SMIRNOV, M.S.; DNEPROV, V.N.

Effect of the sulfur content on the wear of fuel pump plungers in
the ZD-6 engine. Khim.sera-i azotorg.soed. sod.v neft.i neftaprod. 3:
483-485 '60.   (MIRA 14:6)

1. Nauchno-issledovatel'skiy institut goryuche-smazochnykh materialov.
                        (Fuel pumps) (Sulfur)

11.4000

77936
SOV/65-60-3-9/19

AUTHOR: Smirnov, M. S.

TITLE: The Effect of Hydrodesulfurization of Far Eastern Fuels
            and Petroleums on Engine Wear and Gum Formation in
            Diesels

PERIODICAL: Khimiya i tekhnologiya topliv i masel, 1960, Nr 3,
            pp 42-45 (USSR)

ABSTRACT: The experimental data indicate that the sulfur
            compounds present in diesel fuel contribute to engine
            wear and gum formation. The diesel fuel containing 1%
            of sulfur increases engine wear and gum formation by
            1.5-2 times, compared to fuel containing only 0.03% of
            sulfur. Application of hydrodesulfurizaton in the
            production of diesel fuels improves their performance
            quality to the level of low-sulfur fuel DS (GOST 4749-49).
            There are 3 tables; and 1 figure.

Card 1/1

S/081/62/000/005/076/112
B162/B101

// C/40

AUTHORS: Losikov, B. V., Smirnov, M. S., Aleksandrova, L. A.,
            Rubinshteyn, I. A., Ocheretyanyy, I. T., Dneprov, V. N.

TITLE: Application of neutralizing substances in engines working
            on high-sulfur diesel fuels

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 5, 1962, 526,
            abstract 5M200 (Sb. "Prisadki k maslam i toplivam".
            M., Gostoptekhizdat, 1961, 381-388)

TEXT: Results of tests on diesel engines type 1 -10.5/13 (1Ch - 10.5/13),
2 -8.5/11 (2Ch - 8.5/11), IT-9 - 3 (IT - 9 - 3), 3 - 6 (3D - 6),
-50 (M - 50F), and 2 - 100 (2D - 100) working on fuels with a sulfur
content of 1.0 to 1.6 % with ammonia gas fed to the combustion chamber
of the engines in an amount of 0.08 - 0.14 % by weight with respect to the
fuel are given. It is shown that ammonia is a highly efficient means of
reducing corrosion wear of the engines, preventing the formation of
deposits and the burning of piston rings. It is found that the action

Card 1/2

LOSIKOV, B.V.; SMIRNOV, M.S.; RUBINSHTEYN, I.A.; ALEKSANDROVA, L.A.;
      OCHERETYANNYY, I.T.; DNEPROV, V.N.

Use of "neutralizing" substances in engines operating on high-
sulfur diesel fuels. Khim.i tekh. topl.i masel 6 no.2:46-52
F '61.   (MIRA 14:1)
                    (Diesel fuels)

Z/011/62/019/002/002/003
E073/E335

AUTHORS: Smirnov, M.S., Ocheretyanyy, I.T. and Dneprov, V.N.

TITLE: Investigation of the operational properties of
             lubricating-oil additives for diesel engines
             operating with high sulphur-content fuels

PERIODICAL: Chemie a chemicka technologie; Prehled technicke
             a hospodarske literatury, v.19, no. 2, 1962, 85,
             abstract Ch 62-1170 (Khimiya i tekhnologiya topliv i
             masel no. 11, 1961, 59 - 64)

TEXT: If fuels containing over 1% sulphur are used, the
combustion products have to be neutralized by means of
PMSYa and NSK additives in combination with the anti-oxidant
additive VNII-355. Under these conditions the additive
TsIATIM-339 has little effect. 4 tables, 5 references.

[Abstracter's note: this is a complete translation.]

Card 1/1

SMIRNOV, M.S.; DNEPROV, V.N.; LIBENZON, A.A.

Changes of stability and corrosivity of sulfur-bearing diesel
fuels during prolonged storage. Khim.i tekh.topl.i masel 7
no.9:51-55 S '62.   (MIRA 15:8)
                    (Diesel fuels—Storage)

SMIRNOV, M.S.; OCHERETYANYY, I.T.; KUZNETSOV, Ye.G.; DNEPROV, V.N.

Testing of domestic and foreign additives to lubricants in high-speed diesel engines. Khim. i tekh. topl. i masel 8 no.4:56-59 Ap '63.   (MIRA 16:6)

(Diesel fuels—Additives)

L 2567-66   EWT(m)/EWP(w)/EPF(o)/T/EWP(t)/EWP(b)   DIAAP   JD/DJ/GS

ACCESSION NR: AT5022688

UR/0000/65/000/000/0353/0358

AUTHORS: Dneprov, V. N.; Smirnov, M. S.

TITLE: Evaluation of antiwear properties of lubricating oils on engine 2 Ch-8.5/11 using radioactive isotopes

SOURCE: AN SSSR. Nauchnyy sovet po treniyu i smazkam. Teoriya treniya i iznosa (Theory of friction and wear). Moscow, Izd-vo Nauka, 1965, 353-358

TOPIC TAGS: lubricating oil, engine wear, piston ring wear, lubricant property/ B 2 radiation counter, MK 22 lubricant, AS 9.5 lubricant, DS GOST4749 49 fuel, 2 Ch 8.5/11 diesel engine

ABSTRACT: The method and results of piston ring wear experiments on diesel engine 2Ch-8.5/11 using active Co^{60} inserts are discussed. The two-cylinder, four-stroke engine (10 hp at 1500 rpm) in a test stand was used with the equipment shown in Fig. 1 on the Enclosure. This consisted of an auxiliary oil pumping loop (with oil pump 4), counters 1, counting device 2 (type B-2), and recorder 3 (type EPP-09). The slope of the activity (impulse/min)-time curve was used to measure the effects on piston ring wear of rpm, load, cooling water temperature, length of test, and oil burn-off. It was found that: a) at constant load an increase in speed from

Card 1/3

L 2567-66

ACCESSION NR: AT5022688   4

1100-1500 rpm resulted in a 1.5 increase in wear; b) wear increased approximately
linearly with load and was ≈ 2.6 times higher for a high sulfur (1.6%) fuel than for
fuel DS GOST 4749-49\\(0.18% S); c) wear decreased drastically as cooling water
temperature was increased from 35-50C and then remained approximately constant (to
80C); d) wear remained essentially constant after a maximum run-in period of 4 hours
with all lubricants. Based on the above results, operating parameters were chosen
as 1500 rpm, 4-hour duration, 60-65C inlet water temperature, maximum load for all
subsequent tests of lubricants and fuels. Lubricants MK-22 (with 3 different addi-
tives) and AS-9.5 (3 different additives) were tested with high and low sulfur con-
tent fuels, and a table of wear rates (in impulses/min) is presented. AS-9.5
lubricant without additive working with a low sulfur fuel gave best results. Orig.
art. has: 3 tables and 5 figures.

ASSOCIATION: Nauchnyy sovet po treniyu i smazkam, AN SSSR (Scientific Committee on
Friction and Lubrication, AN SSSR)

SUBMITTED: 18May65   ENCL: 01   SUB CODE: FP

NO REF SOV: 000   OTHER: 000

Card 2/3

L 2567-66
ACCESSION NR: AT5022688

To Diesel

Oil drain
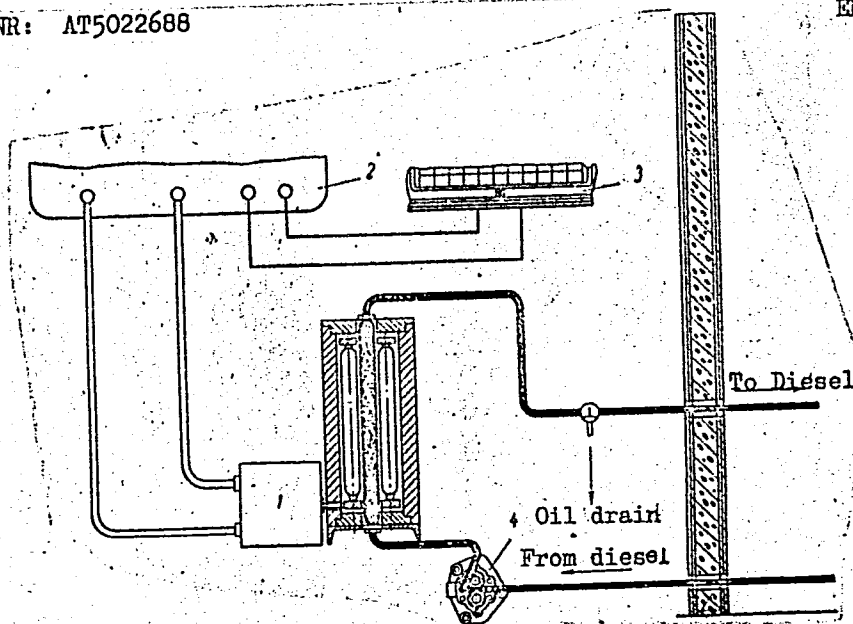
From diesel

Fig. 1. Schematic of test apparatus

Card 3/3

L 20369-66   EWT(m)/T   DJ

ACC NR: AP6006451   (A)   SOURCE CODE: UR/0065/66/000/002/0049/0051

AUTHORS: Papok, K. K.; Smirnov, M. S.; Ocheretyanyy, I. T.

ORG: none

TITLE: Evaluation of performance properties of lubricating oils by means of the GSM-100 method

SOURCE: Khimiya i tekhnologiya topliv i masel, no. 2, 1966, 49-51

TOPIC TAGS: lubricant, performance test,   lubricating oil, diesel engine/ DS-11 lubricating oil, AS-9.5 lubricating oil

ABSTRACT: This investigation was carried out to determine the effect of different lubricating oils on diesel motor parts and to develop a method for the evaluation of performance of lubricating oils. The performance of two oils, DS-11 and AS-9.5 containing various additives, was tested on a liquid-cooled, noncompression 12 h.p. diesel engine of type 2Ch-8.5/11, having a compression ratio of 17 + 1. The performance of the oils was evaluated in terms of the various deleterious effects, e.g., piston ring wear, carbon deposits, etc. The experimental results are

Card 1/2   UDC: 665.521.5

L   20369-66
ACC NR: AP6006451   /

tabulated, and on the basis of these results the authors conclude that the
testing method called the GSM-100 method may be recommended for the evaluation
of performances of lubricating oils containing various additives. Orig. art.
has: 1 table.

SUB CODE: 11, 21/   SUBM DATE: none

Card 2/2   vmb

L 07045-67   EWT(d)/EWT(m)/EWP(f)   DJ/WE

ACC NR: AP6026439   (A, N)   SOURCE CODE: UR/0122/66/000/005/0047/0049

AUTHOR: Mikulin, Yu. V. (Candidate of technical sciences); Smirnov, M. S. (Candidate of technical sciences); Englin, B. A. (Candidate of technical sciences)

ORG: None

TITLE: Start-up wear in a diesel when highly flammable starting fluids are used

SOURCE: Vestnik mashinostroyeniya, no. 5, 1966, 47-49

TOPIC TAGS: diesel engine, engine starter system, engine piston, engine cylinder

ABSTRACT: The authors study the "wear" of "friction surfaces" in the ZD-6 diesel engine during cold starting in summer and winter, i. e. at ambient temperatures above and below zero. Winter start-up was done with a highly flammable starting fluid, DA arctic diesel fuel and MT-14p condensed oil. Standard products were used for summer start-up, i. e. DL diesel fuel and MS-20 oil with a 3% additive of TsIATIM-339. The engine was started once in the morning and once in the afternoon each day with 160 starts in the summer and an equal number in the winter. After starting the engine was idled for 15 minutes and then killed. Winter temperatures were zero to -28°C with an average of -8.4°C while summer temperatures varied from 1 to 32°C with an average temperature of 21°C. It was found that ring wear is more dependent on starting temperature than cylinder wear. Average ring wear during start-up is 3.45 times

UDC: 621.436.573-324-004.62

Card 1/2

L 07945-67

ACC NR: AP6026439   O

nigher in winter than in summer. Sleeve wear is also higher in winter although the
total wear from start-up is insignificant, e. g. average sleeve wear after 160 start-
ups was only 2.2 μ while sleeves are only replaced after 300-500 μ of wear. Thus the
results of this wear study show that highly flammable starting fluids may be recom-
mended for cold starting of diesel engines. Orig. art. has: 5 figures, 3 tables.

SUB CODE: 13/ SUBM DATE: None/ ORIG REF: 006/ OTH REF: 001
            21/

Card 2/2

L 06541-67   EWT(m)   DJ

ACC NR: AP6019754   (A)   SOURCE CODE: UR/0113/66/000/006/0004/0006

AUTHOR: Mikulin, Yu. V. (Candidate of technical sciences); Smirnov, M. S. (Candidate of technical sciences); Lozar', A. S.; Petrova, S. V.; Karnitskiy, V. V.

ORG: none

TITLE: Possibility of decreasing diesel starting wear during the winter

SOURCE: Avtomobil'naya promyshlennost', no. 6, 1966, 4-6

TOPIC TAGS: diesel engine, lubricant, lubricant additive, diesel fuel, lubricating oil , ENGINE STARTER SYSTEM , ENGINE PERFORMANCE CHARACTERISTIC

ABSTRACT: Diesel-engine wear during low-temperature starts is analyzed, and a table is presented listing various Soviet cities, their average temperatures, and the wear on cylinder sleeves during the year at these temperatures. All of the experiments were conducted using a ZD-6, a 6-cylinder, 4-cycle diesel engine with direct fuel injection; the engine develops 150 hp at 1500 rpm. Starting wear on a diesel engine in summer and winter demonstrated the expediency of using a special starting fluid and low-viscosity, thickened oils for cold starts. Cold starting of the engine signi-ficantly facilitates diesel operation at low temperatures and does not increase normal wear. For cold starts in winter, a special starting fluid based on DA GOST 4749-49 arctic diesel fuel and low-viscosity, thickened MT-14p oil, diluted with ~15% diesel fuel, are recommended. In summer, DL GOST 4749-49 fuel and MS-20 with a 3%

Card 1/2   UDC: 621.431.73:620.178

SMIRNOV, M. S.

SMIRNOV, M. S.- "Application of Method of Integral Transforms to the Solution of Problems in the Theory of Molecular Transfer." Min of Higher Education USSR, Moscow Technological Inst of Food Industry, Moscow, 1955 (Dissertations for Degree of Candidate of Technical Sciences)

SO: Knizhnaya Letopis' No. 26, June 1955, Moscow

SMIRNOV, M.S., kandidat tekhnicheskikh nauk.

Studying the nonstationary heat exchange in baking ovens. Trudy
MTIPP no.6:78-89 '56.   (MLRA 10:3)
            (Heat--Transmission) (Ovens)

SMIRNOV, M.S.

Rates of drying. A. V. Lykov and M. S. Smirnov. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1950, No. 8, 10-19.—Rates of drying were studied experimentally and analytically by solving a system of differential equations for heat and mass (moisture) transfer in moist substances of porous capillary structure. Mass transfer of water vapor is taken into account with the help of a specially introduced phase transformation criterion. The Fourier-Kirchhoff equation for heat transfer in moist substances is reduced to the Fourier heat conduction equation to and from the heat source, induced by phase transformation. Equations were derived for the entire drying process (including the periods of const. and decreasing drying rates), on the assumption that the drying object forms an infinite continuous surface, and the drying time can be calcd. from the av. body temp. and the heat-transfer coeff., i.e., the computation of the mass-transfer flux can be reduced to the calcn. of the heat flux.   W. M. Sternberg

SOV/44-58-4-2978

Translation from: Referativnyy zhurnal, Matematika, 1958,
                    Nr 4, P 79 (USSR)

AUTHOR: Smirnov, M.S.

TITLE: A Temperature Field in a Three-ply Wall With a Boundary
          Condition of the Fourth Order (Temperaturnoye pole v
          trekhsloynoy stenke pri granichnom uslovii chetvertogo
          roda)

PERIODICAL: Tr. Mosk. tekhnol. in-t pishch. prom-sti, 1957,
              Nr 8, pp 17-20

ABSTRACT: By the methods of operational calculus a solution is
    given for the one-dimensional problem of heat-conducting theory:

$$\frac{\partial t_1}{\partial \tau} = a_1 \frac{\partial^2 t_1}{\partial x^2}, \quad 0 \leq x \leq R$$

$$\frac{\partial t_2}{\partial \tau} = a_2 \frac{\partial^2 t_2}{\partial x^2}, \quad R \leq x \leq \ell \qquad \tau > 0,$$

$$t_1(x,0) = t_2(x,0) = t_0 = \mathrm{const};$$

Card 1/2

SOV/44-58-4-2978

A Temperature Field in a Three-ply Wall (Cont.)

$$-\lambda_2 \frac{\partial t_2(x,\tau)}{\partial x} + \alpha [t_c - t_2(x,\tau)] = 0 \text{ when } x = \mathcal{L};$$

$$\frac{\partial t_1(x,\tau)}{\partial x} = 0 \quad at = 0;$$

$$-\lambda_1 \frac{\partial t_1(x,\tau)}{\partial x} = -\lambda_2 \frac{\partial t_2(x,\tau)}{\partial x} \text{ when } x = \mathcal{L};$$

$$t_1(x,\tau) = t_2(x,\tau) \text{ when } x = R.$$

The solution, derived as a result of formal transformations in the form of an infinite series, is not studied in the article.

S.S. Dymkov

Card 2/2

SMIRNOV, M.S .

PHASE I BOOK EXPLOITATION   SOV/1435

Akademiya nauk SSSR. Energeticheskiy institut

Teplo- i massoobmen v protsessakh isparaniya (Heat- and Mass-Transfer in
  Evaporation Processes) Moscow, Izd-vo AN SSSR, 1958. 254 p. 5,000
  copies printed.

Resp. Ed.: Lykov, A.V., Academician, BSSR Academy of Sciences; Eds. of Publishing
  House: Tal', A.A. and Smirnov, V.A.

PURPOSE: This book is intended for scientists and engineers in heat engineering and
  chemical technology and for students and teachers of higher educational institu-
  tions in these fields.

COVERAGE: This collection contains articles relating to analytical and experimental
  investigations of heat - and mass-transfer under conditions of phase and chemical
  transformations. A new method of solving unsteady-state heat-flow problems is pre-
  sented. Methods of determining heat - and mass-transfer coefficients during the
  heating and drying of a composite substance are given. New experimental principles
  of surface heat- and mass-transfer in vaporization processes are explained and new

Card 1/5

Smirnov, M.S. The Problem of Thermal Conductivity for a Two-body
  System
                                                                    153

Smirnov, M.S. Two Problems on the Theory Concerning the Drying of
Wet Bodies
                                                                    156

SMIRNOV, M.S.

Nonstationary fields of the potentials of heat and moisture
transfer in the case of evaporation and boundary conditions
of the second order. Trudy NIKFI no.2:128-138 '58.

(MIRA 13:5)

(Thermodynamics) (Drying)

PHASE I BOOK EXPLOITATION   SOV/3407

Akademiya nauk SSSR. Energeticheskiy institut im. G.M. Krzhizhanovskogo

Problemy energetiki; sbornik posvyashchayetsya akademiku G.M. Krzhizhanovskomu
(Problems of Power Engineering; Collection of Articles Dedicated to Academician G.M. Krzhizhanovskiy) Moscow, 1959. 851 p. Errata slip inserted. 2,500 copies printed.

Ed. of Publishing House: B.D. Antrushin, P.V. Dzbkov, P.I. Dzbkov, and
S.M. Mozzhes; Tech. Ed.; Z.A. Prusakova; Editorial Board; A.V. Vincar,
Academician (Deceased), V.I. Popkov (Resp. Ed.) Corresponding Member,
Academy of Sciences USSR, V.I. Veyts, A.S. Predvoditelev, M.A. Styrikovich,
B.V. Chubkanov, M.B. Bogdanova, Candidate of Technical Science, B.K. Eslkov,
Candidate of Technical Sciences, M.M. Lubedev, Candidate of Technical Sciences,
and I.M. Samoilov.

PURPOSE: This collection of articles is intended as a tribute to the memory
of Academician G.M. Krzhizhanovskiy.

COVERAGE: The collection contains sixty articles by former students and
coworkers of the deceased Academician. The articles deal with problems
of a wide range of subjects in the field of power engineering; problems
of the regional development of electrical and thermal power engineering,
power engineering technology, and the physics of combustion. No personalities
are mentioned. References are given after most articles.

DOKUCHAYEV, N.F.; SMIRNOV, M.S.

Rate of drying of some materials. Izv.vys.ucheb.zav.; pishch.
tekh. no.3:135-139 '59.   (MIRA 12:12)

1. Vsesoyuznyy zaochnyy institut pishchevoy promyshlennosti.
              (Food--Drying)

SMIRNOV, M.S.

System of differential equations of the drying process [with
summary in English]. Inzh.-fiz. zhur. 4 no.9:40-44 S '61.
(MIRA 14:8)
1. Vsesoyuznyy saochnyy tekhnologicheskiy institut pishchevoy
promyshlennosti, g. Moskva.
(Drying) (Differential equations)

A-

SMIRNOV, M.S.

Boundary conditions for a transformed system of differential equations relating to drying. Inzh.-fiz.zhur. 5 no.3:88-94 Mr '62.
(MIRA 15:3)

1. Vsesoyuznyy zaochnyy tekhnologicheskiy institut pishchevoy promyshlennosti, Moskva.
(Differential equations)(Drying)

L 5154-66   EWT(1)/EPF(c)/ETC/EPF(n)-2/EWG(m)   WW

ACCESSION NR: AP5020945

AUTHOR: Smirnov, M. S.

TITLE: A nonlinear stationary differential equation system of heat and mass transfer

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 9, no. 2, 1965, 250-254

TOPIC TAGS: nonlinear differential equation, parabolic differential equation, differential equation system, heat transfer, first boundary value problem

ABSTRACT: Heat and mass transfer in heat and mass transfer processes are determined by the following system of nonlinear parabolic equations:

$$\frac{\partial u}{\partial \tau} = \nabla [a \nabla u + a \delta \nabla t] + h(u, t),$$

$$\frac{\partial t}{\partial \tau} = \frac{i}{c\gamma} \nabla (\lambda \nabla t) + \varepsilon \frac{\rho}{c} \frac{\partial u}{\partial \tau} + q(u, t) \qquad (1)$$

Card 1/3

0901 0149

L 5154-66

ACCESSION NR: AP5020945

and corresponding initial and boundary conditions. The functions $\underline{h}$ and $\underline{q}$ account for the effect of sources and escape of heat and mass. The equation system presented combines two parabolic equations connected by additional terms which contain time and coordinate derivatives. The solution to this equation system is particularly interesting in the stationary case when the process becomes independent of time and the partial time differentials may be excluded, as well as when the effect of the dependence of the heat and mass exchange characteristics on temperature $\underline{t}$ and mass transfer potential $\underline{u}$ is particularly apparent not at the initial stage but later, when the process approaches the stationary state. The following nonlinear unidimensional stationary problem with boundary conditions of the first order are investigated:

$$\frac{d}{dx}\left[a(u)\frac{du}{dx} + a(u)\,\delta\,(t)\frac{dt}{dx}\right] = h(u), \tag{2}$$

$$\frac{d}{dx}\left[\lambda(t)\frac{dt}{dx}\right] = 0, \tag{3}$$

$$x = 0, \; t = t_1 = \text{const}; \; x = R, \; t = t_2 = \text{const};$$
$$x = 0, \; u = u_1 = \text{const}; \; x = R, \; u = u_2 = \text{const} \tag{4}$$

Card 2/3

L 5154-66
ACCESSION NR: AP5020945

Orig. art. has: 22 formulas.

ASSOCIATION: Vsesoyuznyy zaochnyy institut pishchevoy promyshlennosti, Moscow (All-Union Correspondence Institute of the Food Industry)

SUBMITTED: 11Jan65   ENCL: 00   SUB CODE: MA, TD

NO REF SOV: 000   OTHER: 000

Card 3/3

SMIRNOV, M.S.

Generalized equation of moisture diffusivity and its solution.
Inzh.-fiz. zhur. 9 no.3:391-395 S '65.   (MIRA 18:9

1. Vsesoyuznyy zaochnyy institut pishchevoy promyshlennosti,
Moskva.

SMIRNOV, M S

Category : USSR/Optics - Physiological Optics   K-9

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5307

Author   : Smirnov, M.S., Bongard, M.M.
Title   : Concerning the Clusters of Color-Sensitive Photo-Receptors.

Orig Pub : Tr. In-ta biol. fiz. AN SSSR, 1955, 1, 158&161

Abstract : An opinion exists that the human retina contains bulbs of serveral
           types with different spectral-sensitivity curves and that bulbs of the
           same type are arranged in clusters with a diameter of approximately
           15 microns. A series of experiments, confirming this opinion, is
           described. It was shown experimentally that persons with good sharp-
           ness of vision distinguish between the red and green bright points
           separated from each other at a distance such that their images are only
           1 micron apart on the retina. The visual separation was determined
           by experimenter from the ability of the subject to determine correctly
           the mutual placement of points, which the experimenter could change
           in each experiment. Such a high resolving power on the part of the
           eye for objects of different color contradicts the existence of the
           clusters. Using A.L. Yarbus'es method for recording the motion of
           the observer's eye, it was shown that points of different color are
Card   : 1/2

SMIRNOV, M. S.

3887. Determination of spectral sensitivity of receptors of the eye by the addition curve. M. M. Bongard and M. S. Smirnov Dokl. Akad. Nauk. S.S.S.R., 1955, 103, 1111—1114. Referat. Zh. Biol., 1956, Abstr. No. 51375.—The method is based on the following assumptions. The colour range of a creature is n-dimensional if for it there exist n linearly-independent colours, but between any $n + 1$ colours there is a linear relation. Any colour of monochromatic light of unit intensity with spectral λ can be represented

by $E_\lambda = \sum_{i=1}^{n} a_i(\lambda)A_i$, where $A_1 \ldots A_n$ are the linearly-independent

colours (basis of the field); the function $a_i(\lambda)$ represents the addition curves relating to the basis $A_1 \ldots A_n$. If the region of the spectrum is limited, any given colour can be represented by a combination of only 1 linearly independent colours (1-dimensional portion of the spectrum). The number of receptors is regarded as coincident with the divisibility of the colour field. The spectral sensitivity of the i receptor is expressed by $f_i(\lambda)$, equal to the ratio of the energies of the monochromatic light of wave-lengths λ_0 and λ at which the i-receptor is brought to identical states. If the creature possesses an n-dimensional colour range, but the basic colours $A_1, A_2 \ldots A_{n+1}$ are chosen in an $(n-1)$-dimensional portion of the spectrum then $f_n(\lambda) = K a_n(\lambda)$, where K is an arbitrary positive number. Proceeding on the basis of this possibility, and starting from the addition curves accepted by the International Commission on Illumination, the spectral curves of sensitivity of the receptors of trichromats have been calculated. The curves obtained coincide with the results of Iustova's measurements on dichromats, and differ from the results of Fedorov's measurements. The reason for the mistake in Fedorov's results is pointed out. (Russian)   T. R. PARSONS

SMIRNOV,M.S.

Distribution of color receptors in the human fovea. Dokl. AN SSSR
103 no.3:427-429 Jl'55.   (MLRA 8:11)

1. Institut biologicheskoi fiziki Akademii nauk SSSR
        (RETINA, anatomy and histology,
           foveal color receptors)
        (COLOR VISION, physiology,
           foveal color receptors)

USSR/Optics

K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10592

Author : Smirnov, M.S., Bongard, M.M.
Inst   : Institute of Biophysics, Academy of Sciences, USSR, Moscow, USSR
Title   : Threshold and Colorimetric Methods of Studying Color Vision.

Orig Pub: Biofizika, 1956, 1, No 2, 158-162

Abstract: An analysis of the possibilities and the limits of applicability of
          threshold and colorimetric methods for the determination of the
          number of receivers participating during the act of color vision
          and to investigate the spectral and time characteristics of their
          sensitivity. Considerable advantages of the colorimetric method
          over the threshold method are noted, in the sense of accuracy and
          variety of the information obtained.

Card   : 1/1

SMIRNOV, M.S.

SMIRNOV, M.S.; BONGARD, M.M.

On contrasting colors. Biofizika 1 no.2:174-177 '56.   (MIRA 9:9)

1.Institut biologicheskoy fiziki Akademii nauk SSSR, Moskva.
                (COLOR)

SMIRNOV, M.S.

BONGARD, M.M.; SMIRNOV, M.S.

N.T.Fedorov's theory of color contrast. Biofizika 1 no.8:754-758
'56.   (MLRA 9:12)

1. Institut biologicheskoy fiziki Akademii nauk SSSR, Moskva.
        (COLOR)

SMIRNOV, M.S.

612.843.31

9152.   FOUR-DIMENSIONAL NATURE OF COLOUR SPACE
IN HUMANS.   M.M.Bongard and M.S.Smirnov.
Dokl. Akad. Nauk SSSR, Vol. 108, No. 3, 447-9 (1956). In
Russian.
    Since twilight vision, in frogs and humans, is based on
the presence of rhodopsin, and the twilight receiver of the
frog operates not only near the threshold, but also at bright-
ness values > 100 apostilbs, an investigation was carried out
to determine whether the same applies to humans. The opera-
tion of the twilight receiver was studied in the presence of
three daylight receivers, using colorimetric method; the com-
pared fields were presented successively to the observer. It
was found that, even for very high brightness values (up to
1000 apostilbs), the twilight receiver operates simultaneously
with the daylight receivers.   F.Lachman

USSR / Human and Animal Physiology. Sense Organs.   T

Abs Jour   : Ref Zhur - Biol., No 15, 1958, No. 70594

Author   : Bongard, M. M.; Smirnov, M. S.
Inst   : Not given
Title   : Visual Colorimetry by the Method of Substitution (A New
             System of Colorimetry for the Study of Human Color
             Perception)

Orig Pub   : Biofizika, 1957, Vol 2, No 1, 119-123

Abstract   : With the method of substitution the fields are divided
             not in space but in time. The authors constructed a
             four-colored "substitution colorimeter" (the theoretical
             scheme is presented in the article), which permits studies
             of color vision both of the center and of the periphery
             of the retina. Experiments were conducted over a wide
             range of brightness, with different lambda of basic illumi-
             nation, with different-sized fields, and with light and

Card 1/2

                                150

USSR/Human and Animal Physiology (Normal and Pathological).   T-13
              Sense Organs. Vision.

Abs Jour   : Ref Zhur - Biol., No 11, 1958, 51335

Author   : Bongard, M.M., Smirnov, M.S.
Inst   : -
Title   : The Curves of Spectral Sensitivity Obtained from Receivers
               Connected with Single Fibers of the Optic Nerve in Frogs.

Orig Pub   : Biofizika, 1957, 2, No 3, 336-341.

Abstract   : With the aid of a colorimeter, the composition curves of r
               receivers measuring retina impulses in frogs were deter-
               mined. The impulses were transmitted by microelectrodes
               of 20-30 μ in diameter. The obtained curves coincided
               well with curves established when signals from the entire
               nerve were transmitted. Along a single fiber of the optic
               nerve information is transmitted from two receivers with
               different curves of spectral sensitivity. The authors are
               of the opinion that the retina of frongs contains two
                                      receivers only. -- M.M. Bongard.

Card 1/1

                            - 136 -

BONGARD, M.M.; SMIRNOV, M.S.

Color adaptation and limits in applying the concept of the "photo-sensitive receptor of the eye" [with summary in English]. Biofizika 3 no.2:184-189 '58.   (MIRA 11:4)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.
        (COLOR SENSE)

17(1)   SOV/26-59-5-3/47

AUTHORS: Bongard, M.M., Smirnov, M.S.

TITLE: Color Vision in Man and Animals

PERIODICAL: Priroda, 1959, Nr 5, pp 13 - 20   (USSR)

ABSTRACT: The author describes the structure of the human eye
              and the process of perception by sight, some parts
              of which, he says, are still unexplained, more es-
              pecially the number and position of the receptors
                        of light, their spectral sensitiveness
              and the conveyance of light signals from the re-
              ceptors to the brain. The author then examines
              visual sight with one receptor (in guinea pigs),
              with two receptors (in turtles) and with more than
              two receptors. The human retina has three receptors.
              More difficult, he considers, is the problem of
              spectral sensitiveness with which is connected the
              problem of daltonians, (two receptors only). The
              disposition of the receptors in the retina depends
Card 1/2   on the type of cone (kolbochka). The conveyance to

SMIRNOV, M.S.; BONGARD, M.M.

Hypothesis of the mechanism of photoreception in the retina;
analogy between retinal receptors and semiconductor photocell
[with summary in English]. Biofizika 4 no.2:181-186 '59.

(MIRA 12:4)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.
            (RETINA, physiol.
                    photoreceptors, analogus characteristics with semi-
                    conductor photoelements (Rus))

SMIRNOV, M.S.; BONGARD, M.M.

    Model studies of color vision. Biofizika 4 no. 6:702-707 '59.

                                                (MIRA 14:4)

    1. Institut biologicheskoy fiziki AN SSSR, Moskva.
                         (COLOR SENSE)

SMIRNOV, M.S.

Measurement of the wave abberation of the human eye. Biofizika 6
no.6:687-703 '61.   (MIRA 15:1)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.
                    (EYE)

L 23853-66   L.T(1)   SCTB   DD

| ACC NR: AP6015179 | SOURCE CODE: UR/0217/65/010/001/0148/0154 |

AUTHOR: Bongard, M. M.; Smirnov, M. S.

ORG: Institute of Biophysics, AN SSSR, Moscow (Institut biofiziki AN SSSR); Institute of Problems of Information Transmission, AN SSSR, Moscow (Institut problem peredachi informatsii AN SSSR)

TITLE: "Skin vision" of R. Kuleshova

SOURCE: Biofizika, v. 10, no. 1, 1965, 148-154

TOPIC TAGS: skin physiology, vision

ABSTRACT: Tests and observations carried out at the Institute of Biophysics to verify R. Kuleshova's capacity for vision by means of the skin of her fingertips are described. The tests were carried out under conditions in which the possibilities of suggestion, telepathy, and peeping (although Kuleshova had a tendency to peep) were eliminated. Sensational reports in the popular press to the effect that Kuleshova could see in the dark were disproved and explanations based on sensitivity to infrared, X-rays, or an electrostatic field capacity for skin vision with an ability to see colors with her fingertips by means of three types of receptors with color sensitivity curves corresponding to those of the cones of the eye retina or similar to them. She had color vision on her right hand only, but could see with either hand. Determinations

Card 1/2   UDC: 577.3

ALEKSANDROV, N.I.; GEFEN, N.Ye.; YEROGOVA, N.B.; SERGEYEV, V.M.; MATYUK, P.D.;
    SMIRNOV, M.S.

Aerosol immunization by means of dry pulverized vaccines and anatoxins.
Report No.2: Study on the effectiveness of the aerosol method of
immunization and reimmunization by means of dry pulverized diphtherial
anatoxins. Zhur. mikrobiol. epid. i immun. 31 no.7:92-97 Jl '60.
                                        (MIRA 13:9)
        (DIPHTHERIA)   (TOXINS AND ANTITOXINS)

ALEKSANDROV, N.I.; GEFEN, N.Ye.; YEGOROVA, N.B.; KREYNIN, L.S.; SERGEYEV,
V.M.; MASLOV, A.I.; SMIRNOV, M.S.; KRAKHT, S.V.; BUDAK, A.P.;
GEFEN, G.Ye.

Development of a method for aerosol immunization against typhoid
fever and dysentery. Voen.-med. zhur. no.5:54-59 My '61.
(MIRA 14:8)

(TYPHOID FEVER)   (DYSENTERY)   (AEROSOLS)

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.; SERGEYEV, V.M.;
    SMIRNOV, M.S.

    Aerosol immunization with dry live vaccines and anatoxins. Report No.7:
    Organization, methods, and technic of mass aerosol immunization of human
    subjects with atomized vaccines. Zhur. mikrobiol., epid. i immun. 32
    no.9:3-7 S '61.   (MIRA 15:2)
            (VACCINATION)   (AEROSOLS)

SMIRNOV, M.S.

7

AUTHORS: Aleksandrov, N.I., Gefen, N.Ye., Gapochko, K.G., Garin, N.S.,
             Koridze, G.G., Markozashvili, I.N., Osipov, N.P., Pischik, M.P.,
             Posobilo, I.A., Smirnov, M.S. and Turov, V.P.

TITLE: Aerosol immunization with dry dust vaccines and anatoxins.
             A study of the method of aerosol immunization with dust plague
             vaccines during mass immunization.

PERIODICAL: Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 7,
             1962, 46-50

TEXT: Tests were conducted to approve the practical use of mass aerosol
immunization with plague vaccine and to check and specify previously ob-
tained data which testified that this vaccination method was safe and had a
low reactivity. Dust plague vaccine was used in a dose of 150-200 million
living microbes of the vaccine EB strain. Four 15-min. seances took place
with up to 190 persons at a time in a 112 m³ room. On the days following
vaccination, 157 persons were subjected to X-ray and hematological tests.

Card 1/2

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.;
      KORIDZE, G.G.; MARKOZASHVILI, I.N.; OSIPOV, N.P.;
      PISCHIK, M.P.; POSOBILO, I.A.; SMIRNOV, M.S.; TUROV, V.P.

      Aerosol immunization with dry pulverized anatoxins and
      vaccines. Report No.8: Studies on a method of aerosol
      immunization with pulverized antiplague vaccine of large
      numbers of persons. Zhur. mikrobiol., epid. i immun. 33
      no.7:46-50 Jl '62.   (MIRA 17:1)

ZHDANOV, V.M.; RITOVA, V.V.; GEFEN, N.Ye.; ZHUKOVSKIY, A.M.;
        BERLYANT, M.L.; YEVSTIGNEYEVA, N.A.; YEGOROVA, N.B.; KREYNIN,
        L.S.; LEONIDOVA, S.L.; SERGEYEV, V.M.; SMIRNOV, M.S.

Comparative study of intranasal and aerosol methods of
vaccination against influenza. Zhur. mikrobiol., epid. i
immun. 33 no.11:63-67 N '62.   (MIRA 17:1)

1. Iz Instituta virusologii imeni Ivanovskogo AMN SSSr.

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.; MASLOV, A.I.
     MISHCHENKO, V.V.; SMIRNOV, M.S.

Aerosol immunization with dry powder vaccines and anatoxins.
Report No.9: Further study of the reactivity and immunological
effectiveness of the method of aerosol immunization with brucel-
losis powder vaccine. Zhur.mikrob.,epid. i immun.33.no.12:95:102.D '62.
     (BRUCELLA)   (VACCINES)   (AEROSOL THERAPY)   (MIRA 16:5)

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.; GORDON, G.Ya.
    KOZHUSHKO, M.I.; KORENEV, G.P.; LAZAREVA, Ye.S.; LEYKEKHMAN, Ye.P.;
    MASLOV, A.I.; PAVLOV, G.A.; POLIVANOV, N.D.; ROMANOV, P.S.; RYBAKOV,
    P.S.; RYBAKOV, M.G.; SAMOKHVALOV, M.F.; SMIRNOV, M.S.; SHTERN, M.A.;
    CHEPKOV, V.N.

Experience with mass aerosol immunization with tularemia dust
vaccine. Zhur. mikrobiol., epid. i imm. 41 no. 2:14-43 F '64.
                                        (MIRA 17:9)

ALEKSANDROV, N.I.; GEFEN, N.Ye.; GAPOCHKO, K.G.; GARIN, N.S.; DANILYUK, S.S.;
     YEGOROVA, L.L.; KUZINA, R.F.; KORIDZE, G.G.;
     LABINSKIY, A.P.; LEBEDINSKIY, V.A.; MASLOV, A.I.; OSIPOV, N.P.;
     SILICH, V.A.; SMIRNOV, M.S.; TSYGANOVA, N.I.

Study of a method of aerosol immunization with powdered plague
vaccine in large population groups. Zhur. mikrobiol., epid. i
immun. 40 no.12:22-28 D '63.

                                                (MIRA 17:12)

L 8985-66   EWT(d)/EWT(1)/ETC/EPF(n)-2/EWG(m)   IJP(c)   WW

ACC NR: AP5027569   UR/0170/65/009/005/0567/0570

AUTHOR: Smirnov, M. S.

ORG: All-Union Correspondence Institute for the Food Industry, (Vsesoyuzniy zaochnyy institut pishchevoy promyshlennosti)

TITLE: Nonlinear problems in heat and mass transfer

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 9, no. 5, 1965, 567-570

TOPIC TAGS: heat transfer, mass transfer, mathematic analysis

ABSTRACT: The article considers a system of equations of the general form:

$$\frac{d}{dx}\left\{ a(u)\frac{du}{dx} + a(u)\,\delta(u,\,t)\frac{dt}{dx}\right\} = h(u),$$

$$\frac{d}{dx}\left\{\lambda(t)\frac{dt}{dx}\right\} = q(t). \qquad (A)$$

The function $\delta(u,t)$ is assumed to be a function only of t or only of u. The article treats a number of cases in which an exact analytical

Card 1/3   UDC: 66.047.31

L 8985-66

ACC NR: AP5027569   3

solution can be obtained to the above system of equations. The second
equation of the system can be written in the form:

$$\lambda(t)\frac{d^2t}{dx^2} + \lambda'(t)\left(\frac{dt}{dx}\right)^2 - q(t) = 0, \qquad (B)$$

where

$$\lambda'(t) = \frac{d\lambda}{dt}.$$

If we introduce the designations

$$\lambda_1(t) = \lambda'(t)/\lambda(t), \quad q_1(t) = -q(t)/\lambda(t),$$

this equation can be written in the form:

$$\frac{d^2t}{dx^2} + \lambda_1(t)\left(\frac{dt}{dx}\right)^2 - q_1(t) = 0. \qquad (B')$$

The latter equation can be solved analytically for a broad class of
functions λ_1 and q_1 with boundary conditions of the first, second,
or third order. The article presents three possible solutions of
this nonlinear equation. Orig. art. has: 6 formulas.

16, 44, 55

Card   2/3

SMIRNOV, M.

PA 65T24

USSR/Chemistry - Cadmium Amalgam   Mar 1948
    Chemistry - Mercury

"Contact Difference of Potentials Between Mercury
and Cadmium Amalgam," M. Smirnov, Lab of Electro-
chem, Inst of Chem and Metal, Ural Affiliate, Acad
Sci USSR, Sverdlovsk, 2 pp

"Zhur Fiz Khim" Vol XXII, No 3

Describes experiment substantiating theory that the
difference in potentials which remains between the
metals at the maximum quantities of electrocapillary
curves must be considered as quantity corresponding
to the contact difference of potentials between
metals. Submitted 26 Mar 1947.

65T24

PA 3/50T81

USSR/Physics - Contact Potential   11 Sep 49
    Metals - Mercury

"Contact Potential Differences Between Liquid
Mercury and Solid Lead and Thallium," S. Karpachev,
M. Smirnov, Inst Phys of Metals, Ural Affiliate,
Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXVIII, No 2

Obtained an average value of 0.447 volt, in three
experiments, as the contact potential difference
between liquid mercury and solid lead. This is
very close to potential difference between points
of zero charge of mercury and lead in water

                                                3/50T81

USSR/Physics - Contact Potential   11 Sep 49
            (Contd)

solutions. Obtained an average value of 0.533
volt for contact potential difference between
liquid mercury and solid thallium, which is also
fairly close to value (0.59 volt) for potential
difference between points of zero charge of liquid
mercury and solid thallium. Submitted by Acad
A. N. Frumkin 8 Jul 49.

3/50T81

SMIRNOV, M. V.

257T35

USSR/Chemistry - Electrochemistry   Jan 53
                         Metallurgy

"The Relationship Between the Quality of Nickel
Cathode Deposits and the Presence of Impurities
in the Electrolyte," S. F. Pal'guyev, M. V. Smirnov,
and S. V. Karpachev, Inst of Chemistry and Metal-
lurgy, Ural Affiliate, Acad Sci USSR

Zhur Prik Khim, Vol 26, No 1, pp 50-54

Demonstrated the strong influence of the presence
of oxygen or traces of moisture in the electrolyte
on the nickel cathode deposit during electrolysis

257T35

of molten chloride. Passing dry hydrogen chloride
through the molten electrolyte frees the latter
from the above impurities and improves the quality
of the metallic cathode deposit.

SMIRNOV, M. V.

②

Cathodic deposition of nickel from molten chloride baths.
II. S. F. Pal'guev and M. V. Smirnov. Zhur. Priklad.
Khim. 26, 1166-75(1953); cf. C.A. 47, 6794i.—Properties c
of cathode deposits of Ni obtained in Cl baths strongly de-
pend on c.d.; 0.005 amp./sq. cm. gives a fairly dense cryst.
deposit. Increase in c.d. increases the amt. of dendrites
formed. Optimum c.d. is at 0.015 amp./sq. cm. with a
thickness of 0.11 mm. Preliminary bubbling of HCl shows
influence on the character of cathode deposits of Ni only in
the case of Cl and phosphate baths, but not in F baths.
This indicates that the character of the cathode deposit is
influenced, apart from the formation of oxide films on the
surface of the metal, by the nature of the anion. The spe-
cific influence of F⁻ on the properties of cathode deposits of Ni
on electrolysis from molten baths can be explained by the
poor wetting of metals by molten fluorides.   V. N. B.

Smirnov, M.V.

Chemical Abst.
Vol. 48 No. 6
Mar. 25, 1954
Electrochemistry

The work function of mercury in an atmosphere of wate
vapor. S. V. Karpachev, M. V. Smirnov, Z. S. Volchenk
ova, and G. K. Stepanov (Inst. Chem. and Met., Ura
Branch. Acad. Sci. U.S.S.R., Sverdlovsk). Zhur. Fiz
Khim. 27, 1370-3(1953); cf. C.A. 48, 11065.—The work
function of Hg in the presence of H_2O vapor (or this vapor
and H) is greater than in vacuo as long as the adsorbed amt.
of H_2O is less than 15×10^{-11} mole/sq. cm. At 10^{-10}
mole/sq. cm. the difference has a max. (approx. 1.1 e.v.)
which is too great to be accounted for by the orientation of
adsorbed H_2O dipoles. The p.d. between Pt in vacuo and
Pt in H_2O vapor (whose pressure varied from 5×10^{-4} to
2×10^{-2} mm. Hg) is independent of the vapor pressure and
decreases from 0.47 v. at 150° to 0.1 v. at 350° and zero at
550°.   J. J. Bikerman

Smirnov, M. V.

USSR/Physics - Technical physics

Card 1/1   Pub. 22 - 21/47

Authors   : Smirnov, M. V., and Detkov, S. P.

Title   : Vapor pressures of metals determined through the application of radioactive isotopes

Periodical   : Dok. AN SSSR 98/5, 777-780, Oct 11, 1954

Abstract   : A dynamic method for the determination of vapor pressures through the application of gamma-radioactive isotopes was introduced. This method was applied for the first time for measuring the vapor pressure of Zn at temperatures of 554 to 904.2° and the results obtained are tabulated. This vapor pressure measuring method is recommended not only for pure metals but also for alloys and salts provided the tested element has a gamma-radioactive isotope of sufficiently great semi-decomposition period. Four references: 2-USA; 1-English and 1-USSR (1920-1950). Table; graphs; drawing.

Institution : ...

Presented by: Academician G. V. Kurdyumov, May 25, 1954

SMIRNOV, M.V.

416   AEC-tr-2674
CHLORINE ELECTRODE OF COMPARISON IN MOLTEN
CHLORIDES. M. V. Smirnov, B. F. Plagiov, and L. E.
Ivanovskii. Translated by [S.] Botcharsky from Zhur. Fiz.
Khim. 29, 772-7(1955). 6p.

The conditions influencing the stability and reproducibility
of chlorine electrode potential of comparison in molten
chlorides were investigated. It has been shown that carbon
electrodes for spectral analysis are the most suitable for
the production of chlorine electrodes of comparison. It was
shown that in order to accelerate the attainment of the
stationary value of the potential of a chlorine electrode the
carbon electrode should be polarized anodically in molten
chlorides for a few minutes. The possibility of measuring
the potentials in molten chlorides by means of a chlorine
electrode with an accuracy of 10^{-5} V has been proved.
(auth)

Smirnov, M. V.

Distr: 4E2c

Cathode processes during deposition of thorium from molten electrolytes. M. V. Smirnov and L. D. Yushina. (Izv. Akad. Nauk SSSR, Otd. khim. Nauk, 1956, II, 1285—1293).—Electrolysis of molten electrolytes is often characterized by a high temp. reducing or eliminating the difficulties of ion-discharge on the cathode; the atoms of the settling metal freely attain the min. free energy required. Some metals react on chlorides of high valence, yielding subchlorides. At high temp. Th yields halides of low valency. The aim of the experiment was the analysis of the processes at the cathode in the electrolysis of chloride and fluoride solutions containing Th^{IV} and alkaline metals. A Mo cathode is used, its polarization having been tested at 600, 700 and 800° in eutectic LiCl-KCl mixtures containing 0·18, 2·6 and 27·8 wt.-% of ThCl$_4$ or 2·2 and 20 wt.-% of ThF$_4$ at c.d. of 10^{-3}-4 amp./cm^2. It has been established that at relatively low c.d. (< 0·01 amp./cm.^{2}) Th^{4+} are converted to Th^{3+} ions on the cathode. The separation potential of metallic Th is attained when the concn. of the Th^{4+}—Th^{3+} ions approaches the limiting value of the diffusion current. The intrinsic c.d. during the separation is constant. At a low concn. of Th ions an increase of c.d. results in separation of alkali metal. When adding F to the solution in a quantity equivalent to the ThF$_4$, the separation potential of Th metal can be increased.

J. SZEBENYI.

SMIRNOV, M.V.

The reaction of thorium oxide with its chloride in salt melts. M. V. Smirnov and L. E. Ivanovskii (Ural Branch, Acad. Sci. U.S.S.R., Sverdlovsk). *Zhur. Neorg. Khim.* 1, 1843-9(1956).—The reaction of ThO_2 with $ThCl_4$ was studied at 840°. If these compds. are heated in an A atm. in a stoichiometric ratio, $ThOCl_2$ is formed. The reaction of ThO_2 in fused eutectic mixts. of LiCl and KCl contg. different amts. of $ThCl_4$ was studied. Above 600° the reaction for forming $ThOCl_2$ takes place only in melts that contain at least 10% $ThCl_4$. The rate of this reaction increases with increasing $ThCl_4$ concn., temp., and dispersion of the oxide particles. The oxychloride is almost insol. in chloride and chloride-fluoride melts. When it is introduced into the melt it decomp. to give the oxide and the chloride.

J. Roytar Leach.

SMIRNOV, M. V.

7   27   27

**Equilibrium potentials of thorium oxide-carbon elec-
trodes.** M. V. Smirnov and L. E. Ivanovskii. *Doklady
Akad. Nauk S.S.S.R.* 110, 812-15(1956).—The ThO₂-C
electrodes were made by heating ThO₂ with sugar sirup
under const. stirring to dryness at 100-110°, pressing the
powder into cylindrical electrodes, and calcining them under
a layer of soot. The molar ratio of C:ThO₂ varied in the
different electrodes between 2 and 200. The equil. poten-
tials of such electrodes were measured in fused equimol.
NaCl-KCl mixt. contg. a definite proportion of ThCl₄. The
electrolyte was fused in an atm. of dry HCl and evacuated
until no more gas was evolved, and used with a Cl₂ electrode
(Smirnov, *et al.*, *C.A.* 51, 1750g) and a Pb electrode at
840 ± 0.8°. The e.m.f. of the (ThO₂-C)(NaCl + KCl +
xThCl₄)/Cl₂ C (where x varied between 0.0105-2.87 mol. %
Th) can be expressed by the $E = 0.813 + 0.56 \log [Th^{4+}]$,
where $[Th^{4+}]$ is the mol. proportion of Th in the melt.

W. M. Sternberg

SMIRNOV, M.V.

Polarization of thorium oxide—carbon electrodes in fused chlorides at low current density. M. V. Smirnov, N. Ya. Chukreev, and L. E. Ivanovskii. Doklady Akad. Nauk S.S.S.R. 110, 1022-5(1950).—The polarization at low c.d. was studied with anodes composed of 92% ThO_2 + 8% C in a fused eutectic mixt. of LiCl-KCl, contg. 5-17% by wt. of $ThCl_4$ at 713°. The electrodes were kept in the electrolyte until the potential became const., 0.903 v. more negative than the Cl^- electrode. Measurements were made in quartz cells in a CO_2 atm. A small current was then passed through the cell, with the c.d. gradually increased from 7 × 10^{-4} to 0.4 amp./sq. cm., with the circuit closed for only 4 sec. for each measurement. The polarization curve of the ThO_2-C electrode at c.d. varying between the above limits is shown, and the potential against Cl^- electrode reached 0 at c.d. of 0.4 amp./sq. cm. A possible explanation of the shape of the curve is suggested.   W. M. Sternberg.
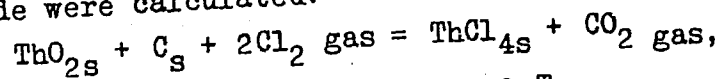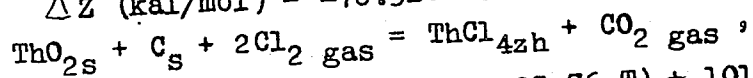
555

Study of the thermodynamics of the reaction $ThO_2 + C + 2Cl_2 =$ $ThCl_4 + CO_2$ and $ThO_2 + C = Th + CO_2$ by the electromotive force method. (Contd.)

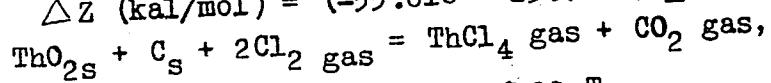$$E = (0.4005 + 4.967 \cdot 10^{-4} \ T) \pm 0.0033 \ volts.$$

Changes in the isobaric potential in the chlorination reaction for the formation of solid, liquid and gaseous thorium tetrachloride were calculated:

$$ThO_{2s} + C_s + 2Cl_2 \ gas = ThCl_{4s} + CO_2 \ gas,$$

$$\triangle Z \ (kal/mol) = -78.310 - 4.2 \ T \ ;$$

$$ThO_{2s} + C_s + 2Cl_2 \ gas = ThCl_{4zh} + CO_2 \ gas \ ,$$

$$\triangle Z \ (kal/mol) = (-55.810 - 25.76 \ T) \pm 1014 \ ;$$

$$ThO_{2s} + C_s + 2Cl_2 \ gas = ThCl_4 \ gas + CO_2 \ gas,$$

$$\triangle Z \ (kal/mol) = -19310 - 56.33 \ T.$$

For the reaction $ThO_{2s} + C_s + Th_s = CO_2 \ gas$, $\triangle Z = (200.090 -$

$77.47 \ T) \pm 1134 \ kal/mol.$

Card 2/3

137-1958-2-2646

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 63 (USSR)

AUTHORS: Smirnov, M. V., Pal'guyev, S. F., Volchenkova, Z. S.

TITLE: The State of the Oxygen in Salt Melts Containing Titanium (O sostoyanii kisloroda v solevykh rasplavakh soderzhashchikh titan)

PERIODICAL: Izv. Vost. fil. AN SSSR, 1957, Nr 3, pp 94-101

ABSTRACT: On the basis of experimental data on the electrolysis of fluoride/chloride melts containing Ti^{4+} it was shown that the effect of the atmospheric O_2 within them and the suspended insoluble dioxide led to the formation of oxy-cations of the TiO^{2+} and $Ti_2O_3^{2+}$ type, which when discharged at the cathode yield well formed crystalline precipitates of the lowest Ti oxides. These oxides were precipitated with potentials 1.3 - 1.4 volts more positive than the potential used to segregate metallic Ti, and 2.2 - 2.3 volts more positive than the potential used to segregate an alkali metal. Tests were made to clarify the nature of the processes which take place at the cathode and at a carbon anode when electrolysis occurs with small current densities. It was found that the reduction of Ti^{4+} to the lowest valences at the cathode was

Card 1/2

137-1958-2-2646

The State of the Oxygen in Salt Melts Containing Titanium

accompanied by the discharge of oxy-cations with the formation of precipitates of the lowest Ti oxides. At the anode, simultaneously with the oxidation of the lowest-valence Ti, an electrochemical reaction took place with the oxy-cations adsorbed on the carbon: $TiO^{2+} + 1/2 C - 2e = Ti^{4+}$ (melt) $+ 1/2 CO_2$. Chlorination reactions involving the particles of TiO_2, Ti_2O_3, and TiO suspended in the melt were also possible. The anode potential during these processes was ~ 0.4 volts more negative than the potential of a chlorine electrode.

N.P.

1. Fluoride melts--Electrolysis   2. Chloride melts--Electrolysis
2. Oxygen--Determination

Card 2/2

SMIRNOV, M.V.; ILYUSHCHENKO, N.G.

Hydrolysis of thorium fluoride in molten salts.   Izv.vost.fil.AN
SSSR no.4/5:114-118 '57.   (MIRA 10:9)

1. Ural'skiy filial Akademii nauk SSSR.
        (Thorium fluorides)   (Alkali metal chlorides)   (Hydrolysis)

Uranium Dioxide Anodes in a Melted Chloride Electrolyte. 79-2-4/58

solution of the uranium dioxide occurs with a small polarization connected with the concentrational changes in the near-electrode electrolyte layer at a potential which is close to equilibrium.

Since the UO_2^{++} ion discharge potential on the cathode was approximately by 1 v more positive than the metallic uranium separation potential, even the slightest oxygen contaminations of the electrolyte led to the contamination of the metal cathode residues by the dioxide. The uranium dioxide anode polarization was measured in a chloride melt at 550° and it was found that at current densities below 0.05 A/cm^2 the anode potential was by 0.57 v more negative than the potential of the chloride electrode and that the potential varies little with current density. Considerable polarization was observed at a current density above 0.05 A/cm^2.

Card 2/3   1 table, 1 graph, 1 drawing. There are 10 references, of which 3 are Slavic.

Thermodynamics of the reaction of calcium chloride with fused chlorides of alkali metals. M. V. Smirnov, S. F. Pal'guev, L. A. Lyapina, and Yu. N. Krasnov. Zhur. Prikad. Khim. 30, 1687-9 (1957).—The nearest to a Ca reversible electrode is CaO + C. This too decrepitates in pure fused CaCl₂ but a few measurements of the e.m.f. of the cell CaO + C | fused CaCl₂ | Cl, C were made at 800°; $E = 1.6$ v. The isobaric potential ΔZ, based on the reaction $CaO + 0.5C_2 + Cl_2 = CaCl_2 + 0.5CO_2$, is -73.8 kcal./mol. This agrees with the value -74.1 calcd. from $\Delta Z_t = (-78.7 + 4.3 \times 10^{-3} T) \pm 1.8$ kcal./mol. CaCl₂. The e.m.f. of the cell CaO + C | melt:0.60 wt. % CaCl₂ + 99.40% (NaCl + KCl) | Cl,C detd. with electrodes of a wide range of mol. fractions of CaO and C in the 800–900° ± 2.5° range was expressed by $s = (1.8245 + 1.09 \times 10^{-3} T) \pm 0.0045$ v. Then the free energy of 0.60% CaCl₂ in equimol. NaCl and KCl is $\Delta Z_s = (-84.163 - 1.1797 T) \pm 2.08$ kcal./mol. CaCl₂ and that of diln. from pure CaCl₂ to 0.60% CaCl₂ is $\Delta Z_4 = \Delta Z_s - \Delta Z_t = (-5.5 - 13.5 \times 10^{-3} T) \pm 2$ kcal./mol. CaCl₂; $\Delta H_4 = -5.5$ kcal./mol. CaCl₂ and $\Delta S_4 = 13.5$ kcal./degree mol. CaCl₂. These data and available data on similar systems suggest the existence of CaCl₃ in dil. melts which decomp.: $CaCl_3 \rightarrow CaCl_2 - \rightarrow CaCl_3 \rightarrow CaCl^+$ and $CaCl^+ + 3Cl^- \rightarrow CaCl_4^{--}$; $H_4 = -5.5$ kcal./mol. CaCl₂.

I. Bencowitz

USSR/ Physical Chemistry - Electrochemistry/

Abs· Jour : Referat. Zhurnal Khimiya, No.1 1958, 579.

B-12

Abstract : $\Delta Z = (-255700 \quad 51.75T) - 120$ cal per mole; and $Th(sol.)$ $+ 2Cl_2(gas) = ThCl_4(solid)$; $\Delta Z = -278200 + 72.3T$ cal per mole. It is shown that anode dissolution of Pb and Th in their melted chlorides proceeds without any noticeable polarization at potentials near the equilibrium potentials of the metals referred to their ions of the highest valency.

Card: 2/2

Metals and Thorium

Orig Pub : Zh. fiz. khimii, 1957, 31, No 3, 641-647

Abstract

Card 1/1

Smirnov M V

USSR / Physical Chemistry - Electrochemistry.   B-12

Abs Jour : Referat. Zhurnal Khimiya, No.1, 1958, 580.

Author   : M.V. Smirnov, L.Ye. Ivanovskiy.
Inst   : —
Title   : Reduction of Th^{4+} Ions in Chloride Melts with Metallic
             Thorium.

Orig Pub : Zh. fiz. khimii, 1957, 31, No.4, 802 - 807.

Abstract : At the interaction between metallic Th with the eutectic
            mixture LiCl-KCl containing 6 to 11% of $ThCl_4$ at 500 to 900°,
            Th dissolves in the melt at the expense of the reduction
            of Th^{4+} to Th^{2+}. In the same melt and at the $ThCl_2$ content
            of 5.83%, the equilibrium potentials E of the Th- and Mo-
            (indifferent) electrodes are equal and change with the tem-
            perature (from 510 to 897°) according to the equation E =
            $(-3.231 + 8.936 \times 10^{-4}T) - 0.02$ v. The equilibrium po-
            tentials E° for the electrode processes Th - 2e $\rightleftharpoons$ Th^{2+}

Card: 1/2

USSR / Physical Chemistry - Electrochemistry.   B-12

Abs Jour : Referat. Zhurnal Khimiya, No.1, 1958, 580.

Abstract : and $Th^{2+} - 2e \rightleftharpoons Th^{4+}$, referred to the chlorine comparison
            electrode were computed and they were $E^o = -3.231 + 10.968$
            $\times 10^{-4}T$ and $E^o = -1.905 - 1.484 \times 10^{-4}T$ correspondingly.
            Approximate magnitudes of $\triangle Z$ of the reactions $Th(sol.) +$
            $+Cl_2(gas) = ThCl_2(liqu.)$ and $Th(sol.) + ThCl_4(liqu.) =$
            $= 2ThCl_2$ (liqu.) were found and they were $\triangle Z = -149000$
            $+ 32.80T$ cal per mole for the first reaction and $Z =$
            $= -21150 + 7.02$ T cal per mole for the second.

Card: 2/2

20-5-27/54

The Anodic Solution of Thorium in Salt Melts

ASSOCIATION: Ural Branch AN USSR
               (Ural'skiy filial Akademii nauk SSSR)

PRESENTED: by A.N. Frumkin, Academician

SUBMITTED: March 13, 1957

AVAILABLE: Library of Congress

Card 5/5

$5.2200(A)$ 5.4700

$5.4600(A)$

66974

SOV/81-59-13-45035

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 13, p 44 (USSR)

AUTHORS: Smirnov, M.V., Ivanovskiy, L.Ye., Pal'guyev, S.F., Volchenko, Z.S.,
             Yushina, L.D.

TITLE: The emf-Method for Studying the Thermodynamics of Some Reactions at
             High Temperatures [21]

PERIODICAL: Tr. in-ta khimii. Ural'skiy filial AS USSR, 1958, Nr 2, pp 143 - 151

ABSTRACT: In the electrolysis of fused chloride baths CO_2 is separated on the
             anodes prepared from an intimate mixture of oxides and carbon and the
             ions of the corresponding metals pass into the electrolyte. The oxide-
             carbon electrodes of thorium, calcium, beryllium, etc. in equilibrium
             are reversible in relation to their ions being in the electrolyte.
             This permits to utilize them by the emf-method for elucidating the
             thermodynamics of reactions, in which oxides and carbon take part at
             high temperatures. The equilibrium potentials of the electrodes are
             determined by the activity of the ions of the corresponding metals in
             the electrolyte and by the CO_2 pressure over them according to the

Card 1/2   electrode reaction $M_2O_n + n/2C - 2ne \rightleftharpoons 2M^n + (fusion) + n/2CO_2$, $E =$

SMIRNOV, M.V.; IVANOVSKIY, L.Ye.; YUSHINA, L.D.

Equilibrium potentials of metals in molten salts.
Trudy Inst. khim. UFAN SSSR no.2:153-159 '58.

(MIRA 12:12)

(Electrometallurgy)

67024

_5. 1310 (A)_   SOV/137-59-10-21896

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 10, p 92 (USSR)

AUTHORS: Smirnov, M.V., Yushina, L.D., Ivanovskiy, L.Ye.

TITLE: Deposition of High-Melting Metals From Molten Electrolytes

PERIODICAL: Tr. in-ta khimii, Ural'skiy fil. AS USSR, 1958, Nr 2, pp 161 - 170

ABSTRACT: The authors investigated processes which take place on a Me-cathode in
             electrolysis of chloride and chloride-fluoride smelts, containing $\underline{Th}$,
             $\underline{Be}$, $\underline{Zr}$, $\underline{Ti}$ and other metals. It is shown that electrolysis of molten
             metallic salts is accompanied with an overcharge on the cathode of ions
             of conventional to lowest valencies. This is the cause for the existence
             of residual currents, which entail reduced cathode yield per current in
             electrolyzers without diaphragms or in open baths. In closed electro-
             lyzers with diaphragms the yield per current increases. The structure of
             the cathode deposit (dimension and cohesion of particles) depends on the
             presence of suspended submicroscopic particles of oxycompounds in the
             electrolyte. During the formation of crystalline deposits true D_k in-
             creases, with higher current intensity of electrolysis, considerably
Card 1/2   slower than the rated value, calculated from the geometrical surface of

             ...ry during the joint deposition of alkali metals. The yield per

G.S.

Card 2/2

67627

5.1310
18.9300

SOV/81-59-14-50262

Translation from: Referativnyy zhurnal, Khimiya, 1959, Nr 14, p 322 (USSR)

AUTHORS: Smirnov, M.V., Chukreyev, N.Ya., Yushina, L.D.

TITLE: The Anode Dissolution and Self-Dissolution (Corrosion) of Beryllium and Thorium in Molten Chlorides of Alkali Metals

PERIODICAL: Tr. in-ta khimii Ural'skiy fil. AS USSR, 1958, Nr 2, pp 171 - 176

ABSTRACT: The behavior of Be and Th in smelts has been studied. The anode dissolution of metals is accompanied by a high concentration polarization. Be passes into the smelt mainly in the form Be^+ and partially in the form Be^+ [sic!]. Th is dissolved mainly in the form of the subion Th^+, which intensifies the destructive action of the smelt on the lining. The corrosion $D_a \le 0.1$ a/cm^2, or the admixtures pass into the smelt. The corrosion of Th, Be, Zr and Ti has an electrochemical nature and proceeds with the formation of subions of alkali metals.

K. Krivolutskiy

Card 1/1

67628

SOV/81-59-14-50263

5. 1310
Translation from: Referativnyy zhurnal, Khimiya, 1959, Nr 14, p 322 (USSR)

AUTHORS: Smirnov, M.V., Ivanovskiy, L.Ye., Krasnov, Yu.N.

TITLE: The Electrochemical Behavior of Lower Oxides, Nitrides and Carbides of Some Metals

PERIODICAL: Tr. in-ta khimii. Ural'skiy fil. AS USSR, 1958, Nr 2, pp 177 - 182

ABSTRACT: The behavior of lower oxides, nitrides, and carbides of Ti and U in a smelt of chlorides has been studied. In proportion to the dissolution the anode is enriched by another component, if the diffusion rate of the component into the interior of the anode is less than the dissolution rate of the anode. An anode of UO_2 forms UO_2^{2+} cations. The lower Ti oxides from Ti^{2+} and Ti^{3+} cations at low D and Ti^{3+} and Ti^{4+} at high D. The cathode Ti precipitate does not contain oxides. Anodes of TiN and TiC are less suitable; separation of the anode and cathode spaces is needed. The possibility of obtaining Ti by electrolysis of smelts with soluble anodes and the refining of polluted Ti has been shown.

K. Krivolutskiy

Card 1/1

68946

SOV/81-59-24-85498

5. 4600

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 24, p 115 (USSR)

AUTHORS: Chukreyev, N.Ya., Smirnov, M.V.

TITLE: Polarization of Oxide-Carbon Anodes of Beryllium in Molten Chlorides

PERIODICAL: Tr. In-ta metallurgii. Ural'skiy fil. AS USSR, 1958, Nr 4, pp 45 - 50

ABSTRACT: In continuation of the works published earlier (RZhKhim, 1957, Nr 11, 37300; 1958, Nr 21, 70226) the polarization of oxide-carbon anodes of beryllium with a variable content of carbon was studied in melts of chlorides of alkali metals at i from $1 \cdot 10^{-4}$ to 1 a/cm^2 and a temperature of 700°C. The analysis of the polarization curves shows that at low current densities the following reaction takes place on the anode: $BeO + C - 2e \rightarrow Be^{2+}$ (molten) $+ CO_2$. On attaining the current density limit (0.1 a/cm^2) the discharge of the Cl^- ior takes place: $2Cl^- - 2e \rightarrow Cl_2$ with the subsequent secondary reaction: $2BeO + C + Cl_2 \rightarrow 2BeCl_2 + CO_2$; due to the latter reaction a further increase in i occurs.

B. Lepinskikh

Card 1/1

SMIRNOV, M.V.; TSIOVKINA, L.A.

Anodic dissolution of titanium in molten salts. Izv.Sib.otd.
AN SSSR no.9:17-25 '58.   (MIRA 11:11)
(Titanium--Electrometallurgy) (Polarization (Electricity)

SOV/78-3-8-25/48

AUTHORS: Smirnov, M. V., Krasnov, Yu. N.

TITLE: The Electrochemical Reaction of Titanium Nitride in the Chloride Melt (Elektrokhimicheskoye povedeniye nitrida titana v khloridnom rasplave)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol. 3, Nr 8, pp. 1876-1882 (USSR)

ABSTRACT: The electrolysis of titanium nitride from the chloride melt of alkali metals ($LiCl+KCl$) was investigated. Titanium nitride of a composition of $Ti_{1,22-1,27}N$ was used. It was found that in the case of low current density, $D_a = 0,004 - 0,035$ A/cm^2, nitrogen is formed in the electrolysis, which then passes over to the electrolyte melt. The anodic polarization of the electrodes of titanium nitride at temperatures of 550, 625 and 635°C with a current density of $3.10^{-4} - 1$ A/cm^2 was investigated. It was found that in the case of a current density lower than $1,5.10^{-3}$ A/cm^2 the anodic potentials change only little. A strong polarization on the titanium nitride anodes is observed within the ranges 0,002-0,2 A/cm^2, with the potential increasing to

Card 1/2

SOV/78-3-8-25/48

The Electrochemical Reaction of Titanium Nitride in the Chloride Melt

0,6-0,7 V. In the case of a current density higher than 0,2 A/cm^2 the anodic potential practically remains constant. Based on the experimental results the mechanism of the process of anodic solubility of titanium nitride in salt melts was discussed. There are 3 figures, 1 table, and 15 references, 10 of which are Soviet.

ASSOCIATION: Uralskiy filial Akademii nauk SSSR (Ural Branch, AS USSR)

SUBMITTED: June 25, 1957

Card 2/2

'AUTHORS: Smirnov, M. V., Chukreyev, N. Ya.   SOV/78-3-11-3/23

TITLE: Investigation of the Thermodynamic Reaction of the Reduction of Beryllium Oxide With Carbon (Izucheniye termodinamiki reaktsii vosstanovleniya okisi berilliya uglerodom)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 11, pp 2445-2449 (USSR)

ABSTRACT: The reduction of beryllium oxide with carbon electrodes in a melt of NaCl and KCl containing $BeCl_2$ was investigated. A carbon monoxide electrode produced by means of charging the carbon with the pure gas mixture CO and CO_2 served as electrode.

The electric conductivity of the melting mixture was investigated in the range of 682 - 1040°C. The electrochemical difference of the potentials between the carbon electrode and the metallic beryllium electrode in the alkali chloride melt is

$E = (2,036 - 5,16 \cdot 10^{-4}T) \pm 0,005$ V.

The change of the isobaric potentials of the reaction

$Be + 1/2\ CO_2 = BeO_2 + 1/2\ C_{graphite}$

$\Delta Z = (-93908 + 23,80\ T) \pm 230$ cal was investigated.

Card 1/2

SOV/78-3-11-3/23

Investigation of the Thermodynamic Reaction of the Reduction of Beryllium Oxide With Carbon

The entropy value of the beryllium oxide is $S^o_{BeO} = 3,37 \pm 0,05$ cal/degree. This value agrees with that given in publications. There are 2 figures, 1 table, and 21 references, 10 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Laboratoriya elektrokhimii (Ural Branch, AS USSR, Electrochemical Laboratory)

SUBMITTED: October 2, 1957

Card 2/2

SOV/75-13-6-10/21

5(2)
AUTHORS: Ivanovskiy, L. Ye., Loginov, N. A.,
             Smirnov, M. V.

TITLE: Determination of Bi- and Trivalent Titanium in Chloride Melts
             by Ferric Chloride (Opredeleniye dvukh- i trekhvalentnogo
             titana v khloridnykh rasplavakh posredstvom khlornogo zheleza)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol 13, Nr 6, pp 671-673
             (USSR)

ABSTRACT: A thorough investigation of the electrolysis of salt melts
             containing titanium requires a separate determination of bi-
             and trivalent titanium in the electrolyte. The determination
             methods (Refs 1,2) hitherto known do not always yield satis-
             factory results. For direct determination of the valences of
             titanium in the salt melt the oxidation of titanium with ferric
             chloride immediately in the melt with a parallel determination
             of the trivalent Ti in an aqueous electrolyte solution is most
             suitable. This method, however, is complicated by the thermal
             dissociation and the volatility of $FeCl_3$. At high temperatures
             ferric chloride is considerably decomposed. It is, therefore,
             useful not to melt the sample to be analyzed with pure $FeCl_3$
             but with its melts formed with alkali metal chlorides. For

Card 1/4

Determination of Bi- and Trivalent Titanium in
Chloride Melts by Ferric Chloride

the production of such ferric chloride melts anhydrous $FeCl_3$
which does not contain $FeCl_2$ is molten with the eutectic mixture
of KCl and LiCl at 450-500° in the chlorine current. In con-
centrations of $FeCl_3 < 5-6$ per cent by weight a homogeneous melt
is obtained. In higher concentrations a second liquid phase
is separated on the bottom. This phase has a constant com-
position and represents a solution of KCl in $KFeCl_4$. After
cooling it forms yellow anisotropic crystals with a melting-
point of $260 \pm 2°$. The upper layer is saturated with $KFeCl_4$.
This phase separation occurs only in the melt of $FeCl_3$ with
LiCl + KCl, but not in the melts of $FeCl_3$ with NaCl, with
LiCl and KCl. $FeCl_2$ formed by thermal dissociation concentrates
in the upper layer only. $KFeCl_4$ is more stable against thermal
dissociation than $FeCl_3$. For the oxidation of titanium in
the melt, $KFeCl_4$ from the lower layer of the ferric chloride

Card 2/4

Determination of Bi- and Trivalent Titanium in
Chloride Melts by Ferric Chloride

SOV/75-13-6-10/21

melt is used therefore instead of pure $FeCl_3$. If this
$KFeCl_4$ is added to the melt which contains the titanium to
be determined (in amounts only somewhat larger than that
required for the oxidation of titanium) and allows then the
melt to cool as quickly as possible, a minimum formation of
$FeCl_2$ may be obtained by thermal dissociation. Accordingly,
a method for the separate determination of bi- and trivalent
titanium in salt melts has been devised. The procedure is
described in detail. The sum of bi- and trivalent titanium
results from the determination of the $FeCl_2$ in the solution
of the cooled melt which was formed in the reduction of ferric
chloride. The content of trivalent titanium is determined in
part of the original melt (before the addition of $KFeCl_4$).

This method yields very accurate results. There are 3 tables
and 4 references, 2 of which are Soviet.

Card 3/4

Determination of Bi- and Trivalent Titanium in   SOV/75-13-6-10/21
Chloride Melts by Ferric Chloride

ASSOCIATION: Institut khimii Ural'skogo filiala AN SSSR, Sverdlovsk
                (Sverdlovsk Chemical Institute of the Ural Branch, AS USSR)

SUBMITTED: April 27, 1957

Card 4/4

Smirnov, M.V.

Distr: 4E4j

Equilibrium potentials of calcium oxide-carbon electrodes. M. V. Smirnov, S. F. Pal'guev, Yu. N. Krasnov, and L. A. Lvanina. Zhur. Priklad. Khim. 31, 66-71(1958); cf. C.A. 51, 1750g.—The equil. potential E of CaO-C electrodes in fused mixts. equimol. KCl + NaCl contg. different mol. fractions N of $CaCl_2$ was detd. at $800 \pm 2.5°$ against a standard Cl electrode (loc. cit.). From 2 to 5 CaO-C electrodes contg. different proportions of CaO were placed in the electrolyte around the Cl electrode. An atm. of CO_2 was maintained over the electrolyte. The proportion of CaO did not affect E. On the other hand, E decreased linearly (slope of line 0.106) as N increased to 0.05 (16.5 wt. % $CaCl_2$) and decreased rapidly as N increased, i.e. the activity coeff. $f_{CaCl_2}/f_{Cl} > 1$. The effect of CO_2 up to $P = 0.25$ atm. on E was expressed by $E = C + 0.058 \log P_{CO_2}$, where $C \approx 2.3 \, RT/4F$; E was controlled by the reaction $2CaO + C - 4 \rightleftharpoons 2Ca^{++}_{melt} + CO_2$. There was a break in the E vs. P curve at $P > 0.25$ atm. The presence of $CaCO_3$ in the electrolyte did not affect E.   I. Bencowitz

SMIRNOV, M.V.; PAL'GUYEV, S.F.; KRASNOV, Yu.N.

The behavior of carbon dioxide calcium electrodes during electrolysis
of fused chlorides. Zhur. prikl. khim. 31 no.2:226-233 F '58.
(Electrodes, Carbon) (Electrolysis) (Chlorides) (MIRA 11:5)

SOV/76-32-9-33/46

AUTHORS: Smirnov, M. V., Chukreyev, N. Ye.

TITLE: The Anodic Dissolution of Metals in Molten Salts (Anodnoye rastvoreniye metallov v solevykh rasplavakh) II. Beryllium (II. Berilliy)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2165-2173 (USSR)

ABSTRACT: The dissolution of a beryllium anode in a eutectic melt of LiCl and KCl was investigated. The apparatus used is shown in figure 1. The results are summarized in a table. At $500°C$ and with a lowered current density (of the order of $10 \ A/cm^2$) about one third of the beryllium enters the electrolyte as a univalent ion.
              Furthermore the polarization of the beryllium anode was investigated. The electrolytic cell is illustrated in figure 2. The electrolyte was again LiCl – KCl eutectic, at temperatures of $400°$, $500°$, $600°$, and $800°C$, and with current densities of 10^{-3} to $5 \ A/cm^2$ (Figs 3,4, and 5). The anode potential increased in this case from 0,7 to 0,8 V. Below $0,01 \ A/cm^2$ the anode potential does not vary with the current density and

Card 1/3

The Anodic Dissolution of Metals in Molten Salts. II.   SOV/76-32-9-33/46
Beryllium

lies close to the potential of beryllium in alkali chloride melts without electrolysis. The following equation is valid with current densities between 0,01 and 0,1 A/cm^2:

$$\varphi = \text{const} + \frac{RT}{2F} \lg i \quad (i \ldots \text{current density}).$$ At still higher current densities the anode potential suddenly jumps higher until the equilibrium potential for Be - BeCl is almost reached. The addition of fluoride to the melt sharply displaces the beryllium potential to negative values (Figs 7 and 8). In fluoride-chloride melts the potential of the beryllium anode varies with the current density (0,001 to 5 A/cm^2) from 1,2 to 1,4 V. There are 8 figures, 1 table, and 6 references, 3 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Sverdlovsk (Ural Branch AS USSR, Sverdlovsk)

SUBMITTED: April 19, 1957

Card 2/2

AUTHORS: Smirnov, M. V., Ivanovskiy, L. Ye.   SOV/76-32-9-34/46

TITLE: Cathodic Processes in the Deposition of Beryllium From Molten
                Electrolytes (Katodnyye protsessy pri osazhdenii berilliya iz
                rasplavlennykh elektrolitov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2174-2182
                (USSR)

ABSTRACT: The authors investigated the polarization of a molybdenum
                cathode at temperatures of 400°, 500°, and 600°C. The current
                density ranged from 10^{-3} to 3 A/cm^2. The electrolyte consisted
                of a melt of a potassium chloride and lithium chloride eutectic
                mixture (Fig 2) with $0,1$, $1,9$, and $7,25$ wt.-% of $BeCl_2$ (Fig 3)
                or $3,9$ wt.-% of K_2BeF_4 (Fig 4) added. Figure 1 illustrates the
                electrolytic cell used. It was found that with current densi-
                ties below 10^{-3} A/cm^2 Li^+ and K^+ are reduced to the respective
                divalent ions Li_2^+ and K_2^+ at the cathode. The deposition po-
                tential of beryllium lies $1,2$ to $1,4$ V above that of the alkali
                metals, depending on the temperature and concentration. The
                addition of fluoride considerably raises the deposition po-

Card 1/2

SOV/76-32-9-34/46

Cathodic Processes in the Deposition of Beryllium From Molten Electrolytes

tential of the beryllium at the cathode, but does not affect
the deposition of the alkali metals. There are 4 figures
and 15 references, 6 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Sverdlovsk (Ural Branch
AS USSR, Sverdlovsk)

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TITLE: The Equilibrium Potentials of Zirconium in Chloride Melts
              (Ravnovesnyye potentsialy tsirkoniya v khloridnykh rasplavakh)

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ABSTRACT: In a previous paper by the same authors (Ref 1) a dependence
              of the equilibrium potential of thorium on the temperature and
              the concentration of its ions in chloride solutions was deter-
              mined. Metallic thorium in such solutions reduces the Th^{4+}-ions
              to Th^{2+}. An analogous reaction might occur also in the case of
              other tetravalent kations of the sub-group of Ti. The authors
              carried out special experiments to check this assumption. For
              this purpose a molten eutectic mixture of lithium chloride and
              potassium chloride pretreated with dry hydrogen chloride was
              filled into a molybdenum crucible. A certain amount of zirconium
              tetrachloride was added to this mixture. This crucible was fixed
              to a molybdenum rod and put into a test glass of quartz which
              was filled with argon. This test glass was then heated in a
Card 1/3   massive metal block serving as a thermoregulator. A diagram

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shows graphically the results of two experiments carried out at
560 and 585° with samples with 2,27 percent by weight of Zr.
First the potential of the indifferent molybdenum electrode
was more positive than the potential of the zirconium electrode.
With progressing reduction the potentials of both chlorides
approached and finally became exactly the same; then they reached
a constant value. This tends to show the reaching of the equi-
librium in the reaction of the reduction
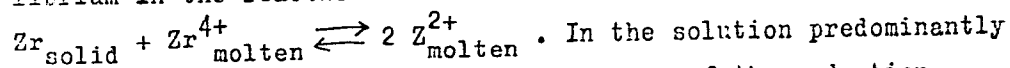
$$Zr_{solid} + Zr^{4+}_{molten} \rightleftharpoons 2\ Z^{2+}_{molten}$$. In the solution predominantly
bivalent zirconium is formed in consequence of the reduction.
Also the equilibrium potentials of zirconium at 400 to 820°C and
at concentrations of 0,0 - 24,9 percent by weight $ZrCl_2$ were

measured. Their measurement is described. The results of the
measurements of the electromotive force at various temperatures
are graphically shown in a diagram. Another diagram shows the
isothermal lines of the electromotive force at 700, 800, 900,
1000 and 1100° K for various concentrations of zirconium in the
electrolyte. These measurements also prove that in the case of

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an equilibrium with the metal the major part of the zirconium
in the solution consists of bivalent ions. There are 4 figures
and 3 references, 2 of which are Soviet.

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1. Zirconium--Electrical properties   2. Zirconium--Thermodynamic
properties   3. Chloride solutions--Applications

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