S/056/62/043/005/027/058
B102/B104

AUTHORS: Zhizhin, Ye. D., Nikitin, Yu. P.

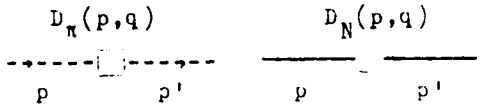
TITLE: On inelastic diffraction processes at high energies

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 5(11), 1962, 1731 - 1742

TEXT: On the basis of previously developed methods (ZhETF, 24, 505, 1953; DAN SSSR, 93, 439, 1953; 94, 651, 1954; 96, 265, 461, 1954) for calculating inelastic diffraction processes at high energies, the cross sections of inelastic scattering of fast particles from nuclei are calculated. It has been shown already that, under ultrarelativistic conditions, inelastic processes can be calculated "exactly" if one knows the wave functions in a spatial region $r \gtrsim R$ when the produced particles fly away in a direction not too different from that of the incident particle. These "exact" wave functions are now used to determine the scattering operators needed to apply the graph technique. This is done for the simplest case of pion scattering from a black-sphere nucleus when the momenta transfered are small ($q_{\perp} \lesssim 1/R$)

Card 1/4

On inelastic diffraction...



and the nucleus can be considered in static approximation. $D_\pi(\vec{p},\vec{q})$ is the vertex function, $\vec{p}$ is the momentum of the incoming particle anc $\vec{q}$ is the momentum transfered to the nucleus. For the left-hand graph

$$D_\pi(\mathbf{p}, \mathbf{q}) = 2|\mathbf{p}| J_\pi(\mathbf{q}, R_\pi),$$
$$J_\pi(\mathbf{q}, R_\pi) = \int e^{i\mathbf{q}\rho}(1 - \Omega_\pi(\rho))\, d\rho. \qquad (2.1)$$

$$\Omega_\pi(\rho) = \begin{cases} 1, & \rho > R_\pi \\ 0, & \rho < R_\pi \end{cases}, \quad \rho \perp \mathbf{p}. \qquad (2.2)$$

$$J_\pi(\mathbf{q}, R_\pi) = \frac{2\pi R_\pi}{k} J_1(kR_\pi).$$

where k is tne transverse component of the momentum transfered R_π is the nuclear radius with respect to pion absorption, $J_1(x)$ is a first-order Bessel function. For the right-hand graph

Card 2/4

On inelastic diffraction...

$$D_N(\mathbf{p}, \mathbf{q}) = -i(\gamma\mathbf{n})\, J_N(\mathbf{q}, R_N), \quad \mathbf{n} = \mathbf{p}/p,$$
$$J_N(\mathbf{q}, R_N) = \int e^{i\mathbf{q}\rho}\,(1 - \Omega_N(\rho))\, d\rho, \quad \rho \perp \mathbf{p}. \tag{2.3}$$

$$\Omega_N(\rho) = \begin{cases} 1, & \rho > R_N \\ 0, & \rho < R_N \end{cases}, \qquad J_N(\mathbf{q}, R_N) = \frac{2\pi R_N}{k} J_1(kR_N), \tag{2.4}$$

and

$$f_N(\mathbf{p}, \mathbf{q}) = -\frac{E}{2\pi}(\bar{u}_{p'}(\gamma\mathbf{n})\, u_p)\, J_N(\mathbf{q}, R_N);$$
$$E = \sqrt{\mathbf{p}^2 + m^2}, \qquad u_p^+ u_p = 1.$$

gives the scattering amplitude. $\bar{u}$ and u are bispinors and $\vec{\gamma} = -i\vec{\alpha}$ is the Dirac matrix. These expressions for the vertex functions can be applied to calculating the matrix elements of inelastic diffraction processes on the basis of the usual graph technique. This is done for each of the processes

$$\gamma + A \to \pi^+ + \pi^- + A,$$
$$p + A \to n + \pi^+ + A,$$
$$p + A \to K^+ + \Lambda\,(\Sigma^0) + A,$$
$$\pi^- + A \to n + \bar{p} + A.$$

Card 3/4

and the matrix elements and the partial cross sections are given explicitly. From numerical estimates it may be seen that at high energies the diffraction mechanism may play a great role. In practice, this is important for producing narrow pion or strange-particle beams of high energy by means of proton or electron accelerators. The compensation of pole graphs containing nucleonic and pionic virtual lines observed in first perturbation-theoretical approximation is of great theoretical interest. There are 8 figures.

SUBMITTED: May 8, 1962

S/056/62/043/006/047/067
B111/B102

AUTHORS: Galanin, A. D., Grashin, A. F., Mel'nikov, V. N., Nikitin, Yu. P.

TITLE: Nucleon-nucleon scattering in two-meson approximation with consideration of the $\pi\pi$-interaction

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 6 (12), 1962, 2245 - 2254

TEXT: The explicit calculation of the two-meson contribution to the nucleon-nucleon scattering amplitude has been possible so far only for large values of the orbital angular momentum $l \gg 1$. The accuracy obtained was $(\sqrt{1 + p^2/\mu^2})/(l + 1)$, where μ is the pion-mass and p is the nucleon momentum in the c. m. s. In order to achieve more accurate results, the absorptive part of the NN-amplitude must be calculated by using the πN-amplitude in the nonphysical domain. In the present work this calculation given by

$$\lambda_l(x) = e^{i\delta_l(x)} \sin\delta_l(x) = Q^{(l)}(x)\sqrt{x}/[X^{(l)}(x) - iQ^{(l)}(x)\sqrt{x}]; \quad (3)$$

$$\sqrt{x}\operatorname{ctg}\delta_l(x) = X^{(l)}(x)/Q^{(l)}(x); \quad l = 0(S),\ 1(P),\ 2(D),$$

S/056/62/043/006/047/067
B111/B102

Nucleon-nucleon scattering in ...

was performed for $4\mu^2 < t < 4m\mu$ (t is the momentum transferred and m is the nucleon mass) using the πN-amplitude obtained by A. D. Galanin and A. F. Grashin (ZhETF, 41, 633, 1961). The ππ-scattering having the isotopic spins I = 0 for even l and I = 1 for odd l was taken into account. $X^{(l)}(x)$, $Q^{(l)}(x)$ are arbitrary polynomials in x, x being the square of the three-dimensional meson momentum. The accuracy achieved is found to be $\sim t/4m$ and $\sim p^2/m^2$ in nonrelativistic approximation. The calculations showed that the NN-amplitude depends only weakly on a ππ-amplitude which is free from resonance. In practice, it is the S-amplitude of the ππ-scattering only (isotopic spin I=0) that affects the central forces between the nucleons, but also in this case the NN-scattering experiments fail to give any insight into the parameters of the ππ-amplitude. It is only the ππ-amplitudes with kinematic resonances vanishing near the point of resonance that make significant contributions to the NN-amplitude, in particular to the spin angular momentum forces and tensor forces. In the simplest case of a kinematic P-resonance at 750 Mev (π-meson) it is impossible to make the results from the two-meson approximation of the electromagnetic nucleon form factors and from the elastic

Card 2/3

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S/056/63/044/002/052/065
B184/B102

AUTHORS: Barmin, V. V., Krestnikov, Yu. S., Kuznetsov, Yu. V., Meshkovskiy, A. G., Nikitin, Yu. P., Shebanov, V. A.

TITLE: New data on π^0 meson production in the nuclear Coulomb field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 748 - 749

TEXT: The present article is a continuation of experimental [illegible] (ZhETF, 43, 1223, 1962) on the reaction $\pi^- + Xe \longrightarrow \pi^- + \pi^0 + Xe$, observed in a xenon bubble chamber bombarded by pions of 2.8 bev/c. [illegible] had been found on scanning about 10,000 stereophotographs. Now another 15,000 stereophotographs were scanned four times and 53 π^0 production events were found. Since $d\sigma/d\Omega = f(\theta)$ tends to zero with $\theta \longrightarrow 30^\circ$, the reaction cross-section was determined from the values obtained for $3^\circ \leq \theta \leq 30^\circ$, and $\sigma_c = 2.65 \pm 0.90$ mb was obtained; θ is the angle of π^- emission. The inelastic scattering cross-section was taken as 1200 mb. From this result also the cross-section $\bar{\sigma}_p$ of the reaction $\gamma + \pi^- \longrightarrow \pi^- + \pi^0$ was estimated; assuming $\sigma_c/\bar{\sigma}_p = 7.5$, a value of 0.35 ± 0.12 mb was obtained for $\bar{\sigma}_p$. There are

Card 1/2

New data on π^0 meson production... S/056/63/044/002/052/065
B184/B102

1 figure and 1 table.

AUTHOR: Institut teoreticheskoy i eksperimental'noy fiziki Akademii nauk SSSR (Institute of Theoretical and Experimental Physics of the Academy of Sciences USSR)

SUBMITTED: November 2, 1962

Card 2/2

NIKITIN, Yu.P.

Diffraction mechanism of the inverse $\pi \to \mu + \nu$ decay process in the field of a nucleus. Zhur. eksp. i teor. fiz. 44 no.3:957-961 Mr '63.
(MIRA 16:3)

(Mesons—Decay) (Diffraction) (Neutrinos)

L 10208-63 EWT(m)/BDS—AFFTC/ASD

ACCESSION NR: AP3000054 S/0056/63/044/005/1590/1592

AUTHOR: Berkov, A. V.; Nikitin, Yu. P. 55

TITLE: Pion production by high-energy muons in the field of the nucleus 19

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 44, no. 5, 1963, 1590-1592

TOPIC TAGS: high-energy pion production, Coulomb mechanism, diffraction mechanism

ABSTRACT: The production mechanism of pion production by muons in high-energy reactions by the Coulomb mechanism is considered, as well as the diffraction mechanism proposed by Nikitin (Zhurnal eksperimental'noy i teoreticheskoy fiziki, vol. 44, 957, 1963) for the production of pions and muons by neutrinos. The reaction cross section calculated by the diffraction mechanism is more than two orders of magnitude larger than that given by the Coulomb mechanism. "In conclusion, the authors would like to thank V. A. Shebanov for stimulating advice, and also to I. Ya. Pomeranchuk, Yu. A. Simonov, and M. V. Terent'yev for helpful discussions. Orig. art. has: 5 formulas, 2 tables.

ASSOCIATION: none

SUBMITTED: 04Dec62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: PH NR REF SOV: 003 OTHER: 002

Card 1/1

NIKITIN, Yu.P.; SHABALIN, Ye.P.

Production of π-meson pairs by high-energy neutrinos on nuclei. Zhur. eksp. i teor. fiz. 47 no.2:708-714 Ag '64. (MIRA 17:10)

1. Institut teoreticheskoy i eksperimental'noy fiziki gosudarstvennogo komiteta po ispol'zovaniyu atomnoy energii i Moskovskiy inzhenerno-fizicheskiy institut.

L 59526-65 EWT(1)

ACCESSION NR: AP5016561 UR/0056/65/048/006/1669/1678

AUTHOR: Alekseyev, A. I.; Nikitin, Yu. P.

TITLE: Radiation from an atom in an anisotropic medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965, 1669-1678

TOPIC TAGS: quantum electrodynamics, field quantization, anisotropic medium, Cerenkov radiation, emission probability, atomic radiation, uniaxial crystal, ruby laser

ABSTRACT: The quantum theory of radiation in a medium, first proposed by V. L. Ginzburg (ZhETF v. 10, 589, 1940) and by A. A. Sokolov (DAN SSSR v. 28, 415, 1940) is extended to include anisotropic media. Atomic radiation in anisotropic media is of great practical interest for such applications as solid-state lasers and emission from luminescent crystals. It is pointed out that earlier analyses of radiation in an anisotropic medium, considered in connection with Cerenkov radiation or with the investigation of electromagnetic phenomena in a magnetoactive plasma, were based on classical electrodynamics. In the present study, the authors quantize the macro-

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L 59526-65
ACCESSION NR: AP5016561

4

scopic electromagnetic field within an isotropic medium in a general form that is suitable for application to various electrodynamic problems, and specifically to atomic radiation. Dipole, magnetic dipole, and quadrupole radiations are considered. The angular distribution of the radiation and the total probability of emission per unit time of a quantum with polarization corresponding to either the extraordinary or ordinary wave are determined for the particular case of a uniaxial crystal. The formulas derived describe particularly Cerenkov radiation in any optically transparent anisotropic medium, with account taken of the spin and recoil of an emitting particle. The polarization of radiation from a laser is discussed. "The authors thank V. A. Galitskiy for critical remarks which have contributed to refinement of some individual deductions, and also to V. I. Kogan and M. I. Ryazanov for a discussion of the results." Orig. art. has: 23 formulas. [02]

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering Physics Institute)

SUBMITTED: 09Jan65 ENCL: 00 SUB CODE: NP, GP

NO REF SOV: 014 OTHER: 001 ATD PRESS: 4053

Card 2/2

L 33134-66 EWT(1) GG
ACC NR: AP6014031 SOURCE CODE: UR/0056/66/050/004/0915/0925

AUTHOR: Alekseyev, A. I.; Nikitin, Yu. P.

ORG: Moscow Engineering Physics Institute (Moskovskiy inzhenerno-fizicheskiy institut)

TITLE: Quantization of an electromagnetic field in a dispersive medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 4, 1966, 915-925

TOPIC TAGS: electromagnetic field, anisotropic medium, isotropic plasma, Green function

ABSTRACT: A free macroscopic electromagnetic field in a homogeneous, transparent, nonmagnetic, dispersive, anisotropic medium has been quantized by taking into consideration all types of waves excited in a medium. The Green function and the delayed Green function of the electromagnetic field were obtained. The radiation of an impurity atom in an anisotropic dispersive medium was determined on the basis of the method developed. Selection rules for the emission of a longitudinal quantum were derived. The probability of long-wave emission of a transverse and a longitudinal quantum was calculated for an impurity molecule located in an homogeneous

Card 1/2

L 33154-66

ACC NR: AP6014031

isotropic plasma with the spacial dispersion. The authors thank V. M. Galitskiy, V. I. Kogan, and M. I. Ryazanov for their discussions of the results. Orig. art. has: 30 formulas. [Based on authors abstract] [NT]

SUB CODE: 20/ SUBM DATE: 15Jun65/ ORIG REF: 013/ OTH REF: 002

Card 2/2

KORNOUKHOV, Nikolay Vasil'yevich, akademik; BELYANKIN, F.P., akademik, otv. red.; STREL'BITSKAYA, A.I., doktor tekhn. nauk; AMIRO, I.Ya., kand. tekhn. nauk, red.; DLUGACH, M.I., kand. tekhn. red.; YEREMENKO, V.S., kand. tekhn. nauk, red.; NIKITIN, Yu.P., kand. tekhn. nauk, red.; PAVLOV, I.G., kand. tekhn. nauk, red.; POLYAKOV, P.S., kand. tekhn. nauk, red.; KIYANITSA-GUSLISTAYA, N.N., mlad. nauchn. sotr., red.; ORLIK, Ye.L., red.; LISOVETS, A.M., tekhn. red.

[Selected works on structural mechanics] Izbrannye trudy po stroitel'noi mekhanike. Kiev, Izd-vo AN Ukr.SSR, 1963. 321 p. (MIRA 17:2)

1. Akademiya nauk Ukr.SSR (for Kornoukhov, Belyankin).

GEL'D, P.V.; POPEL, S.I.; NIKITIN, Yu.P.

Liquid silicon oxide (SiO). Zhur.Priklad.Khim. 25, 592-601 '52. (MLRA 5:7)
(CA 47 no.17:8621 '53)

NIKITIN, Yu. P.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
Metallurgy and Metallography

(3) Mc1

Liquid silicon oxide (SiO). V. P. Vol'dman, P. I. Popel, and Yu. P. Nikitin. *J. Appl. Chem. U.S.S.R.* 25, 876-82 (1952) (Engl. translation).—See *C.A.* 47, 8021*h*.
H. L. H.

NIKITIN, YU. P.

(4)

Surface tensions of iron-silicon alloys. P. V. Gel'd, N. V. Zelovskikh, N. N. Serebrennikov, and Yu. P. Nikitin. *J. Appl. Chem. U.S.S.R.* 25, 707-74(1952); *Zhur. Prikład. Khim.* 25, 687-93(1952).—The surface tension of Fe-Si melts was measured at 1480 ± 30° by the max.-bubble-pressure method. Porcelain capillaries calibrated against H_2O were used. The isotherm suffers a break in the region of compn. corresponding to the compd. FeSi. For < 50 at. % Si the isotherm is given by $\sigma = 1200 - 138.5 \ln(0.3C_1 + 1) - 2.41C_1$; for > 50 at. % Si, $\sigma = 650 - 70.9 \ln(0.4C_2 + 1) - 1.49C_2$. σ = surface tension in ergs/cm.^{2}, C_1 = concn. of FeSi in moles/l. and C_2 = concn. of free Si in g atoms/l. Antonov's rule of additivity applies to the interfacial tension of systems of ferrosilicon-acids lag. Considerations are given for the semiquant. application of this rule to metal-sulfide, slag-sulfide, and iron-acid slag systems.

Don T. Cromer

CA

Electrocapillary phenomena at high temperatures. O. A. Esin, Yu. P. Nikitin, and S. I. Popel (Ural Polytech. Inst., Sverdlovsk). *Doklady Akad. Nauk S.S.S.R.* 83, 431–4 (1952). The surface tension of molten Fe-C alloys with 2.5, 3, and 4% C, in a fused-silicate electrolyte of the compn. SiO_2 71.5, Na_2O 14.0, CaO 8.3, Al_2O_3 5.6% was measured as a function of the polarization by the drop method. The diam. of the drop was 14–16 mm., and the surface area of the other electrode, a graphite tube, large enough to be considered unpolarizable. The c.d. was not over 50 ma./sq. cm. In the temp. range 1,250–1,390°, the interface tension σ decreases with increasing neg. polarization φ. These capil. curves represent the cathodic branches of the electrocapillary curves. Anodic polarization has less effect on σ than does cathodic polarization. Consequently, the Na^+ ions are more surface-active than the silicate anions. The curves of σ are steeper at lower C contents of the metal. The charge d. $-E = \partial\sigma/\partial\varphi$, between 0 and −0.2 v., is 50 and 30 microcoulombs/sq. cm. with 2.5 and 4% C, resp. It follows that the adsorption of C at the surface of the drop falls with increasingly neg. φ; i.e. the positive charge of the double layer on the electrolyte side repels from the metal surface the C cations more strongly than it repels the Fe cations.

POPEL', S.I., YESIN, O. A., NIKITIN, YU. P.

USSR

Iron - Metallurgy

Effect of carbon on the interphase tension of iron which is on the boundary with slag
Dokl. AN SSSR 83, No. 2, 1952
Ural'skiy Politekhnicheskiy Institut im. S.M. Kirova, Sverdlovsk
recd. 1 Jan. 1952

SO: Monthly List of Russian Accessions, Library of Congress, August, 1952 1[illegible] Uncl.

NIKITIN, Yu.P.

Met. 3

British Abstracts
B1, July 1963
Ferrous Metal-
lurgy

Electrocapillary phenomena at different compositions of metal and slag. Yu P Nikitin, O A Esin, and S I Popel (*C R Acad Sci U R S S*, 1952, 87, 813–815).—Electrocapillary phenomena in the system liquid Fe–C alloy–slag are investigated. Exchange of CaO for Na_2O in the slag causes lowering of interphase tension, δ_{-}, along the whole course of the cathode branch of the electrocapillarity curve. It follows that on the boundary of Fe–C or Fe–P alloys and slags the surface activity of Na ions is higher than that of Ca ions. P is also a surface-active agent but it lowers δ_{-} a smaller amount than equal at % of C. Whilst adsorption of C depends with the increase of cathode potential the adsorption of P does not depend upon it.

S K Lacombrez

NIKITIN, YU. P.

USSR/Metals - Iron, Interphase Tension 11 Mar 52

"Effect of Carbon on the Interphase Tension of Iron at the Boundary With Slag," S. I. Popel', O. A. Yesin, Yu. P. Nikitin, Ural Polytech Inst imeni S. M. Kirov, Severdlovsk "Dok Ak Nauk SSSR" Vol LXXXIII, No 2, pp 253-255

Describes expts for detg interphase tension of a number of iron-carbon alloys at boundary with slag in range of 1,45-1,500°, using method of resting drop in combination with X-raying. Since existing integral formulas for approximating interphase or surface tension are too complicated and give greatly divergent results, more and sufficiently precise calg method of graphical integration was employed. Submitted by Acad A. N. Frumkin 10 Jan 52.

PA 214T66

NIKITIN, YU. P.

USSR/Physics - Metallurgy

Card 1/1 Pub. 147 - 20/27

Authors : Krasovskiy, N. N.; Nikitin, Yu. P.; Esin, O. A.; and Popel', S. I.

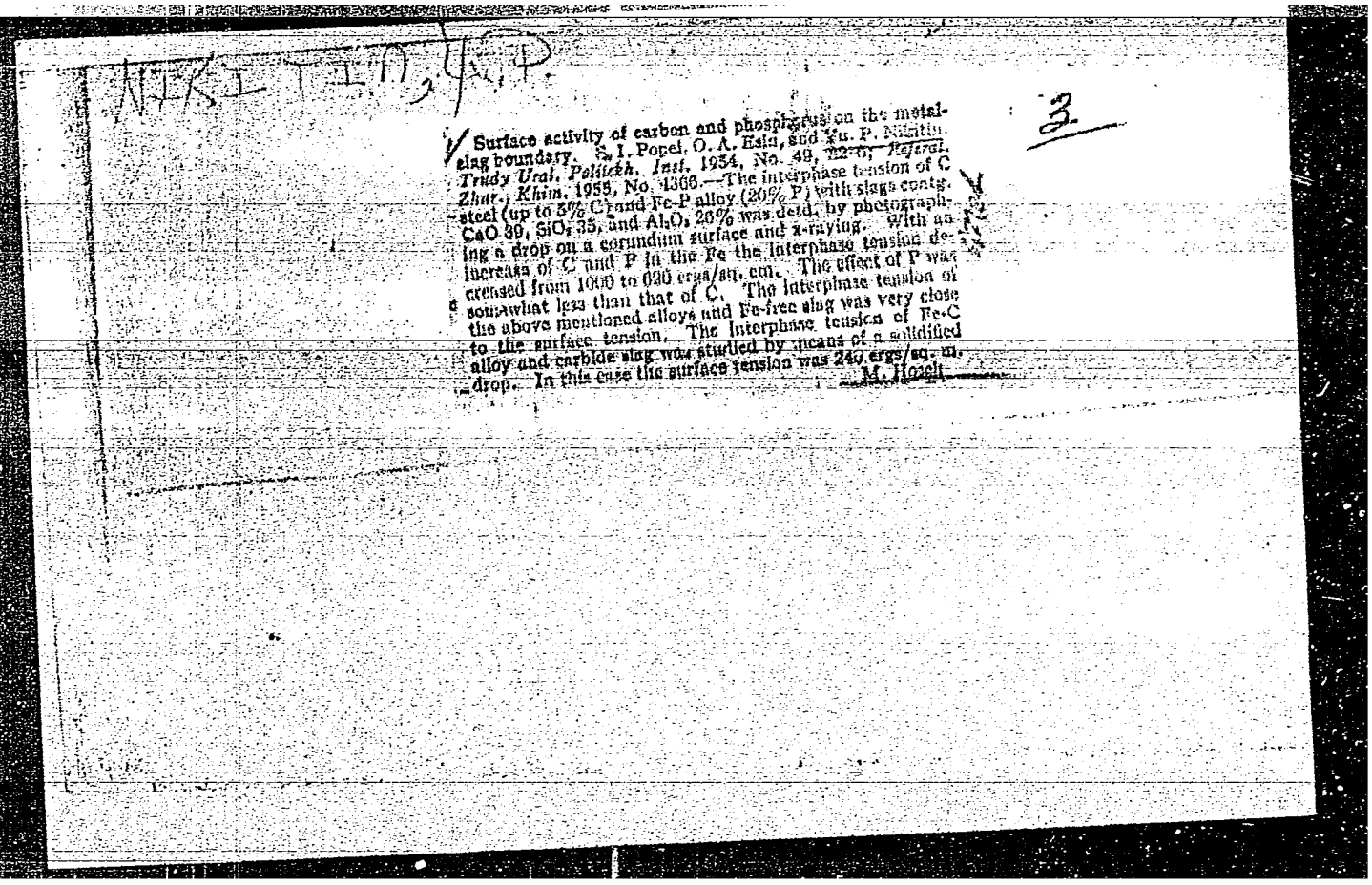
Title : Calculation of surface tension by the form of a recumbent drop

Periodical : Zhur. fiz. khim. 28/9, 1678-1679, Sep 1954

Abstract : A table for the calculation of surface tension according to the form of a recumbent drop and a suitable method for the graphical integration of an equation for such a drop are briefly described. The method, which has numerous advantages, is also applicable to drops of different size and form. Examples of such calculations are shown. Five references: 3-USSR; 1-Indian and 1-English (1883-1953). Table; graph.

Institution : The S.M.Kirov Ural Polytechnicum, Faculty of the Theory of Metallurgical Processes, Sverdlovsk

Submitted : April 20, 1954

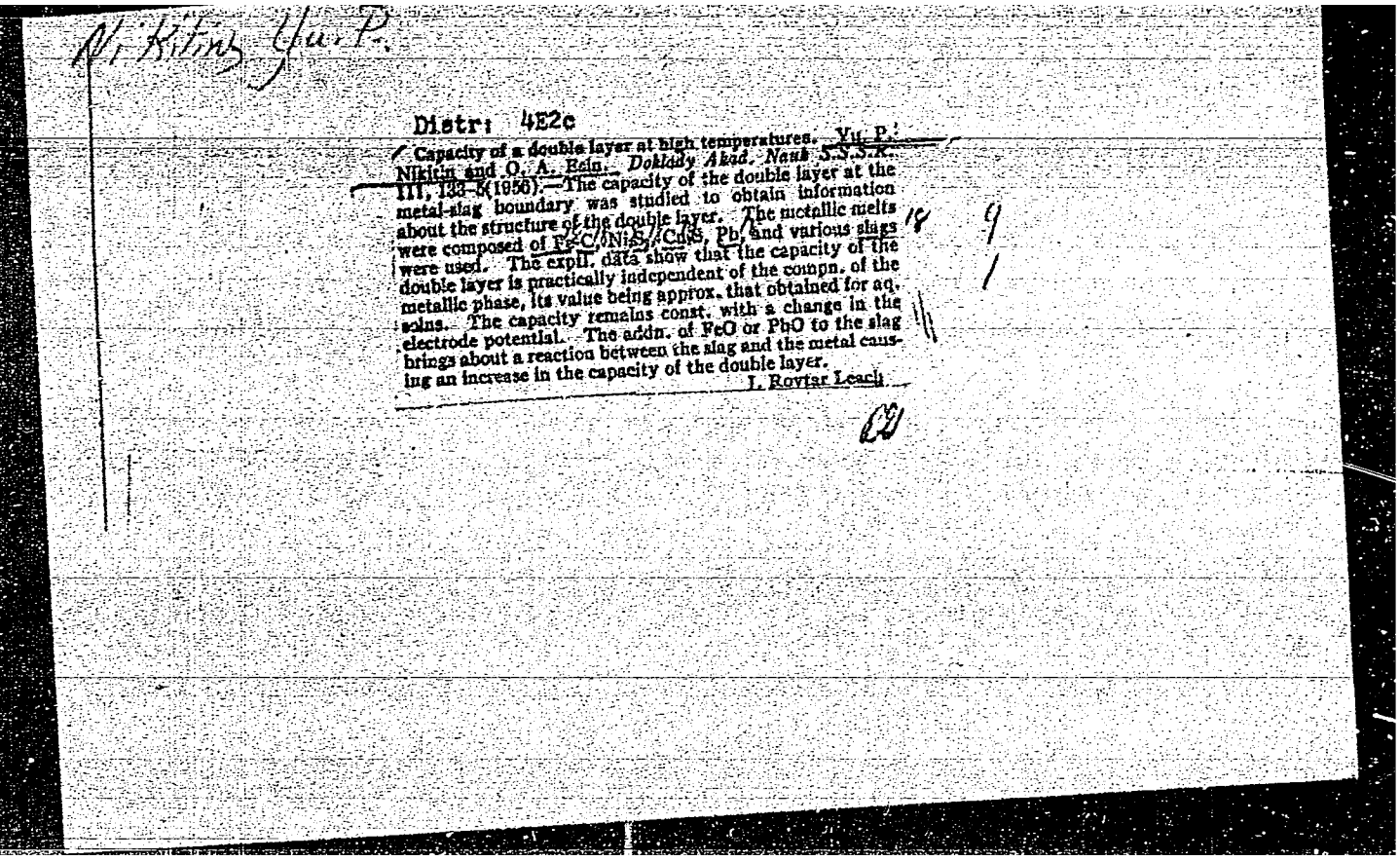


Surface activity of carbon and phosphorus on the metal-slag boundary. S. I. Popel, O. A. Esin, and Yu. P. Nikitin. *Trudy Ural. Politekh. Inst.* 1954, No. 49, 82-6; *Referat. Zhur., Khim.* 1955, No. 1366.—The interphase tension of C steel (up to 5% C) and Fe-P alloy (20% P) with slags contg. CaO 39, SiO_2 35, and Al_2O_3 26% was detd. by photographing a drop on a corundum surface and x-raying. With an increase of C and P in the Fe the interphase tension increased from 1000 to 020 ergs/sq. cm. The effect of P was somewhat less than that of C. The interphase tension of the above mentioned alloys and Fe-free slag was very close to the surface tension. The interphase tension of Fe-C alloy and carbide slag was stuffied by means of a solidified drop. In this case the surface tension was 240 ergs/sq. cm. M. Hoseli

NIKITIN, Yu. P., and YESIN, O. A.

"Measurements of the Surface Density of a Charge of Liquid Metal Which is Contact With Slag" a paper read at the International Metallurgists' Conference, Moscow 26-30 June 56

SO: CS-3,302,240, 11 Jan 57.



Nikitin, Yu. P.

Distr: 4E2c

Capacity of a double layer at high temperatures. Yu. P. Nikitin and O. A. Esin. *Doklady Akad. Nauk S.S.S.R.* 111, 133–6(1956).—The capacity of the double layer at the metal-slag boundary was studied to obtain information about the structure of the double layer. The metallic melts were composed of Fe-C, (Ni-S)/Cu-S, Pb, and various slags were used. The expil. data show that the capacity of the double layer is practically independent of the compn. of the metallic phase, its value being approx. that obtained for aq. solns. The capacity remains const. with a change in the electrode potential. The addn. of FeO or PbO to the slag brings about a reaction between the slag and the metal causing an increase in the capacity of the double layer.

I. Rovtar Leach

18 9 1

NIKITIN, Yu.P., YESIN, O.A.

"The Double Electric Layer of Capacity on the Metal-Slag Boundary," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

NIKITIN, Yu. P.

137-1958-2-2348

Translation from Referativnyy zhurnal Metallurgiya, 1958 Nr 2, p 20 (USSR)

AUTHORS Yesin, A.O., Nikitin, Yu P

TITLE Electrocapillary Phenomena in a Metal-Slag System (Elektrokapillyarnyye yavleniya v sisteme metall-shlak)

PERIODICAL V sb Fiz -khim osnovy proiz-va stali Moscow, AN SSSR, 1957, pp 446-452, Diskus pp 505-512

ABSTRACT A description is given of methods of studying electrocapillary phenomena in a metal-slag system at temperatures of 1320-1500°. Such phenomena were discovered in Fe-C and Fe-P alloys in contact with synthetic slags containing Ca, Si, Al and Na oxides. It was found that the surface of the alloys, when the latter were in contact with the slags, bore a negative electric charge. The results obtained made it possible to explain why the exchange of CaO for NaO_2 had more of an effect on the interphase balance of the metal than did the exchange of Al_2O_3 for SiO_2. Surface activity on the part of the Na ions was noted in the systems studied. It was found that the adsorption of C on the surface of the metal decreased as the negative potential of the metal increased. An explanation is given of the influence of the polarity and composition of the

Card 1/2

137-1958-2-2348

Electrocapillary Phenomena in a Metal-Slag System

electrode coating on the size of the drops that form when ferrous metals are welded with direct current

Yu N

1. Slags—Phenomena 2. Slags—Temperature effects

Card 2/2

137-58-6-11532

Translation from: Referativnyy zhurnal Metallurgiya, 1958, Nr 6, p 47 (USSR)

AUTHORS Nikitin, Yu P, Yesin, O A

TITLE On an Experimental Verification of the Equation for the Electrocapillary Curve at Elevated Temperatures (K eksperimental'noy proverke uravneniya elektrokapillyarnoy krivoy pri vysokikh temperaturakh)

PERIODICAL Tr Ural'skogo politekhn in-ta, 1957, Nr 67, pp 37-41

ABSTRACT Measurement is made of the charging currents on an incipient metal surface in contact with slag, the cases being Fe-C and Mn-C alloys saturated with C and slag of the following content: CaO 39%, SiO_2 41%, and Al_2O_3 20% (I), and CaO 25%, SiO_2 63%, and Al_2O_3 12% (II). The experiments were conducted at temperatures of ~1500°C in fused-MgO crucibles. It is established that in both cases the metal surface in contact with the slag has a negative charge. In the case of Fe-C its magnitude is $3 \cdot 10^{-6}$, while in the case of Mn-C it is $6 \cdot 10^{-6}$ coulomb/cm^2. An electro-capillary curve is taken for Mn-C alloy and slag II. All that is derived is the cathode arm of the curve, corresponding to the presence of a negative charge of

Card 1/2

On [illegible] in Experimental Verification (cont.)

$9 \cdot 10^{-6}$ coulomb/cm^2 on the surface of the metal. The resting-drop test is used to study the relation of interphase tension [illegible] of Mn-Fe and Mn-C alloys and slag II. An increase in the [Fe] in the alloy leads to an increase in [illegible], an increase in [C] leads to a decline therein. At 25 atom % C in the alloy, its magnitude is equal approximately to 540, and at 75% Fe to 1160 erg/cm^2. For pure Mn σ = 1050 erg/cm^2. Comparison of the magnitudes and sign of the electrical charges on the surface of metal alloys obtained by electrocapillary measurements and by charge currents testifies to the fact that the fundamental equation for the electrocapillary curve is valid for temperatures of [illegible]1500°C.

Yu.N.

[illegible]--Electrical properties [illegible]. Electrochemistry--Applied [illegible]

Card 2/2

137-58-6-11533

Translation from Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 41 (USSR)

AUTHOR: Nikitin, Yu P.

TITLE: Electrocapillary Phenomena in a Sulfide-slag System (Elektrokapillyarnyye yavleniya v sisteme sul'fid-shlak)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 51-53

ABSTRACT: A study is made of electrocapillary phenomena in systems consisting of Ni sulfides and Cu sulfides and a slag (14.6% Na_2O 8.3% CaO, 5.6% Al_2O_3, and 71.5% SiO_2). The experiments were performed in a kryptol furnace at 1350-1400°C. The interface tension was determined by the shape of a drop at rest. In either case only the cathodic branches of the curve were derived. Consequently, the surfaces of both sulfides carry a negative electric charge. Its magnitude in the absence of current is $15 \cdot 10^{-6}$ coulomb/cm^2 for Ni sulfide and $12 \cdot 10^{-6}$ coulomb/cm^2 for Cu sulfide.

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137-58-6-11520

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 39 (USSR)

AUTHORS: Popel', S.I., Nikitin, Yu.P.

TITLE: The Effect of Components Dissolved in Iron on Its Interphase Tension with Slag (Vliyaniye komponentov, rastvorennykh v zheleze, na yego mezhfaznoye natyazheniye so shlakom)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 60-63

ABSTRACT: A measurement is made of the interphasic tension σ of Fe and of ferroalloys at the metal (ME) - slag (SL) boundary. A thin plate of fused magnesia is placed on the bottom of a graphite crucible, and on it rests a drop of ME immersed in SL. The crucible is subjected to X-rays and a shadow image of the drop is produced on a film. An enlargement yields its true dimensions. σ is determined therefrom by means of graphs. The ME used was of technical purity. The SL was of chemically pure oxides. Experiments with Fe-V, Fe-Si, and Fe-Ti employed SL of the following weight % composition; CaO 46, SiO_2 36, Al_2O_3 18, while in the experiments with Fe-Mn and Mn-Si the SL were of the following composition (in % by weight): CaO 25, SiO_2 65, Al_2O_3 12. The densities of the ME were

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The Effect of Components (cont.)

calculated from their values at room temperature, on the assumption that their coefficients of expansion were the same as with steel containing 0.45% C. The densities of SL, as measured by the change in maximum pressure in the bubbles on immersion of the tube into the melt, are 2.80 and 2.66 g/cm^3, respectively, for the first and second SL. The experiments were run at 1480-1560°C. The σ values of the Fe-Mn, Fe-Si, and Mn-Si alloys vary against concentration in virtually linear fashion and constitute 1200 and 1080 erg/cm^2 for Fe and Mn respectively, 710 erg/cm^2 for Fe-Si at 60 atomic % Si, and 700 erg/cm^2 for Mn-Si at 50 atomic % Si. In the alloys Fe-V and Fe-Ti the corresponding curves are bent slightly upward and drop to 400 erg/cm^2 at 27% Ti, and 480 erg/cm^2 at 38% V. The drop in σ in the case of Fe-Mn is explained by the adsorption of MnO, the concentration of which in the SL after the experiment was higher (up to 3.8%) than that of FeO (up to 1%). In the case of other alloys, the drop in σ is induced chiefly by the appearance of weaker bonds within the metal phase, e.g., as a result of the formation of quasi-molecules of FeSi and Fe_3Ti. An increase in the concentration of Ti, V, Si, and Mn at the ME-SL boundary and the good solubility of oxides thereof in the SL ensures the oxidation of these additions in the steel-smelting furnace at the ME-SL surface. 1. Metals--Properties 2. Slags--Properties X-rays --Application 3. Metals--Phase studies

Card 2/2

S.P.

SOV/137-58-8-16387

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 23 (USSR)

AUTHORS: Sryvalin, I.T., Nikitin, Yu.P., Khlynov, V.V.

TITLE: Interphase Tension in Sulfide-slag Melts (Mezhfaznoye natyazheniye rasplavov sul'fid-shlak)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 64-68

ABSTRACT: The interphase tension of sulfides on the boundary (B) with the slags (S) at 1200-1250°C was measured by means of X-ray photography of a drop. The Cu sulfide contained (here and further on in weight %) Cu 77.71, S 20.47, and Fe 1.82, while the Ni sulfide contained Ni 72.8 and S 25.7. The density of the sulfides and S was calculated approximately by the law of additivity from data relative to solid components. The calculation of σ was done graphically. The error in the measurements did not exceed 20%. The σ of Cu_2S on the B with S [CaO 12, Al_2O_3 15, the remainder ($FeO+SiO_2$)] decreases from 340 (FeO 0) to 150 erg/cm^2 (FeO 50); for Ni_3S_2 on the B with S [CaO 27, Al_2O_3 11, the remainder ($FeO+SiO_2$)]. it varies from 450 (FeO 0) to 200 erg/cm^2 (FeO 35). The decrease of σ is explained by the approach of the nature of the

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Interphase Tension in Sulfide-slag Melts

sulfides toward that of the S in proportion to the increasing concentration of FeO in the latter. Upon the substitution of Cu_2S for Ni_3S_2 in the matte, the σ on the B with S (SiO_2 72, CaO 8, Al_2O_3 6, Na_2O 14) decreases from 470 (Ni_3S_2 100) to 300 erg/cm^2 (Cu_2S 100). The σ-vs.-composition curve is concave upward. The values for σ are close to those of the surface tension of sulfides measured earlier. The authors explain the decrease in the losses of sulfides in the slag by the increase of σ upon the decrease of FeO in S or Cu_2S in the matte.

S.P.

1. Metal sulfides--Surface tension 2. Slags--Properties 3. Mathematics

Card 2/2

20-1-17/44

AUTHORS: Nikitin, Yu.P., Yesin, C.A.

TITLE: The Exchange Current between Liquid Metal and Slag (Tok obmena mezhdu zhidkim metallom i shlakom)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 1, pp. 63 - 65 (USSR)

ABSTRACT: For the precise definition and renewed examination of the values of the capacity of the double layer (C_g) found already previously at 50 cycles on the boundary between metal salg and of the reaction resistance (R_r), the authors caried out measurements within the frequency range of from 50 to 1700 cycles. The experiments were carried cut at temperatures of between 1480 and 1560° in a furnace with a carbon resistance, in which a vat made of magnesia oxide was fitted. The thin inclined and vertical channels of this vat were filled with liquid metal, and above this the slag was located. Both electrodes had the same composition and the same contact surfaces with the slag. The experiments were carried out with an alternating current bridge, and the amperage to be measured with a zero-device was previously amplified about 200 times by a two-tube amplifier. The following measuring results were obtained: The capacity C_g remained

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The Exchange Current between Liquid Metal and Slag

nearly constant with increasing frequency of the alternating current. This points in the direction of a low concentration of the ions determining the potential. The potential upon the phase boundary to be investigated is probably due to the transition of the iron ions from the metal into the slag. The share of the part played by such ions in the electrolyte is usually low (about 1 weight-percent), and the double layer usually contains other cations. If such cations are lacking in the slag, a diffuse structure of this formation and a reduced value of the capacity of the double layer may be expected. This was confirmed by the experiments carried out. However, if a large quantity of sodium cations was introduced into the electrolyte (which nearly removed the diffuse character of the double layer), capacity increased to its normal value. The use of high frequencies considerably reduced the reaction resistance. The facts mentioned here tend to show that the potential on the electrodes is determined by the exchange of iron ions. However, if ions are introduced into the electrolyte, the electrochemical potential of which is nearly equal to that of iron, the strength of the exchange current increases. There are 2 figures, and 10 references, 7 of which are Slavic.

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The Exchange Current between Liquid Metal and Slag 20-1-17/44

PRESENTED: April 12, 1957, by, A.N. Frumkin, Academician

SUBMITTED: April 12, 1957

AVAILABLE: Library of Congress

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SOV/161-58-1-7/33

AUTHORS: Nikitin, Yu. P., Yesin, O. A., Sryvalin, I. T.

TITLE: The Capacity of the Double Layer at the Boundary Between the Aluminum and the Cryolite-Alumina Melt (Yemkost' dvoynogo sloya na granitse alyuminiya s kriolito-glinozemnym rasplavom)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1/58 Nr 1, pp 37-39 (USSR)

ABSTRACT: The capacity of the double layer at the boundary between the aluminum and the cryolite-alumina melt was determined by direct measurements at different composition of the alumina melt. From the result may be seen that a decrease of the cryolite ratio to 6 - 1,9 does not at all influence the capacity, whereas an increase of the aluminum oxide content considerably increases the capacity of the boundary layer. The dielectric constant ε of the boundary layer was measured (see Table). In addition to the capacity the resistance and the diffusion were also measured.
When the cryolite content is changed no considerable change of the diffusion coefficient takes place; a change in the

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The Capacity of the Double Layer at the Boundary Between the Aluminum and the Cryolite-Alumina Melt

Al_2O_3 content, however, increases the diffusion coefficient.

There are 2 figures, 1 table, and 12 references, 12 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut
(Ural Polytechnical Institute)

SUBMITTED: October 4, 1957

AUTHORS: Sryvalin, I.T., [illegible]149-58-4-9/26
Yesin, O.A.,
Nikitin, Yu.P.

TITLE: Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys (Termodinamicheskiye svoystva rasplavov sistemy med'-nikel'-sera)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, 1958, Nr 4, pp 66-72 (USSR)

ABSTRACT: The object of the present investigation was to obtain data on deviation of the Cu-Ni-S melts from the ideal solutions. This was done by measuring the emf of the concentration cell formed by solid nickel (99.9% purity) on one side, and molten Ni-Cu or Ni-S alloy on the other. Molten acid slag containing 20% CaO, 30% Na_2O, 33% SiO_2, 15% Al_2O_3 and 2% NiO was used as the electrolyte. The experiments were carried out in a fused magnesia vessel shown on Fig.1. The metal electrodes were contained in two vertical channels connected at the top by a central compartment filled with the electrolyte. The lower ends of the vertical channels led to two inclined channels

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Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys

housing graphite leads and filled with a neutral slag protecting the metal electrodes from oxidation. The results of the measurements taken at 1340 - 1360°C are given in Table 1, for the Cu-Ni alloys and in Table 2 for the Ni-S alloys. From these data the activity of Ni-Cu and S in the Cu-Ni and Ni-S melts was calculated. The calculated activity values were in good agreement with those obtained by Vol'skiy (Ref.2) in his investigation of chemical equilibrium and with the published data on the equilibrium diagrams of the Cu-Ni and Ni-S systems. It is shown that the equations of the ideal solutions are not applicable to the Ni-S melts which however can be adequately described by the expressions derived by the Authors (equations 10 and 11) in which non-additive character of the bond between dissimilar atoms had been taken into account. It is shown by comparison with literary data that the activity values of Ni, Cu and S, determined by the emf method, are in good agreement with those determined by

Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys

the method of chemical equilibrium and the fusion diagrams Cu-Ni and Ni-S. The Cu-Ni and Ni-S melts were found to be characterised by a negative deviation from the ideal solutions, small in the former and large in the latter case. There are 4 figures, 3 tables and 12 references of which 7 are Soviet, 4 English and 1 German.

ASSOCIATION: Ural'skiy Politekhnicheskiy Institut. Kafedra Teorii Metallurgicheskikh Protsessov (Ural Polytechnical Institute, Chair of the Theory of Metallurgical Processes)

SUBMITTED: 21st March 1958.

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Yu. P. Nikit...

15(2)

AUTHOR: Vargin, V.V. SOV/72-58-12-22/23

TITLE: Conference on Enamels and Metal Enameling (Soveshchaniye po emalyam i emalirovaniyu metallov)

PERIODICAL: Steklo i keramika, 1958, Nr 12, pp 47-48 (USSR)

ABSTRACT: The organizers of the conference were: Leningradskoye oblastnoye nauchno-tekhnicheskoye obshchestvo promyshlennosti stroitel'nykh materialov (Leningrad Oblast Scientific and Technical Society of the Industry of Building Materials); Leningradskiy sovnarkhoz (Leningrad Council of National Economy) and Leningradskiy tekhnologicheskiy institut imeni Lensoveta (LTI) (Leningrad Technological Institute imeni Lensovet (LTI). The program of the conference included: the most important problems of enamel synthesis, enameling of metal products and industrial apparatus. About 250 experts took part in the conference: representatives from works in the UkrSSR, Ural, Novosibirsk, Ulan-Ude, Kuznetsk, Dzerzhinsk, as well as functionaries of the universities, of the scientific research and design institutes in Leningrad, Moscow, Novocherkassk, Dnepropetrovsk, Sverdlovsk, Riga, Khar'kov, and other towns. More than 40 reports were given and discussed. Professor K. S. Yevstrop'yev, director of the LTI imeni Lensovet, in his opening speech stressed the great economic importance of the problem of enameling metal products and apparatus.

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Ye.I. Litvinova (LTI imeni Lensovet) reported on the influence of metal quality on the formation of "fish-scales" in enameling.

A.A. Appen, Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry of the AS USSR), spoke on the present stage of the problems of calculating the properties of glass and enamels according to their composition.

N.V. Serebryakova (LTI imeni Lensovet) gave a survey of foreign literature on enamels and metal enameling.

M.S. Lifshits, Nauchno-issledovatel'skiy institut sanitarnoy tekhniki (Scientific Research Institute of Sanitary Engineering) reported on the enameling of products in the electric field of a corona discharge.

I.G. Petrunya, Luganskiy zavod imeni Artema (Luganskiy Works imeni Artema)

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spoke of new types of enameled steel products made in this factory.

Yu.P. Nikitin, Ural'skiy politekhnicheskiy institut (Ural'skiy Polytechnical Institute) reported on the character of interaction between metals and melted enamels.

N.S. Smirnov, Ural'skiy nauchno-issledovatel'skiy institut chernykh metallov (Ural'skiy Scientific Research Institute of Ferrous Metals) reported on the influence of the condition of the steel surface on the formation of the enamel coat.

A.I. Borisenko, Institute of Silicate Chemistry of the AS USSR, spoke on the new method of obtaining thin silicate coats of semi-colloid solutions.

Ye.N. Podkletnov spoke on a new enameling method with heating of the products by high-frequency currents.

P.A. Rozhdestvenskiy, Lys'venskiy metallurgicheskiy zavod (Lys'venskiy Metallurgic Works) gave informations on new enamels used by the factory.

T.I. Polyutash, Novosibirskiy metallurgicheskiy zavod (Novosibirskiy Metallurgic Works) reported on the dependence of the moistening angle and the enamel deliquescence on the correlation of boric and non-boric silts.

Card 3/6

AUTHORS: Nikitin, Yu. P., Yesin, O. A., SOV/76-32-6-38/46
Vorontsov, Ye. S.

TITLE: On the Determination of the Diffusion Coefficients in Molten Oxides (K opredeleniyu koeffitsiyentov diffuzii v rasplavlennykh okislakh)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 6, pp, 1420-1420 (USSR)

ABSTRACT: The influence exerted by the convection heat transfer renders the determination of the diffusion coefficient especially at higher temperatures very difficult, so that it is necessary to employ several independent methods which are based on rules different in principle, in order to obtain correct results. In order to meet the demands of metallurgy, silicate industry and geochemistry the authors of the present paper carried out measurements by means of radioactive indicators on the one hand and by means of the electrode polarization with a. c. on the other hand. The authors used for the experiments a $CaO - Al_2O_3 - SiO_2$ melt at 1500° as well as an Fe^{59} isotope and the diffusion

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On the Determination of the Diffusion Coefficients in Molten Oxides SOV/76-32-6-38/46

coefficient from the radiation measurements calculated according to a mentioned equation. Parallel to this investigation slags of the same system were investigated by means of the polarization with a. c. of different frequencies from liquid electrodes of ferro-alloys; this was done in order to determine the so-called ohmic and capacitive resistance of the electrodes. The final results were obtained graphically and according to a given equation; from the comparison (given in form of a table) of the values obtained according to either method may be seen that it is possible to obtain sufficiently good values for the diffusion coefficient. There are 1 table and 3 references, which are Soviet.

ASSOCIATION: Ural'skiy Politekhnicheskiy institut im. S.M. Kirova, Sverdlovsk (Ural Polytechnical Institute imeni S.M. Kirov, Sverdlovsk)

SUBMITTED: May 6,1957

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On the Determination of the Diffusion Coefficients SOV/76-32-6-38/46
in Molten Oxides

1. Oxides--Diffusion 2. Diffusion--Determination 3. Heat transfer
4. Slags--Polarization

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SOV/20-123-1-32/44

AUTHORS: Mikitin, Yu. P., Yesin, [illegible]

TITLE: On the Kinetics of the Ion Exchange Between Metal and Slag (O kinetike ionnogo obmena mezhdu metallom i shlakom)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1, pp 104-108 (USSR)

ABSTRACT: The authors investigated the velocity of the ion exchange between liquid metals (Fe-C, Fe-Si, Fe-P, etc) and molten slags according to a method described in a previous paper (Ref 1). On the basis of the found values of the diffusion resistance R_D, the diffusion coefficients D of the iron and silver ions were estimated. For slags with 31 % CaO, 54 % SiO_2, 15 % Al_2O_3, the diffusion coefficients for iron at 1500°C lie within the interval of from 2,4 to $3,1.10^{-6} cm^2.sec^{-1}$. The diffusion coefficient of the silver ions in melted sodium nitrate (15 % Na_2O, 85 % B_2O_3) at 940° amounted to [illegible].10^{-7}, and at 940° to $1,42.10^{-7} cm^2.sec^{-1}$. From these values the value 23 kcal/gram-atom was found for the activation energy

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of the diffusion process. Then the exchange currents i_o were calculated. For the alloys of iron with carbon, silicon, and phosphorus, and for the slags which contain CaO, SiO_2, Al_2O_3, Na_2O, B_2O_3, P_2O_5 and low concentrations of FeO and Fe_2O_3 a practically linear dependence between i_o and the total percentage of the iron oxides was found. The discharge of the ions is the phase which determines the velocity exchange. The introduction of Na_2O into the slag increases the concentration of FeO in it and also the exchange current. Numerical values are then given for the exchange currents at various temperatures. The activation energy E_1 of the reaction Fe (cast iron) = Fe^{2+} (slag) + 2e is equal to 23,5 kcal/gram-atom, and for the inverse process the activation energy E_2 = 13 kcal/gram-atom was found. The corresponding values for the reaction Ag (metal)=Ag^+(slag)+ e are E_1 = 12,8 and E_2 = 22,8 kcal/gram-atom. These unusual values call for further investigations. The capacities of the double layer of the 3 cases investigated are approximately equal and they are also similar to the previously found

On the Kinetics of the Ion Exchange Between Metal and Slag

values for Fe-C. Apparently, the iron ions are connected with the slag in a more stable manner than the metal cations with the aqueous solution. According to the results of this paper, the current of the exchange with the slag must be intensive at high temperatures. There are 1 figure, 1 table, and 10 references, 9 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S. M. Kirova Sverdlovsk (Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk)

PRESENTED: April 11, 1958, by A. N. Frumkin, Academician

SUBMITTED: March 15, 1958

NIKITIN, Yu.P., YESIN O.A.

O k inetike vzaimodeystviya ferrosplavov s szidkimi shlakami.

report submitted for the 5th Physical Chemical Conference on Steel Production.

1959

MOSCOW 30 JUN 1959

24(8) PHASE I BOOK EXPLOITATION SOV/2117

Soveshchaniye po eksperimental'noy tekhnike i metodam vysokotempera-turnykh issledovaniy, 1956

Eksperimental'naya tekhnika i metody issledovaniy pri vysokikh temperaturakh; trudy soveshchaniya (Experimental Techniques and Methods of Investigation at High Temperatures; Transactions of the Conference on Experimental Techniques and Methods of Investigation at High Temperatures) Moscow, AN SSSR, 1959. 789 p. (Series: Akademiya nauk SSSR. Institut metallurgii. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali) 2,200 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: A.L. Bankvitser.

PURPOSE: This book is intended for metallurgists and metallurgical engineers.

COVERAGE: This collection of scientific papers is divided into six parts: 1) thermodynamic activity and kinetics of high-temperature processes 2) constitution diagram studies 3) physical properties of liquid metals and slags 4) new analytical methods and production of pure metals 5) pyrometry, and 6) general questions. For more specific coverage, see Table of Contents.

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5(2), 24(3)

AUTHORS: Nikitin, Yu. P., Yesin, O. A., Khlynov, V. T.

TITLE: On the Structure of the Electric Double Layer at the Boundary Between Liquid Sulfides and Silicates (O stroyenii dvoynogo elektricheskogo sloya na granitse mezhdu zhidkimi sul'fidami i silikatami)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 1, pp 40 - 42 (USSR)

ABSTRACT: Electrocapillary measurements were carried out on boundary layers between copper and nickel sulfides on the one hand and silicate (glass) on the other hand. A double layer is formed the negative charge of which is on the sulfides whereas the positive charges are formed by the cations of silicate. It may be concluded from the charge density (Table 1) that the cation excess amounts to 10% at most; the remaining 90% of the surface are occupied by cations and anions neutralizing each other. The measurement of the exchange currents in a slag poor in metal in contact with nickel or copper sulfide at 1400° (Table 2) shows insignificant current intensities only in spite of high temperature. This is caused by the small

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copper and nickel ion content of the slag. It is therefore which are decisive for the potential rather than the concentration of calcium ions. Slags with a higher Cu or Ni content showed also greater exchange currents (Table 3). The measurement of the capacity (Table 4) shows that the positive side of the double layer is formed mainly by silicate ions. The capacity is almost independent of the composition of the sulfide phase and (in the case of slags poor in CaO) near the capacity of aqueous solutions, molten sulfides, perchlorates, and nitrates and of silicates which are in contact with cast iron, ferrosilicon or ferrophosphorus. With silicates, however, the dielectricity constant is lower, which is explained by the concentration of the electron shells of oxygen. The cations in the slag which have large electrostatic fields (Si^{4+}, Al^{3+}) unite the oxygen ions to complex anions. An FeO addition increases the capacity of the double layer. The sulfide is oxidized and SO_2 is formed. At the

Card 2/4 same time the double layer is formed in a different way.

On the Structure of t[illegible] Layer at t[illegible]
Boundary Between Liquid Sulfides and Silicates

The Fe cations pass from silicate to sulfide and c[illegible]r e it positively. The negative layer, therefore, consists mainly of oxygen anions. The deformation of its [illegible] of electrons by a shift toward the positive layer decreases the size and increases the capacity of the double layer. This is also confirmed by the fact that with an increasing [illegible]- content in ilicate the interphase voltage of the sulfide decreases considerably. These data are confirmed by the investi ation of the electrocapillary motion of drops. In the electric field drops of co[illegible]r and nickel sulfid[illegible] in silicate move toward the anode. If about 7% [illegible] are introduced into the slag, the motion is reversed. The plotting of electrocapillary curves, the measurement of the exchange current and capacity, the observation of the electrocapillary motion of drops show a sufficiently detailed picture of the structure of the electric double layer at the boundary between liquid sulfide and molten silicate. There are [illegible] tables and 12 references, 14 of which are Soviet.

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On the Structure of the Electric Double Layer at the Boundary Between Liquid Sulfides and Silicates SOV/[illegible]

ASSOCIATION: Kafedra teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta (Chair of the Theory of Metallurgical Processes of the Ural Polytechnic Institute)

SUBMITTED: February 20, 1959

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SOV/21-58-7-6/25

24(6)

AUTHOR: Nikitin, Yu.I.

TITLE: Method of Nomographic Determination of Curved Axes of Flexible Bars and Shells

PERIODICAL: Dopovidi Akademii Nauk Ukrains'koi RSR, 1958, Nr 7, pp 718-723 (UkrSSR)

ABSTRACT: A nomographic method is considered for solving problems on the determination of large elastic displacements of flexible bars, under the effect of concentrated forces and moments, and problems on the choice of rational axes of structures under the effect of hydrostatic loads. The solution is found with the aid of two lattice nomograms employed independently of each other. The nomograms were constructed on the basis of Euler's elastics-intergral curves of the exact equation of bending. There are 17 mathematic formulas, 2 nomograms and 4 Soviet references

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SOV/21-59-7-6/25

Method of Nomographic Determination of Curved Axes of Flexible Bars and Shells

ASSOCIATION: Kyyivs'kyy inzhenerno-budivel'nyy instytut (Kiyev Civil Engineering Institute)

PRESENTED: F.P. Belyankin, Member AS UkrSSR

SUBMITTED: March 30, 1959

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18.3000, 1.3000

AUTHORS: Nikitin, [illegible] (Candidate of Technical Sciences), Yelin, S. [illegible] (Doctor of Technical Sciences, Professor)

TITLE: Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1959, Nr 9, pp 3-14 (USSR)

ABSTRACT: This is an attempt to use the method of polarization by alternating current in the study of kinetic characteristics of the process of interaction of liquid metal with slag. For rational control of such an interaction it is important to know what governs the kinetics of this process, to what limit the mixing may speed up the reaction, that is, to what extent is it possible to increase its rate during the transition from the diffusion process to the kinetic process. The reactions of decarbonization, desulphurization, and dephosphorization represent a

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combination of the two electrochemical stages, in one of which the substances gain electrons, and in the other they lose them. Therefore, in the study of these reactions a method of polarization can be used. The authors selected the polarization by alternating current. This method permits a simultaneous determination of both kinetic characteristics of the stage: the constant of the reaction rate and the coefficient of diffusion of ion in the slag. The essence of this method, offered by B. V. Ershler and co-authors, is that a low amperage alternating current is passed through a cell consisting, for instance, of two liquid metal electrodes and the molten slag which connects them. The resistance of the cell is balanced by an alternating current bridge, by ohmic resistance R_n and capacitance C_n connected, for instance, in parallel. A general view of the crucible and a schematic diagram of the electric bridge are given in Fig. 1. (Abstracter's note: the designations used by

Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

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SOV/148-59-9-1/21

the authors are evidently taken from their previous work on the subject and are not all explained in the present article; it is stated that on the basis of the electro-chemical theory the measured value $R_{п}$ is composed from the serially connected "resistances" conditioned by the electrode reaction $R_{р}$, by the diffusion of the ion $R_{д}$ (determining the potential) and by the electrolyte $R_{э}$. The diffusion capacitance $C_{д}$ is connected in series and the capacitance of the double electrical layer $C_{с}$ on the boundary metal-slag in parallel).

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Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

77131
SOV/148-59-9-1/22

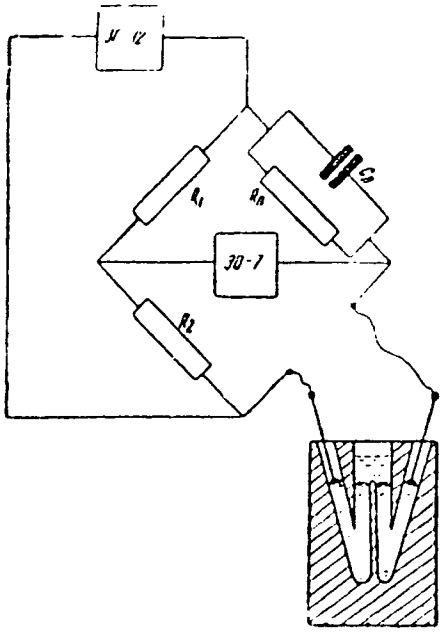


Fig. 1. A general view of the crucible and a schematic diagram of the electric bridge.

Card 4/8

Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

77131
SOV/148-59-9-1/22

The authors state that since they used two identical electrodes, the theoretical diagram of the cell will be as shown in Fig. 2.

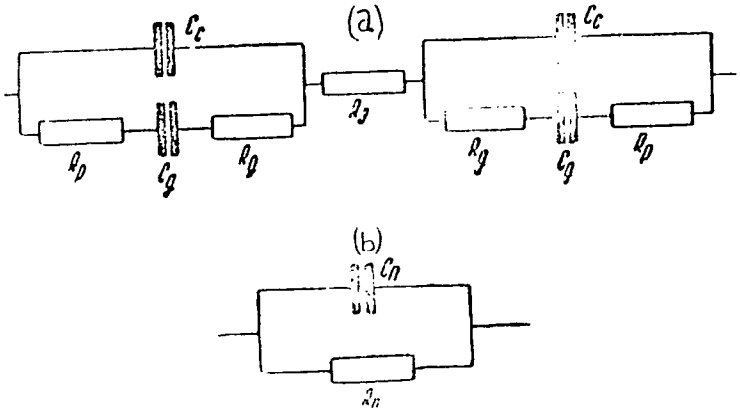


Fig. 2. The electrical diagrams of the cell: (a) theoretical; (b) its equivalent.

Card 5/8

Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

The authors derive 20 formulas and compile the values of resistances, capacitances, and exchange currents for Fe-C (about 4.3% C) alloy at 1580° C; the values of exchange currents and capacitances of the double layer on the boundary of Fe-C with slags of different compositions; the values of capacitance C_n for Fe-C (about 4.5% C) alloys in different slags at 1540-1550° C and frequency of 50 cycles (at this point the authors state that all the values of R_n given previously in Reference 20 (Nikitin, Yu. P., Yesin, O. A., DAN SSSR, 111, 133, 1956) should be decreased 25 times due to the arithmetical error); the values C_n and R_n at 1540-1550° C; the values of capacitances and resistances for a number of metal and slag compositions. It was established that the tested method is applicable to the investigation of the speed of exchange of ions Fe^{2+} between the liquid alloy of iron with carbon

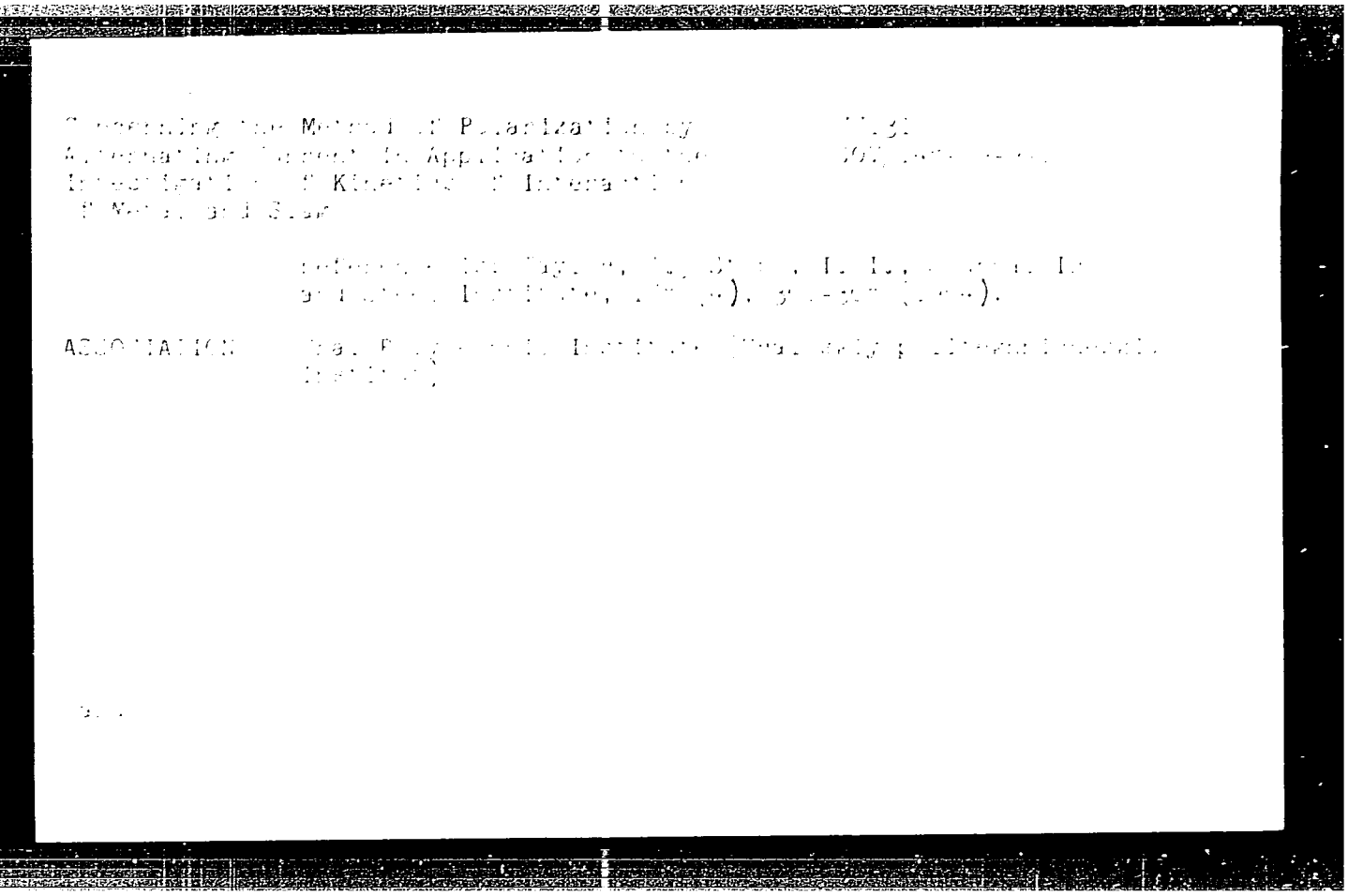
Card 6/8

Concerning the Method of Polarization by Alternating Current in Application to the Investigation of Kinetics of Interaction of Metal and Slag

[illegible]-31
SOV [illegible]

(about [illegible] % C) and the slag containing CaO, SiO_2, Al_2O_3 with small additions of FeO. The coefficients of diffusion of ions Fe^{++} in the slag, determined by this method, are of the same order of magnitude as those determined by the radioactive isotope Fe [illegible]. It was shown that the speed of exchange of ions between the slag and cast iron is not high and equals about [illegible] gram-ions through 1 cm² per second at [illegible] % Fe in the slag and at [illegible] °C. The speed of exchange is directly proportional to the FeO content in the slag and changes with the temperature in accordance with the law of Arrhenius. The energy of activation of transition of iron ions into metal equals [illegible] and into slag [illegible] kcal per [illegible]. There are [illegible] figures; [illegible] tables; and [illegible] references, [illegible] Soviet, [illegible] German, [illegible] U.K., [illegible] U.S. The U.S. references are: Martin, A., Derge, G., Amer. Inst. Min. Metall. Eng. [illegible]; Latimer, W. A., Baker, H. C., Journal of the Franklin [illegible] ([illegible]). The U.K.

Card [illegible]



NIKITIN, Yu.P.

Structure of a double electric layer at the metal - slag boundary. Trudy Ural. politekh. inst. no.93:44-55 '59. (MIRA 15:3)

(Iron alloys--Electrometallurgy)
(Manganese alloys--Electrometallurgy)
(Electrocapillary phenomena)

NIKITIN, Yu.P.; NIKITIN, N.P.

Double layer capacitance and exchange currents at high temperatures. Trudy Ural. politekh. inst. no.93:56-63 '59.
(MIRA 15:3)
(Aluminum--Electrometallurgy)

NIKITIN, Yu. P., Cand Tech Sci -- (diss) "Non-linear problems in statics of flexible rods and fine cylindrical shells." Kiev, 1960. 16 pp with charts; (Ministry of Higher and Secondary Specialist Education Ukrainian SSR, Kiev Construction Engineering Inst); 150 copies; price not given; (KL, 17-60, 157)

TOPORISHCHEV, G.A.; NIKITIN, Yu.P.

Interaction of melts containing bismuth oxide with metals. Izv. vys. ucheb. zav.; tsvet. met. 3 no.4:89-93 '60. (MIRA 13:9)

1. Ural'skiy politekhnicheskiy institut. Kafedra teorii metallurgicheskikh protessov.
(Bismuth oxide) (Electrometallurgy)

85454

S/149/60/000/005/002/015
A006/A001

187520

AUTHORS: Nikitin, Yu.P. and Sryvalin, I.T.

TITLE: Investigation of Properties of Ni-Cu-Sb, Ni-Cu-S and Ni-Fe-S Melted Systems by the Method of Electromotive Forces

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 5, pp. 43-48

TEXT: A study was made in order to complete existing data on the deviation from ideal solutions of melts of the Ni-Cu-Sb, Ni-Cu-S and Ni-Fe-S ternary systems using the emf method. Moreover, an attempt was made to apply formulae describing the behavior of binary systems to the investigated ternary systems. The experiments were made at 1,340-1,360°C and show noticeable deviations of the systems from the Raoult's law. Relatively low negative deviations of Ni in the Ni-Cu-S melts are explained by the existance in the liquid of cybotaxis groupings of copper and sulfur in concentrations exceeding mean statistical values. Thermodynamical data of binary systems are used to derive formulae for the analytical description of properties of the described ternary systems. 1) Based on Ya.I. Gerasimov's data, nickel activity at 1,350°C in the Ni-Cu-Sb system is expressed

Card 1/2

S/149/60/000/005/002/015
A006/A001

Investigation of Properties of Ni-Cu-Sb, Ni-Cu-S and Ni-Fe-S Melted Systems by the Method of Electromotive Forces

by formula (8)
$\lg f_{Ni} = -0.12 x_{Cu}(1 - x_{Ni}) - 3x_{Sb}(1 - x_{Ni}) + 3x^2_{Sb}(1 - 2x_{Ni}) + 2.4 x_{Cu} x_{Sb} - 4.8 x_{Cu} x^2_{Sb}$

2) Thermodynamical data given by A.N. Vinitskiy serve to derive the following equation for Ni activity in the Ni-Cu-S system (13)
$\lg f_{Ni} = -0.12 x_{Cu}(1 - x_{Ni}) - 4 x_S(1 - x_{Ni}) + 3.05 x_{Cu} + 6.88 x_{Cu} x^2_S$

3) Formula (15) $\lg f_{Ni} = -4 x_S(1 - x_{Ni}) + 2 x_{Fe} x_S$ based on Chipman's data, describes the coefficient of Nickel activity in the Fe-Ni-Fe-S system. Experimental values of activities are in a satisfactory agreement with data calculated according to the given formulae, reflecting in the first approximation the effect of the melt structure on the heat of mixing. There are 3 tables and 7 references: 6 Soviet and 1 English.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)
Kafedra teorii metallurgicheskikh protsessov (Department of the Theory of Metallurgical Processes)

SUBMITTED: March 8, 1960

Card 2/2

NIKITIN, Yu.P., POKUCHIKOV, Yu.P.

Determining the composition of cupola slags. Lit. proizv. no.6:31-32 Je '60. (MIRA 13:8)
(Cupola furnaces) (Slag)

NIKITIN, Yu.P., dotsent, kand. [illegible]; POLICHIKOV, Yu.P., dotsent, kand. tekhn.nauk

New method of calculating [illegible] furnace slag. Trudy Ural. politekh. inst. no.71:109-113 '60. (MIRA 13:2)
(Slag) (Cupola furnaces)

S/081/62/000/011/009/057
E111/E152

AUTHORS: Nikitin, Yu.P., and Yesin, O.A.

TITLE: Kinetics of the reaction of ferroalloys with liquid slags

PERIODICAL: Referativnyy zhurnal, Khimiya, no.11, 1962, 59, abstract 11 B 354. (In the Symposium: 'Fiz.-khim. osnovy proiz-va stali' ('Physico-chemical fundamentals of Steel Production'), M., AN SSSR, 1961, 266-270).

TEXT: The rate of the reactions $Fe - 2e \rightleftharpoons Fe^{2+}$ (1) and $Mn - 2e \rightleftharpoons Mn^{2+}$ between various alloys based on Fe and Mn, and slags consisting mainly of CaO, SiO_2 and Al_2O_3 with small quantities of FeO and MnO, were studied at 1480-1580 °C by an electrochemical method. The reactions occur in the diffusion-controlled range at the rate of about 10^{-6} g-atom/sec.cm^2. The rate of the back-reaction (1) is proportioned to the concentration of Fe^{2+} in the slag and occurs with an activation energy E = 27 kcal/g.atom; for the forward direction of reaction (1) E=20 kcal/g-atom. Additions of CaS and Na_2O in slag

Card 1/2

accelerates transfer of metal from slag to metal. With Mn alloys the rate of transfer of Mn is somewhat lower than for Fe. For technically pure Fe and Mn the reaction occurs under kinetic rate control conditions 10^3 times faster than for alloys with C, Si and P; evidently these components, because of inter-phase activity, isolate the surface atoms of the metals.

[Abstractor's note: Complete translation.]

S/149/61/000/001/001/013
A006/A001

AUTHOR: Nikitin, Yu.P.

TITLE: Activity of the Components in Melts at High Temperatures

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1961, No. 1, pp. 42 - 45

TEXT: Information on the activity of the components in metallurgical melts is needed to determine the equilibrium conditions during the interaction of the melts. Moreover, the activity of components as a function of the melt composition may serve to draw conclusions on the energy of bonds between the particles in the melt. The author used the method of electromotive forces to determine the activity of components for a number of oxide melts by two series of tests. In the first series he measured the activity of nickel monoxide in liquid melts composed of CaO, SiO_2, Al_2O_3 and Na_2O. The tests were performed in a furnace with a platinum heater at 1,380 - 1,400°C. The electrochemical cell was made of magnesium oxide and consisted of two compartments separated by a partition acting as an oxygen electrode. The metallic electrodes were made of electrolytic nickel. The emf of the cell depended on the activity of the nickel monoxide in the melts, being in both the com-

Activity of the Components in Melts at High Temperatures

partments, determined by the equation

$$E = \frac{R\,T}{2\,F} \ln \frac{a'_{NiO}}{a''_{NiO}}$$

where R is the gas constant; T is the absolute temperature of the experiment; F is the Faraday constant; a'_{NiO} and a''_{NiO} are the activities of nickel monoxides in the melts investigated. Melts with a NiO content not over 7.35 mol. % were studied. Calculated NiO activities show that the coefficients of activity (γ_{NiO} and γ'_{NiO}) are almost constant for all the investigated melts. This permits the application of Henry's rule to nickel monoxide within a certain concentration range (2 - 3 mol. %). A higher NiO content raises the coefficient of activity proving the negative deviation of the melt from the Raoult law. The second series of tests was made to study the activity of components in Bi_2O_3 - SiO_2 and Bi_2O_3 - Al_2O_3 melts. The experiments were made at 1,250°C in cells of the same type as in the first tests. The metallic electrodes were made of pure bismuth. Tungsten current outlets were enclosed in corundum tubes. Values of Bi_2O_3 activity in the melts were determined by the equation

Activity of the Components in Melts at High Temperatures

$$E = \frac{R\,T}{6\,F} \ln \frac{1}{a_{Bi_2O_3}}$$

since liquid pure Bi_2O_3 was used as a standard. Besides usual measurements with the participation of MgO, acting as oxygen electrode, the author attempted to estimate the diffusion potential in the systems, which appeared to be very low. The dependences revealed are described by equations of regular solutions:

$$RT \ln \gamma_{Bi_2O_3} = -12{,}400\ N^2_{SiO_2}$$

and

$$RT \ln \gamma_{Bi_2O_3} = -54{,}000\ N^2_{Al_2O_3}.$$

Experimental and calculated data obtained are given in tables 1, 2 and 3.

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Activity of the Components in Melts at High Temperatures A006/A001

Table 1

Activity of Nickel Monoxide in Aluminosilicate Melts at 1,380 - 1,400°C

No. of test	Initial composition				Concentration of nickel monoxide N_{NiO}	NiO	NiO	NiO	NiO
	N_{CaO}	N_{SiO_2}	$N_{Al_2O_3}$	N_{Na_2O}					
I-1	0,42	0,43	0,15	-	0,0085	0,0085	1	-	-
I-2	"	"	"	-	0,0125	0,0123	0,99	-	-
I-3	"	"	"	-	0,018	0,020	1,1	-	-
I-4	"	"	"	-	0,025	0,033	1,3	-	-
II-1	0,20	0,35	0,10	0,35	0,008	0,002	0,25	0,008	1
II-2	"	"	"	"	0,0095	0,003	0,31	0,0096	1,01
II-3	"	"	"	"	0,012	0,0032	0,27	0,0118	0,985
II-4	"	"	"	"	0,020	0,0057	0,285	0,0208	1,04
II-5	"	"	"	"	0,057	0,0176	0,31	0,065	1,14
II-6	"	"	"	"	0,0735	0,024	0,33	0,0875	1,2

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Activity of the Components in Melts at High Temperatures

Table 2

Activity of Components in Bi_2O_3 - SiO_2 Melts at 1,250°C

No. of test	Composition of Melt		Experimental			Theoretical				
№ опыта	$N_{Bi_2O_3}$	$N_{Al_2O_3}$	E. .мв	$a_{Bi_2O_3}$	$\gamma_{Bi_2O_3}$	$a_{Bi_2O_3}$	$\gamma_{Bi_2O_3}$	$a_{Al_2O_3}$	$\gamma_{Al_2O_3}$	$\Delta Z_{Bi_2O_3}$, кал/г·моль cal/g·mole
1	1	0	0	1	1	1	1	0	0	0
2	0,88	0,12	5	0,80	0,91	0,7	0,8	$0,13 \cdot 10^{-6}$	$1,1 \cdot 10^{-6}$	2780
3	0,82	0,18	10	0,63	0,77	0,46	0,56	$1,15 \cdot 10^{-6}$	$6,3 \cdot 10^{-6}$	5800
4	0,77	0,23	30	0,25	0,31	0,30	0,39	$0,65 \cdot 10^{-5}$	$2,8 \cdot 10^{-5}$	17400
5	0,68	0,32	47	0,12	0,17	0,12	0,17	$1,0 \cdot 10^{-4}$	$3,2 \cdot 10^{-4}$	27200
6	0,60	0,40	58	0,07	0,12	0,04	0,06	$0,72 \cdot 10^{-3}$	$1,8 \cdot 10^{-3}$	33600

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S/149/61/000/001/001/013
A006/A001

Activity of the Components in Melts at High Temperatures

There are 3 tables and 4 Soviet references.

ASSOCIATIONS: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute); Kafedra teorii metallurgicheskikh protsessov (Department of the Theory of Metallurgical Processes)

SUBMITTED: April 19, 1960

Card 7/7

S/137/62/000/003/063/191
A006/A101

AUTHORS: Nikitin, Ya. P., Smirnov, N. S.

TITLE: On the part of electrochemical interaction in sintering processes of metals and oxides

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 41, abstract 3G282 ("Poroshk. metallurgiya", 1961, no. 4, 36 - 39, English summary)

TEXT: The authors studied the rate of ion exchange between some metals (Fe, Ni, Cu, W) and molten enamels of various composition. The activation energy of this process was 25 - 30 kcal/g-atom. The rate of ion exchange depends slightly on the metal nature, but changes substantially with temperature. The diffusion coefficients of Fe-ions in enamels at 1,040°C were evaluated.

R. Andriyevskiy

[Abstracter's note: Complete translation]

Card 1/1

KHLYNOV, V.V.; YESIN, O.A.; NIKITIN, Yu.P.

Electrocapillary motion of sulfides in oxide melts. Izv.vys.ucheb. zav.; khim.i khim.tekh. 4 no.1:53-56 '61. (MIRA 14:6)

1. Ural'skiy politekhnicheskiy institut imeni S.M. Kirova, kafedra teorii metallurgicheskikh protsessov.
(Sulfides) (Electrocapillary phenomena)

5 21

AUTHORS Yastrin, Yu. P., Ovchinnikova, V. I. and Smirnov, N. S.

TITLE Reaction of enamel melt with steel

PERIODICAL Izvestiya vysshikh uchebnykh zavedeniy SSSR, Khimiya i khimicheskaya tekhnologiya, v. 4, no. 1, 1961, [illegible]

TEXT In spite of discussion in the literature, the question of the role of ionic exchange in adhesion between metal and enamel is not settled. The ionic nature of enamels enables the exchange kinetics to be studied by electrochemical methods, the most fruitful of which is that of electrode polarization with an alternating current. This method was applied to salt melts (Ref. 3: J. E. B. Randles, W. White, Z. Elektrochem., 59, 666, 1955; Ref. 4: H. A. Laitinen, N. C. Gaur, J. Electrochem. Soc., 12, 730, 1957) and also to slag melts (Ref. 5: Yu. P. Nikitin, O. A. Yesin, Dokl. AN SSSR, 111, 133, 1956; 116, 63, 1957; 122, 109, 1958) and enabled determining a number of kinetic relations governing their interaction with various metals. The method is based on the principle that the impedance of a cell consisting of two electrodes submerged in an electrolyte is composed of a resistance and a

Card 1/3

reactance, the equivalent circuit of which is shown in Fig 1. The resistance at a constant temperature depends on the speed of the ion exchange (resistance of the reaction R_p) and on the speed of diffusion and concentration of ions in the electrolytes (diffusion resistance R_g). The capacitances are determined by the structure of the division boundary between the metal and the electrolyte, C_c, and by the diffusion capacitance, C_g. Equations are set up and solved for this equivalent circuit. The practical realization is shown in Fig 2, where 3F is an audio oscillator, 0 - oscillograph, 1 - electrodes, 2 - corundum tube, 3 - asbestos filling, 4 - corundum crucible, 5 - Al_2O_3 paste, 6 - fused enamel. The experiments were carried out at 900 and 1040°C with electrodes of 0.5 mm thick type 08KP (08KP) steel (0.08% C). Enamels were made from chemically pure materials. Two series of experiments were made. In the first the influence on the exchange current of various additions (CaF_2, Co_2O_3, Ni_2O_3, MnO_2, TiO_2) to a basic formulation of 20% Na_2O, 47% SiO_2, 19% B_2O_3, 8% Al_2O_3 was studied. A formulation of 21% Na_2O_3, 50% SiO_2, 20% B_2O_3, 9% Al_2O_3 was also

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Reaction of enamel melt with steel

S/153/61/004/004/010/013
E111/E535

tested). It was found that the current increased with temperature and with increasing additions of cobalt, nickel and manganese oxides and CaF_2; TiO_2 had the opposite effect. In the second series of experiments the effect of preliminary oxidation on the exchange-current was studied. A tendency was found for the current first to increase with increasing duration of preliminary oxidation and then to decrease; this effect became more pronounced at higher temperatures. The capacitance component of the cell resistance remained practically constant with the various enamels and at the two temperatures, indicating (Ref.8: A. N. Frumkin, V.S.Bagotskiy, Z. A. Iofa, B. N. Kabanov. Kinetics of Electrode Processes. Izd. MGU, M., 1952) that the structure of the double layer is also unchanged. Further study of the influence of temperature, enamel composition and pre-treatment of the metal surface on the exchange current is needed to find exactly what role ion exchange plays in the formation of an enamel coating. There are 2 figures, 3 tables and 9 references: 6 Soviet and 3 non-Soviet.

ASSOCIATION: Kafedra teorii metallurgicheskikh protsessov, Ural'skiy nauchno-issledovatel'skiy institut chernykh metallov i Ural'skiy politekhnicheskiy institut imeni

S/149/62/000/002/001/008
A006/A101

AUTHOR: Nikitin, Yu. P.

TEXT: Silicon activity in copper-silicon-nickel alloys

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 2, 1962, 56-57

TEXT: Activity of silicon in Cu-Si and Cu-Ni-Si alloys was studied at 1,400°C by the method of emf. The experiments were made in an electric heating furnace in melted magnesium oxide crucibles. Sodium silicate with 75% SiO_2 was used as electrolyte. The current leads were made of tungsten and enclosed in corundum tubes. The results obtained are given in a table and show that the theory of regular solutions is, contrary to Ref. 3, 127, not applicable to the Cu-Si system. When copper is replaced by nickel the coefficient of silicon activity decreases; this is explained by the stronger bond of nickel with silicon. There are 1 table and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

Card 1/2

NIKITIN, Yu.P.; TARANUKHINA, L.V.; SEREDINA, L.R.; PUSHKAREVA, S.A.; POPOVA, I.A.; VERSHININA, N.V.

Activity of oxides in liquid aluminum silicates. Izv.vys.ucheb. zav.; tsvet.met. 5 no.1:74-76 '62. (MIRA 15:2)

1. Ural'skiy politekhnicheskiy institut, kafedra tekhnologii silikatov.
(Aluminum silicates) (Activity coefficients)

NIKITIN, Yu.P.; YESIN, O.A.; KHLYNOV, V.V.; SOTNIKOV, A.I.; KOROTCHENKOV, A.A.

Electrochemical investigation of the burning out of carbon. Izv. vys. ucheb. zav.; chern. met. 5 no.5:16-24 '62. (MIRA 15:6)

1. Ural'skiy politekhnicheskiy institut.
(Liquid metals)
(Electrochemical analysis)

S/125/62/000/009/003/008
A006/A101

AUTHORS: Safonnikov, A. N., Nikitin Yu. P.

TITLE: Poor fusion in electric-slag welding of chrome-nickel austenite steels and alloys

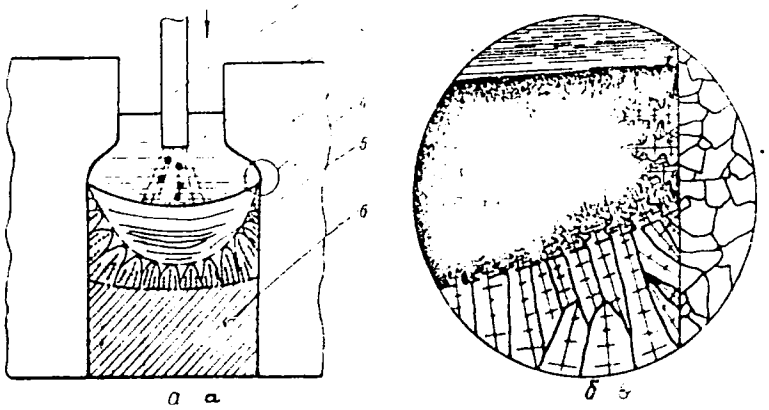
PERIODICAL: Avtomaticheskaya svarka, no. 9, 1962, 27 - 36

TEXT: An illustration (fig 2) shows the mechanism of poor fusion, according to the concept that the wetting of growing crystals by slag depends on its surface and interface tension. To confirm this theory, the authors investigated the surface properties of fluoride-base welding fluxes (slags) and their interface tension along the boundary with austenite steels and alloys. Data published previously by Nikitin, Yesin, Mikiashvili, Popel' and other Soviet authors are used. The effect of oxygen ions on surface tension was also studied. Tabulated results obtained confirm the author's theory on the mechanism of poor fusion and show that it depends in electric-slag-welded joints of Cr-Ni steels and alloys, on the surface tension of slags, interface tension along the slag-metal boundary, and the ion percentage of oxygen in the slag. The probability of poor fusion decreases with higher values of the aforementioned characteristics; it decreases also with

Poor fusion in electric-slag welding ...

fusion exists); c - slag with high surface tension - formation and emersion of globules (poor fusion is absent); g - formation of poor fusion in the weld.

Figure 2



Card 3/4

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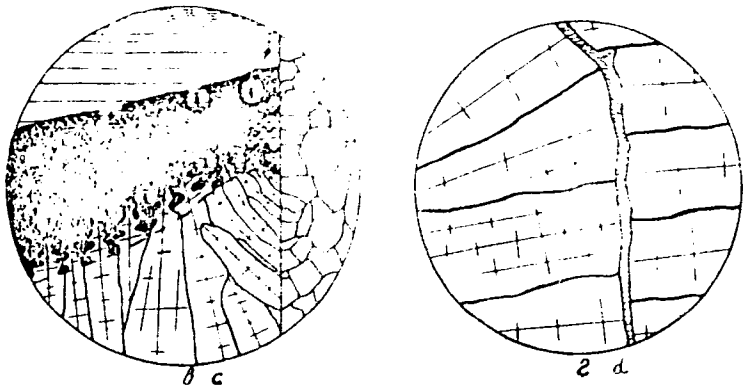
A006/A101

Poor fusion in electric-slag welding of...

Figure 2 (continued)



Card 4/4

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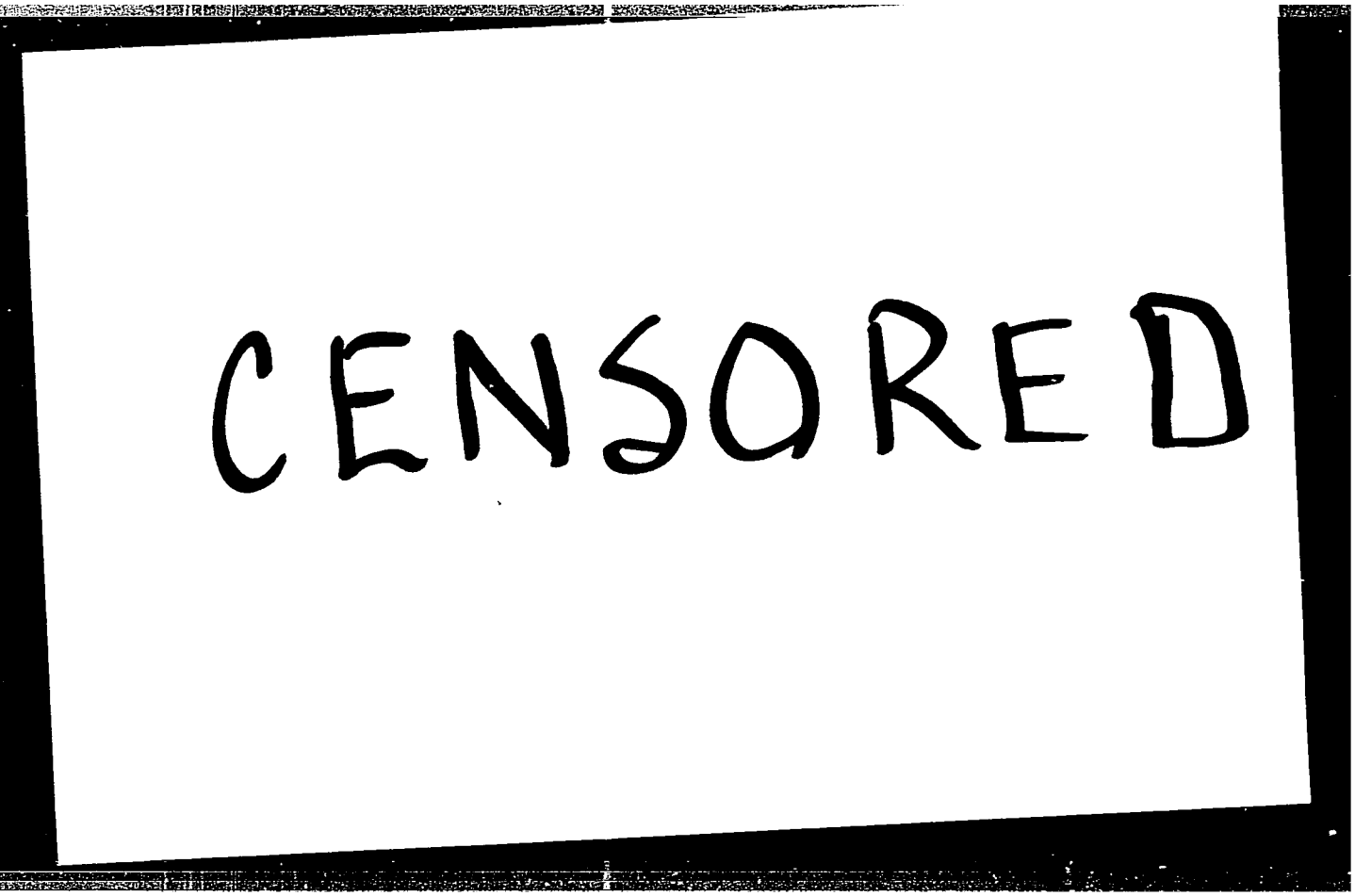

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001137020007-0"

NIKITIN, Yu.P.; YESIN, O.A.; SOTNIKOV, A.I.

Ferrotungsten recovery from waste slags with the help of electric currents. Izv. vys. ucheb. zav.; chern. met. 6 no.2:12-15 '63. (MIRA 16:3)

1. Ural'skiy politekhnicheskiy institut.
(Slag)
(Iron-tungsten alloys)
(Electrocapillary phenomena)

YESIN, O.A.; GEL'D, P.V.; POPEL', S.I.; NIKITIN, Yu.P.

Review of "Physical chemistry" by A.A. Zhukhovitskii and L.A. Shvartsman. Zhur. fiz. khim. 37 no.6:1435-1436 Je '63. (MIRA 16:7)

1. Ural'skiy politekhnicheskiy institut imeni S.M. Kirova.
(Zhukhovitskii, A.A.) (Shvartsman, L.A.)
(Chemistry, Physical and theoretical)

S/020/63/148/001/032/032
B101/B186

AUTHORS: Nikitin, Yu. P., Korpachev, V. G., Safronnikov, A. N.

TITLE: Surface properties of melts on CaF_2 basis

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 1, 1963, 160-161

TEXT: It was found that the surface tension σ rises from 280 to 315 erg/cm^2 if 26% by weight of CaO are added to CaF_2. The increase of σ is assumed to be caused by the appearance of double-charged oxygen anions at the surface of the melt. This was proved by measuring the difference $\Delta\varepsilon_w$ between the potential of CaF_2 and that of CaF_2 + 26% CaO according to the relation: $\Delta\varepsilon_w = \Delta\varepsilon'' - \Delta\varepsilon' - \Delta\varepsilon_x$. $\Delta\varepsilon_x$ was determined in the galvanic cell Pt(I) | CaF_2 with CaO traces | CaF_2 - CaO | Pt(II), where

$\Delta\varepsilon_x = \varepsilon_{II} - \varepsilon_I = 32$ mv. $\Delta\varepsilon''$ and $\Delta\varepsilon'$ were determined as potential drop

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