1: Zh. tekh. fiziki, 21, 316, 1951) and E.I. Nikol'skaya et al (Ref. 2: Zh. tekh. fiziki, 25, 1347, 1955). Certain aspects of the preparation of HgTe have also been studied by O.D. Elpat'yevskaya et al (Ref. 3: Zh. tekh. fiziki, 26, 2154, 1956) and I.M. Tsidilkovskiy (Ref. 4: Zh. tekh. fiziki, 27, 1744, 1957), while R.O. Carlson and other scientists have devised a modified process for obtaining this compound. The basic materials are

Card 1/3

25660
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D209/D305

Synthesis of HgSe and HgTe

Se, processed Te and purified Hg. The experimental apparatus consists of a thick-walled ampoule with a capacity of 35 - 40 cm^3, a length of 110 mm, an inner diameter of 20 mm and an internal pressure of about 40 atm. After insertion of the powdered Te and Se and Hg amalgam the ampoule is placed horizontally inside a stout copper vessel in the furnace, the apertures of the copper vessel and furnace being sealed with asbestos for heat-insulation. In the case of HgSe the ampoule temperature is brought to 800° for 6 - 8 hours and is then cooled after a 20 - 30 minute period of soaking; a temperature of 675° is required for the formation of HgTe. The selenide and telluride thus obtained have a glistening color, the former substance being slightly darker with a bluish hue. Their respective melting points are 793° and 667°. In the opinion of the authors there are three points worthy of further consideration. The first and most important is the need for the fine grinding of Se and Te to ensure their reaction with Hg, although this may entail the risk of their slight oxidation during pulverization. Tests conducted by the authors, however, indicate that the essential properties

Card 2/3

Synthesis of HgSe and HgTe

of HgTe -- its electroconductivity and thermoelectromotive force -- prepared from both coarse and powdered Te are almost identical. Secondly, the horizontal position of the ampoule prevents any fracturing that might result from the increase in volume of the reaction mixture at a temperature of 200 - 500°. The third feature is the appearance of small amounts of mercury after the heating and cooling of the chalcide in consequence of the uneven temperature inside the ampoule. During the reaction this gaseous mercury both inhibits the dissociation and vaporization of the chalcide and restricts its secretion. Free mercury is not detected in reactors with no temperature gradient. Decomposition of HgSe and HgTe can also be avoided by introducing a small quantity of Hg into the heated ampoule. There are 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The reference to the English-language publications read as follows: R.O. Carlson, Phys. Rev., III, 2nd ser., 476. 1958; W.O. Lawson et al, Phys. and Chem. of Solids, 9, 325, 1959.

SUBMITTED: April 5, 1960

Card 3/3

USACHEV, S.

Word of builders. Sov.profsoiuzy 5 no.11:32-34 N '57. (MIRA 10:11)

1. Predsedatel' tsekhovogo komiteta stroitel'nogo tsekha Moskovskogo ordena Trudovog Krasnogo Znameni elektrolampovogo zavoda.
(Housing)

CHEREPANOV, A.I., inzhener; USACHEV, S.G., inzhener.

Installation of singlr-phase electric meters. Energetik 4 no.9:24-25 S '56. (Electric meters) (MLRA 9:10)

SOBOTKA, Zdenek inzh., dots.; AGADZHANOV, V.I., kand. tekhn. nauk [translator]; IVANOV, M.A., inzh., nauchn. red.; USACHEV, T.A., inzh., nauchn. red.; BEGAK, B.A., red.

[Suspension roofs] Visiachie pokrytiia. Moskva, Stroiizdat, 1964. 151 p. (MIRA 17:11)

SIZOV, G.; RABEY, M.; USACHEV, V.

The PMR-600/50 immersion pump. Rech. transp. 21 no.8:25 Ag '62.
(MIRA 18:9)

1. Nachal'nik laboratorii TSentral'nogo nauchno-issledovatel'skogo instituta ekonomiki i ekspluatatsii vodnogo transporta (for Sizov).
2. Glavnyy inzh. Astrakhanskogo tsentral'nogo konstruktorskogo byuro Ministerstva rechnogo flota (for Rabey).

RABEY, M.; SIZOV, G.; USACHEV, V., konstruktor

PNR-600/50 electric sinker pump for petroleum tank vessels. Mekh. transp. 21 no.2:34-35 F '62. (MIRA 15:3)

1. Galvnyy inzh. Astrakhanskogo tsentral'nogo konstruktorskogo byuro Ministerstva rechnogo flota (for Rabey). 2. Nachal'nik laboratorii TSentral'nogo nauchno-issledovatel'skogo instituta ekonomiki i ekspluatatsii vodnogo transporta.
(Tank vessels--Equipment and supplies) (Pumping machinery)

ORLOV, R.V., inzh.; USACHEV, V.A., inzh.

Testing the inflammability of dust-air mixtures. Bezop.truda v prom. 2 no.10:19-20 O '58. (MIRA 11:11)
(Mine dusts)