"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

76-32-5-36/47

AUTHORS: Yesin, O. A., Lyumkis, S. Ye.

TITLE: Letters to the Editor (Pis'ma v redaktsiyu) The Effect of the Solvent on the Properties of Cations in Salt Melts (O vliyanii rastvoritelya na svoystva kationov v solevykh rasplavakh)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 5, pp.1165-1167 (USSR)

ABSTRACT: The working through of data in publications concerning the electric forces in metal-salt melt systems showed an interesting regularity referring to the halide salts of the metals of the side series of the periodic system. From a table containing the ion radii of the corresponding metals besides the magnitudes of the decrease of the isobaric potential at the transition of liquid single salts into the solution can be seen that the numerical value of the decrease ΔZ in some cases becomes smaller with the increase of the radius of the cation in a series of the periodic system, but that on the other hand only a small change or increase of the value ΔZ

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Letters to the Editor. The Effect of the Solvent on the Properties of Cations in Salt Melts

is observed. This contradiction is removed by the assumption that by the increase of the electric field of the ions the increase of their polarizability is decreased. The iodides of copper, zinc, lead and cadmium are mentioned as examples for the case that no polarization increase and thus also no change of the thermodynamic properties takes place. After giving a detailed consideration and explanation of the reaction of the metals mentioned in the table the authors say that among the mentioned salts the strongest selective effect on chloride compounds of nickel, cobalt, copper and iron was observed with alkali metal chlorides, with the extremely small decrease of potential of nickel chloride being used for the purification of nickel-sulfur alloys. There are 1 table and 8 references, 7 of which are Soviet.

ASSOCIATION: Sverdlovskiy politekhnicheskiy institut
(Sverdlovsk Polytechnical Institute)

SUBMITTED: December 6, 1956

1. Metal halides--Thermodynamic properties 2. Ions--Properties

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

AUTHORS: Musikhin, V. I., Yesin, O. A. SOV/ 76-32-6-28/46

TITLE: Investigation of the Properties of Molten Titanates by Means of the EMF-Method (Izucheniye svoystv rasplavlennykh titanatov metodom elektrodvizhushchikh sil)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 6, pp.1372-1378 (USSR)

ABSTRACT: In the present paper the systems Na_2O-TiO_2 and MnO-TiO_2 are investigated by means of the EMF method, using cells without ion transfer. The experiments were carried out at 1200° and 1470°C, and 2 types of cells were used, their diagrams as well as the working technique employed being given. It was observed that the EMF varies, which fact was explained by the oxidation of Mn^{+2} to Mn^{+3}; the experiments were correspondingly carried out in a suitable way. The measurements were carried out with a high-resistance potentiometer of the type PPTV-1; the data obtained are given together with those of the chemical analysis and the calculated values of the activity and of the activity coefficient in a table. From the results of the experiments may be seen that there is quite a deviation from ideal solutions; it is assumed

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Investigation of the Properties of Molten Titanates by Means of the EMF-Method

that ions of the type TiO_4^{-4}, TiO_3^{-2} and $Ti_2O_5^{-2}$ exist. Already Bethe (Ref 4) proposed a method of calculation which later on was extended to compounds of the type AB_2 by Peierls (Ref 5), while Kirkwood (Ref 6) calculated the free energy in another way, which method was then used by I. M. Lifshits (Ref 7) for any concentration. Using the equation of the last mentioned author the authors of this paper found out that according to B. N. Finkel'shteyn (Ref 8) a formula for the calculation of small mixing energies may be derived, while according to the equation by A. A. Zhukhovitskiy, B. N. Finkel'shteyn and I. S. Kulikov (Ref 9) another kind of derivations exists. Later on I. S. Kulikov (Ref 10) elaborated an equation for the system $FeO-SiO_2$, while V. A. Kozheurov (Ref 12) proceeded from the quasichemical method for determining the activity of the components in binary solutions. As the equations refer to the formation of a compound of the type AB the system Fe-Si was investigated, with data obtained by Schneider and Mayer (Ref 17) being compared. It is assumed that a great decrease of the coordination number z takes place in melting FeSi, and that on the other

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SOV/76-32-6-26/46

Investigation of the Properties of Molten Titanates by Means of the EMF-Method

hand quasimolecules and ferrosilicon form. There are 3 figures, 3 tables, and 19 references, 10 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Institut metallurgii, Sverdlovsk
(Ural Branch AS USSR, Sverdlovsk, Institute of Metallurgy)

SUBMITTED: February 22, 1957

1. Titanates (Liquid)--Properties 2. Titanates (Liquid)--Chemical analysis 3. Potentiometers--Applications

Card 3/3

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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

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 5 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

Card 2/3

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

SOV/76-32-8-24/37

AUTHORS: Lepinskikh, B. M., Yesin, O. A., Musikhin, V. I.

TITLE: The Anisotropy of the Electroconductivity in a Sodium Silicate Current (Anizotropiya elektroprovodnosti v struye silikata natriya)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 8, pp. 1874-1877 (USSR)

ABSTRACT: The present investigations are intended to solve the problem whether in a flow of silicate an orientation of the anions takes place having a different resistance along and across the direction of flow. The experiments were carried out by means of melts of the system Na_2O-SiO_2 in an apparatus the diagram and the description of which are given. The flow rate was not always the same, it never surpassed, however, a Reynol'd number of 20, with the transition from an accelerated flow to a normal flow taking place according to Gagen-Puazeyl in the initial section of 1 cm length. The representation of the electric scheme as well as a description of the operation method are given. The results obtained show a clear anisotropy of the

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electroconductivity, with a decrease of the resistance being observed in the direction along the flow, and an increase of it in the cross direction. This is explained by a complex structure of the silicon oxide anion, and it is assumed that an orientation of chain— or lamella-type silicon oxide anions in the direction of flow is present. It was found that the observations made agree with those by Bockris and Lowe (Bokris and Love) (Ref 12), and that they contradict those by Baak (Bok) (Ref 13). In the explanations of the results obtained, referring to the periodicity of the above anisotropy by the change of the composition of the silicate the authors give data obtained by N. V. Belov (Ref 15). There are 1 figure and 15 references, 6 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Institut metallurgii Sverdlovsk (Ural Branch of the AS USSR, Institute of Metallurgy, Sverdlovsk)

SUBMITTED : March 25, 1957

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) 18

AUTHORS: Musikhin, V. I., Yesin, O. A. SOV/76-32-10-26/39

TITLE: Cathodic Polarization in Titanium-Containing Slags (Katodnaya polyarizatsiya v titanosoderzhashchikh shlakakh)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 10, pp 2410-2414 (USSR)

ABSTRACT: The phenomenon of cathodic polarization in liquid slags already observed (Refs 2,3,4) is in the present case investigated with melts of $CaO-MgO-Al_2O_3-B_2O_3$ (with small TiO_2 additions). The construction of the electrolyzer according to Piontelli (Ref 7) turned out to be insufficient, and the direct method was not employed because the Lugin-Gaber capillaries are difficult to produce. The cathode potential was measured according to the commutator method (Ref 2) with an electrolyzer being used; a diagram of the electrolyzer is given. The determinations were carried out at 1400° with Cu - Ti, Fe - P - Ti and W-cathodes. A slow diffusion of the Ti^{4+}-ions was observed. The absence of abrupt polarization drops also points to a diffusion character. On the cathode of the iron alloy with 10% and 2-3% Ti, where

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the depolarization is apparently low an overcharging of Ti^{4+} to Ti^{3+} mainly takes place. Reduction processes of Ti^{3+} to Ti^{2+}, Ti^{4+} to Ti^{2+} and Ti^{4+} to Ti take place at the same time, which the coefficient n>1 tends to show. On the solid tungsten cathode where practically no depolarization takes place only an overcharge of the Ti-ions may be found. There are 3 figures, 1 table, and 11 references, 5 of which are Soviet.

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

SUBMITTED: May 21, 1957

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SOV/81-59-7-24173

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 7, p 352 (USSR)

AUTHORS: Vorontsov, Ye.S., Yesin, O.A.

TITLE: The Application of Radioactive Indicators to the Study of Diffusion in Liquid Slags

PERIODICAL: Tr. Ural'sk. politekhn. in-ta, 1958, Nr 73, pp 57 - 73

ABSTRACT: To elucidate the structure of liquid phases, diffusion (D) of Ca and S separately was investigated and that of either Ca and P or Fe and Ca simultaneously was also studied. Liquid blast-furnace slag of the composition (in %): CaO 40, Al_2O_3 20, SiO 40 served as medium. The experiments were carried out in the isothermal zone of the furnace with a carbon resistance at a temperature of 1,300 - 1,600°C. The method of "labeled atoms" was employed for revealing the results of D. P^{32} was introduced into slag in the form of tricalcium phosphate, S^{35} in the form of sulfides, Ca^{45} and Fe^{59} in the form of oxides. Slag was molten in a crucible (C) and kept for 15 - 20 minutes, then a little piece of slag (50 - 75 mg) with the substance, the D of which was

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SOV/81-59-7-24173

The Application of Radioactive Indicators to the Study of Diffusion in Liquid Slags

investigated, was preliminarily heated and carefully introduced onto the surface of the melt. The experiment lasts from 1 to 9 hours. It was established that in liquid slags of the $CaO-Al_2O_3-SiO_2$ system the mass transfer of Ca, P and S in a graphite C takes place at temperatures of 1,300 - 1,600°C at the expense of surface D. The material of C is badly wetted by slag, and the boundary: melt-C is a passageway for diffusing perticles. In the case of introducing the sulfur isotope ($\sim$ 1%) into slag the wettability of C increases and the D rate of sulfur decreases 3 - 4 times. In the case of using C made of Al_2O_3 the wettability increases and the D rate of Ca, S and P in this case was less than in a graphite C. The investigation of the simultaneous mass transfer of P and Ca, as well as of Ca and Fe, showed that their conditional diffusion coefficients are values of one order of magnitude. P and Fe are transferred somewhat more rapidly than Ca.

I. Mikhaylova

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APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

AUTHORS: Khlynov, V. V., Yesin, O. A. 307/ 2o-12o-1-36/63

TITLE: Electrocapillary Motions in Melted Slags(Elektrokapillyarnyye dvizheniya v rasplavlennykh shlakakh)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 12o, Nr 1, pp. 134 - 136 (USSR)

ABSTRACT: At temperatures of 137o - 15oo°C the authors noticed a shift of the drops of Cu, Ni, Mn, Ag, Ni_3S_2 to a certain electrode on the surface of a slag containing 52% CaO, 41% Al_2O_3 and 7% SiO_2. The experiments as well as the arrangements for the measurements are discussed in short. In some of the experiments the authors could observe the simultaneous motion of a great amount (2o - 3o) of drops of different size (0,5 to 3 mm) in cases where liquid electrodes of Ni_3S_2 supplied from graphite feeders. In agreement with the theory such motions were not at all observed in the case of solidified metal drops and pieces of solid magnesium oxide. The results of the experiments in an oxidizing atmosphere (air) are compiled in a table. The same table contains the values of the specific movabilities. As the

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Electrocapillary Motions in Melted Slags 307/20-120-1-35/63

metals and nickel sulfide move in opposite direction the determination of the sulfur content corresponding to zero movability is of interest. The experiments carried out in the case of field gradients E = 5 - 6 show the following: a decrease of the sulfur contained in the alloy Ni-S from 26% (Ni_3S_2) to 0,4% is practically of no influence on the movability. This is probably dependent on the great capillary activity of sulfur. In the case of a small content of sulfur the surface of the Ni-S melts is positively charged, in the case of high and medium sulfur content, however, negatively. Various details are given. The dislocations observed and discussed by the authors are electrocapillary motions of the drops at the surface of the slag. This is also proved by a quantitative comparison of the theory of electrocapillary motions with the results of the present work. There are 1 table, and 17 references, 15 of which are Soviet.

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

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SOV/20-122-1-29/44

5(4)

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

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 122, Nr 1, pp 105-108 (USSR)

ABSTRACT: The authors investigated the velocity of the ion exchange between liquid metals (Fe-C, Fe-Si, Fe-P, Ag) 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_g, 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 840° amounted to 0,6.10^{-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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On the Kinetics of the Ion Exchange Between Metal and Slag

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

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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

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5(4)

AUTHORS: Khlynov, V. V., Yesin, O. A. SOV/20-123-2-31/59

TITLE: Extraction of Sulphide Inclusions From Molten Slags by Means of an Electric Field (Izvlecheniye sul'fidnykh vklyucheniy iz rasplavlennykh shlakov pri pomoshchi elektricheskogo polya)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 2, pp 320-332 (USSR)

ABSTRACT: The present paper gives the results obtained by an investigation carried out by the authors of the use of the electrocapillary motion of liquid metal drops for the purpose of extracting sulphide inclusions from molten slags. Experiments were carried out at a temperature of ~ 1400° in boats of corundum or porcelain, which were filled with molten factory slags of the following composition (in %): CaO 15; Al_2O_3 10; SiO_2 43; Fe 20; MgO 10; Ni 0.1-0.2; Co 0.02; and S 0.15-0.2. A large part of nickel and cobalt was contained in these slags in form of matte inclusions of from 10^{-4} to 0.2 mm. Carborundum rods were used as current conveyers. In preliminary experiments, matte drops of large radius (r = 0.9 to 1.3 mm) were dipped into slags, and after 2 - 10 minutes a constant electric field with a field strength of from 5 to 7 v/cm was

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connected. The cell was then quickly cooled, and the path covered by the drops was determined. The inclusions move with velocities of $u = (7 \div 10)10^{-3}$ cm/sec in the direction of the cathode, and this corresponds to a mobility of $v = u/Er = (1.0 \div 1.5).10^{-2}$ cm/sec.v. The authors also investigated the influence exercised by the composition of the slags. The results obtained with Ni_3S_2 drops in iron-less slags of various compositions are given in a table; they show that the mobility of the drops is inversely proportional to the viscosity η of the slags. The data obtained for different iron oxide contents in the slags are given in the second table. The charge of the sulphide in iron-less slags is negative; it decreases after an addition of FeO, passes through zero, and then becomes positive. With increasing FeO concentration during the formation of the double layer, transition of the iron ions from the slags into the sulphide apparently begins to play an ever-increasing part: $Fe^{2+}_{(slags)} \rightarrow Fe_{(sulphide)} - 2e$ and not the inverse displacement of the nickel ions $Ni_{(sulphide)} \rightarrow Ni^{2+}_{(slags)} + 2e$. After 8 % FeO is attained, the process

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$Fe^{2+}_{(slags)} \rightarrow Fe_{(sulphide)} - 2e$ begins to predominate. However, a further increase of FeO concentration reduces the mobility of the drops in spite of the fact that their positive charge increases and the viscosity of the slags is reduced. Conceptions on an ideally polarizable drop are absolutely out of place in the case under investigation. The equation determining mobility contains a depolarization coefficient. The reduction of drop polarizability is probably the main reason for the reduction of its mobility in the slags which contain iron oxides. An additional proof of the correctness of what has been just said is furnished by the results obtained by experiments carried out with constant FeO concentration (23 %) and a variable ratio between CaO and SiO_2 contents. Also in this case the mobility of drops hardly depends at all on the viscosity of the slags. The experiments discussed fully confirm the possibility of extracting valuable sulphide inclusions from molten slags by means of electrocapillary

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motions. There are 1 figure, 3 tables, and 8 references, 7 of which are Soviet.

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

PRESENTED: June 25, 1958, by I. P. Bardin, Academician

SUBMITTED: June 24, 1958

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PHASE I BOOK EXPLOITATION

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Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk

Termodinamika i stroyeniye rastvorov; trudy soveshchaniya... (Thermodynamics and Structure of Solutions; Transactions of the Conference Held January 27-30, 1958) Moscow, Izd-vo AN SSSR, 1959. 295 p. 3,000 copies printed.

Ed.: M. I. Shakhparonov, Doctor of Chemical Sciences; Ed. of Publishing House: N. G. Yegorov; Tech. Ed.: T. V. Polyakova.

PURPOSE: This book is intended for physicists, chemists, and chemical engineers.

COVERAGE: This collection of papers was originally presented at the Conference on Thermodynamics and Structure of Solutions sponsored by the Section of Chemical Sciences of the Academy of Sciences, USSR, and the Department of Chemistry of Moscow State University, and held in Moscow on January 27-30, 1958. Officer reports also read at the conference, be not included in this work are listed in the Table of Contents. Among the problems treated in this work are given: aqueous solutions, ultrasonic measurement, dielectric electrolytic solutions, ultrasonic mixtures, spectro- and thermodynamic properties of various individual articles. accompany scopic analysis, etc. References

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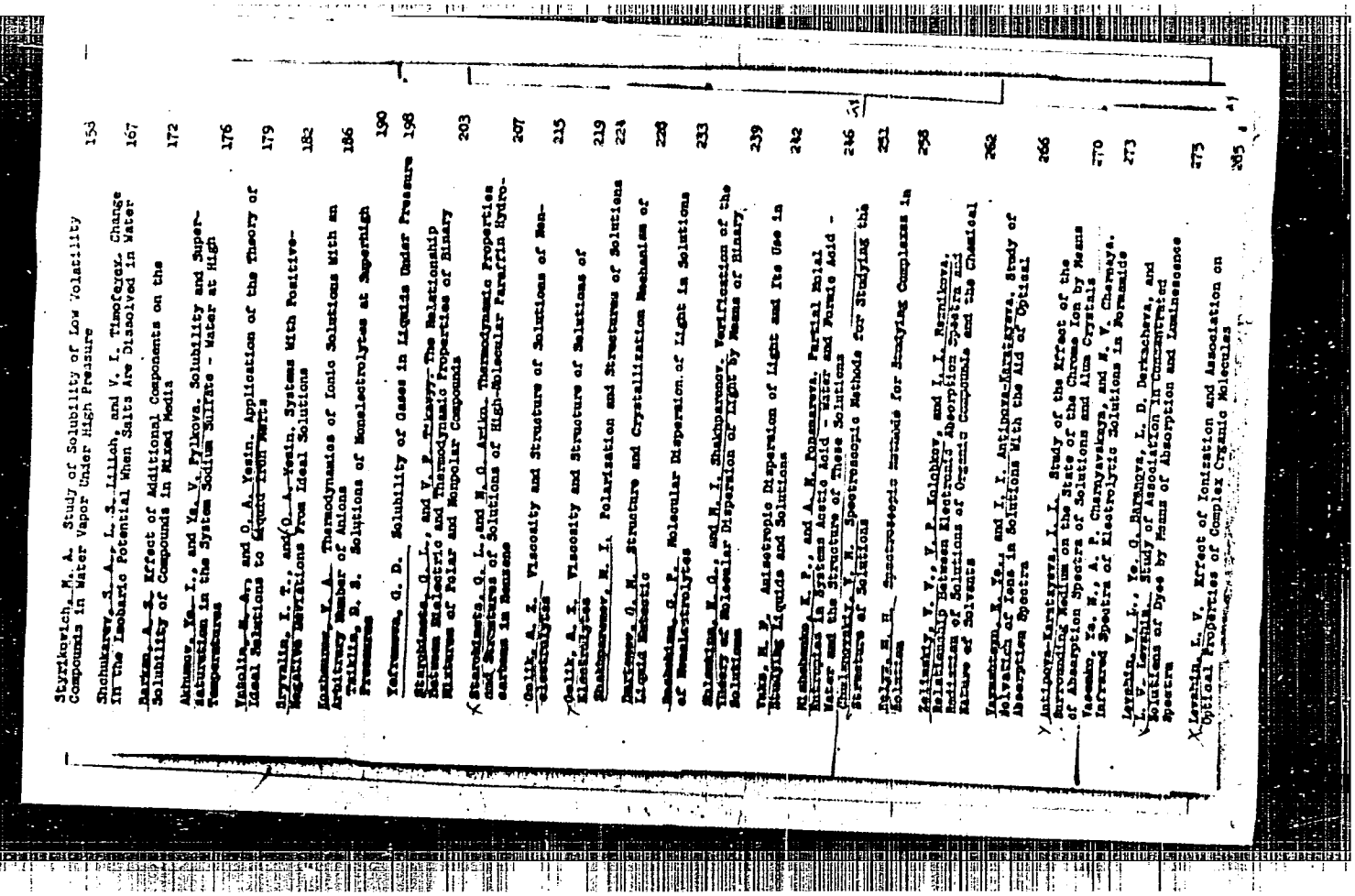

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Soveshchaniye po elektrokhimii. 4th, Moscow, 1956.

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

Sponsoring Agency: Akademiya nauk SSSR. Otdeleniya khimicheskikh nauk.

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

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

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

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YESIN, O. A.

with Khlynov, V. V., "O snizh enii soderzhaniya korolykov Ferrosplavov v shlakakh."

with Nikitin, Yu. P., "O kinetike vzaimodeystviya ferrosplavov s szidkimi shlakami,"

with Sryvalin, I. T. "O ipimeninii prosteyshikh popravok k formulam regulyarnykh rastvorov dlya metallurgicheskikh shlakov."

with Zakharov, I. M., "The valency of Cr in liquid slags."

with Lepinskikh B. M., Musikhin, B. I. and Vatolin, N. A., "Elektrokhimicheskoe legirovanie stali vanadiem."

reports submitted for the 5th Physical Chemical Conference on Steel Production. Moscow, 30 Jun 1959.

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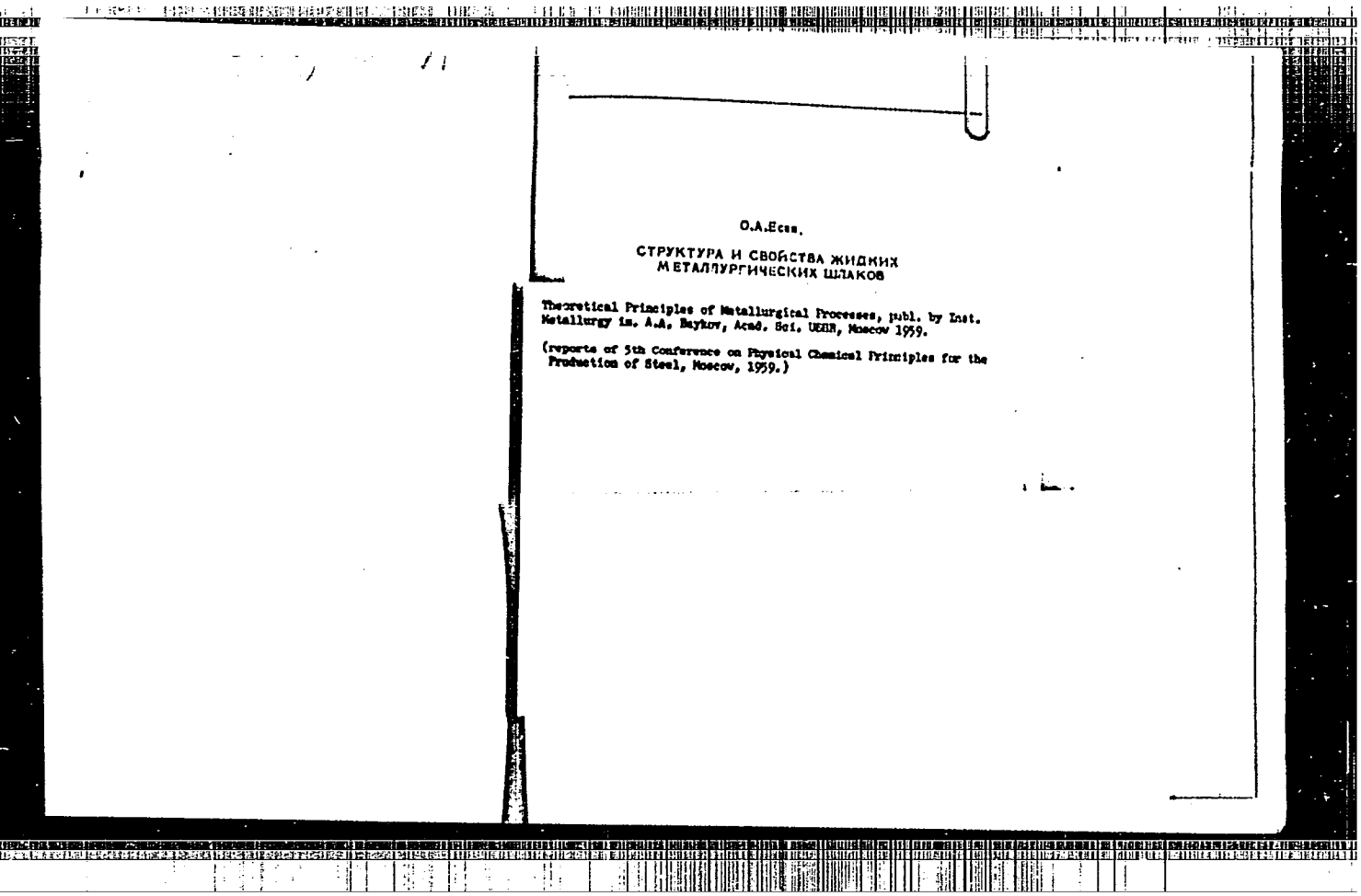

O.A.Esin.

СТРУКТУРА И СВОЙСТВА ЖИДКИХ МЕТАЛЛУРГИЧЕСКИХ ШЛАКОВ

Theoretical Principles of Metallurgical Processes, publ. by Inst. Metallurgy im. A.A. Baykov, Acad. Sci. USSR, Moscow 1959.

(reports of 5th Conference on Physical Chemical Principles for the Production of Steel, Moscow, 1959.)

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AUTHOR: Britskaya, E. K. S/072/60/000/03/021/025
B003/B008

TITLE: 3rd All-Union Conference on the Vitreous State

PERIODICAL: Steklo i keramika, 1960, Nr 3, pp 43-46 (USSR)

ABSTRACT: The 3rd All-Union Conference on the Vitreous State was held in Leningrad at the end of 1959. It was organized by the Institut khimii silikatov AN SSSR (Institute of the Chemistry of Silicates AN SSSR), Vsesoyuznoye khimicheskoye obshchestvo imeni D. I. Mendeleyeva (All-Union Chemical Society imeni D. I. Mendeleyev) and Gosudarstvennyy opticheskiy institut imeni S. I. Vavilova (State Optical Institute imeni S. I. Vavilov). More than 100 reports on the structure of glass, investigation methods of the vitreous state, the mechanism of vitrification and physicochemical and technical properties of glasses were delivered. The Conference was opened by Academician A. A. Lebedev. Fundamental investigations methods and results concerning the glass structure were discussed at the 1st meeting. Academician A. A. Lebedev reported on possibilities and results of optical methods. Yu. A. Pospy-Kozhits on the diffraction method. E. S. Yevstrop'yev on general problems concerning structure and properties of glasses. The 2nd meeting produced 5 reports on the problem of the vitreous state: B. L. Tsel'ler, "Chemical Peculiarities of Polymeric Vitreous Materials and Their Nature of Vitrification"; [illegible] and B. E. Kolesnikov, "On the Problem of Conformities of the Vitrification"; I. A. Bryazgin, "Theory of Glass Formation"; A. G. Vlasov, "Natural Oscillations of the Glass Lattice". The 3rd meeting produced 9 reports on investigation results of silicate melts and on problems of the methods of vitrification. A. I. Avgustinik, "On the Problem of the Formation of the Crystalline Phase From the Silicate Melt"; S. K. Bobrovskiy, "Process of Vitrification and the Structure of Glass"; B. [illegible], O. A. Yesin and V. I. Pavlenko, "On the Thermodynamics of Melts"; I. N. Boguslavskiy and O. A. Yesin, "Thermodynamic Properties of the Silicate Systems $PbO - SiO_2$ and $CaO - Al_2O_3 - SiO_2$"; G. M. Barzakov, "Chemical and Structural Vitrification"; K. V. Vol'kenshteyn, "Mechanism of Vitrification". At the 4th meeting, 13 reports dealt with problems of the glass structure and optical investigation methods: V. A. Florinskaya, "Infrared Reflection Spectra of Some Silicate Glasses and Their Relations to the Structure"; [illegible] and E. K. Prokhorova, "Infrared-Beam Dispersion of Light and the Structure of Silicate Glasses"; V. A. Kolesova, "Investigation of the Vitrification Process of Aluminosilicate Glasses"; K. S. Evstrop'yev reported on the Fifteenth Institut AN SSSR (Institute of Physics AS USSR) with

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glasses free of copper, with the help of infrared spectroscopy"; E. A. Sidorov reported on the molecular structure and the properties of the crystalline quartz; S. M. Ryabchevskikh and V. P. Gavrilenko reported on structural investigations of acid- and alkaliborate glasses with the aid of infrared spectroscopy; A. G. Pikus, "On Quantitative Relation of the Orderly and Irregular Phase in Glass"; G. O. Karapetyants and A. G. Aleksandr, "Electronographic Investigation of the Structure of Glasses"; E. A. Porai-Koshits, "On the Structure of a Sodium-borosilicate Glass Subjected to Strong Thermal Treatment"; E. S. Andreyeva, V. I. Averbakh, V. A. Voyshvillo, "Structural Interpretation of the Internal Diffusion of the Visible Light in Sodium-boro-silicate Glasses". At the 5th meeting, 9 reports dealt with the investigation results of sodium-boro-silicate glasses. A. A. Appen and Sat' Fu-Si, "Boron and Aluminoboron Anomaly of the Properties of Silicate Glasses"; Ye. I. Gelch, "On the Coordination Numbers of Aluminum and Boron in Some Glasses"; S. P. Chikova reported on structural changes in boro-silicate glasses; Yu. A. Pospy-Kozhits and S. P. Zhdanov reported on some controversial problems concerning the structure of boro-silicate glasses and their porous products; Yu. A. Pospy-Kozhits and E. S. Litvyn, "Chalcogenide Inhomogeneities in the Structure of Simple Glasses". The 15 reports at

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18(6)
AUTHORS: Sryvalin, I. T., Yesin, O. A. SOV/163-59-1-2/50

TITLE: On the Most Simple Corrections to the Equations for Regular Solutions (O prosteyshikh popravkakh k formulam regulyarnykh rastvorov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 1, pp 5-10 (USSR)

ABSTRACT: In this paper an attempt is made to find simple extensions of the formulas from the theory of regular solutions, which would permit to extend the range of applicability of these formulas considerably. At first the influence of temperature is investigated. Formulas (2,1), (3,1), (4,1), and (5,1) are obtained for the heat of mixture ΔH, for the excess entropy $\Delta S'$, and the excess isobaric potential $\Delta z'$. From these formulas it can be seen that $\Delta z'$ is linearly dependent upon temperature, and that the relationship between ΔH, $\Delta z'$, $\Delta S'$ and the composition of the solution is also linear. Subsequently the consideration of the deviation from the additivity of the bindings is investigated. Formula (1,2) for the energy of mixture ΔE is written down for one mole of solution according to the theory of regular solutions. In this instance

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it is assumed that the atoms interact by means of short range order forces. It is further assumed that the atoms are in a state of statistical disorder and that in the calculation of the energy of mixture the rule concerning the additivity of bonds is applicable. Attempts are made to estimate the influence of small deviations from the rule of mixture for individual bonds. Formula (4,2) is derived. In this formula, Q denotes similar as for regular solutions the "energy of mutual exchange", whereas q denotes the deviation from the additivity of the binding energy between different atoms. Assuming that the entropy of mixture is identical with that of an ideal solution, formula (5,2) for $\Delta z'$ is written down. This formula specifies satisfactorily the thermodynamic characteristics of the isothermal lines of a number of silicate melts and of sulfide and metallic solutions (Ref 10), which are characterized not only by asymmetric curves for $\Delta z'$, but also by deviations with change of sign. This formula does, however, not express the dependence of $\Delta z'$ upon temperature. It is assumed that temperature takes a linear course and thus formulas (6,2), (7,2), (8,2), (9,2), and (10,2)

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are obtained. In order to elucidate the practical use of these formulas, the three systems tin-thallium, tin-zinc, and sodium-cadmium are investigated. The excess isobaric potential for the first system follows a linear relationship, that of the second is described by an asymmetric curve, the last system is characterized by deviations from the ideal solution with change of sign. Q and q were determined with the help of activities of one component of two mixtures found experimentally, whereas for the coefficient k (a constant which depends upon the nature of the constituents of the mixture) the experimental data for $\Delta z'$ at different temperatures were used. From a comparison of the experimental and the theoretical data follows that the system tin-thallium is an example of a solution, for which $\Delta S'$ differs noticeably from zero, although the isothermal lines of the activities follow the rules of regular solutions. The system tin-zinc exhibits a close agreement between the activities of the components and those of the enthalpy of mixture, which were computed according to the formulas (4,3) and (8,3), presented in this paper, and the experimental data. For the system sodium-cadmium the

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On the Most Simple Corrections to the Equations for Regular Solutions SOV/163-59-1-2/50

computed values for $\Delta z'$ coincide with the experimental values, whereas considerable deviations in the values appear for ΔH. There are 3 figures, 2 tables, and 13 references, 7 of which are Soviet.

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

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5(2), 24(3)

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

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 vysshoy 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 these ions which are decisive for the potential rather than the concentration of calcium ions. Slags with a higher Cu or Ni content showed also stronger exchange currents (Table 3). The measurement of the capacity (Table 3) 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 phases and (in the case of slags poor in metal) 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 increased the capacity of the double layer. The sulfide is oxidized and SO_2 is formed. At the same time the double layer is formed in a different way.

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On the Structure of the Electric Double Layer at the Boundary Between Liquid Sulfides and Silicates

SOV/156-59-1-19/34

The Fe cations pass from silicate to sulfide and charge it positively. The negative layer, therefore, now consists mainly of oxygen anions. The deformation of its cloud 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 FeO content in silicate the interphase voltage of the sulfides decreases considerably. These data are confirmed by the investigation of the electrocapillary motion of drops. In the electric field drops of copper and nickel sulfides in silicate move toward the anode. If about 7% FeO 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 3 tables and 15 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/156-59-1-11/34

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

SUBMITTED: February 22, 1958

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5 (2)

AUTHORS: Bratchikov, S. G., Yesin, O. A., Sryvalin, I. T. SOV/163-59-2-6/48

TITLE: The Thermochemistry of Melted Lead Silicates (K termokhimii rasplavlennykh silikatov svintsa)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 32-37 (USSR)

ABSTRACT: The specific heat in the $PbO-SiO_2$ melts was measured in the temperature interval of 550°-960° in solid and liquid state. The average molar specific heat and enthalpy for melts of different compositions are given in tables 1 and 2. The dependence of the melting heat (L) and enthalpy (ΔH_{298}^{T}) on the composition of the samples of the system was investigated and is given in figure 1. It is concluded from the results that stable compounds with the group Pb-O-Si exist in the melts. The experimentally measured c_p-values are higher than the additively detected ones. The results concerning the enthalpy, of the specific- and melting heats confirm the fact that the melts represent compounds with the structures

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

The Thermochemistry of Melted Lead Silicates SOV/163-59-2-6/48

$PbSiO_3$ and Pb_2SiO_4. Several thermodynamic parameters (characteristic values) for the melts $PbO-SiO_2$, as e. g. the heat (ΔH_x), entropy (ΔS_x), and the isobaric potential (ΔZ_x) were computed (Table 3). The dependence of heat (ΔH_x) and entropy (ΔS_x) on the isobaric potential (ΔZ_x) of the composition of the melt $PbO-SiO_2$ was investigated at 1223° K and the results are given in table 3. Stable asymmetrical groups like Pb-O-Si exist in the melt. The Laboratory Assistant B. T. Kadnikov and the Students S. I. Andrianov and V. I. Sokolov assisted in the measurements. There are 3 figures, 3 tables, and 10 references, 7 of which are Soviet.

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

SUBMITTED: July 4, 1958

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A.

Electrochemical properties and the structure of molten slag. Trudy Ural. politekh. inst. no.93:5-27 '59. (MIRA 15:3)
(Slag) (Electrochemistry)

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

BARMIN, L.N.; YESIN, O.A.; CHUCHMAREV, S.K.

Determining water activity in slag by electrochemical methods. (MIRA 15:3)
Trudy Ural. politekh. inst. no.93:28-38 '59.
(Slag) (Water) (Electromotive force)

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5(1,2) SOV/153-2-2-20/31

AUTHORS: Yesin, O. A., Bratchikov, S. G.

TITLE: Thermochemical Characteristics of Molten Iron Silicates (Termokhimicheskiye kharakteristiki rasplavlennykh silikatov zheleza)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1959, Vol 2, Nr 2, pp 247 - 253 (USSR)

ABSTRACT: Some of the structural features of silicates at low temperatures (Ref 1) in their crystalline phase as well as in their gaseous phase, could be explained by means of heat capacity. Analogous examination at high temperatures may supply material for an explanation of the structural properties of the liquid phases. Unfortunately the data given on the heat capacities of melted silicates, are only few (Refs 2,3). In order to fill this gap, the authors concentrated on the technically important system of $FeO-SiO_2$ the properties of which were often dealt with (Refs 6-11). The heat capacity was measured by means of the mixing method in the sphere of temperatures comprising the transition from the solid into the liquid phase (1100-1330°). For this purpose a plant is used with an adiabatic calorimeter (construction of the Institute obshchey i neorganicheskoy khimii AN SSSR - Institute of General and Inorganic

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Chemistry of the AS USSR). Figure 1 shows the experimental isotherms $\Delta H^{T}_{298} - H_{FeO}$ (curve 3 for 1290°) and the isotherms computed according to the rule of additivity from the enthalpies of the undercooled liquid oxides (straight line 4). The position of the experimental curve 3 below the corresponding straight line 4, apparently indicates (Refs 14,15) that there are orthosilicate Fe-O-Si groups in the melting mass developing during the evolution of heat. In other words, these groups develop besides the oxide melting. Therefore the additivity of the heat of fusion can only be maintained if the compound Fe_2SiO_4 is taken into consideration.

The difference in the heat effect of the reactions is approximately estimated from the deviation of the actual heat of fusion of the second sample (~4500 cal), from the heat of fusion computed according to the rule of additivity (~5700 cal). The authors proved that the degree of the disordered concentration of the liquid iron orthosilicate, estimated according to the radius of curvature of the liquidus curve at its maximum point, and also according to the heat of fusion, does not differ very much from that which is computed according to the thermochemical knowledge

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of solid substances. It was ascertained that the found values of the heat of mixture and those of the excess isobar potential, qualitatively correspond to the data achieved during the investigation of chemical equilibria and distribution coefficients. The negative sign of the heat of mixing and of the excess entropy, is explained by the authors as a confirmation of the existence of a larger order than the accidental statistical order with regard to the position of the Fe and Si cations beside the O-anions in the melting mass. Low positive values of the excess isobar potential are explained by a superposition of the effects connected with the silica polymerization due to its permanent solubility. There are 3 figures, 1 table, and 27 references, 21 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut; Kafedra teorii metallurgicheskikh protsessov (Ural Polytechnical Institute, Chair for the Theory of Metallurgical Processes)

SUBMITTED: February 10, 1958

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

KHLYNOV, V.V., inzh.; YESIN, O.A., prof.

Application of electrocapillary movements to reduce ferroalloy losses in slag. Izv.vys.uchab.zav.; chern.met. 2 no.7:3-11 Jl '59. (MIRA 13:2)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta.
(Electrocapillary phenomena)
(Iron alloys)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

SRYVALIN, I.T., kand.tekhn.nauk, dots.; YESIN, O.A., dokt.tekhn. nauk, prof.

Component activity of molten CaO - Al_2O_3 - SiO_2 systems. Izv.vys.ucheb.zav.; chern.met. 2 no.8:9-16 Ag '59. (MIRA 13:4)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta.
(Chemistry, Physical and theoretical)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A.

18.3000,18.3200

77131
SOV/148-59-9-1/[illegible]

AUTHORS: Nikitin, Yu. P. (Candidate of Technical Sciences), Yesin, O. A. (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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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

the authors are evidently taken from 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

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SOV/148-59-9-1/22

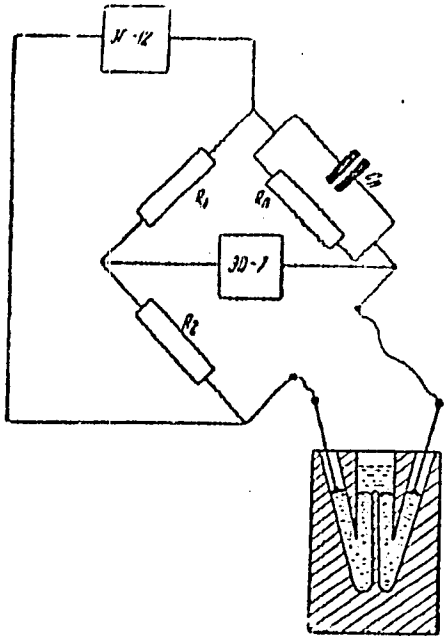

Fig. 1. A general view of the crucible and a schematic diagram of the electric bridge.

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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.

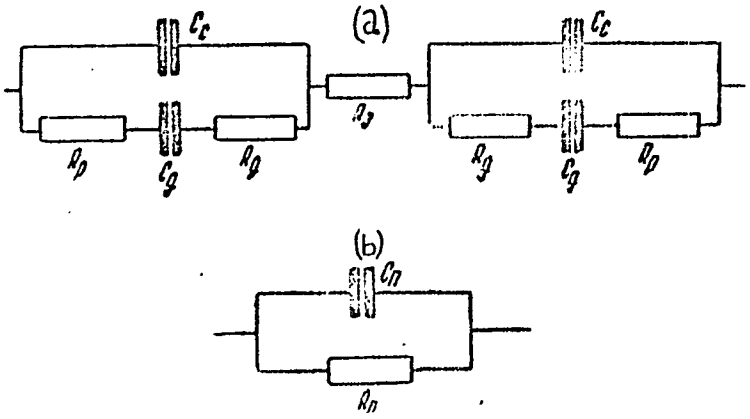

Fig. 2. The electrical diagrams of the cell: (a) theoretical; (b) its equivalent.

Card 5/8

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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 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_{Π} for Fe-C (about 4.5% C) alloys in different slags at 1450-1550° C and frequency of 50 cycles (at this point the authors state that all the values of R_{Π} 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_{Π} and R_{Π} at 1450-1550° 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

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(about 4.3% C) and the slag containing CaO, SiO_2, Al_2O_3 with small additions of FeO. The coefficients of diffusion of ions Fe^{2+} in the slag, determined by this method, are of the same order of magnitude as those determined by the radioactive isotope Fe^{59}. It was shown that the speed of exchange of ions between the slag and cast iron is not high and equals about 10^{-6} gram-ions through 1 cm^2 per second at 0.9% Fe in the slag and at 1580° 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 20 and into slag 27 kcal/gr-atom. There are 3 figures; 5 tables; and 30 references, 26 Soviet, 1 German, 1 U.K., 2 U.S. The U.S. references are: Martin, A., Derge, G., Amer. Inst. Min. Metall. Eng. (1943); Laitinen, H. A., Gaur, H. C., Journal of the Electrochemical Society, 12, 730 (1957). The U.K.

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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

reference is: Taylor, J., Stobo, I. I., Journal Iron and Steel Institute, 178 (4), 360-368 (1954).

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

Card 8/8

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A., doktor tekhn.nauk prof.; ZAKHAROV, I.N., inzh.

Determining the solubility of chromium oxides in iron slags. Izv.vys.ucheb.zav.; chern.met. 2 no.10:9-16 O '59. (MIRA 13:3)

1. Institut metallurgii Ural'skogo filiala AN SSSR. Rekomendovano kafedroy teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta.
(Chromium oxides) (Slag) (Electromotive force)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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67277
SOV/180-59-4-8/48

AUTHORS: Yesin, O.A., Lepinskikh, B.M. and Musikhin, V.I.
(Sverdlovsk)

TITLE: Study of the Thermodynamic Properties of the Lead Oxide-Vanadium Pentoxide, Lead Oxide-Silica and Lead Oxide-Vanadium Pentoxide-Silica Systems by the Method of Electromotive Force

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 4, p 47-51 (USSR)

ABSTRACT: Measurements of the emf E of a cell were used for determining the standard changes of potential ΔZ°, of entropy ΔS° and of enthalpy ΔH°. By introducing a second oxide in the electrolyte, the activity of the components and the deviation of the thermodynamic functions from ideal values can be calculated. The slag systems used were PbO - SiO_2, PbO - V_2O_5 and Pb - SiO_2 - V_2O_5 and the compositions are given in Table 1. Fig 1 shows the apparatus used, consisting of a resistance heater (1), a crucible (2), liquid lead (3), oxide mixture (4) and electrodes of platinum (5) and platinum-oxygen (7). The results for E for the PbO-SiO_2 system and the activity of PbO are given in Table 2. Fig 2 compares the results

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

Study of the Thermodynamic Properties of the Lead Oxide-Vanadium Pentoxide, Lead Oxide-Silica and Lead Oxide-Vanadium Pentoxide-Silica Systems by the Method of Electromotive Force

for the activity of PbO with the previous results by other workers. The present results are similar to those of Richardson and Webb (Ref 7). The negative deviations from ideal solution indicate the formation of Pb-O-Si, the stability of which increases with decreasing temperature. The thermodynamic functions for the $PbO-SiO_2$ system are given in Table 3 and Fig 3. The results confirm the formation of Pb-O-Si, with a decrease in potential and entropy and evolution of heat. The results of studies of the $PbO-V_2O_5$ system are given in Fig 2. This system shows greater negative deviations from the ideal state. The thermodynamic functions are given in Table 3 and Fig 3. These confirm the formation of Pb-O-V. Results for the system $PbO-SiO_2-V_2O_5$ are given in Table 4. Negative deviations are again observed. Results confirm that the bond in Pb-O-V is stronger than that in Pb-O-Si. The thermodynamic characteristics of PbO in the ternary system are given in Table 5. There are 3 figures, 5 tables and 9 references, 5 of which are Soviet and 4 English.

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

67277

SOV/180-59-4-8/48

Study of the Thermodynamic Properties of the Lead Oxide-Vanadium Pentoxide, Lead Oxide-Silica and Lead Oxide-Vanadium Pentoxide-Silica Systems by the Method of Electromotive Force

ASSOCIATION: Institut metallurgii UFAN (Metallurgical Institute UFAN)

SUBMITTED: February 20, 1959

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APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

SOV/78-4-4-28/44

5(2)

AUTHORS: Sryvalin, I. T., Yesin, O. A., Khlynov, V. V.

TITLE: On the Deviations of Molten Silicates From Ideal Solutions (Ob otkloneniyakh rasplavlennykh silikatov ot ideal'nykh rastvorov)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 877-883 (USSR)

ABSTRACT: The deviations of molten silicates from ideal solutions as well as the activity coefficients were computed by the following semi-empirical equations:

$RT \ln \gamma_1 = (2Q-q)N_2^2 + (2q-2Q)N_2^3$, and

$RT \ln \gamma_2 = (2q-Q)N_1^2 - (2q-2Q)N_1^3$,

where T denotes the absolute temperature, R = gas constant, γ_1, γ_2 = mole fractions, Q,q = coefficients of certain physical importance and N_1, N_2 = number of the atoms A and B. The silicate melts of the systems $FeO-SiO_2$, $PbO-SiO_2$, $CaO-SiO_2$ and

Card 1/2

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

On the Deviations of Molten Silicates From Ideal Solutions

$MgO-SiO_2$ were investigated by means of these equations. The activity of SiO_2 and FeO at 1600° was calculated and is listed in table 1. The values agree well with publications. In the system $PbO-SiO_2$ the activity at 900° was calculated and is represented in figure 3. In this system the authors observed positive and negative deviations from the ideal solution with PbO, while they found only positive deviations in the case of SiO_2. The systems $CaO-SiO_2$ and $MgO-SiO_2$ were thermodynamically characterized by determinations of the activity of CaO and MgO at 1600° and 1700°. Figure 4 shows the negative deviation of the melt $CaO-SiO_2$ from the ideal solution at 1600°. For the system $MgO-SiO_2$ the authors computed Q and q according to the composition of the corresponding liquid phases at 1700°. The measurement results applied and the results of the computation of Q and q are contained in a table. There are 4 figures, 2 tables, and 14 references, 11 of which are Soviet.

SUBMITTED: January 17, 1958
Card 2/2

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

AUTHORS: Lepinskikh, B.M., Yesin, O.A.

SOV/80-32-2-13/56

TITLE: On the Possibility of Carbon Control in the Converter Process by the Method of Electro-Motive Forces (O vozmozhnosti kontrolya ugleroda v konverternom protsesse metodom elektrodvizhushchikh sil)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol XXXII, Nr 2, pp 313-317 (USSR)

ABSTRACT: A galvanic element [Ref. 6] Fe, C | CaC, Al_2O_3, CaC_2 | Fe, C may be used for the control of carbon in the converter process. In Figure 3 the changes of the emf (upper curves) and of the carbon content (lower curves) are given. In the initial stage of the process there are considerable differences between the data. In the later stages the values determined by the emf method and those obtained by chemical analysis are more congruent. The experiments were made with a small induction furnace of 1.5 kg capacity and a converter of 50 kg capacity. In the second case there were considerable deviations, especially in the presence of Si, Mn, S, and P admix-

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APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

On the Possibility of Carbon Control in the Converter Process by the Method of Electro-Motive Forces

tures in the iron. The emf method may only be used for the qualitative determination of carbon.
There are 2 diagrams, 3 graphs, 1 table, and 6 references, 4 of which are Soviet, 2 English, 1 French, and 1 German.

SUBMITTED: October 7, 1957

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

SOV/76-33-8-36/39

5(4), 28(5)
AUTHORS: Yesin, O. A., Teterin, G. A., Zakharov, I. K.

TITLE: On the Transfer Numbers in Melted One-component Electrolytes

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 8, pp 1887-1890 (USSR)

ABSTRACT: Publications point out that experimental difficulties exist in the determination of the transfer number (n) of ions in pure melted salts (Refs 1, 2). As often as not, it is said that such measurements are not only highly complicated but in fact impossible. Various publications are thoroughly studied in the present paper, and the problems arising in connection with the determination of the transfer number are investigated. In particular, the statements made by Sundheim (Ref 5), as well as the friction between ions, are discussed. It is stated on the basis of the observations made that there has not yet accumulated sufficient evidence to say positively that it is impossible to measure the transfer number in one-component systems of melted electrolytes. There are 14 references, 4 of which are Soviet.

Card 1/2

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

On the Transfer Numbers in Melted One-component Electrolytes SOV/76-33-8-36/39

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Institut metallurgii, Sverdlovsk
(Urals Branch of the Academy of Sciences USSR, Institute of Metallurgy Sverdlovsk)

SUBMITTED: April 10, 1959

Card 2/2

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A., doktor tekhn.nauk; BRATCHIKOV, S.G., kand.tekhn.nauk

Heat capacity of molten iron silicates. Trudy Ural.politekh. inst. no.75:243-247 '59. (MIRA 13:4)
(Iron silicates--Thermal properties)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

5(4)
AUTHORS: Zakharov, I. N., Yesin, O. A.

SOV/20-126-3-41/69

TITLE: The Electric Conductivity and the Cathode Polarization of Chromium-containing Slags (Elektroprovodnost' i katodnaya polyarizatsiya khromsoderzhashchikh shlakov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 3, pp 605-607 (USSR)

ABSTRACT: In the introduction the formation of bivalent chromium in slag which is in contact with a steel bath is mentioned, which has already been dealt with by a number of papers (Refs 1-3), and an earlier paper by the authors is mentioned (Ref 4) in which this problem is also investigated in connection with the determination of the solubility of chromium oxides. As shown by Yu. P. Kiryushkin in a paper (Ref 5), trivalent chromium decreases electric conductivity in the alloy $CaO-SiO_2$, and bivalent chromium increases it. Further, Pastukov showed in a paper (Ref 6) that in slags with a low content of iron, ions of bivalent chromium increase electric conductivity, and that ions of bivalent chromium increase viscosity. The authors investigated the influence exercised by bi- and trivalent chromium upon the conductivity of the slags, and the electrical equipment for

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APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

The Electric Conductivity and the Cathode Polarization of Chromium-containing Slags SOV/20-126-3-41/69

measuring them as well as the composition of the slags is described. A diagram shows the dependence of conductivity on temperature and on the composition of the slags (Fig 1). This diagram is discussed in great detail, each of the 13 different compositions being investigated. Cathode polarization was investigated both with a solid tungsten electrode and with a liquid cathode of copper; two diagrams (Figs 2,3) show the results of measurements. These results are also discussed in detail, on which occasion also the respective experimental conditions and the composition of the slags are dealt with. There are 3 figures and 16 references, 13 of which are Soviet.

ASSOCIATION: Institut metallurgii Ural'skogo filiala Akademii nauk SSSR (Institute of Metallurgy of the Ural Branch of the Academy of Sciences, USSR)

PRESENTED: February 20, 1959 by I. P. Bardin, Academician

SUBMITTED: February 19, 1959

Card 2/2

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

SOV/20-126-5-34/69

5(4)

AUTHORS: Musikhin, V. I., Yesin, O. A., Lepinskikh, B. M.

TITLE: Cathodic Polarization During the Deposition of Vanadium From Melted Oxides (Katodnaya polyarizatsiya pri osazhdenii vanadiya iz rasplavlennykh okislov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 5, pp 1037-1040 (USSR)

ABSTRACT: S. A. Sakharuk and G. M. Vaynshteyn (Ref 1) showed the possibility of an electrolytic deposition of V from melted calcium aluminate, containing V_2O_5, on a liquid iron cathode. The kinetics of this process is investigated. Figure 1 shows the polarization curves on the Fe,V-cathode for two Ca-aluminate melts (with and without SiO_2) to which different amounts of V_2O_5 (up to 3%) were added. The critical currents are proportional to the V_2O_5-content of the melts. Considering that the diffusion coefficients in liquid iron are much higher than in the oxide melts ($i'_n \gg i_n$), the following may be derived from the equation for the polarization of the concentration: $-\eta \approx \frac{RT}{nF} \ln(1 - \frac{i}{i_n})$ (2).

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APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

Cathodic Polarization During the Deposition of Vanadium From Melted Oxides

The points of the initial sections of the polarization curves are in the coordinate system η, $\lg(1-\frac{i'}{i_n})$ actually on a straight (Fig 1) with an angular coefficient equal to $n \cong 5$. Consequently the reaction $V^{5+} + 5e = V$ takes place on the cathode (3). The further course of the polarization curve for the melt containing SiO_2 shows that Si is discharged. Thus, under the conditions chosen a separate deposition of V and Si is possible. This was examined on melts with small additions of SiO_2 and V_2O_5 (Fig 2). In the aforementioned coordinate system two straight lines result corresponding to reaction (3) and reaction $Si^{4+} + 4e = Si$ (4). At an increasing concentration of V_2O_5 (up to 35%) a considerable polarization occurs (Fig 3) which disobeys equation (2). It is explained by an accumulation of the low-valent V^{3+}-ions on the electrode. The deposition of metallic vanadium and the change in charge of vanadium ions is limited by

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

Cathodic Polarization During the Deposition of Vanadium From Melted Oxides

the diffusion in the oxide melt. These processes take place at more positive potentials than the deposition of Si. The presence of iron oxides reduces the current yield of V as the cathodic reduction of Fe^{3+} and Fe^{2+} takes place more easily. There are 3 figures and 8 references, 6 of which are Soviet.

ASSOCIATION: Institut metallurgii Ural'skogo filiala Akademii nauk SSSR (Institute of Metallurgy of the Urals Branch of the Academy of Sciences, USSR)

PRESENTED: March 3, 1959, by A. N. Frumkin, Academician

SUBMITTED: March 3, 1959

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

5(4) SOV/20-128-3-37/58

AUTHORS: Yesin, O. A., Teterin, G. A.

TITLE: Mobility of Cations in Molten Phosphates

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 3, pp 567-570(USSR)

ABSTRACT: Investigations of silicate melts (Refs 1-8) proved that the transport of electricity is mainly due to metal cations and not to Si-ions. The low mobility of the Si-ion is also confirmed by its low diffusion coefficient D_{Si} (Ref. 9). In $CaO-P_2O_5$-melts however, the D_P of phosphorus is larger than D_{Ca}, whereas the transport number n_P equals zero (Refs 10-11). In order to explain this contradiction the electrical conductivity, the transport number and the ionic velocity were investigated in $CaO - P_2O_5$ and $CaO - CoO - P_2O_5$ melts using the isotopes Ca^{45}, Co^{60} and P^{32}. The method is described in reference 2. A graphite pot, served as cathode and a graphite bar, later replaced by phosphor bronze as anode. For the chosen test temperature no remarkable volatilization of radioactive phosphorus occurred. Some of the test results are shown in tables 1 and 2 and in figures 1-2. The transport numbers $n_{Ca} = 0.7$ and $n_P = 0.3$ were determined. In melts containing Co (as well as in silicate melts) $n_{Ca} = 0.5$ and $n_{Co} = 0.4$ were found. The transport number

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n_D decreased however from 0.3 to 0.2, though the concentration of P_2O_5 was constant. The mobility of the Ca^{2+}-ions was investigated in corundum tubes by means of tagged atoms. The diffusion was measured under and without the action of electric current (Fig 3) and a noticeable electrolytic mobility of the phosphorus in $CaO-P_2O_5$ melts was determined. The electric transport in these melts is not only done by Ca-ions, but also by P-ions, whereby the latter do not migrate as complex anions but as cations. Though the ionic charge of Ca and of P is almost equal and the radius of the P-ion is smaller, the mobility of the P-ion is lower being retarded by the stronger P-O linkage. In the diffusion however, the phosphorus migrates as cation as well as with the oxygen anions, similar to diffusion of ionic pairs in NaCl-melts. There are 3 figures, 2 tables, and 19 references, 13 of which are Soviet.

ASSOCIATION: Institut metallurgii Ural'skiy filial Akademii nauk SSSR (Institute of Metallurgy Ural Branch of the Academy of Sciences, USSR)

PRESENTED: May 21, 1959, by A. N. Frumkin, Academician

SUBMITTED: May 21, 1959

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YESIN, O.Th.

PHASE I BOOK EXPLOITATION SOV/2186

Akademiya nauk SSSR

Stroyenlye vesheshestva i spektroskopiya (Structure of Matter and Spectroscopy) Moscow, Izd-vo AN SSSR, 1960. 113 p. Errata slip inserted. 2,300 copies printed.

Ed.: K. V. Astakhov, Professor; Tech. Ed.: T. P. Polenova.

Purpose: This collection of articles is intended for physicists and chemists interested in spectroscopic methods of research on the structure of molecules and related problems.

Contents: The articles contained in this collection were taken from the Editorial files of the Zhurnal fizicheskoy khimii (Journal of Physical Chemistry) and are concerned with spectroscopic methods in research on the structure of molecules, the hydrogen bond, isotopic effects, problems in magnetochemistry, the structure of aqueous solutions of electrolytes, and the chemistry of complex compounds. References accompany individual articles.

The author thanks the following for having participated in determining the density of deuterocompounds: V. G. Gol'd, P. N. Nikolayev, V. I. Kucheryavyy, Ye. Z. Zhuravlev, V. I. Murin, and L. S. Zhilkin. He thanks A. I. Brodskiy for his discussion of the results.

Ar'yev, A. M., and M. B. Al'shuler [Novocherkassk Polytechnic Institute]. Problem of Change in the Structure of Polyethylene at Place-Radial Extension 69

Babinovich, I. B., V. M. Balov, Ye. I. Nazimova, S. P. Yaremenko, and V. M. Nikolayev [Gor'kiy State University imeni N. I. Lobachevskiy]. Isotopic Effect on the Viscosity of Deuteroalcohols 73

Yatsina, M. I., V. N. Yerofeyenko, and V. V. Pasenko. Investigation of Surface Tension of Liquid Metal Solutions. I. Surface Tension of a Lead-Silver System 78

Voyutskiy, I. I. Coordination Equilibria of Nickel Ions in $K_2O - PbO - SiO_2$ System Glasses 81

Glazyrin, V. A. [Institut khimii silikatov (Institute of the Chemistry of Silicates)]. Structure of Spodumene Glass 91

V. I. Averyanov is thanked for having plotted the curves for α- and β- spodumene and for the crystallization product of spodumene glass.

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The author thanks I. N. Kolechavaya and B. Ye. Samsonov for the numerical calculations, and Ye. N. Gur'yanova and M. M. Adamov for their suggestions.

Smorlov, O. Ya., and N. N. Pushayeva [Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov)]. Temperature Dependence of Coordination Numbers of Alkali Metal Cations in Aqueous Solutions 102

Yatsina, O. A. [Ural'skiy politekhnicheskiy institut im. S. M. Kirova (Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk)]. Form of Surface Tension Isotherms 111

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YESIN, O.A.

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Vsesoyuznoye soveshchaniye po steklokhimii; 3d, Leningrad, 1959.

Steklokhimiya; trudy Tretyego vsesoyuznogo soveshchaniya Leningrad, 16-20 noyabrya 1959 (Vitreous State; Transactions of the Third All-Union Conference on the Vitreous State, Held in Leningrad on November 16-20, 1959) Moscow, Izd-vo AN SSSR, 1960. 534 p. Errata slip inserted. 3,200 copies printed.
(Series: Its: Trudy)

Sponsoring Agencies: Institut khimii silikatov Akademii nauk SSSR. Vsesoyuznoye khimicheskoye obshchestvo imeni D.I. Mendeleyeva and Gosudarstvennyy orden Lenina opticheskiy institut imeni S.I. Vavilova.

Editorial Board: A.I. Avgustinik, V.P. Barzakovskiy, M.A. Bezborodov, O.K. Botvinkin, V.V.Vargin, A.G. Vlasov, K.S. Yevstropyev, A.A. Lebedev, M.A. Matveyev, V.S. Molchanov, R.L. Myuller, Ye.A. Porai-Koshits, Chairman, M.A. Toropov, V.A. Florinskaya, A.K. Yakhkind; Ed. of Publishing House: I.V. Suvorov; Tech. Ed.: V.V. Bocharov.

PURPOSE: This book is intended for researchers in the science and technology of glasses.

COVERAGE: The book contains the reports and discussions of the Third All-Union Conference on the Vitreous State, held in Leningrad on November 16-19, 1959. They deal with the methods and results of studying the structure of glasses, the nature of the relation between the structure and properties of glasses, the nature of the chemical bond and glass structure, and the crystallochemistry of glass. Fused silica, mechanism of vitrification, optical properties and glass structure, and the electrical properties of glasses are also discussed. A number of the reports deal with the dependence of glass properties on composition, the tinting of glasses and radiation effects, and mechanical, technical, and soda borosilicate glasses. Other papers treat glass semiconductors and photoconductivity of glasses. The Conference was attended by more than 500 delegates from Soviet and East German scientific organizations. Among the participants in the discussion were N.V. Solomin, Ye. V. Kuvshinskiy, Yu.A. Gastev, V.P. Pryamikhin, Yu. Ya. Gotlib, O.P. Mchedlov-Petrosyan, G.P. Mikhaylov, G.K. Petrov, A.N. Lazarev, D.I. Levin, A.V. Shatilov, N.F. Plashchinskiy, P.Ye. Bokiy, E.K. Keller, Ye.A. Myrzakovskaya, A.A. Kalenov, M.M. Shemyakov, F. Flinker, and O.S. Molchanova. The final session of the Conference was addressed by Professor I.I. Kitaygorodskiy, Rukovitel' section of the Conference was addressed by Professor V.P. Pardaev, R.S. Shevelevich, Z.G. Pinsker, and O.S. Molchanova. Honored Scientist and Engineer, Doctor of Technical Sciences. The following institutes were cited for their contribution to the development of glass science and technology: Gosudarstvennyy opticheskiy institut (State Optical Institute); Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, AS USSR); Fiziko-tekhnicheskiy institut AN SSSR (Physics Institute AS USSR), Fiziko-tekhnicheskiy institut fiziki AN BSSR, Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, AS USSR), Institut fiziki AN BSSR, Minsk (Institute of Physics, Academy of Sciences, Belorusskaya SSR, Minsk), Fiziko-tekhnicheskiy institut (Physicotechnical Institute AS USSR), Institut obshchey i neorganicheskoy khimii AN SSSR, Minsk (Institute of General and Inorganic Chemistry, Academy of Sciences, Belorusskaya SSR, Minsk), Institut vysokomolekulyarnykh soyedineniy AN SSSR (Institute of High Molecular Compounds, AS USSR), Gosudarstvennyy institut steklyannykh volokna (State Institute for Glass Fibers), Gosudarstvennyy institut elektrotekhnicheskoy stekla (State Institute for Electrical Glass), Sibirskiy fiziko-tekhnicheskiy institut, Tomsk (Siberian Physicotechnical Institute, Tomsk), Leningradskiy gosudarstvennyy universitet (Leningrad State University), Moskovskiy khimiko-tekhnologicheskiy institut (Moscow Institute of Chemical Technology), Leningradskiy tekhnologicheskiy institut (Leningrad Technological Institut imeni Lensoveta), Belorusskiy politekhnicheskiy institut (Belorussian Polytechnic Institute, Minsk), Novocherkasskiy politekhnicheskiy institut (Novocherkask Polytechnic Institute), and Sverdlovskiy politekhnicheskiy institut (Sverdlovsk Polytechnic Institute). The Conference was sponsored by the Institute of Silicate Chemistry AS USSR (Acting Director - A.S. Gotlib), the Vsesoyuznoye khimicheskoye obshchestvo im. D.I. Mendeleyeva (All-Union Chemical Society imeni D.I. Mendeleyev), and the Gosudarstvennyy orden Lenina opticheskiy institut imeni S.I. Vavilova (State Order of Lenin "Optical Institute imeni S.I. Vavilov). The 35 resolutions of the Conference include recommendations to organize a Center for the purpose of coordinating the research on glass, to publish a new periodical under the title "Fizika i khimiya stekla" (Physics and Chemistry of Glass), and to join the International Committee on the Organization of Chemistry of Glass. Academician, Professor, and Chairman of the Committee A.A. Lebedev, Professor, Doctor of Physics and Mathematical Sciences, Member of the Organizational Committee Ye.A. Porai-Koshits, Professor, Doctor of Chemical Sciences, Member Ye.A. Porai-Koshits, and R.L. Myuller, Doctor of Chemical Sciences, Member of the Organizational Committee. The editorial board thanks G.M. Barlow, M.V. Volkenshteyn, L.I. Demkina, D.P. Dobychin, F.N. Dubrovo, V.A. Ioffe, and B.T. Kolomiytsev. References accompany individual reports.

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TETERIN, G.A.; YESIN, O.A.

Electrolytic recovery of cobalt from molten slags. Izv.vys.ucheb. zav.; tsvet.met. 3 no.2:65-68 '60. (MIRA 15:4)

1. Ural'skiy politekhnicheskiy institut, kafedra teorii metallurgicheskikh protsessov.
(Cobalt--Electrometallurgy) (Slag)

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KHLYNOV, V.V., assistent; YESIN, O.A., prof., doktor tekhn.nauk

Activity of lead oxide in $PbO - Na_2O - SiO_2$ melts determined by the electromotive force method. Trudy Ural. politekh.inst. no.91:117-127 '60. (MIRA 14:2)

(Lead oxide) (Activity coefficients)

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

KVYATKOVSKIY, A.N.; YESIN, O.A.; ABDKYEV, M.A.; KHAN, O.A.

Thermodynamics of the direct and indirect reduction of melted lead oxides. Vest.AN Kazakh.SSR 16 no.2:19-25 F '60. (MIRA 13:6)
(Reduction, Electrolytic) (Lead oxides)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

KVYATKOVSKIY, A.N.; YESIN, O.A.; ABDEYEV, M.A. (Ust'kamenogorsk)

Determination of the isobaric potential of the direct reduction of liquid lead oxide by the electromative force method. Zhur. fiz. khim. 34 no. 11:2463-2466 N '60. (MIRA 14:1)

1. Akademiya nauk KazSSR, Altayskiy gorno-metallurgicheskiy institut.
(Lead oxide) (Electromotive force)

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A.; POPEL, S.I.; CHUCHMAREV, S.K.

Sulfur removal from slag by electrolysis. Izv.vys.ucheb.zav.; chern.met. no.3:5-9 '60. (MIRA 13:4)

1. Ural'skiy politekhnicheskiy institut.
(Slag) (Desulfuration)

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

BRATCHIKOV, S.G.; YESIN, O.A.

Thermochemistry of PbO - Na_2O and Na_2O - SiO_2 melts. Izv. vys. ucheb. zav.; tsvet. met. 3 no.4:39-44 '60. (MIRA 13:9)

1. Ural'skiy politekhnicheskiy institut. Kafedra teorii metallurgicheskikh protsessov.
(Metallic oxides) (Thermochemistry)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

KIR'YANOV, A.K.; YESIN, O.A.

Current efficiency in the electrolysis of molten iron silicate.
Trudy Inst.met.UFAN SSSR no.5:87-92 '60. (MIRA 13:8)
(Iron--Electrometallurgy)

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0"

"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

YESIN, O.A.

Efficient ion charge in slags. Izv. vys. ucheb. zav.; chern. met. no.8:5-14 '60. (MIRA 13:9)

1. Ural'skiy politekhnicheskiy institut.
(Slag) (Ionic crystals)

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E032/E414

24.2200 1144, 1395, 1482, 1162

AUTHORS: Vatolin, N.A. and Yesin, O.A.

TITLE: Magnetic Susceptibility of Antimony-Palladium Melts

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.5, pp.798-800

TEXT: In recent years, magnetic analysis has been widely used in chemical studies. This method is one of the few which can be used to obtain direct information on the structure of liquid metal systems. The present paper reports measurements of the magnetic suspectibility of antimony-palladium melts, using the Faraday method. The force on the specimens was measured with the aid of an analytical balance, the balancing force being produced by a permanent magnet and a compensating solenoid. The specimens were placed in a heater consisting of two coaxial quartz tubes. A bifilar nichrome heater was wound on one of the tubes. The temperature was measured by a thermocouple. All the measurements were carried out at atmospheric pressure in an argon atmosphere. Sponge palladium and chemically pure antimony were investigated. At room temperature the magnetic susceptibility of antimony was -0.34×10^{-6} while the susceptibility of palladium was

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Magnetic Susceptibility of Antimony-Palladium Melts

22.8×10^{-6}. These figures differ from published data, indicating that the materials employed contained some unknown impurities. The palladium antimony alloys (44% Sb and 56% Pd) were prepared in an argon atmosphere at 900°C. 1.765 g of the material thus obtained was placed in a quartz ampoule, the susceptibility of the quartz ampoule being compensated for by an identical empty ampoule. The working space was then evacuated and filled with argon and the specimen was heated to 850°C. After the measurements had been carried out, the temperature was reduced, the ampoule was weighed and the loss of antimony from the alloy was determined. It was usually found to be between 0.005 and 0.02% of the total amount of material. A known amount of antimony was then added and the experiment was repeated. The results obtained are shown in the figure and table on p.799. They show that palladium - antimony alloys have a weak diamagnetism at 850°C, while at room temperature they are relatively strong paramagnetics (susceptibility between 2×10^{-6} and 9×10^{-6}). As can be seen from the figure, the susceptibility versus concentration curve has

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Magnetic Susceptibility of Antimony-Palladium Melts

a minimum of 54% Sb. This can apparently be explained by the formation of a valence bond between the d-electrons of the palladium atoms and the p-electrons of the antimony atoms. The above concentration of 54% Sb corresponds to the compound PdSb. The present measurements thus indicate that in palladium - antimony melts, there are ordered structures corresponding to the compound PdSb. There are 1 figure, 1 table and 7 references: 2 Soviet and 5 Non-Soviet (one of which is translated into Russian).

ASSOCIATION: Institut metallurgii UFAN SSSR
(Institute of Metallurgy UFAN USSR)

SUBMITTED: May 26, 1960

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

ORLOV, V.N.; YESIN, O.A.; SHURYGIN, P.M.

Investigating the direct reduction process of iron oxides from molten slag by the electromotive force method. Izv. vys. ucheb. zav.; chern. met. no. 11:12-19 '60. (MIRA 13:12)

1. Ural'skiy politekhnicheskiy institut.
(Iron oxide) (Electromotive force)

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

S/148/60/000/011/001/015
A161/A030

AUTHORS: Yesin, O. A.; Pastukhov, A. I.; Popel', S. I.; Dzemyan, S.K.

TITLE: Desulfuration of steel and slag with the electric current in an arc furnace

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 11, 1960, 20 - 26

TEXT: It was stated in several previous investigations that sulfur reduction from iron and steel can be speeded up by direct current when liquid metal is the cathode. Information is given on experiments with D.C. and A.C. in a 500-kg three-phase arc furnace normally working with 1500 amp. A.C. from a 400 kva transformer. The transformer was connected by means of switches to a mercury rectifier to produce 1500 - 2000 amp D.C. Slag was deoxidized with 2 - 2.5 kg ferrosilicon and 1 kg coke, and liquefied with fluorspar or with sodium silicate. Liquefiers, and particularly fluorspar, raised the desulfuration rate considerably. Evaporation of S was observed along with electrolysis by D.C. as well as A.C., which shows that

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A161/A030

Desulfuration of steel and slag ....

S elimination is possible through the irradiation with electrons and photons from the arc. A perceptible FeO content in slag and slowed desulfuration was observed at C below 0.27 %, and a regular increase of desulfuration rate with increased initial S content, which appears to be due to the S content in the layer at the electrode and on the slag surface. The slag layer depth had a considerable effect. It had been stated in previous work (Ref. 7: Yesin, Popel' and Chuchmarev, Izv. vyssh. uch. zav. Chern. metallurgiya, 1960, No. 3, 5) that electrochemical S elimination into gas takes place when alternating current passes through the slag, and the process goes on the electrode which is the anode at the moment; the S elimination is relatively intense also when A.C. is brought into the slag by arcs. To compare the effect of D.C. and A.C., one electrode in the A.C. process was submerged into the slag, and the two other electrodes closed the circuit with the arcs. Desulfuration in this case was slightly lower with A.C. than with D.C. In two heats electrodes were not submerged and three A.C. arcs burned; C content in metal was about 1 %, and fluorspar was used for the slag liquefier. The result was a lower S content in the metal and slag, and the final S content in the metal was 0.003% (or 12 % of the initial S content). The desulfuration rate was practically equal with the three A.C. arcs with 1500

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Desulfuration of steel and slag ....

amps each and with one 2200 amp D.C. arc. A considerable desulfuration had been observed previously in conventional operation in electric arc furnaces (Ref. 11: A. M. Samarin, Elektrometallurgiya, Metallurgizdat, 1945), but the authors did not connect the phenomenon with electrochemical reactions. The results of experiments have proven that A.C. electrolysis and irradiation from burning arcs must be considered in addition to the phenomena usual in the open-hearth process. Conclusions: 1) It is proven in production-scale electrochemical desulfuration experiments that the speed and completeness of sulfur elimination from steel is higher with electric arcs; 2) It is confirmed that desulfuration is possible by direct as well as by alternating current of common frequency, and the difference is only slight; 3) The sulfur elimination rate is higher, the thinner the layer is of well-deoxidized basic fluid slag containing fluorspar; up to 90 % of the total sulfur content in metal and slag is extracted in 30 - 40 min. without skimming the slag, and the final sulfur content in metal sinks to 0.002 - 0.005 %; 4) It is apparent that mass transfer of sulfur in slag is the major limiting stage of the desulfuration process in conventional arc furnace operation.

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A161/A030

Desulfuration of steel and slag ....

There are 3 figures and 9 Soviet and 2 non-Soviet references; the reference to the English-language publication reads as follows: (Ref. 10) R. E. Boni, G. Derge, Journal of Metals, 8, 59, 1956.

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

SUBMITTED: April 19, 1960

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

S/076/60/034/009/009/022
B015/B056

AUTHORS: Teterin, G. A. and Yesin, O. A.

TITLE: Simultaneous Determination of the Diffusion, the Transfer, and the Mobility of Ions in Molten Cobalt Silicates

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, pp. 1976-1979

TEXT: A method of simultaneously determining the mobility of ions, their transfer number, and the coefficients of mass transfer in melts is described, and the results obtained for the cobalt cation $CoO-SiO_2$ melts is given. The device used (Fig. 1) is, in principle, a corundum crucible, in which the silicate to be investigated is melted. A tungsten cathode is introduced into the melt, which is surrounded by a corundum shell down to the lower end, and further also two corundum tubes, whose diameters are accurately measured with an МИР-1М (MIR-1M) microscope. In the two tubes two tungsten rods are dipped into the melt, one tungsten rod serving as an anode. Onto the immersed points of the two tungsten rods, radioactive silicate of the investigated composition was applied. Next, direct

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Simultaneous Determination of the Diffusion, the Transfer, and the Mobility of Ions in Molten Cobalt Silicates

S/076/60/034/009/009/022
B015/B056

current is caused to pass through the rod serving as an anode. Transfer of the isotope from the tungsten rod not connected with the circuit is thus carried out only by natural diffusion and convection. The duration of the experiment was selected in such a manner that the isotope did not reach the bottom of the crucible. After the end of electrolysis, the crucible was quickly cooled, the two tubes with the activated tungsten rods were cut out, purified, and the activity distribution was determined by means of a slit in a lead shield and a Geiger counter of the type Б (B). In the present case, Co^{60} was used, and for cobalt metasilicate the following values were obtained (Table) at 1450-1460°C: U_{Co} = (1.2 -1.6)·10^{-4} cm^2/v·sec, n_{Co} = 0.94-1.03, D_{Co} = (1-3.7)·10^{-5} cm^2/sec. The reliability of the measuring method described is confirmed by the agreement between the experimental values of electrical conductivity with the calculated ones. There are 2 figures, 1 table, and 7 references: 6 Soviet and 1 US.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR Institut metallurgii (Ural Branch of the Academy of Sciences USSR, Institute of Metallurgy)

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Simultaneous Determination of the Diffusion, the Transfer, and the Mobility of Ions in Molten Cobalt Silicates

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

S/180/60/000/006/021/030
E111/E335

AUTHORS: Yesin, O.A. and Sryvalin, I.T. (Sverdlovsk)

TITLE: Thermodynamic Properties of Metallic Alloys and Phase Diagrams

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, No. 6, pp. 116 - 118

TEXT: The authors give a critical survey of investigations of thermodynamic properties of alloys (mainly binary metallic) in relation to the corresponding phase diagrams. Deviations of solution from ideality form the major part of the survey. For systems with continuous solid solution deviations are usually slightly negative or zero. An example of the rare system where positive deviation in the liquid accompanies complete miscibility in the solid could be Au-Ni but the authors doubt the evidence (Refs. 2, 3). Most such systems obey regular-solution laws. Simple eutectic alloys generally show positive deviation; those that show a negative deviation, such as Bi-Pb, are specially interesting. Negative deviations

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Thermodynamic Properties of Metallic Alloys and Phase Diagrams

also occur when unstable compounds, decomposing below the melting point, are formed. Especially large negative deviations occur in alloys of iron with nonmetallics. E.m.f. measurements (Ref. 5) indicate the existence of stable FeSi. These results are in line with those of other methods (Refs. 6, 7, 8, 9). The e.m.f. method has also been used (Ref. 10) for carbon-saturated ferro-alloys: Fe_2P was detected in Fe-P-C (Ref. 12). Positive deviations are suggested if there is an immiscibility "dome" on the phase diagram; other links between e.m.f. results and phase diagrams have been reported (Refs. 16, 17). The submicro heterogeneity of eutectoid liquid alloys is suggested by X-ray (Ref. 18), centrifuging (Ref. 19) and thermal (Refs. 20-22) experiments. The authors doubt the validity of Bartenev's views (Ref. 23)

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Thermodynamic Properties of Metallic Alloys and Phase Diagrams

on liquid-solid relationships. Of the authors, Yesin has cooperated in many contributions in this field, e.g. Refs. 5, 10, 11, 12, 13, 16, 17, 24.
There are 24 references: 18 Soviet and 6 non-Soviet.

SUBMITTED: August 26, 1960

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

LEPINSKIKH B.M.; YESIN, O.A.; TETERIN, G.A.

Surface tension and density of alloys containing oxides of lead, vanadium, and silicon. Zhur. neorg. khim. 5 no.3:642-648 Mr '60. (MIRA 14:6)

1. Institut metallurgii Ural'skogo filiala AN SSSR.
(Lead oxide)
(Vanadium oxide)
(Silica)

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S/081/62/000/008/033/057
B156/B101

18.1200

AUTHORS: Lepinskikh, B. M., Yesin, O. A., Musikhin, V. I., Vatolin, N. A.

TITLE: The electrochemical alloying of metal with vanadium

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 8, 1962, 372, abstract 8K198 (Sb. "Fiz.-khim. osnovy proiz-va stali". M., AN SSSR, 1961, 238-241)

TEXT: The electrochemical extraction of V from dumped or conversion blast furnace slags containing up to 20% V_2O_5 and up to 40% FeO is described. The cathodic current yield of V in relation to D_c, the furnace atmosphere, the composition of the slag and metal and the temperature is investigated. In oxidizing atmospheres the cathodic current is much lower than in reducing atmospheres, since in the first case the V is in the form of V_2O_5. Variation between 1 and 2.5 a/cm^2 in D_c may be accompanied by a possible variation between 5 and 25% in the initial V content. The metal bath of the furnace can be used as the cathode. [Abstracter's note: Complete translation.]

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"APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920011-0

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 $Fe - 2e \rightleftarrows Fe^{2+}$ (1) and $Mn - 2e \rightleftarrows Mn^{2+}$ 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

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Kinetics of the reaction of ... S/081/62/000/011/009/057
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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.]

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