2

processes in these rubbers by reduction of the temperature. The structures present in the raw rubbers were found to be preserved during the vulcanization process. The authors note that the widespread idea of rubbers as homogeneous systems, consisting of random interlaced molecular chains, connected by chemical bonds, is only a very rough approximation. Orig. art. has 4 figures.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute); Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of the Tire Industry)

SUBMITTED: 19May64 ENCL: 00 SUB CODE: MT, NP

NO REF SOV: 004 OTHER: 000 JPRS

KUKURA, Stefan; MASIN, J.; REZUCHA, M.

Mediastinal bronchogenic cysts. Rozhl. chir. 36 no.11:760-762 Nov 57.

1. Chirurgicke odd. OUNZ v Michalovciach, prednosta Stefan Kukura.
(MEDIASTINUM, cysts
bronchogenic, surg. (Cz))

PLANK, J.; REZUCHA, M.; ROJKOVIC, D.

First two diagnosed cases of hemorrhagic nephroso-nephritis in Czechoslovakia; viral nephroso-nephritis of Far East. Cas. lek. cesk. 94 no.40:1078-1084 30 Sept 55.

1. Z patologicko-anatomickeho odd., prednosta dr. J. Plank, a z infekcneho odd., prednosta Dr. D. Rojkovic, KUNZ v Presove.
(EPIDEMIC HEMORRHAGIC FEVER, epidemiology, in Czech., first cases.)

KUKURA, S.; REZUCHA, M.; JUHAS, S.; FAJTA, K.; BOZO, S.

Some conclusions from the analysis of injuries of the trunk and extremities. Bratisl. Lek. Listy 2 no.11:666-673 '61.

1. Z chirurgickeho oddelenia OUNZ v Michalovciach, prednosta primar MUDr. S. Kukura.

(EXTREMITIES wds & inj) (ACCIDENTS)

KUKURA, Stefan; REZUCHA, Milan

Arteriography in acute & chronic osteomyelitis. Rozhl. chir. 37 no.4: 273-275 Apr 58.

1. Chirurgicke oddelenie OUNZ v Michalovciach, prednosta MUDr. Stefan Kukura. S. K., Michalovce, OUNZ.
(ANGIOGRAPHY, in various dis.
arteriography in acute & chronic osteomyelitis (Cz))
(OSTEOMYELITIS, diag.
arteriography (Cz))

ANDREYEV, K.P.; VLADIMIROVA, N.I.; REZUKHINA, A.V.; ZINGEL', M.A.; FINKEL', G.M.

Flotation method of isolating yeasts from yeast beer. Gidroliz.i lesokhim.prom. 13 no.3:11-14 '60. (MIRA 13:7)

1. Nauchno-issledovatel'skiy institut gidroliznoy i sul'fitno-spirtovoy promyshlennosti (for Rezukhina). 2. Sukhonskiy sul'fitno-spirtovoy zavod (for Finkel').
(Yeast) (Flotation)

L 24461-65 EWT(m)/EPF(c)/EPR/EWP(j)/T Pc-4/Pr-4/Ps-4/P1-4 RPL WW/JW/RM

ACCESSION NR: AP5002577 S/0076/64/038/012/2920/2923

AUTHOR: Golubenko, A.N.; Rezukhina, T.N.

TITLE: Thermodynamic properties of calcium titanate, determined from electrochemical measurements at elevated temperatures

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 12, 1964, 2920-2923

TOPIC TAGS: calcium titanate, electrochemistry, heat of formation, iron electrode, niobium electrode, wuestite, titanium oxide

ABSTRACT: The thermodynamic functions for the reaction $CaO + TiO_{0.5} + 0.75\ O_2 = CaTiO_3$ were calculated from measurements at 1180-1290K, using an emf cell, a solid electrolyte with exclusively anionic conductivity, and a comparison electrode made from $Fe_{0.95}O$ and Fe, or from NbO - Nb. The temperature dependence of the wuestite-iron system used as a comparison electrode, was determined from equilibrium constants for the reduction of wuestite by a carbon monoxide-dioxide mixture. A "hydrostatic" weighing technique was employed for the latter measurement. The thermodynamic values of $TiO_{0.5}$ were calculated for 1300K and for standard conditions from published data on the thermodynamic properties of solid solutions of oxygen in titanium. The thermodynamic properties

Card 1/2

L 24461-65
ACCESSION NR: AP5002577

of calcium titanate were then also calculated for 1300K and for standard conditions. Orig. art. has: 3 tables and 6 formulas.

ASSOCIATION: Khimicheskiy fakul'tet, Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Chemistry department, Moscow state university)

SUBMITTED: 02Jan64 ENCL: 00 SUB CODE: TD, IC

NO REF SOV: 007 OTHER: 009

Card 2/2

REZUKHINA, T. N. Cand. Chem. Sci.

Dissertation: "Equilibrium of the Wolframates and the Molybdates of Certain Metals with Hydrogen." Moscow Order of Lenin State U imeni M. V. Lomonosov, 26 Nov 47.

SO: Vechernyaya Moskva, Nov, 1947 (Project #17836)

[illegible], T. [illegible]

[illegible], [illegible], V. [illegible] oroxova, [illegible]. I. [illegible]. Thermodynamics of [illegible]. VI. **Equilibrium** of cobalt tungstate with hydrogen. P. [illegible]

[illegible] State Univ., June 17, 1 [illegible]

SC: Journal of [illegible], Vol. [illegible], No. [illegible] ([illegible])

CA

2

Thermodynamics of rare metals. II. Equilibrium between manganese tungstate and hydrogen. T. N. Rezukhina, Ya. I. Gerasimov, and V. A. Morozova (Lomonosov Univ., Moscow). *Zhur. Fiz. Khim.* 25, 93–9(1951).—The equil. const., $K = pH_2O/pH_2$, of $\frac{1}{3}MnWO_4 + H_2 = \frac{1}{3}MnO + \frac{1}{3}W + H_2O$ (1) is measured in a circulating system between 950 and 1100° with an error of ±1%. The values of $-\log K$ at 965, 970, 1018, 1070, and 1113° are, resp.: 1.009, 0.996, 0.911, 0.823, and 0.766 and fit the relation (least squares): $\log K = (-12,845/4.573\ T) + 1.2590$. An x-ray analysis recognizes three phases, viz. $MnWO_4$, MnO, and W, in partially reduced $MnWO_4$; this shows that the 1st stage of the reduction follows (1). The value of K does not depend on the compn. of the solid phase during (1). With these results and literature data for K of $H_2 + \frac{1}{2}O_2 = H_2O$ and $MnO + H_2 = Mn + H_2O$ and for sp. heats, one finds: $\Delta H^\circ_{298} = -315,520$ and $\Delta F^\circ_{298} = -290,570$ cal./mole for $Mn(\alpha) + W + 2O_2 = MnWO_4$. Michel Boudart

1951

Thermodynamics of rare metals. III. Equilibrium between iron tungstate and hydrogen. T. N. Rezukhina, Yu. P. Simanov, and Ya. I. Gerasimov (Lomonosov State Univ., Moscow). *Zhur. Fiz. Khim.* **25**, 305–11(1951); cf. *C.A.* **45**, 5005a.—The equil. const. K_p between $FeWO_4$ and H_2 is measured between 850 and 1150° in an app. used previously (*loc. cit.*). The compn. of the solid phase is detd. by x-ray analysis. First, mixts. of Fe_2O_3 and WO_3 are reduced in H at 850°, then kept *in vacuo* at 1000–1100° for 15–20 hrs.; powder photographs show the presence of Fe_7W_6 besides pure Fe or W according to the initial compn. of the mixt. Other Fe-W intermetallic compds. are not formed under these conditions; the Fe_7W_6 phase is that described by Magneli and Westgren (*C.A.* **32**, 7300⁸). The dimensions of the unit cell of $FeWO_4$ are detd., $a = 4.722$, $b = 5.691$, $c = 4.951$ A. Partially reduced $FeWO_4$ contg. various amts. of O is analyzed by x-ray; the phases detected are $FeWO_4$, W, and Fe_7W_6. Thus the reduction of $FeWO_4$ occurs in one stage: $^1/_4\ FeWO_4 + H_2 \rightarrow {}^1/_{28}\ Fe_7W_6 + {}^1/_{28}\ W + H_2O$. This conclusion is confirmed by the constancy of the exptl. values of K_p at a given temp. for compns. between $FeWO_{3.4}$ and $FeWO_{4.1}$. A straight line in a diagram (log K_p, $1/T$) fits the data (least squares; av. deviation 0.2%). The relation is $\log K_p = (-9284/4.57T) + 1.0413$. **IV. Equilibrium between cobalt tungstate and hydrogen.** Yu. P. Simanov, T. N. Rezukhina, V. A. Morosova, and Ya. I. Gerasimov. *Ibid.* 357–61.—The equil. const. K_p between $CoWO_4$ and H_2 is measured between 900 and 1100°. The compn. of the solid phase is detd. by x-ray analysis. First, mixts. of CoO and WO_3 are reduced in H at 850°, then kept *in vacuo* at 1000–1100° for 5–10 hrs.; powder photographs show the presence of only Co_3W and Co_7W_6. Other Co-W intermetallic compds. are not formed in these conditions. Complete reduction of $CoWO_4$ at 901 and 1103° gives Co_7W_6 and W only, as identified by their x-ray pattern. Partially reduced $CoWO_4$ shows the same phases besides the initial $CoWO_4$. Thus, in the temp. interval investigated, the reduction of $CoWO_4$ occurs in one stage, as shown also by the constancy of K_p at a given temp. for compns. between $CoWO_{3.7}$ and $CoWO_{4.1}$. The data for the reaction $^1/_4\ CoWO_4 + H_2 \rightarrow {}^1/_{28}\ Co_7W_6 + {}^1/_{28}\ W + H_2O$ are represented by the relation $\log K_p = (-7741/4.57T) + 1.321$. Michel Boudart

USSR/Chemistry - Wolfram and Cobalt Mar 51

"Thermodynamics of Rare Metals: VI. Equilibrium of Cobalt Wolframate With Hydrogen," Yu. P. Simanov, T. N. Rezukhina, V. A. Morozova, Ya. I. Gerasimov, Moscow State U imeni M. V. Lomonosov

"Zhur Fiz Khim" Vol XXV, No 3, pp 357-361

X-ray anal of products of reduction with H_2 of $CoO + WO_3$ mixts with different Co:W ratios showed at 900-1,100°C 2 intermetallic compds Co_7WO_6 (with at excess of W) and Co_3W (with at excess of Co) are formed. Measured reduction consts

185T13

USSR/Chemistry - Wolfram and Cobalt (Contd) Mar 51

of $CoWO_4$ with H_2 at 900-1,100° and set up eq for equil const. Calcd free energy at 900-1,100° and heat effect of reaction: $1/7Co_7W_6 + 1/7W + 2O_2 \longrightarrow CoWO_4$.

185T13

REMENNIKA, T. M., SHVYREV, V. V.

Vaporization, Heats of

Pressure of saturated vapor and heats of vaporization of carbonyls of chrome, of wolfram and of molybdenum. Vest. Mosk. un. No. 6, 1952.

9. Monthly List of Russian Accessions, Library of Congress, December 1952 Uncl.

REZUKHINA, T. N.

Heats of combustion and heats of formation of chromium, tungsten, and molybdenum hexacarbonyls. K. A. Shardlov and T. N. Rezukhina. *Trudy Inst. Fiz. i Mat., Akad. Nauk Azerbaidzhan. S.S.R., Ser. Fiz.* 6, 53-61(1953); *Referat. Zhur., Khim.* 1954, No. 30309.—Heats of combustion were obtained at 20° and recalcd. to 25°. $Cr(CO)_6$, $Q_v^{18} = 452.61$ and $Q_p^{18} = 451.23$; $Mo(CO)_6$, $Q_v^{18} = 507.58$ and $Q_p^{18} = 506.69$; $W(CO)_6$, $Q_v^{18} = 540.67$ and $Q_p^{18} = 539.79$ kcal./mole. The error of this detn. is ±0.02–0.035%. From heats of formation of Cr_2O_3 (Roth and Becker, *C.A.* 24, 1783), Mo_2O_3 and W_2O_3 (Moose and Parr, *C.A.* 19, 1084) and of CO_2 (Hubbard, *et al.*, *C.A.* 43, 1639*b*) and the detd. heats of combustion of the hexacarbonyls, the heats of formation of the carbonyls were calcd. to be $Cr(CO)_6$, $Q_v^{18} = 257.08$; $Mo(CO)_6$, $Q_p^{18} = 233.12$; and $W(CO)_6$, $Q_p^{18} = 319.29$ kcal./mol. M. Hoseh

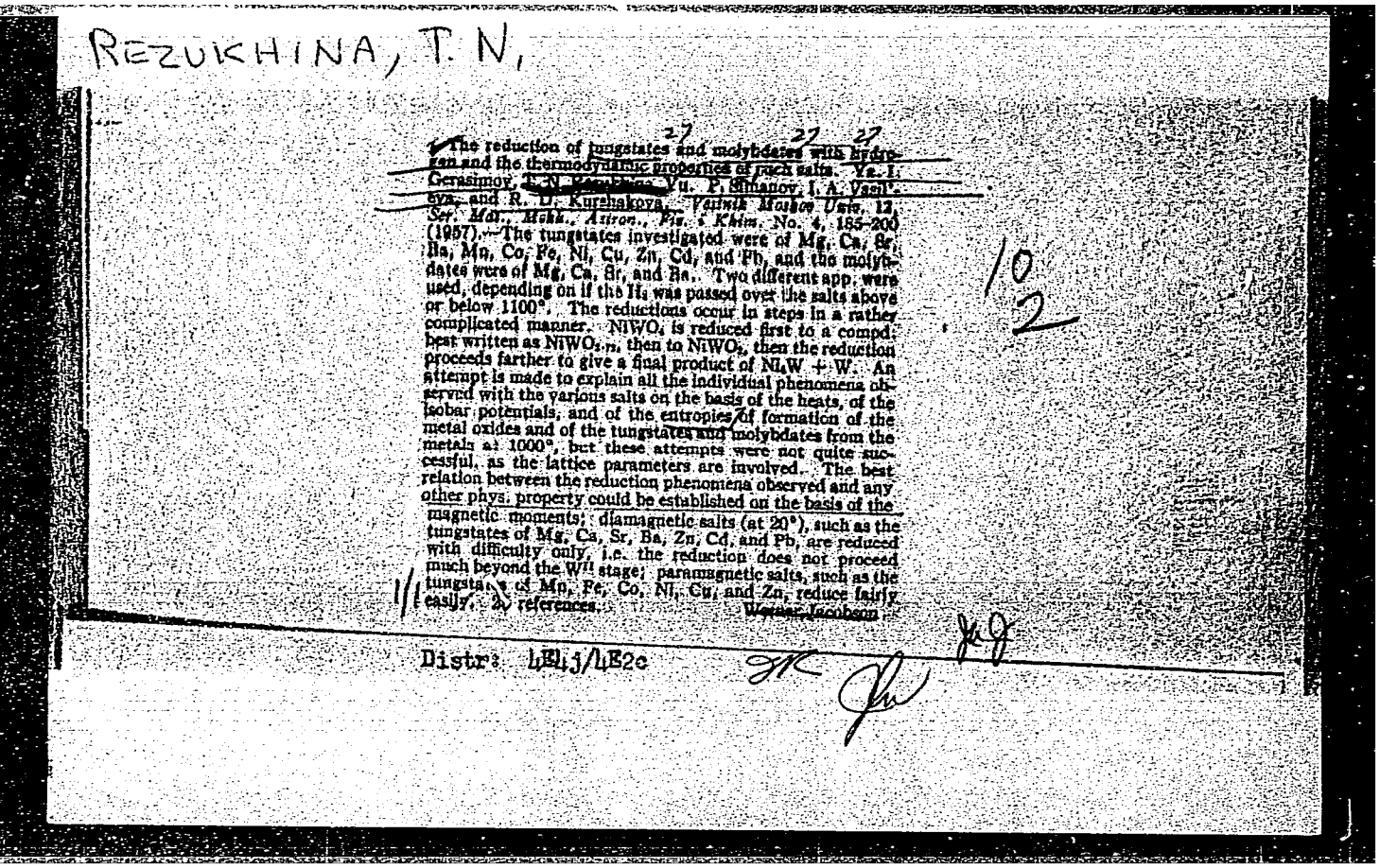
REZUKHINA, T.N. Docent, SIMANOV, Yu. P. Docent, GERASIMOV, YA. I. PROF.

"The Equilibruim of Tungstates of Bivalent Metals with Hydrogen," a paper given at the All-University Scientific Conference "Lomonosov Lectures", Vest. Mosk. Un., No 8, 1953

Translation U-7895, 1Mar 56

SHARIFOV, K.A.; REZYKHINA, T.N.

Heats of combustion and heats of formation for chromium, tungsten, and molybdenum hexacarbonyls. Uch.zap.Mosk.un. no.164:115-121 '53. (Thermochemistry) (Carbonyls) (MLRA 8:7)



REZUKHINA, T. N.

27 27 27

The reduction of tungstates and molybdates with hydrogen and the thermodynamic properties of such salts. Ye. I. Gerasimov, T. N. Rezukhina, Yu. P. Simanov, I. A. Vasil'eva, and R. D. Kurbakova. *Vestnik Moskov. Univ. 12, Ser. Mat., Mekh., Astron., Fiz. i Khim.* No. 4, 185-200 (1957).—The tungstates investigated were of Mg, Ca, Sr, Ba, Mn, Co, Fe, Ni, Cu, Zn, Cd, and Pb, and the molybdates were of Mg, Ca, Sr, and Ba. Two different app. were used, depending on if the H_2 was passed over the salts above or below 1100°. The reductions occur in steps in a rather complicated manner. $NiWO_4$ is reduced first to a compd. best written as $NiWO_{4-n}$, then to $NiWO_3$, then the reduction proceeds farther to give a final product of $Ni_4W + W$. An attempt is made to explain all the individual phenomena observed with the various salts on the basis of the heats, of the isobar potentials, and of the entropies of formation of the metal oxides and of the tungstates and molybdates from the metals at 1000°, but these attempts were not quite successful, as the lattice parameters are involved. The best relation between the reduction phenomena observed and any other phys. property could be established on the basis of the magnetic moments; diamagnetic salts (at 20°), such as the tungstates of Mg, Ca, Sr, Ba, Zn, Cd, and Pb, are reduced with difficulty only, i.e. the reduction does not proceed much beyond the WO_2 stage; paramagnetic salts, such as the tungstates of Mn, Fe, Co, Ni, Cu, and Zn, reduce fairly easily. 20 references.

Werner Jacobson

Distr: 4E4j/4E2c

REZUKHINA, T.N.

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria, Physical-Chemical Analysis, Phase Transitions. B-8

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7119.

Author : I.A. Vasil'yeva, Ya.I. Gerasimov, Yu.P. Simanov, T.N. Rezukhina.

Inst :

Title : Copper Tungstate - Hydrogen Equilibrium and Thermodynamic Characteristics of $CuWO_4$.

Orig Pub: Zh. fiz. khimii, 1957, 31, No 4, 825-831.

Abstract: The pressure of saturated $CuWO_4$ (I) vapors was measured by Knudsen effusion method (with a tantalum ampoule) in the range from 1098 to 1181°K. The obtained data comply with the equation log p (mm of merc. col.) = -2714.1/T + 0.2474. The evaporation heat of I is 12416 cal per mole. The I - hydrogen equilibrium was investigated by the circulation method in the

Card : 1/2

-6-

REZUKHINA, T.N.

76-10-6/34

AUTHORS: Rezukhina, T.N., Dugacheva, G.M., Sinanov, Yu.P.

TITLE: Thermodynamics of Rare Metals. VII. (Termodinamika redkikh metallov. VII.) The Equilibrium of Nickel Tungstate with Hydrogen (Ravnovesiye vol'framata nikelya s vodorodom)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957; Vol. 31, Nr 10, pp. 2206-2212 (USSR)

ABSTRACT: The investigation of the equilibrium of the nickel tungstate with hydrogen was carried out, completed by a radiographic investigation of its reconstruction products. The equilibrium constants of the reconstruction of $NiWO_4$ by hydrogen were measured at four temperatures within the region of from 806 - 990°C. It is shown that the reconstruction of $NiWO_4$ by hydrogen takes place on three stages. The final products of the reconstruction are Ni_4W and W. It is shown that the dependence of the lgK_pIV on $1/T$ for the reaction

$$NiWO_4 + 4H_2 = \frac{1}{4} Ni_4W + \frac{2}{4} W + 4 H_2O \text{ is like this}$$

$$lgK_pIV = lg \frac{P^4_{H_2O}}{P^4_{H_2}} = - \frac{8536,48}{T} + 7,6789.$$

Card 1/2

Thermodynamics of Rare Metals. VII. The Equilibrium of Nickel Tungstate with Hydrogen

76-10-6/34

For the reaction $NiWO_4 = \frac{1}{4} Ni_4W + \frac{3}{4} W + 2O_2$ following equation is obtained:

$$\Delta Z^{o}_{VI(cal)} = 276\,060 - 8{,}024\ T \lg T + 0{,}0_3 3\ T^2 - \frac{1\,632\,000}{T} - 62{,}363\ T.$$

There are 2 figures, 2 tables, 8 Slavic references.

ASSOCIATION: Moscow State University imeni M.V. Lomonosov (Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova)

SUBMITTED: June 25, 1956

AVAILABLE: Library of Congress

Card 2/2

76-10-15/34

AUTHORS: Zharkova, L.A., Rezukhina, T.N.

TITLE: Specific Heat of Lead and Cadmium Tungstate at High Temperatures (Teployemkosti vol'framatov svintsa i kadmiya pri vysokikh temperaturakh)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2278-2280 (USSR)

ABSTRACT: Data for the specific heat within the range of from 800 - 20°C are given here. The specific heat was determined according to the method for mixing in a massive calorimeter. The description of the device is found in M.M. Popov's "Termometriya i kalorimetriya", 1954, publishing house MGU. The mean specific heat of KCl and KBr was measured as a control of the absolute accuracy of measuring . It amounted to 0,1800, 0,1131 cal/gram-degree resp. The mean specific heat $\overline{C}_p$ within the investigated temperature range amounts to:

$\overline{C}_{p,\ PbWO_4} = 0{,}06566 + 1{,}034 \cdot 10^{-5}\ T$ (accuracy $\pm$ 0,03 %)

$\overline{C}_{p,\ CdWO_4} = 0{,}07754 + 1{,}9041 \cdot 10^{-5}\ T$ (accuracy $\pm$ 0,10 %)

Card 1/2

AUTHORS: Alekseyev, N. V., Rezukhina, T. N., Simanov, Yu. P. 76-32-3-12/43

TITLE: The Thermal Dissociation of Calcium Chromate (Termicheskaya dissotsiatsiya khromata kal'tsiya)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 3, pp. 580-584 (USSR)

ABSTRACT: Investigation results of the dissociation and radiographic analyses of the dissociation products are given, as the results of Indian scientists (refs 1-5), due to the use of an imperfect apparatus, are inadequate. F. N. Vasenin (ref 6) and at the same time Ford and Rees (refs 7,8) set up analogous dissociation equations of calcium chromate. From the given method of preparation and work, and a drawing of the present paper, follows that a heatable quartz reactor, connected with a manometer (cathetometer KM-10), as well as a container with oxygen electrolytically obtained, were used. The work was performed at 900-1030°C in a vacuum, while the analyses were performed according to Gillebrandt (ref 9) and Petrashen' (ref 10). The values of the axial parameters of calcium chromate were

Card 1/3

determined in an [illegible]-chamber and are given with $a = 7.244 \pm 0.002$ Å and $c = 6.292 \pm 0.002$ Å. The published data on the crystal parameter of $CaCrO_4$ are very different and contradictory, as the results of Germann (ref 11), Clouse (ref 12), and Eyckepff (ref 13) show. This is explained by the fact that the tetragonal high-temperature form of $CaO.Cr_2O_3$ forms more easily than the orthorhombic low-temperature form, and that transition be- [illegible] is rendered difficult. From the investigation results, [illegible] that the dissociation takes place according to the following scheme:

$$4/3\ CaCrO_4 = 2/3 CaO + 2/3 CaO.Cr_2O_3 + O_2$$

where another scheme is given for the course of the dissociation in air. By determinations of the thermal dissociation, a value of $\lg K_p = -\frac{13624}{T} + 12.416$ was found, from which the values of ΔZ°, ΔH° and ΔS° can be calculated.

The Thermal Dissociation of Calcium Chromate 76-32-3-12/43

There are 2 figures, 2 tables, and 14 references, 5 of which are Soviet

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 31, 1956

Card 3/3

5(4), 24(8)
AUTHORS: Zharkova, L. A., Rezukhina, T. N. SOV/76-32-10-1/39

TITLE: The Specific Heat of the Nickel, Strontium and Zinc Tungstates and the Barium and Strontium Molybdates at High Temperatures (Teployemkost' vol'framatov nikelya, strontsiya i tsinka i molibdatov bariya i strontsiya pri vysokikh temperaturakh)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 10, pp 2233-2235 (USSR)

ABSTRACT: The determinations mentioned in the title were carried out in the molar calorimeter within the temperature ranges of 683,2-293,2°K to 1125,2-293,2°K. The scheme, the method employed as well as other details were already described (Ref 1). Data on the technique of preparation and analysis are given. The results obtained are given in a table. In the table the mean values of the specific heat are given for each temperature range, and so are the comparative values of parallel experiments. Equations for the calculation of the mean specific heat as well as the data obtained using them are mentioned. The mean specific heat ($\overline{C}_p$) of all investigated salts varies linearly with the temperature within the ranges investigated. The specific heat C_p was

Card 1/2

The Specific Heat of the Nickel, Strontium and Zinc Tungstates and the Barium and Strontium Molybdates at High Temperatures

SOV/76-32-10-1/39

calculated from the mean specific heat according to the equation

$$C_p = \frac{d\left[\overline{C}_p\ (T - 293,2)\right]}{dT}$$

The function $C_p(T)$ is given individually for the chemical compounds investigated. The authors thank Professor S. M. Skuratov for his advice. There are 1 table and 2 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 30, 1957

Card 2/2

KISELEVA, Ye.V.; KARETNIKOV, G.S.; KUDRYASHOV, I.V.; BOTVINKIN, O.K., doktor khim.nauk, retsenzent; MAKOLKIN, I.A., doktor tekhn.nauk, retsenzent; MISHCHENKO, K.P., doktor khim.nauk, retsenzent; GRYAZNOV, V.M., red.; REZUKHINA, T.N., red.; ZAZUL'SKAYA, V.F., tekhn.red.

[Collection of illustrated physical chemistry problems and exercises] Sbornik primerov i zadach po fizicheskoi khimii. Moskva, Gos. nauchno-tekhn.izd-vo khim.lit-ry, 1960. 264 p. (MIRA 13:7)
(Chemistry, Physical and theoretical--Problems, exercises, etc.)

PROSHINA, Z.V.; REZUKHINA, T.N.

Determination of heats of formation of manganese and nickel tungstates. Zhur.neorg.khim. 5 no.5:1016-1021 My '60. (MIRA 13:7)

(Heat of formation) (Manganese tungstate) (Nickel tungstate)

S/076/60/034/04/20/042
B010/B009

AUTHORS: Yakovleva, R. A., Rezukhina, T. N. (Moscow)

TITLE: The Specific Heats of Calcium, Manganese, and Cobalt Tungstates at High Temperatures

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 4, pp. 819 - 823

TEXT: The present paper is a report on the continuation of investigations concerning the thermodynamic properties of the tungstates and molybdates of bivalent metals. The mean specific heats of Ca-, Mn-, and Co-tungstate were determined in a calorimeter at 573 to 1073°K. The working method and apparatus have already been described (Refs. 2 and 5). The measurement values are given in a table. A polymorphous transformation was found to take place in $CoWO_4$ within the temperature range of 973-1000°K; in this case the heat of transformation was found to be 445 cal/mole. Equations for the mean and true specific heats of the tungstates under investigation are given. By means of the equation of the true molar specific heat, $C_p = 26.10 + 0.0126\ T$, the specific heats of tungstates and molybdates of the general formulas $MeMoO_4$ and $MeWO_4$ can be found for temperatures from 294°

Card 1/2

The Specific Heats of Calcium, Manganese, and Cobalt Tungstates at High Temperatures

S/076/60/034/04/20/042
B010/B009

to 1073°K, unless polymorphous transformations take place. The authors conclude by thanking Professor S. M. Skuratov for his suggestions. There are 2 figures, 1 table, and 6 Soviet references.

SUBMITTED: June 30, 1958

Card 2/2

B6157

S/076/60/034/008/033/039/XX
B015/B063

21.3100 (1138, 1496, 1565)

AUTHORS: Leonidov, V. Ya., Rezukhina, T. N., and Bereznikova, I. A.

TITLE: Specific Heat of Calcium and Barium Uranates (VI) at High Temperatures

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 8, pp. 1862-1865

TEXT: The present work follows a series of experiments on the thermodynamic properties of the chromates, molybdates, and tungstates of divalent metals (Refs. 1-4). Its principal purpose was to compare the thermodynamic properties of these compounds with those of the uranates of divalent metals. The mixing method was used to measure the specific heat of $CaUO_4$ and $BaUO_4$ with a compact calorimeter. The measurements were made between 588° and 1134°K, the lower temperature being 293°K. A detailed description of measurement and calorimeter is given in M. M. Popov's manual (Ref. 8) and in a paper by L. A. Zharkova and T. N. Rezukhina (Ref. 2). The sample was heated in a Pt ampoule placed in a vertical furnace above the calorimeter. The specific heat was calculated from the

Card 1/3

Specific Heat of Calcium and Barium Uranates (VI) at High Temperatures

difference of the quantities of heat introduced into the calorimeter with a full and with an empty ampoule. The mean values obtained are listed in Table 2. The specific heat of $BaUO_4$ in the above temperature range was found to be a linear function of temperature. In the case of $CaUO_4$ this function is linear only up to 1022°K, changes abruptly between 1022° and 1027°K, and becomes again linear. In this range there occurs a phase transition with a heat of 220 cal/mole. Finally, equations are given for the calculation of the mean and the actual specific heat for the temperature range considered: $CaUO_4$ (I) (below the point of transition): $\tilde{c}_p = 0.08555 + 1.636 \cdot 10^{-5}T$, $\bar{C}_p = 29.27 + 5.60 \cdot 10^{-3}T$; $CaUO_4$ (II) (above the point of transition): $\tilde{c}_p = 0.08435 + 1.839 \cdot 10^{-5}T$, $\bar{C}_p = 28.86 + 6.29 \cdot 10^{-3}T$; $BaUO_4$: $\tilde{c}_p = 0.06929 + 1.094 \cdot 10^{-5}T$, $\bar{C}_p = 30.45 + 4.81 \cdot 10^{-3}T$; and $CaUO_4$ (I): $c_p = 0.08075 + 3.272 \cdot 10^{-5}T$, $C_p = 27.63 + 11.19 \cdot 10^{-5}T$, $CaUO_4$ (II): $c_p = 0.07895 + 3.678 \cdot 10^{-5}T$, $C_p = 27.01 + 12.58 \cdot 10^{-3}T$;

86357

Specific Heat of Calcium and Barium Uranates (VI) at High Temperatures

S/076/60/034/008/033/039/XX
B015/B063

$BaUO_4$: $c_p = 0.06608 + 2.189 \cdot 10^{-5}T$; C_p 29.04 + $9.62 \cdot 10^{-3}T$. Professor S. M. Skuratov is thanked for advice. There are 1 figure, 2 tables, and 9 references: 7 Soviet and 2 US.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 20, 1958

Tab. 2

Таблица 2

Средняя удельная теплоемкость моноуранатов кальция и бария

1 Количество ураната в ампуле, г	2 Температурный интервал измер. теплоемкости, °К	3 Подъем температуры калориметра*, (сопротивление платинового термометра, Ω)	4 Тепло, внесенное солью в калориметр, кал	5 Средняя уд. теплоемкость ураната	
				из опыта	по уравнению
		$CaUO_4$			
4.9463	588,63—293,07	0,05695	139,22	0,09523	0,09518
	784,57—293,00	0,0963	230,13	0,09835	0,09838

Card 3/3

84255

S/076/60/034/009/021/022
B015/B056

5,4700 also 2209

AUTHORS: Kuznetsov, F. A., Rezukhina, T. N., and Golubenko, A. N.

TITLE: Determination of the Formation Heat of Ce_2O_3 by the Method of Combustion in the Bomb Calorimeter

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, p. 2129

TEXT: For the purpose of determining the formation enthalpy of Ce_2O_3, the reaction heat of the reaction $Ce_2O_3 + 1/2\ O_2 = 2\ CeO_2$ was determined. The Ce_2O_3 was obtained by reduction of CeO_2 in a hydrogen current at 1250-1300°C. The reaction heat of this reaction was determined by the diathermic method by means of a calorimeter (volume of the bomb: 0.04 l), and the experimental results of Ce_2O_3 combustion are given in a table. After the necessary corrections had been made, the value $\Delta H^o_{298.2}$ = -85.43 ± 0.26 kcal/mole was obtained for the reaction, and, according to (Ref. 3), $\Delta H^o_{298.2}$ = - 260.18 ± 0.33 kcal/mole is substituted for the

Card 1/2

84255

Determination of the Formation Heat of Ce_2O_3 by the Method of Combustion in the Bomb Calorimeter

S/076/60/034/009/021/022
B015/B056

reaction $Ce + O_2 = CeO_2$, so that for the formation heat of Ce_2O_3 from the elements $2\,Ce + 3/2\,O_2 = Ce_2O_3$ the value $\Delta H^o_{298.2} = -434.93 \pm 0.99$ kcal/mole was obtained. There are 1 table and 5 references: 1 Soviet, 3 US, and 1 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 16, 1960

Card 2/2

S/076/60/034/011/008/024
B004/B064

AUTHORS: Kuznetsov, F. A. and Rezukhina, T. N. (Moscow)

TITLE: Specific Heat of Cerium Dioxide at High Temperatures

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 11, pp. 2467 - 2468

TEXT: The authors report on the calorimetric measurement of the specific heat of CeO_2 in the temperature range 608^o - 1172^oK by the mixing method. A preparation of GIREDMET (State Institute of the Rare Metals Industry) with 99.9% CeO_2 was used. For the average specific heat the experimental data gave $\overline{c_p} = 0.08895 + 1.42_2 \cdot 10^{-5}$ T, and for the true specific heat, $c_p = 0.0847_7 + 2.84_4 \cdot 10^{-5}$ T. The calculation was carried out by means of the equation $c_p = \overline{c_p} + (\overline{dc_p}/dT)\Delta T$. There are 1 table and 3 Soviet references.

Card 1/2

Specific Heat of Cerium Dioxide at High Temperatures

S/076/60/034/011/008/024
B004/B064

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: February 12, 1959

Card 2/2

LAVRENT'YEV, V.I.; GERASIMOV, Ya.I.; BEZUKHINA, T.N.

Equilibrium with hydrogen and thermodynamic characteristics of $BaMoO_4$ and $BaMoO_3$. Dokl.AN SSSR 133 no.2:374-376 Jl '60. (MIRA 13:7)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
2. Chlen-korrespondent AN SSSR (for Gerasimov).
(Barium molybdate)

KEZURKHIN, T. N.

report to be submitted for the IUPAC 21st Conference and 17th Intl. Congress of Pure and Applied Chemistry, Montreal, Canada, 2-12 August 1961

ALIMARIN, I. P., and ZOLOTOV, Yu. A., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "Extraction of metal chelate compounds as affected by the nature of the solvent" (To be presented in Russian) (Section C.2 - 11 Aug 61, morning)
BAGDASAR'YAN, Kh. S., and KRONGAUZ, V. A., Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov, Moscow - "Some aspects of energy transfer in radiation chemistry" (Section A.1, Session II - 7 Aug 61, morning)
DELIMARSKIY, Yu. K., Institute of General and Inorganic Chemistry, Academy of Sciences UkSSR, Kiev - "The kinetics of the electrode processes in the electrolysis of melted salts" (Section B.3 - 10 Aug 61, morning)
DELIMARSKIY, Yu. K., ANDREYEVA, V. N., SOYKA, K. M. (Possibly VOYNA, K. M.), NASARENKO, G. D., and KAPSOVA, T. N., Institute of General and Inorganic Chemistry, Academy of Sciences UkSSR, Kiev - "Electrochemical experiment with melted borate and phosphate" (Section A.3, c, (2), Session I - 11 Aug 61, morning)
DELIMARSKIY, Yu. K., PANCHENKO, I. D., and SHILINA, G. V., Institute of General and Inorganic Chemistry, Academy of Sciences UkSSR, Kiev - "On the convection diffusion in melted salts" (Section B.3 - 9 Aug 61, afternoon)
GERASIMOV, Ya I., Moscow State University imeni M. V. Lomonosov, (Co-Chairman, Section A.3,c,(2), Session I(B), 11 Aug 61, afternoon)
GERASIMOV, Y. I, LAVRENT'YEV, V. I., KUZNETSOV, F. A., and REZUKHINA, T. N., Moscow State University imeni M. V. Lomonosov - "The thermodynamic properties of columbium and cerium oxides" (Section A.3,c,(3), Session II(A), 11 Aug 61, morning)
GOL'DANSKIY, V. I., Institute of Chemical Physics, Academy of Sciences USSR - "Two-proton radioactivity - a new kind of radioactive decay of nuclei" (Section A.4 - 7 Aug 61, morning)

GOLUBENKO, A.N.; REZUKHINA, T.N.

Application of the cyclovoltammetric method to the study of heterogeneous equilibria. Zhur. neorg. khim. 6 no.3:674-678 Mr '61. (MIRA 14:3)

(Chemical equilbrium) (Reduction, Chemical)

22009

S/076/61/035/004/017/018
B106/B201

15 2210 1215, 1042

AUTHORS: Kuznetsov, V. A., and Rezukhina, T. N.

TITLE: Heat capacity of Ce_2O_3 at high temperatures

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 4, 1961, 956 - 957

TEXT: The mean molar heat of Ce_2O_3 in the temperature range of 578-1116°K was measured by the method of mixing in a massive calorimeter. The calorimetric apparatus and the measuring method are thoroughly described in the literature (Ref. 1: M. M. Popov, Termometriya i kalorimetriya, Izd-vo MGU, 1954; Ref. 2: L. A. Zharkova, T. N. Rezukhina, Zh. fiz. khimii, 31, 2278, 1957). The Ce_2O_3 oxide was prepared by a protracted reduction of CeO_2 (99.9% purity) at 1150-1200°C in a hydrogen flow which had been carefully purified from O_2 and H_2O. The product obtained in this way had a mustard-yellow color. The lattice parameters of the product that were found roentgenographically fitted data contained in the literature. Already after moderate heating, Ce_2O_3 burns in the air to form CeO_2. For

Card 1/4

S/076/61/035/004/017/018
B106/B201

Heat capacity of Ce_2O_3 ...

this reason, the preparation was carefully freed from gases prior to the calorimetric measurements and sealed in a quartz ampul. The heat capacity of Ce_2O_3 resulted from the difference between the heat amount fed to the calorimeter with the oxide by the heated ampul, and the heat content of the heated empty ampul. The heat value of the calorimeter was determined electrically (1 cal = 4.1840 abs. joules), with an accuracy within ± 0.1%. Results of the calculation of the mean molar heat of Ce_2O_3 from the results of the calorimetric determinations are given in a table (the molecular weight of Ce_2O_3 is 328.26). The results obtained are reproduced with an accuracy of ± 0.5% by equation $\bar{C}_p = 25.17 + 6.327 \cdot 10^{-3}T$. With the aid of equation $C_p = \bar{C}_p + T \cdot d\bar{C}_p/dT$, which establishes the relationship between actual and mean molar heats, one obtains the following equation for the temperature dependence of the actual molar heat of Ce_2O_3:

$C_p = 23.31 + 1.265 \cdot 10^{-2}T$. In a previous paper (Ref. 4: Zh. fiz. khimii, 34, 2129, 1960) the authors and A. N. Golubenko have determined the change

Heat capacity of Ce_2O_3 ...

of enthalpy in the reaction $Ce_2O_3 + 1/2\ O_2 = 2\ CeO_2$:

$\Delta H^o_{298.16} = -85.43 \pm 0.26$ kcal (1). According to another indication in the literature (Ref. 5: E. Huber, Ch. Holley, J. Amer. Chem. Soc., 75, 5645, 1953) the change of enthalpy in the reaction $Ce + O_2 = CeO_2$ amounts to: $\Delta H^o_{289.16} = -260.18 \pm 0.33$ kcal (2). One therefrom obtains for the reaction $2\ Ce + 3/2\ O_2 = Ce_2O_3$ the formation heat of Ce_2O_3: $\Delta H^o_{289.16} = -434.93 \pm 0.99$ kcal (3). If one compares the temperature dependence of the molar heat of Ce_2O_3, as found in the present work, with the temperature dependence of the molar heat of CeO_2, as earlier determined by the authors (Ref. 6: Zh. fiz. khimii, 34, 2467, 1960), and with data contained in the literature on the molar heats of metallic cerium (Ref. 7: Stull, Sinke, Thermodynamic properties of elements, 1957) and of oxygen (Ref. 8: Ya. I. Gerasimov, A.N. Krestnikov, A. S. Shakhov.

Card 3/4

Heat capacity of Ce_2O_3...

Khimicheskaya termodinamika v tsvetnoy metallurgii, t. I, Metallurgizdat, 1960), the following equations result for the temperature dependence of enthalpy changes of reactions (1)-(3):

ΔH_T^0 (1) = -85500 + 1.74 T - $1.49 \cdot 10^{-3}$ T^2 - $0.94 \cdot 10^5$ T^{-1},

ΔH_T^0 (2) = -259800 + 0.62 T + $0.31 \cdot 10^{-3}$ T^2 - $1.88 \cdot 10^5$ T^{-1},

ΔH_T^0 (3) = -434000 - 0.49 T + $2.13 \cdot 10^{-3}$ T^2 - $2.82 \cdot 10^5$ T^{-1}.

[Abstracter's note: essentially complete translation.] There are 1 table and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The two references to English language publications read as follows: E. Huber, Ch. Holley, J. Amer. Chem. Soc., 75, 5645, 1953; Stull, Sinke, Thermodynamic properties of elements, 1957.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 25, 1960

20642

S/020/61/136/006/018/024
B101/B203

54700 1043, 1273, 1087

AUTHORS: Lavrent'yev, V. I., Gerasimov, Ya. I., Corresponding Member AS USSR, and Rezukhina, T. N.

TITLE: Thermodynamic characteristics of niobium oxides (equilibrium with hydrogen, and electrochemical measurements)

PERIODICAL: Doklady Akademii nauk SSSR, v. 136, no. 6, 1961, 1372-1375

TEXT: As published data concerning the reduction of niobium oxides are insufficient, and the equilibrium of low niobium oxides with hydrogen has not yet beeen studied at all, the authors report on the reduction of Nb_2O_5 in equilibrium with H_2 to NbO, as well as on the measurement of emf of a galvanic cell of NbO and metallic niobium. The equilibrium of niobium oxides with hydrogen between 1200 and 1550°C was studied in a circulation apparatus described in Ref. 8. The samples were placed in a molybdenum furnace on a platinum base in such a manner that they touched the Pt in a few places only, and were reduced in a hydrogen flow. The total composition of the reaction products was determined from the

Card 1/4

Thermodynamic characteristics of niobium...

increase in weight of the sample on annealing in air, the phase composition by means of X-rays. Two stages of reduction of Nb_2O_5 were ascertained: $2.5NbO_{2.4}+H_2 \longrightarrow 2.5NbO_2+H_2O$ (I), and $NbO_2+H_2 \longrightarrow NbO+H_2O$ (II). Fig. 1 shows the logarithms of the equilibrium constant $K_p = P_{H_2O}/P_{H_2}$ as a function of composition. Between $NbO_{2.4}$ and $NbO_{2.5}$, K_p changes so quickly that it could not be measured accurately. For the polytherms of the equilibrium constant of the two stages, the authors found the equations: $\log K_{p_I} = -15050/4.575T+1.3306$ (1480-1673°K); $\log K_{p_{II}} = -29490/4.575T+1.3334$ (1673-1823°K), and obtained therefrom: $\Delta G^o_I(cal) = 15050-6.087T$; $\Delta G^o_{II}(cal) = 29490-6.10T$. By combination of reactions I and II with $H_2+(0.5)O \longrightarrow H_2O_{gas}$ (III), and with the use of J. Chipman's data (Ref. 9) and the specific heat for NbO_2 and NbO (Ref. 10) as well as for O_2 (Ref. 11), they found for the reaction

S/020/61/136/006/018/024
B101/B203

Thermodynamic characteristics of niobium...

$2NbO_2+0.5O_2 \longrightarrow Nb_2O_5$ (VI): $\Delta G^o_{VI} = -65.5$ kcal; $\Delta H^o_{VI} = -70.25$ kcal; $\Delta S^o_{VI} = -15.91$ entropy units (referred to 298.2°K). It was not possible to conduct the reduction to the metal under equilibrium conditions. Therefore, the thermodynamic functions of NbO were determined by measuring the emf E of the cells $Pt|Fe,Fe_{0.95}O|$ solid electrolyte $|NbO,Nb|Pt$ (A), and $Pt|Fe_3O_4,Fe_{0.95}O|$ solid electrolyte $|Fe_{0.95}O,Fe|Pt$ (B) between 841 and 1073°C. Mixed crystals of the system ThO_2 - La_2O_3 were used as solid electrolyte. Values in good agreement with published data were obtained for cell B. For cell A, results are given in Fig. 3. The maximum error does not exceed 1.2%. For the reaction $Fe_{0.95}O+Nb \longrightarrow 0.95Fe+NbO$ (VII), the authors calculated: $\Delta G^o_{VII} = -34500+3.15T$; for the reaction $Nb+0.5O_2 \longrightarrow NbO$ (VIII): $\Delta G^o_{VIII} = -92.36$ kcal; $\Delta H^o_{VIII} = -98.39$ kcal; $\Delta S^o_{VIII} = -20.19$ entr.un. By combination of the reactions $NbO+0.5O_2 \longrightarrow NbO_2$ (V), as well as VI and VIII, they calculated for

Card 3/4

Thermodynamic characteristics of niobium...

$2Nb+(5/2)O_2 \longrightarrow Nb_2O_5$ (IX): (at 298.2°K) ΔH^o_{IX} = -456.9 kcal; ΔG^o_{IX} = -424.9 kcal; ΔS^o_{IX} = -107.43 e.u., and for the reaction $Nb+O_2 \longrightarrow NbO_2$ (X): ΔH^o_X = -193.3 kcal; ΔG^o_X = -179.7 kcal; ΔS^o_X = -45.76 entr.units. There are 3 figures, 2 tables, and 23 references: 8 Soviet-bloc and 10 non-Soviet-bloc.

SUBMITTED: November 30, 1960

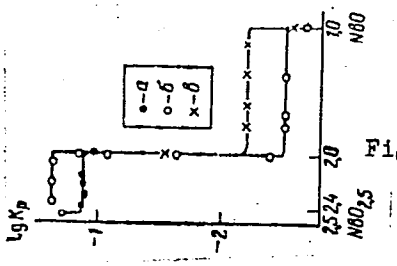


Fig. 1

Fig. 3

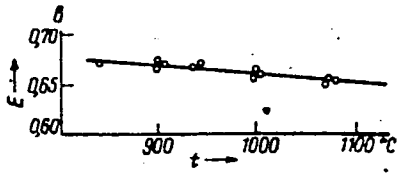


Fig. 3

L 34980-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pu-4 IJP(c) JD/JW/JG
ACCESSION NR: AP5004355 S/0076/65/039/001/0141/0146

30
09
B

AUTHOR: Drobyshev, V. N.; Rezukhina, T. N.; Tarasova, L. A.

TITLE: Thermodynamic properties of cobalt-molybdenum alloys

15 27 27

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 1, 1965, 141-146

TOPIC TAGS: cobalt-molybdenum alloys, thermodynamics, electromotive force, thermodynamic function

ABSTRACT: The thermodynamic functions of Co-Mo alloys were determined in the 900-1200°C range by measuring the emf of the galvanic cell: $Pt|MoO_2,Mo|$solid electrolyte $(ThO_2-La_2O_3)|Co-Mo(alloy),MoO_2|Pt$. The values were used to calculate the thermodynamic properties of solid solutions of molybdenum in cobalt and of the three intermediate phases θ, K and ε in which the mole fraction of molybdenum is 0.18, 0.245 and 0.45 respectively. The free energy of formation of these alloys from the elements per gram atom of alloy are as follows:

θ phase $\Delta G^\circ = -490-0.2T$, cal
K phase $\Delta G^\circ = -1490+0.46T$, cal
ε phase $\Delta G^\circ+-1350+0.1T$, cal

The obtained thermodynamic data confirm the phase diagram for Co-Mo obtained by

Card 1/2

L 34980-65
ACCESSION NR: AP5004355

Quinn and Humé-Rothery (J. Less-Common Metals, 5, 314, 1963). The equation for the reaction $Mo + O_2 \equiv MoO_2$ which holds over the 1260-1360°C temperature range is $\Delta G^\circ = -137.580 + 40.48T$ cal where ΔH°_{298} is -140.4 K cal. This value is in good agreement with the published data on calorimetric measurements. Orig. art. has: 9 formulas, 2 tables and 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 01Jun64 ENCL: 00 SUB CODE: TD, MM

NO REF SOV: 004 OTHER: 008

Card 2/2

L 34978-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pad/Pu-4 IJP(c) JD/JW/HW/JG

ACCESSION NR: AP5004356 S/0076/65/039/001/0151/0156

30
29
B

AUTHOR: Drobyshev, V. N.; Rezukhina, T. N.

TITLE: Thermodynamic properties of cobalt-niobium alloys

16 27 27

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 1, 1965, 151-156

TOPIC TAGS: cobalt-niobium alloy, thermodynamics, electromotive force, thermodynamic function

ABSTRACT: To determine the thermodynamic properties of Co-Nb alloys at high temperatures, the emf was measured in the galvanic cell: Pt|Co-Nb(alloy), NbO|solid electrolyte|Fe, Fe_xO|Pt. Solid solutions of the ThO_2-La_2O_3 system were used as the solid electrolyte in the cell and the equilibrium mixture of wüstite with metallic iron served as a reference electrode. It was found that the emf of cells containing niobium and its alloys should be measured in a high vacuum, under conditions which exclude the possibility of oxide film formation at the electrode-electrolyte interface. X-ray diffraction analysis of the alloys and emf measurements confirm the existence of a hexagonal Laves phase with a composition which approaches Co_3Nb. From the emf measurements of galvanic cells with a solid electrolyte, including cobalt-niobium alloys at 1275-1425° K,

Card 1/2

L 34978-65

ACCESSION NR: AP5004356

thermodynamic properties of two intermediate phases, Co_3Nb, $\Delta G=-13,700+1.5T$, cal. For $Co+Nb=Co_3Nb$, $\Delta G=-14,100+1.1T$ cal. Thermodynamic functions of the lower oxide of niobium were determined from the emf measurements of the cell $Pt|NbO,Nb|ThO_2-La_2O_3|Fe, Fe_{0.947}O|Pt$ in the 1250-1380° K interval. It was found that for $Nb+1/2\ O_2=NbO$, $\Delta H°_{298}=-99.13$ Kcal and $\Delta G°_{298}=-92.7$ Kcal. These values are in close agreement with published calorimetric data. Orig. art. has: 3 figures, 18 formulas and 2 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 07Aug64 ENCL: 00 SUB CODE: TD, MM

NO REF SOV: 008 OTHER: 009

Card 2/2

DROBYSHEV, V.N.; REZUKHINA, T.N.; TARASOVA, L.A. (Moskva)

Thermodynamic properties of alloys in the system Co-MO. Zhur. fiz. khim. 39 no. 1:141-146 Ja '65 (MIRA 19:1)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova. Submitted June 1,1964.

L 16803-66 EWT(m)/EWP(t) IJP(c) JD/JW/HW

ACC NR: AP6003372 SOURCE CODE: UR/0363/66/002/001/0145/0150 45 43 B

AUTHOR: Levitskiy, V.A.; Rezukhina, T.N.

ORG: Chemistry Department, Moscow State University im. M.V. Lomonosov (Khimicheskiy fakul'tet, Moskovskiy gosudarstvennyy universitet)

TITLE: Thermodynamic properties of cobalt and nickel aluminates based on emf data at elevated temperatures 14 27 27 27

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 1, 1966, 145-150

TOPIC TAGS: cobalt compound, nickel compound, aluminate, thermodynamic calculation

ABSTRACT: The emf method employing a solid electrolyte possessing O^{2-} -ionic conductivity in the 1300 — 1500K range was used to obtain thermodynamic data on the reactions of formation of nickel and cobalt aluminates saturated with Al_2O_3 from the oxides:

$$NiO + 1.136\,Al_2O_3 \rightarrow NiAl_{2.28}O_{4.41};\quad \Delta G^\circ(\pm 0.05) = -5.55(\pm 0.31) - 0.42(\pm 0.23)\cdot 10^{-3}\,T,\ \text{kcal}$$

$$CoO + 1.235\,Al_2O_3 \rightarrow CoAl_{2.47}O_{4.70};\quad \Delta G^\circ(\pm 0.08) = -12.12(\pm 0.91) + 3.46(\pm 0.70)\cdot 10^{-3}\,T,\ \text{kcal}$$

Card 1/2 UDC: 546.623'132:66-971+546.623'742:66-971

L 16803-66
ACC NR: AP6003372

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From the data obtained for the 1273 – 1473K range, thermodynamic parameters were calculated for the dissociation reaction of the aluminates (including iron aluminates), and the compositions of equilibrium gaseous mixtures were determined for the reactions of reduction of the aluminates by carbon monoxide. As in the case of oxides and silicates, the capacity of iron group aluminates to be reduced decreases in the sequence nickel-cobalt-iron; this permits a selective reduction of nickel and cobalt in converter slags, which contain these metals in the form of spinels. Orig. art. has: 3 figures, 2 tables, and 6 formulas.

SUB CODE: 11, 20 / SUBM DATE: 17Apr65 / ORIG REF: 009 / OTH REF: 011

Card 2/2 mc

DROBYSHEV, V.N.; REZUKHINA, T.N.

Thermodynamic properties of alloys in the system cobalt-niobium. Zhur. fiz. khim. 39 no. 1:151-156 Ja '65 (MIRA 19:1)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova. Submitted August 7, 1964.

LEVITSKIY, V.A.; REZUKHINA, T.N.; DNEPROVA, V.G.

Measurement of the E.M.F. in galvanic cells with a solid electrolyte at temperature above 1100°C. Thermodynamic properties of nickel chromite. Elektrokhimiia 1 no.8:933-940 Ag '65. (MIRA 18:9)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.

L 23803-66 EWT(m)/EWP(t) IJP(c) JD/JW/JG

ACC NR: AP6007256 SOURCE CODE: UR/0363/66/002/002/0325/0331

AUTHOR: Rezukhina, T.N.; Levitskiy, V.A.; Frenkel', M.Ya. 38 B

ORG: Moscow State University im. M.V. Lomonosov, Department of Chemistry (Moskovskiy gosudarstvennyy universitet, Khimicheskiy fakul'tet)

TITLE: Thermodynamic properties of barium and calcium tungstates

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 2, 1966, 325-331

TOPIC TAGS: barium compound, calcium compound, tungsten compound, thermodynamic property, EMF

ABSTRACT: The article describes the use of the electromotive force method using a solid electrolyte to measure the properties of the above mentioned compounds. The measurements were made on apparatus described elsewhere in the literature (citations given). Most of the measurements were made in an atmosphere of inert gas, and some in a vacuum. The experimental results are shown in graphic and tabular form. The data is used to calculate the thermodynamic properties of mono- and tricalcium tungstate and tribarium tungstate. In the temperature interval from 1200-1590°K, measurements were made of the electromotive force of cells with a solid O⁻electrolyte, containing tribarium and tribarium tungstate.

Card 1/2 UDC: 546.41'786 + 546.431'786

L 23803-66

ACC NR: AP6007256

In the temperature interval from 860-1060°, measurements were made of the electromotive force of a cell with a F^--electrolyte, containing $CaWO_4$. In the temperature interval studied, the reaction $2BaO + BaWO_4 \rightarrow Ca_3WO_6$ is characterized by significantly negative values of the isobaric potential. At the same time, ΔG_T° for the reaction $2CaO + CaWO_4 \rightarrow Ca_3WO_6$ has only a slight negative value. Orig. art. has: 13 formulas, 2 figures, and 6 tables.

SUB CODE: 07,20,11/SUBM DATE: 24Jun65/ ORIG REF: 012/ OTH REF: 011

Card 2/2 FV

ACC NR: AP6013370 SOURCE CODE: UR/0370/66/000/002/0156/0162

AUTHOR: Drobyshev, V. N. (Moscow); Rezukhina, T. N. (Moscow)

ORG: none

TITLE: X-ray diffraction study of alloys of the Nb-Fe system and determination of certain thermodynamic properties of the compound $NbFe_2$

SOURCE: AN SSSR. Izvestiya. Metally, no. 2, 1966, 156-162

TOPIC TAGS: niobium alloy, iron alloy, free energy, entropy, heat of formation

ABSTRACT: Alloys of the Nb-Fe system were studied by x-ray diffraction over a wide concentration range. Their thermodynamic properties were investigated by measuring the emf of the galvanic cell

$$Pt \left| \begin{matrix} NbO, Nb\text{-}Fe \\ (alloy) \end{matrix} \right| \begin{matrix} solid \\ electrolyte \end{matrix} \left| Fe, Fe_{0.95}O \right| Pt,$$

where the solid electrolyte consisted of solid solutions in the ThO_2-La_2O_3 system, and the electrode Fe, $Fe_{0.95}O$ was the reference electrode. The x-ray data confirmed the existence of the two intermediate phases ϵ ($NbFe_2$) and η (Nb_3Fe_2) in the Nb-Fe system. The region of homogeneity of the η phase extends from ~56.0 to 63.0 at.%

Card 1/2 UDC: 669-971:536.715

ACC NR: AP6013370

Nb, and the lattice spacing of the alloy corresponding to the stoichiometric composition Nb_3Fe_2 is 11.24 kX. The region of homogeneity of the phase $NbFe_2$ does not exceed 30-37 at.% Nb. The emf measurements at 1280-1393°K were used to determine the thermodynamic functions of the compound $NbFe_2$: ΔH^0_{298} = -4.9 kcal/g-atom, ΔG^0_{298} = -4.6 kcal/g-atom, and ΔS^0_{298} = -1.1 cal/deg g-atom. The experimental data are discussed from the standpoint of the electronic structure of the metallic components. Orig. art. has: 1 figure, 2 tables, and 8 formulas.

SUB CODE: 11/ SUBM DATE: 22Jan65/ ORIG REF: 006/ OTH REF: 012

Card 2/2/MLP

LEVITSKIY, V.A., [illegible], M.Yu., REZUKHINA, T.N.

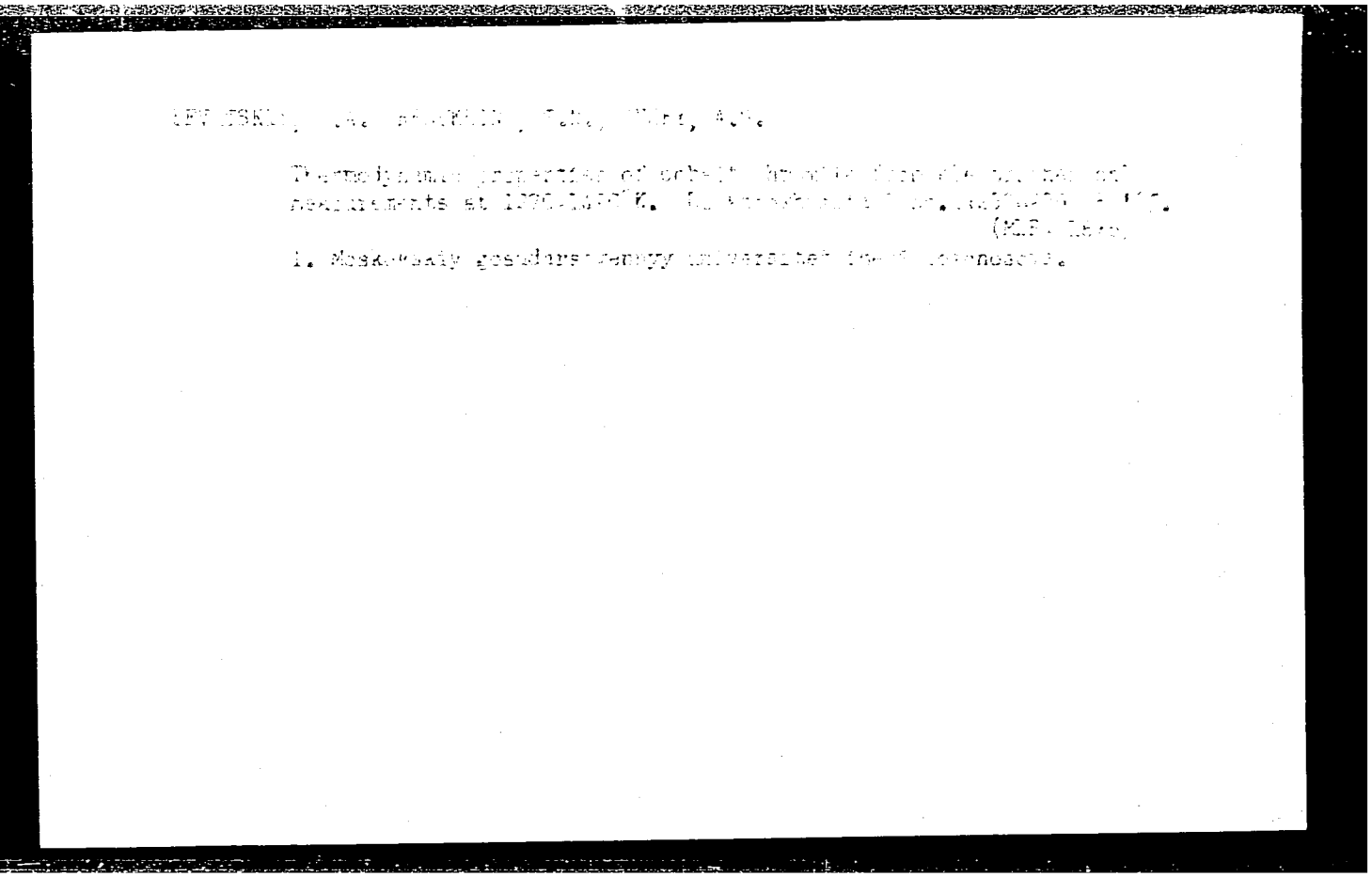
Thermodynamic properties of calcium molybdate determined by electrochemical measurements at high temperatures. Elektrokhimiya 1 no.11:1371-1374 N '65. (MIRA 18:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

GOLUBENKO, A.N.; REZUKHINA, T.N.

Thermodynamic properties of nickel titanate. Zhur. fiz. khim. 39 no.6:1519-1521 Je '65. (MIRA 18:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova. Submitted June 19, 1964.



REZUKHINA, T.N.; LEVITSKIY, V.A.; ISTOMIN, B.A.

Thermodynamic properties of iron chromite determined from electrochemical measurements. Elektrokhimiia 1 no.4:467-471 Ap '65. (MIRA 18:6)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

L 00917-66 EWT(m)/EWG(m)/T/EWP(t)/EWP(z)/EWP(b) IJP(c) DS/JD/JW/HW/MJW/CL

ACCESSION NR: AP5020386 UR/0364/65/001/008/0933/0940
541.135.4

AUTHOR: Levitskiy, V. A.; Rezukhina, T. N.; Dneprova, V. G.

TITLE: Measurement of emf of galvanic cells with solid electrolyte above 1100°C. Thermodynamic properties of nickel chromite

SOURCE: Elektrokhimiya, v. 1, no. 8, 1965, 933-940

TOPIC TAGS: thermodynamic function, nickel compound, electrochemistry, galvanic cell

ABSTRACT: A cell was designed for electrochemical measurements in oxide systems at high temperatures (see fig. 1 of the Enclosure). The emf of galvanic cells with solid electrolyte was measured up to 1600°K. To check the performance of the apparatus the emf of cells containing iron oxides, as well as iron and cobalt chromites was used. The emf of the following cell was measured in the 1300-1550°K temperature interval

$$Pt|Fe_{0.95}O, Fe|ThO_2\text{-}La_2O_3|(Ni + Cr_2O_3), NiCr_2O_4|Pt$$

On the basis of these measurements the Gibbs standard free energy for the reaction $NiO + Cr_2O_3 \rightarrow NiCr_2O_4$ in the investigated temperature interval was found to be

Card 1/3

L 00917-66

ACCESSION NR: AP5020386

$\Delta G^\circ(\pm 0.05$ Kcal) = $-17.55(\pm 0.57)-1.07(\pm 0.41)\cdot 10^{-3}T$.

The thermodynamic functions for $NiCr_2O_4$ were obtained for the first time and compared to iron and cobalt chromites. The high negative value of the isobaric potential is characteristic for the formation of all three chromites from oxides. Even at high temperatures (1200-1500°C), these chromites are stable with respect to ordinary reducing agents (CO and H_2). Therefore, during reduction melting the presence of chromium in oxidized cobalt-nickel ores would lead to the loss of cobalt and nickel with the slag. Orig. art. has: 4 tables and 3 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 04Jan65 ENCL: 01 SUB CODE: MM, EM

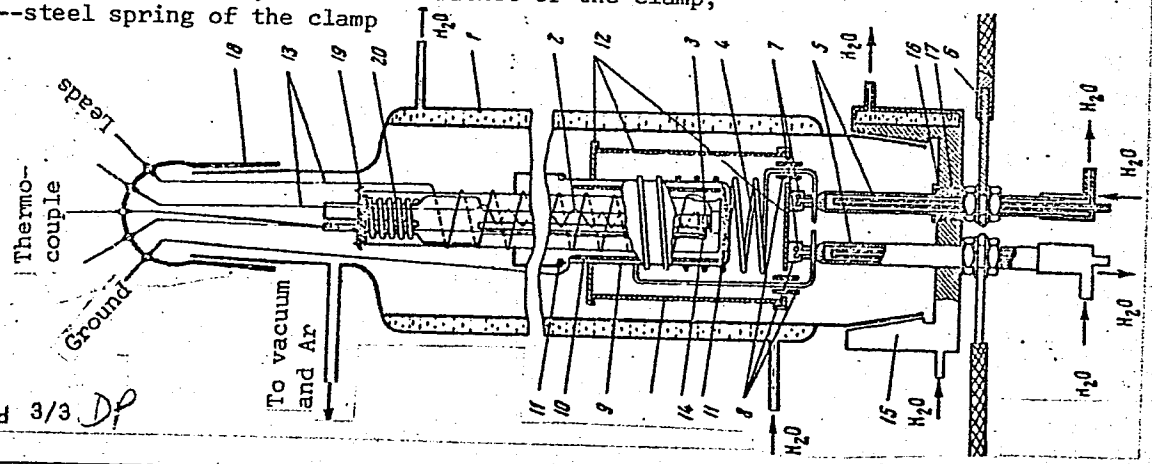
NO REF SOV: 012 OTHER: 013

Card 2/3

L 00917-66

ACCESSION NR: AP5020386 ENCLOSURE: 01

Fig. 1. Apparatus for measurement of galvanic cell emf above 1100°C. 1--quartz reactor with water cooled walls; 2--quartz clamp for the cell; 3--pellets; 4--heater; 5--water cooled current leads; 6--copper bus bars; 7--clamps for attaching heater to lead wires; 8--insulators; 9--quartz jacket; 10--ground shield; 11--getter (Zr or Ti shavings); 12--molybdenum reflector; 13--platinum cell leads; 14--thermocouple; 15--metallic water-cooled tapered joint; 16 & 17--vacuum insulating seals; 18--tapered joint of the reactor; 19--metal bracket of the clamp; 20--steel spring of the clamp



Card 3/3

[illegible] OSTROVSKIY, O.A., RYZUKHINA, T.N.

Thermodynamic properties of cobalt titanate. Zhur. fiz. khim. 39 no.5:1164-1167 My '65. (MIRA 18:8)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

GOLUBENKO, A.N.; KUZNETSOVA, T.N. (Moscow)

Thermodynamic properties of calcium titanate from electrochemical measurements at elevated temperatures. Zhur. fiz. khim. 38 no.12:2920-2923 D '64.

(MIRA 18:2)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova, Khimicheskiy fakul'tet.

REZUKHINA, T.N.; PROKHINA, Z.V.

Determination of the thermodynamic properties of alloys by the EMF method using a solid electrolyte having anion-oxygen conductance of 1 - Co_3W. Zhur. fiz. khim. 36 no.3:637-640 Mr '62. (MIRA 17:8)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

KUZNETSOV, F.A.; REZUKHINA, T.N.

Thermodynamic properties of praseodymium oxides. Zhur. fiz. khim. 36 no.6:1364-1367 Je'62 (MIRA 17:7)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

REZUKHINA, T. N.; LEVITSKIY, V. A.; OZHEGOV, P.

Thermodynamic properties of iron aluminate. Zhur. fiz. khim. 37 no. 3:687-688 Mr '63. (MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

REZUKHINA, T.N.; LEVITSKIY, V.A.

Thermodynamic properties of magnesium tungstate. Zhur.fiz.khim. 37 no.10: 2357-2360 O '63. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

LEVITSKIY, V.A.; REZUKHINA, T.N.

Thermodynamic properties of strontium tungstate. Zhur. fiz. khim. 37 no.5:1135-1137 My '63. (MIRA 17:1)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

PROSHINA, Z.V. (Moskva); REZUKHINA, T.N. (Moskva)

Heat capacity of Ni_4W at high temperatures. Zhur. fiz khim. 36 no.1:153-155 Ja '62. (MIRA 16:8)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova
(Intermetallic compounds)
(Heat capacity)

L 10289-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD

ACCESSION NR: AP3000424 S/0076/63/037/005/1135/1137

56

AUTHOR: Levitskiy, V. A.; Rezukhina, T. N.

TITLE: Thermodynamic properties of strontium tungstate 27 27

SOURCE: AN SSSR. Zhurnal fizicheskoy khimii, v. 37, no. 5, 1963, 1135-1137

TOPIC TAGS: thermodynamic properties, strontium tungstate

ABSTRACT: "The authors express deep appreciation to Yu. P. Simanov for a series of valuable instructions in conducting roentgenographic analysis." Orig. art. has: 1 figure and 12 equations.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 30May62 DATE ACQ: 19Jun63 ENCL: 03

SUB CODE: 00 NR REF SOV: 004 OTHER: 006

Card 1/2

PROSHINA, Z.V.; REZUKHINA, T.N.

Heat capacity of Co_7W_6 and Fe_7W_6 at high temperatures. Zhur.fiz. khim. 36 no.8:1749-1750 Ag '62. (MIRA 15:8)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Tungstates--Thermal properties) (Intermetallic compounds)

S/081/62/000/011/005/057
E073/E192

AUTHORS: Kochetkova, N.M., and Rezukhina, T.N.

TITLE: Heat capacity of gallium, antimony and their intermetallic compound at elevated temperatures.

PERIODICAL: Referativnyy zhurnal, Khimiya, no.11, 1962, 44, abstract 11 B243. (In the Symposium: Vopr. metallurgii i fiz. poluprovodnikov ("Problems of Metallurgy and Semiconductor Physics"), Moscow, AN SSSR, 1961, 34-37).

TEXT: Applying the method of mixing in a massive calorimeter, the accuracy of which was ± 0.2%, the enthalpies were measured of gallium and antimony purified by zonal refining and containing 99.99% of the base material, and GaSb produced from them, its monophasic nature being verified by means of X-ray diffraction. For Ga(liquid) $c_p = 6.445 - 3.72 \times 10^{-4}$ t cal/deg. g-atom (20-700°); Sb(solid) = $5.297 + 5.644 \times 10^{-3}$ t cal/deg. g-atom (20-590°); GaSb(solid) = $11.313 + 3.042 \times 10^{-3}$ t cal/deg. mol. (20-700°).

Card 1/1 [Abstractor's note: Complete translation.]

REZUKHINA, T.N.; LEVITSKIY, V.A.; KAZIMIROVA, N.M.

Thermodynamic properties of magnesium molybdate. VI. Zhur fiz. khim. 35 no.11:2639-2642 N '61. (MIR 14:12)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Magnesium molybdate)

36799
S/137/62/000/004/080/201
A052/A101

26.2532

AUTHORS: Kochetkova, N. M., Rezukhina, T. N.

TITLE: The heat capacities of gallium, antimony and of their intermetallic compound at high temperatures

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 6 - 7, abstract 4I44 (V sb. "Vopr. metallurgii i fiz. poluprovodnikov", Moscow, AN SSSR, 1961, 34 - 37)

TEXT: The heat capacities of 99.99% pure Ga and Sb and of GaSb compound were measured by the method of mixing in a massive Cu-calorimeter in the temperature range of 20 - 590°C for Sb and of 20 - 700°C for Ga and GaSb with an accuracy of ±0.2%. The obtained values of mean heat capacities were recomputed into true specific heat capacities by the formula

$$c_p(t - 20^\circ) = \int_{20}^{t} c_p dt.$$

The temperature dependence of true molar heat capacity is described by the equa-

Card 1/2

S/137/62/000/004/080/201
A052/A101

The heat capacities of...

tions: for Ga $c_p = 6.445 - 3.72 \cdot 10^{-4}$ t cal/degree·g-atom; for Sb $c_p = 5.297 +$ $+ 5.644 \cdot 10^{-3}$ t cal/degree·g-atom; for GaSb $c_p = 11.313 + 3.042 \cdot 10^{-3}$ t cal/degree·g-mole. The obtained results agree well with the published data.

L. Bystrov

[Abstracter's note: Complete translation]

Card 2/2

KUZNETSOV, F.A.; BELYY, V.I.; REZUKHINA, T.N.; GERASIMOV, Ya.I.

Thermodynamic properties of cerium oxides. Dokl. AN SSSR 139 no.6:1405-1408 Ag '61. (MIRA 14:8)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
2. Chlen-korrespondent AN SSSR (for Gerasimov).
(Cerium oxide--Thermal properties)

S/058/62/000/002/028/053
A061/A101

AUTHORS: Kochetkova, N. N., Remukhina, T. N.

TITLE: Heat capacities of gallium, antimony, and their intermetallic compound at high temperatures

PERIODICAL: Referativnyy zhurnal, Fizika, no. 2, 1962, 18, 2E183 (V sb. "Vopr. metallurgii i fiz. poluprovodnikov". Moscow, AN SSSR, 1961, 34 - 37)

TEXT: The enthalpies of Ga and Sb (of purity degree 99.99%) and of GaSb were measured by the calorimetric method at temperatures up to ~700°C. The following expressions were obtained for true molar heat capacities (t = temperature in °C): $C_p(Ga) = 6.445-3.72\cdot10^{-4}$ t cal/g-atom·deg; $C_p(Sb) = 5.297 + 5.644\cdot10^{-3}$ t cal/g-atom·deg; $C_p(GaSb) = 11.313 + 3.042\cdot10^{-3}$ t cal/g-mol·deg.

[Abstracter's note: Complete translation]

D. Belashchenko

Card 1/1

S/576/61/000/000/004/020
E032/E514

AUTHORS: Kochetkova, N.M. and Rezukhina, T.N.

TITLE: The specific heat of gallium, antimony and their intermetallic compounds at high temperatures

SOURCE: Soveshchaniye po poluprovodnikovym materialam, 4th. Voprosy metallurgii i fiziki poluprovodnikov; poluprovodnikovyye soyedineniya i tverdyye splavy. Trudy soveshchaniya. Moscow, Izd-vo AN SSSR, 1961. Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Fiziko-tekhnicheskiy institut. pp. 34-37

TEXT: The gallium and antimony employed was 99.99% pure (zonal recrystallization) and the compound GaSb was obtained by heating a stoichiometric combination of Ga and Sb in evacuated quartz ampoules, followed by structural X-ray analysis. It is stated that there is no published information about the specific heat of GaSb. The specific heats of the above substances were measured by the method of mixtures in a massive calorimeter in the following temperature ranges: 20-700°C (Ga and GaSb) and

Card 1/4

- are higher by about 3%.

The specific heat of gallium ... S/576/61/000/000/004/020
E032/E514

The discrepancy is ascribed to the fact that Schubel did not take into account the cooling of the specimen as it drops from the furnace into the calorimeter. Heat losses by evaporation of the calorimetric liquid were not corrected for by Schubel.
There are 1 table and 8 references: 4 Soviet and 4 non-Soviet.

Card 3/4

The specific heat of gallium ... S/576/61/000/000/004/020
E032/E514

Table

Amount of substance	Temperature range, °C	$\bar{c}_p$
	Галлий (Gallium)	
10,2698	315;1—20,01	0,09160
	433,1—20,05	0,09120
	512,2—20,02	0,09099
	612,5—20,00	0,09085
	712,0—20,02	0,09048
	GaSb	
8,3604	312,7—20,01	0,06161
	431,2—20,01	0,06281
	511,9—20,00	0,06309
	611,8—20,02	0,06407
	707,2—20,01	0,06481
	Сурьма (Antimony)	
7,1504	313,6—20,01	0,05108
	433,0—20,00	0,05418
	513,2—20,01	0,05600
	611,7—20,00	0,05810

Card 4/4

KUZNETSOV, F.A.; REZUKHINA, T.N.

Heat capacity of cerium sesquioxide Ce_2O_3 at high temperatures.
Zhur. fiz. khim. 35 no. 4:956-957 Ap '61. (MIRA 14:5)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Cerium oxide—Thermal properties)

REZUKHINA, T.N.; LAVRENT'YEV, V.I.; LEVITSKIY, V.A.; KUZNETSOV, F.A.

Determination of the thermodynamic functions of oxygen-containing salts by the electromotive force method. Zhur.fiz. khim. 35 no.6:1367-1369 Je '61. (MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Salts) (Electromotive force)

YAKOVLEVA, R.A.; REZUKHINA, T.N. (Moscow)

Heat capacity of calcium, manganese, and cobalt tungstates at high temperatures. Zhur. fiz. khim. 34 no.4:819-923 Ap '60. (MIRA 14:5)

(Calcium tungstate) (Manganese tungstate)
(Cobalt tungstate)

LAVRENT'YEV, V.I.; GERASIMOV, Ya. I.; REZUKHINA, T.N.

Thermodynamic characteristics of niobium oxides (equilibrium with hydrogen and electrochemical measurements). Dokl. AN SSSR 136 no.6:1372-1375 F '61. (MIRA 14:3)

1. Chlen-korrespondent AN SSSR (for Gerasimov).
(Niobium oxide)

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15 7630

AUTHORS: Kuznetsov, F. A., Belyy, V. I., Rezukhina, T. N., and Gerasimov, Ya. I., Corresponding Member AS USSR

TITLE: Thermodynamical properties of cerium oxides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 6, 1961, 1405-1408

TEXT: The authors determined thermodynamical data on cerium which, together with data from publications, provide a complete thermodynamical characterization of the system Ce-O_2. In previous papers (Ref. 4: ZhFKh, 34, 2467 (1960); Ref. 5: ibid. 35, No. 3 (1961); Ref. 6: ibid. 34, No. 9 (1960)), they measured the high-temperature specific heat of CeO_2 and Ce_2O_3, and obtained the value $\Delta H^o_{298} = -85.43$ kcal. The present paper deals with the thermodynamical properties of cerium oxides in the CeO_2-$CeO_{1.5}$ range of compositions. They used the emf method with a solid electrolyte (Ref. 7, see below). In addition, the authors measured the equilibrium constants of cerium oxides with hydrogen. They used a more convenient

Card 1/5

Thermodynamical properties of...

modification of the apparatus described in Ref. 7 (Ref. 8: T. N. Rezukhina et al., ZhFKh, 35, No. 6 (1961)) for measuring the emf, namely, the cell

CeO_x ($2 > x > 1.5$)	solid electrolyte	Fe + wüstite

(1).

Mixed crystals of the system ThO_2-La_2O_3 with a purely ionic conductivity served as electrolytes. The CeO_x electrodes were pressed out of a mixture of corresponding amounts of CeO_2 and Ce_2O_3 at a pressure of 10 t/cm^2. The oxygen content of the preparation was determined by measuring the emf by the method of "active oxygen". CeO_x was handled in an argon atmosphere. The values of the equilibrium emf of cell correspond to the change of the isobaric potential ($\Delta\bar{G}^o_I = -2FE$) of the reaction releasing the current: $(1/\delta)CeO_x + Fe_{0.947}O \rightarrow (1/\delta)CeO_{x+\delta} + 0.947\,Fe$ (I). A combination of $\Delta\bar{G}^o_I$ with $\bar{G}^o_{II}$ of the wüstite formation from the elements:

Thermodynamical properties of...

$0.947\ Fe + 0.5\ O_2 \rightarrow Fe_{0.947}O$ (II), for which $\Delta G_{II} = -63,570 + 16.06\ T$ (1073 - 1270°K) according to Ref. 10 (see below) and H. Peters, H. H. Möbius (Ref. 11: Zs. phys. Chem., 209, 298 (1958)), makes it possible to calculate the reaction $(\Delta\bar{G}^{o}_{III})$: $(1/\delta)CeO_x + 1/2\ O_2 \rightarrow (1/\delta)CeO_{x+\delta}$ (III). It was found that E varies linearly with temperature for each composition of CeO_x over the entire range of temperatures: $E = a + bT$. The equilibrium constants $K_{eq} = p_{H_2O}/p_{H_2}$ of the reduction of CeO_x by hydrogen: $(1/\delta)CeO_{x+\delta} + H_2 \rightarrow (1/\delta)CeO_x + H_2O$ (IV) were measured in a device described by the authors in ZhFKh, 25, 93 (1951). Since the intermediate cerium oxides are pyrophoric, only the constants of CeO_2 or Ce_2O_3 were measured. By a combination of $\Delta\bar{G}^{o}_{IV} = -RT \ln K_{eq}$ with ΔG^{o}_{V} of the reaction of water-vapor formation: $(\Delta G^{o}_{V} = -59,000 + 13.38\ T)$ it is also possible to calculate ΔG^{o}_{III}. The authors' results agree well with those obtained by

Card 3/5

Thermodynamical properties of...

G. Brauer et al. (Ref. 14, see below). The thermodynamical values describing the reaction $Ce_2O_3 + 1/2\ O_2 \longrightarrow 2CeO_2$ (VI) were obtained by graphical integration of the $\Delta\bar{G}^{o}_{III}$ isotherms for the composition of CeO_x between $1.5 \leqslant x \leqslant 2$ for 973, 1073, 1173, and 1273°K. On the basis of these data and of the value $(\Delta H_{298})_{VI} = -85.43$ kcal, and considering the temperature dependence of the specific heat of CeO_2 and Ce_2O_3, the following equation was derived for the range 298-1273°K:
$\Delta G^{o}_{VI} = -85,500 - 4.007 \log T + 1.495 \cdot 10^{-3}\ T^2 - 0.47 \cdot 10^5/T + 35.8\ T$. After determining $(\Delta S^{o}_{298})_{VI}$ and assuming $S^{o}_{298} = 16.64$ entropy units for cerium (Ref. 1, see below) and $S^{o}_{298} = 14.89$ entropy units for CeO_2, the authors obtain $(S^{o}_{298})_{Ce_2O_3} = 30.8$ entropy units. On the strength of this value and of other data presented above, all thermodynamical values of the reaction $2\ Ce + 3/2\ O_2 \longrightarrow Ce_2O_3$ (VII) can easily be calculated. There are

Card 4/5

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S/020/61/139/006/020/022
B103/B101

Thermodynamical properties of...

1 figure, 5 tables, and 14 references: 5 Soviet and 9 non-Soviet. The four most important references to English-language publications read as follows: Ref. 1: D. H. Parkinson, F. E. Simon, F. H. Spedding, Proc. Roy. Soc., 207, 137 (1951); Ref. 7: K. Kiukkola, C. Wagner, J. Electrochem. Soc., 104, 379 (1957); Ref. 10: L. S. Danken, R. W. Garry, J. Am. Chem. Soc., 61, 1398 (1945); Ref. 14: G. Brauer , K. A. Gingirich, U. Holtschmidt, J. Inorg. and Nucl. Chem., 16, 77 (1960).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 5, 1961

Card 5/5

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