ANDREYEV, S.N.; SHCHUKAREV, S.A.; BALICHEVA, T.G.

Vibrational spectra of the water of crystallization in the single crystals $NiSO_4 \cdot 7H_2O$, $NiSO_4 \cdot 6H_2O$ and $CaSo_4 \cdot 2H_2O$ in the region of the fundamental frequency for the valence vibrations of O-H. Zhur. struk. khim. 1 no.2:183-188 Jl-Ag '60. (MIRA 13:9)

1. Leningradskiy gosudarstvennyy universitet im. A.A.Zhdanova
(Nickel sulfate--Spectra) (Calcium sulfate--Spectra)
(Crystallization, Water of--Spectra)

SOV/78-5-1-2/45

5 (2), 5 (4)

AUTHORS: Shchukarev, S. A., Oranskaya, M. A., Tolmacheva, T. A., Il'inskiy, Yu. S.

TITLE: Thermal Dissociation of Vanadium Dichloride

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 1, pp 8 - 11 (USSR)

ABSTRACT: Publications give different data for the formation enthalpy ΔH of VCl_2. The authors report on their indirect determination of ΔH by investigation of the equilibrium of VCl_2 reduction by means of H at 750°, 775°, 800°, and 825°. The method is described in references 9,10. The experiments lasted for 100-200 hours. Table 1 shows the values of the dissociation pressure of VCl_2. Figure 1 shows the linear dependence of lg p_{Cl_2} on $\frac{1}{T}$. The computed values of the formation enthalpy ΔH and of the absolute entropy ΔS are shown in table 2. The value found for ΔH is in good agreement with that assumed by the U.S.A. Bureau of Standards. Figure 2 and table 3 show the opposite behavior of

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SHCHUKAREV, S.A.; KOKOVIN, G.A.

Determination of the heat of formation of tungsten hexabromide. Zhur.neorg.khim. 5 no.2:507 F '60. (MIRA 13:6)
(Tungsten bromide) (Heat of formation)

Shchukarev S.A.

S/078/60/005/008/002/018
B004/B052

AUTHORS: Shchukarev, S. A., Novikov, G. I., Vasil'kova, I. V., Suvorov, A. V., Andreyeva, N. V., Sharupin, B. N., Bayev, A. K.

TITLE: The Thermodynamic Properties of Chlorides and Oxychlorides of Tungsten and Molybdenum

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 8, pp. 1650-1654

TEXT: By applying various methods, the authors wanted to check the formation heats, formation entropies, and formation enthalpies in the case of Mo- and W chlorides, published in western papers (Refs. 1, 2). They investigated: WCl_6, $MoCl_5$, $WOCl_4$, $MoCl_4$, WO_2Cl_2 (obtained by a successive chlorination of WO_3 and MoO_3 by means of CCl_4); MoO_2Cl_2 (obtained by the reaction between MoO_2 and Cl_2); $MoCl_3$, WCl_4, WCl_5 (by the reduction of $MoCl_5$ and WCl_6 by means of H_2), and $MoCl_2$, WCl_2 (obtained by dispropor-

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tion of $MoCl_3$ and WCl_4, and $MoOCl_4$). Two calorimetric methods were applied: 1) Comparison of the heat of solution of the investigated substance to the heat of solution of a substance whose heat of formation is known (Table 1). 2) Combustion in oxygen (Table 2). Furthermore, the vaporization, depolymerization, dissociation, and disproportionation processes taking place in a state of equilibrium, were spectrophotometrically and tensimetrically investigated (Tables 3, 4). The enthalpies of formation, and partly also the standard entropies of formation were calculated from the experimental data. In Tables 5 (Mo compounds) and 6 (W compounds) they are compared with the data given in Ref. 2 which were adopted almost unchanged by the US National Bureau of Standards (Ref. 9). The values determined by the authors are 1.4 - 1.7 times as high. Therefore, the dependence of the free energy of formation of temperature is different altogether. This is graphically represented in Fig. 1 (comparison of determined ΔH^0 and ΔF^0 for tungsten compounds, with the data of the National Bureau of Standards), and Fig. 2 (comparison of the ΔH_{form} of Cr, Mo, and W chlorides, with the data of the National Bureau of Standards). There are 2 figures, 6 tables, and 9 references: 6 Soviet, 2 US, and 1 Dutch.

The Thermodynamic Properties of Chlorides
and Oxychlorides of Tungsten and Molybdenum

S/078/60/005/008/002/018
B004/B052

ASSOCIATION: Leningradskiy gosudarstvennyy universitet Khimicheskiy fakul'tet
(Leningrad State University Department of Chemistry)

SUBMITTED: May 6, 1959

SHCHUKAREV, S.A.; KOLBIN, N.I.; RYABOV, A.N.

Ruthenium tribromide. Zhur. neorg. khim. 5 no.8:1900-1901 Ag '60.
(MIRA 13:9)

1. Leningradskiy gosudarstvennyy universitet, Kafedra neorganicheskoy khimii.
(Ruthenium bromide)

S/078/60/005/009/019/040/XX
B017/B058

AUTHORS: Shchukarev, S A and Ryabov, A N

TITLE: Heat of Formation of Ruthenium Dioxide 27

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1931 - 1933

TEXT: The heat of formation of RuO_2 was determined by calorimetric measurements All experiments were conducted at 25°C and a pressure of 30 atm. The heat of formation amounts to -73± 1 kcal/mole Only RuO_2 and metallic ruthenium were detected by X-ray examinations (determined according to Chugayev by means of thiourea) in the combustion products of ruthenium. The formation of RuO_4 in the combustion products was not ascertained The data by Remy and Köhn (1) on the heat of formation of RuO_2 (-59.5 kcal/mole) must be described

Card 1/2

Heat of Formation of
Ruthenium Dioxide

S/078/60/005/009/019/040/XX
B017/B058

as being wrong The free energy for the formation of RuO_2 is given as $\Delta F^{\circ}_{\text{formation } RuO_2}$ = 60 6 kcal/mole. There are 1 table and 4 references: 3 Soviet and 1 German

ASSOCIATION: Leningradskiy gosudarstvennyy universitet
Kafedra neorganicheskoy khimii
(Leningrad State University, Chair of Inorganic Chemistry)

SUBMITTED: June 25, 1959

Card 2/2

S/078/60/005/009/040/040/XX
B017/B058

AUTHORS: Shchukarev, S. A., Oranskaya, M. A. (Deceased), Shemyakina, T. S.

TITLE: Determination of the Formation Enthalpy of Niobium Pentachloride

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 2135 - 2136

TEXT: The formation enthalpy of $NbCl_5$ was determined by calorimetric measurements. Niobium pentachloride was prepared by chlorination of niobium pentoxide with carbon tetrachloride in sealed ampoules at 300°C. The spectroscopic analyses of the samples are given in Table 1. The formation enthalpy of niobium pentachloride was ascertained by determining the heat effect of the hydrolysis of niobium pentachloride according to equation $NbCl_5 + 5/2\ H_2O - \Delta Q = 1/2\ Nb_2O_{5\,aq} + 5HCl$. The results of this determination are given in Table 2. The heat effect of the hydrolysis was

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Determination of the Formation Enthalpy of Niobium Pentachloride

S/078/60/005/009/040/040/XX
B017/B058

measured in the isothermic calorimeter at 25°C. A mean value of -(65.59 ± 0.45)kcal/mol was calculated for ΔH. The formation enthalpy of niobium pentachloride amounts to -(193.7 ± 0.7)kcal/mol. This value agrees well with that mentioned by Schäfer (Ref. 1). There are 2 tables and 5 references: 1 Soviet, 2 US, and 2 German.

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SUBMITTED: March 31, 1960

Card 2/2

S/078/60/005/011/003/025
B015/B060

AUTHORS: Shchukarev, S. A., Apurina, M. S.

TITLE: The System Nickel - Tellurium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 11, pp. 2410-2413

TEXT: The authors investigated the system nickel - tellurium and checked the earlier established phase conditions in the interval $NiTe_{1.0}$-$NiTe_{2.0}$. Moreover, they for the first time studied the region Ni - $NiTe_{1.0}$. An isopiestic method, described previously (Refs. 6,7) was applied. It is stated that the experiments took 60 hours. Experimental results obtained at 900°C with preparations $NiTe_{\geqslant 1.0}$ (Table 1) show that in the system investigated at 900°C there is a wide field of homogeneity, which extends at least from the composition $NiTe_{1.0}$ to $NiTe_{1.7}$, and, possibly, even further to a higher tellurium content.

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Card 1/2

The System Nickel - Tellurium

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B015/B060

In the interval $NiTe_{1.0}$ - $NiTe_{1.95}$ the lattice parameters (Table 2) are dependent, as shown by the X-ray pictures, on the composition, in agreement with previous experimental results. Experiments with preparations Ni - $NiTe_{1.0}$ show (Table 3) that at 900°C in the system Ni - Te the compounds $NiTe_{0.62}$ and $NiTe_{0.88}$ exist in a very narrow homogeneous region, as well as the phase $NiTe_{0.66-0.67}$ - $NiTe_{0.82-0.83}$. The authors thank Ye. V. Stroganov and I. I. Kozhina for their assistance in taking the X-ray pictures. There are 3 figures, 3 tables, and 11 references: 4 Soviet, 4 German, and 2 US.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: July 30, 1959

Card 2/2

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; SHARUPIN, B.N.

Molybdenum halides. Part 4: Determining the enthalpy of formation of molybdenum dichloride and trichloride. Vest.LGU 15 no.10:112-120 '60. (MIRA 13:5)
(Molybdenum chloride) (Enthalpy)

SHCHUKAREV, S.A.; SMIRNOVA, Ye.K.; VASIL'KOVA, I.V.; LAPPO, L.I.

Enthalpies of formation of tantalum pentachloride and pentabromide. Vest. LGU 15 no.16:113-119 '60. (MIRA 13:8)

(Tantalum chloride) (Tantalum bromide)
(Enthalpy)

SHCHUKAREV, S.A.; MAKARENYA, A.A.

Bibliography of works on the periodic law. Vest. LGU 15 no.16:151-152 '60. (MIRA 13:8)
(Bibliography--Periodic law)

5.4700

77850
SOV/79-30-2-1/78

AUTHORS: Shchukarev, S. A., Borisova, Z. U., Baydakov, L. A.

TITLE: Concerning Heat of Solution of Magnesium Perchlorate Hexahydrate

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol 30, Nr 2, pp 353-355 (USSR)

ABSTRACT:

Heats of solution of $Mg(ClO_4)_2 \cdot 6H_2O$ for various dilutions at 25^0 were measured in a microcalorimeter [described in Mishchenko, K. P., Pronina, M. Z., et al., Zhur. priklad. khim. 27, 1003 (1954)]. Magnesium perchlorate, obtained by dissolving MgO in perchloric acid, was recrystallized 3-5 times and dried for 24 hr over concentrated sulfuric acid (the time of drying was determined by finding the maximum ΔH in the plot of ΔH vs time). Tables 1 and 2 list the experimental results (each is an average of ΔH found in 8-9 experiments. Figure 2 gives the graphical representation along with the ΔH for zinc perchlorate hexahydrate [Shchukarev, S. A., Andreyev, S. N., et al., Zhur. obshchey khim., 29, 2468 (1959)]. It can be seen that the limiting value for integral heat of dilution of the magnesium perchlorate hexahydrate equals 1.00 kcal/mole (reached at dilution 1:500). There are 2 figures;

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Concerning Heat of Solution of Magnesium Perchlorate Hexahydrate

77850
SOV/79-30-2-1/78

2 tables; and 6 references, 3 Soviet, 1 Belgian, 2 U.S. The U.S. references are: Smeets, Ch. A., 27, Nr 1, 5629 (1936); Smit, Rees, Hardy, J. Am. Chem. Soc., 54, 3513 (1932).

ASSOCIATION: Leningrad State University (Leningradskiy gosudarstvennyy universitet)

SUBMITTED: February 10, 1959

Table 1

Dilutions	ΔH_{av} (kcal/mole)
1 : 1000	1.00 ± 0.03
1 : 700	1.00 ± 0.03
1 : 500	1.00 ± 0.03
1 : 300	1.17 ± 0.03
1 : 200	1.73 ± 0.03
1 : 100	1.75 ± 0.03
1 : 50	1.86 ± 0.03
1 : 30	1.94 ± 0.03

Table 2

Dilutions	ΔH_{av} (kcal/mole)
1 : 25	2.05 ± 0.02
1 : 15	2.47 ± 0.02
1 : 11	2.91 ± 0.02
1 : 9	3.24 ± 0.02
1 : 8	3.42 ± 0.02
1 : 7	3.56 ± 0.02
1 : 6.5	3.71 ± 0.02

Card 2/3

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[illegible]11
SOV/79-30-3-53/69

AUTHORS: Shchukarev, S. A., [illegible], L. [illegible]., Orlova, G. M.

TITLE: Concerning Heats of Solution of Cobalt and Nickel Perchlorates Hexahydrates

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol 30, Nr 3, pp 1053-1055 (USSR)

ABSTRACT: Heats of solution of $Co(ClO_4)_2 \cdot 6H_2O$ and $Ni(ClO_4)_2 \cdot 6H_2O$ in water, in a wide range of dilutions, were measured by the previously described method (S. S. Shehukarev and others, ZhOKh, 29, 2468 (1959); S. A. Shehukarev and others, ZhOKh, 30, 55[illegible] (1960)). The results obtained were compared with the previously published data on heats of solution of Mg and Zn salts. The results are given in the Fig. A. According to their endothermal effects of solution at infinite dilution, the investigated elements form the following series: Mg < Zn < Co < Ni. There are 1 table; 1 figure; and 4 Soviet references.

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oncerning Heats of Solution of Cobalt
Nickel Perchlorates Hexahydrates

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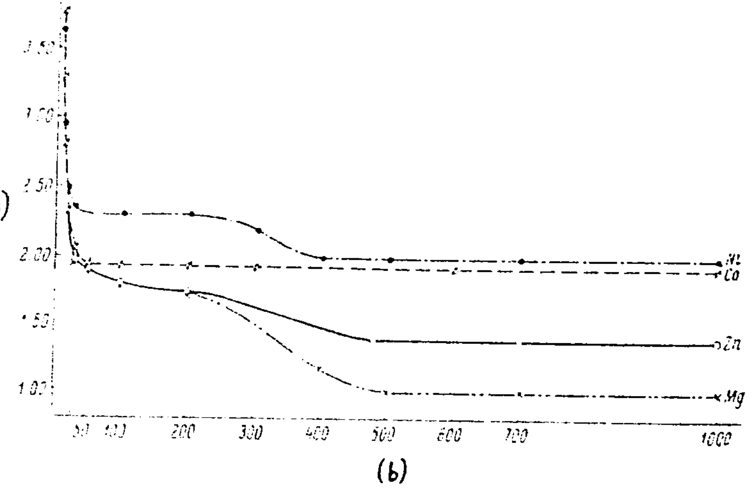
SOV/79-30-3-65/69

Fig. A. Heats of solution of Ni, Co, Zn, and Mg perchlorate hexahydrates, at various dilutions. (a) ΔH_{avg} Cal/mole; (b) dilution.



ASSOCIATION: Leningrad State University (Leningradskiy gosudarstvennyy universitet)

SUBMITTED: July 6, 1959

Card 2/2

SHCHUKAREV, S.A.; ORLOVA, G.M.; BORISOVA, Z.U.

Heats of solution of copper perchlorate hexahydrate in water and aqueous solutions of perchloric acid. Zhur.ob. khim. 30 no.7:2097-2102 Jl '60. (MIRA 13:7)

1. Leningradskiy gosudarstvennyy universitet.
(Copper perchlorate) (Heat of solution)
(Perchloric acid)

S/079/60/030/007/001/020
B001/B063

AUTHORS: Shchukarev, S. A., Morozova, M. P., Damen, Kh.

TITLE: The W - WS_2 System

PERIODICAL: Zhurnal obshchey khimii, 1960, Vol. 30, No. 7, pp. 2102-2104

TEXT: Contrary to the sulfides of the 3ds elements, which are homogeneous in a fairly wide range (Refs. 1,2,3,4,5), only little material is available on the ranges of homogeneity of the sulfides of the 4d5s and 5d6s elements. It was the purpose of the present paper to study the phases in the W-WS_2 system. The WSx preparations were produced by homogenizing pulverulent mixtures of pure metallic tungsten and pure sulfur in evacuated quartz ampoules at 800°C. Annealing took 500 h. The four preparations produced had the composition $WS_{0.91}$, $WS_{1.73}$, $WS_{1.98}$, and WS_2. In accordance with data published in the paper of Ref. 6, the X-ray analysis showed only the lines of tungsten and disulfide in the whole interval W-WS_2. Moreover, the two lattices showed no change. No homogeneous preparations were

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The W - WS_2 System

S/079/60/030/007/001/020
B001/B063

obtained by annealing the tungsten-sulfur mixtures. The quantity of sulfur was higher than is necessary for the formation of WS_2. The free sulfur found indicates that WS_2 has no range of homogeneity extending to a higher stoichiometric sulfur content. Thus, it was found that in the W - S system there is only the compound WS_2 which has no noticeable range of homogeneity. As compared to sulfur, tungsten is only tetravalent, whereas chromium shows the neighboring valences 2 and 3, and forms compounds with sulfur that are characterized by wide ranges of homogeneity. Finally, the authors discuss several rules concerning the change in the ranges of homogeneity of oxides and sulfides in the periodic system. It may be seen from the accompanying table that no transfer of sulfur from the sulfide $WS_{1.98}$ to metallic tungsten is observable, which is also the case with the pair $WS_{1.73}$ - $WS_{0.91}$. There are 1 table and 11 references: 3 Soviet, 5 German, 1 Belgian, and 2 British.

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The W - WS_2 System

S/079/60/030/007/001/020
B001/B063

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: July 8, 1959

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Card 3/3

SHCHUKAREV, S.A.; BORISOVA, Z.U.; GUSEV, A.M.

Heat of solution of cadmium and mercury perchlorates hexahydrates.
Zhur. ob. khim. 30 no.12:3857-3859 D '60. (MIRA 13:12)

1. Leningradskiy gosudarstvennyy universitet.
(Cadmium perchlorate) (Mercury perchlorate)
(Heat of solution)

S/054/61/000/001/007/008
B117/B203

AUTHORS: Shchukarev, S. A., Suvorov, A. V.

TITLE: Thermodynamic study of some chlorine derivatives of molybdenum and tungsten

PERIODICAL: Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, no. 1, 1961. 87-99

TEXT: The authors give results of thermodynamic studies of compounds of two isotope groups: $MoCl_5 - MoOCl_4 - MoO_2Cl_2 - MoO_3$ and $WCl_6 - WOCl_4 - WO_2Cl_2 - WO_3$. They used their membrane- and opticotensimetric methods (Ref. 23: G. I. Novikov, A. V Suvorov, "Zav. lab." no. 6, 750, 1959; Ref. 24: S. A. Shchukarev, G. I. Novikov, A. V. Suvorov, ZhNKh. 1, 2433, 1956). The two apparatus used were improved. For instance, temperature was measured with the aid of a thermocolumn consisting of three thermocouples with an accuracy of ±0.5 %. By means of an ЭПВ-01 (EPV-01) electron potentiometer it was possible to keep the temperature constant for a long period (1-20 hr) with the same accuracy. Pressure

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Thermodynamic study of some chlorine,

S/054/61/000/001/007/008
B117/B203

was measured in the range of 1-800 mm Hg with an МБП (MBP) mercury manometer with an accuracy of ±0.1 mm Hg, and in the range of 800-1400 mm Hg with a U-shaped mercury manometer with an accuracy of ±1 mm Hg. With the use of an ФЭУ-19-М (FEU-19-M) electron photomultiplier together with a voltage divider it was possible to extend considerably the range of exactly measureable optical densities. With the use of plane-parallel, all-soldered optical cuvettes, the optical density was measured with the same accuracy as the vapor pressure (about 0.5-1%). The pressure of saturated and unsaturated $MoCl_5$ vapor was studied. Two series of measurements were made at a chlorine pressure of about 300 and 400 mm Hg in a temperature range of 80°-300°C. The data averaged by the method of least squares correspond to the equations:

			ΔH, kcal/mole	ΔS energy units
sublimation	$[MoCl_5]_{solid}$	$\log P_{atm} = 9.150 - 4750/T$	21.7 ± 0.5	43.5 ± 0.5
evaporation	$MoCl_5$ liqu	$\log P_{atm} = 5.536 - 3036/T$	13.9 ± 0.5	25.3 ± 0.5

By simultaneous solution of these equations, the melting point 201°C and the boiling point 276.5°C are obtained. The values determined from the dissociation equation $(MoCl_5)_{gas} = (MoCl_4)_{gas} + \frac{1}{2}(Cl_2)_{gas}$ for the equi-

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librium constant K_p correspond to the equation $\log K_p = 3.201 - 2779/T$; $\Delta H = 12.8 \pm 0.5$ kcal/mole; $\Delta S = 14.8 \pm 0.5$ energy units. The data found for the evaporation process of liquid $MoOCl_4$ correspond to the equation: $\log P_{atm} = 4.783 - 2552/T$; $\Delta H = 11.7 \pm 0.5$ kcal/mole; $\Delta S = 21.9 \pm 0.5$ energy units. This gives a boiling point of 250.5°C. The data determined for the dissociation of $MoOCl_4$ according to the scheme $(MoOCl_4) = (MoOCl_3) + \frac{1}{2}(Cl_2)$ from two series of measurements at an initial chlorine pressure of 170 and 430 mm Hg correspond to the equation: $\log K_p = 3.152 - 2498/T$; $\Delta H = 11.5 \pm 1$ kcal/mole; $\Delta S = 14.5 \pm 1$ energy unit. To investigate the thermodynamic characteristics of MoO_2Cl_2, the authors studied its process of formation from MoO_3 and chlorine according to the scheme $[MoO_3] + (Cl_2) = (MoO_2Cl_2 + \frac{1}{2}(O_2)$. Experiments showed that MoO_3 started reacting with chlorine at temperature above 500°C. The results obtained correspond to the equation: $\log K_p = 3.112 - 2865/T$; $\Delta H = 13 \pm 1$ kcal/mole; $\Delta S = 14 \pm 1$ energy units. The pressure of saturated WCl_6 vapor was studied

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at pressures of up to 900 mm Hg. The data obtained corresponded to the following equations: (1) Sublimation α-WCl_6: $\log P_{atm} = 7.480 - 4400/T$; $\Delta H = 20.1 \pm 0.3$ kcal/mole; $\Delta S = 34.3 \pm 0.5$ energy units; (2) sublimation β-WCl_6: $\log P_{atm} = 5.983 - 3645/T$; $\Delta H = 16.7 \pm 0.3$ kcal/mole; $\Delta S = 27.5 \pm 0.5$ energy units; (3) evaporation WCl_6: $\log P_{atm} = 5.222 - 3216/T$; $\Delta H = 14.7 \pm 0.5$ kcal/mole: $\Delta S = 24.0 \pm 0.5$ energy units. By simultaneous solution of these equations the temperatures of phase transformations are obtained: $T_{\alpha-\beta} = 231^{\circ}C$, $T_{melt} = 291^{\circ}C$. $T_{boil} = 343^{\circ}C$ is determined by solving Eq. (3) with P = 1. In the range of unsaturated vapor, the dissociation of WCl_6 occurs in two stages at the same time. The data found correspond to the equations: $(WCl_6) = (WCl_5) + \frac{1}{2}(Cl_2)$ $\log K_p = 6.729 - 5280/T$; $\Delta H = 24.2 \pm 0.5$ kcal/mole; $\Delta S = 30.8 \pm 0.5$ energy units; $(WCl_6) = (WCl_4) + (Cl_2)$ $\log K_p = 11.200 - 9333/T$; $\Delta H = 43 \pm 1$ kcal/mole; $\Delta S = 51 \pm 0.5$ energy units. This shows that the dissociation of WCl_6 in the first stage is more intensive than in the

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second stage. The pressure of saturated $WOCl_4$ vapor was measured up to 1340 mm Hg. The data obtained correspond to the equations: Sublimation $WOCl_4$: $\log P_{atm} = 9.743 - 4789/T$; $\Delta H = 21.7 \pm 0.5$ kcal/mole; $\Delta S = 44.2 \pm 0.5$ energy units; evaporation $WOCl_4$: $\log P_{atm} = 4.564 - 2250/T$; $\Delta H = 11 \pm 1$ kcal/mole; $\Delta S = 22 \pm 1$ energy units: hence, the melting point of 211°C and the boiling point of 227°C are obtained. For the disproportionation of $WOCl_4$ according to the scheme $2(WOCl_4) = (WO_2Cl_2) + (WCl_6)$, the following thermodynamic characteristics were determined in first approximation: $\log K_p = 1.41 - 2400/T$; $\Delta H = 11 \pm 1$ kcal/mole; $\Delta S = 6 \pm 1$ energy units. In the system WO_2Cl_2, the simultaneous course of three independent processes is assumed: (I) $[WO_2Cl_2] = (WO_2Cl_2)$; (II) $2[WO_2Cl_2] = (WOCl_4) + [WO_3]$, and (III) $3[WO_2Cl_2] = (WCl_6) + 2[WO_3]$. The partial pressures obtained and the respective equilibrium constants correspond to the equations (pressure in atm): (I) $\log P_{WO_2Cl_2} = 6.666 - 5043/T$;

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$\Delta H = 23 \pm 1$ kcal/mole; $\Delta S = 31 \pm 1$ energy units; (II) $\log P_{WOCl_4} = 11.547 - 7471/T$; $\Delta H = 36 \pm 1$ kcal/mole; $\Delta S = 56 \pm 1$ energy units; (III) $\log P_{WCl_6} = 18.455 - 12648/T$; $\Delta H = 56 \pm 1$ kcal/mole; $\Delta S = 82 \pm 1$ energy units. The simultaneous solution of these equations shows that WO_2Cl_2 prevails in vapors only below 224°C. At higher temperatures, $WOCl_4$ prevails. At 372°C, the pressure of WCl_6 vapor equals the pressure of WO_2Cl_2 vapor. At temperatures above 400° - 450°C, the dissociation processes must obviously not be neglected. The composition of vapor above WO_2Cl_2 becomes even more complicated.

A. V. Tarasov assisted in the investigations of $WOCl_4$ and WO_2Cl_2.

D. N. Tarasenkov and A. V. Komandin are mentioned. There are 5 tables and 26 references: 15 Soviet-bloc and 11 non-Soviet-bloc.

31793

S/020/61/141/003/011/021
B103/B101

5.5310

AUTHORS: Shchukarev, S. A., and Semenov, G. A.

TITLE: Mass-spectrometric study of the vapor composition above rare-earth oxides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 3, 1961, 652-654

TEXT: The vapor composition above the oxides of all rare earth elements (except Tu) was studied in a МИ-1305 (MI-1305) mass spectrometer with vaporization from an iridium band. The thermocouple used in the spectrometer was gaged by means of an optical pyrometer of the 1st type in the Laboratoriya vysokikh temperatur Vsesoyuznogo nauchno-issledovatel'skogo instituta metrologii im. Mendeleyeva (Laboratory of High Temperatures of the All-Union Scientific Research Institute of Metrology imeni Mendeleyev). It is recommended to take into account the simultaneous formation of ions having equal mass by direct ionization of neutral particles when setting out to obtain quantitative data on the ratio of the partial pressures of the vapor components. Such ions may also form by dissociative ionization of heavier molecules. The authors criticise the

Card 1/5

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B103/B101

Mass-spectrometric study ...

assumption by M. B. Panish (Ref. 4, see below) according to which the interrelation of ionic currents in the mass spectrum at an ionizing voltage of 20 v corresponds to the interrelation of the concentrations of the corresponding neutral molecules in the vapor. On the one hand, an arbitrary choice of electron energy may result in considerable dissociative ionization, and on the other, the efficiency of the ionization of certain molecules, especially those of the MO_2 type, may be extremely low. The potentials of ion formation were estimated for all the oxides. The scale of the ionizing voltage was corrected using the ionization potentials of argon and mercury as a basis. Then the initial sections of the curves of ionization efficiency were extrapolated from the time of beginning formation of ion fragments unto the ionic current peak, since here the current strength depends little on the electron energy. The interrelation of the ionic currents at the maximum efficiency, corrected for the ratio of the effective ionization cross sections (Ref. 6, see below) corresponds to the interrelation of the concentrations of the neutral particles. The results are represented in Table 1. In each experiment the maximum ionic current was taken as unit. The measurements were carried out at temperatures sufficiently high to attain

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S/020/61/141/003/011/021
B103/B101

Mass-spectrometric study ...

a vapor pressure of 10^{-5} mm Hg of the major component. Modifications of the Langmuir method were used for La_2O_3 and Nd_2O_3. With other oxides, the vapor pressure was determined during simultaneous vaporization of equimolar quantities of the oxide in question and La_2O_3. Above Er_2O_3 and Yb_2O_3, the vapor pressure of the metals was measured. It was found that the volatility of the oxides of the individual elements in a high vacuum and the composition of their vapors vary widely. The stability of the gaseous monoxides of the lanthanide series, on passing from La to Lu compounds, shows a general tendency to decrease. This results in an increasing M^+/MO^+ ratio. This regularity is strictly periodical: The latter ratio is highest for elements having a valency +2 (Eu, Yb), and a lowest sublimation enthalpy of the metal. These oxides are also more volatile. Dioxide molecules (CeO_2, PrO_2, TbO_2) were found to be present in the vapors of elements having the valency +4. This was also found to be the case in check tests carried out in a spectrometer with a tungsten band, as the ionic currents of Ir^+ and ThO^+ cannot be separated in the MI-1305 instrument. On heating in a vacuum, CeO_2 dissociates unto about

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Mass-spectrometric study ...

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$CeO_{1.80}$-$CeO_{1.67}$ (Ref. 8, see below). The vapor of this oxide contains CeO and CeO_2 molecules. The ratio of the ion currents CeO^+/CeO_2^+ does not remain constant, but increases gradually as the quantity of substance on the vaporizer band decreases, i.e. from 0.5 : 1.0 at the outset to 0.8 : 1.0 at the end of the test (ionizing voltage 45 v). Ce_2O_3 was found to vaporize congruently at a solid phase composition of approximately $CeO_{1.6}$. Formation of ions of the type MO_2^+, or polymeric ions $(MO)_n$ was not observed. There are 2 figures, 1 table, and 8 references: 2 Soviet and 6 non-Soviet. The three most important references to English-language publications read as follows: Ref. 4: M. B. Panish, J. Chem. Phys., 34, 1079 (1961); Ref. 6: J. M. [illegible], D. P. Stevenson, J. Am. Chem. Soc., 78, 546 (1956); Ref. 8: G. Brauer, K. A. Gingerich, H. Holtschmidt, J. In. Nucl. Chem., 16, 77 (1960).

PRESENTED: June 26, 1961, by A. N. Terenin, Academician

SUBMITTED: June 23, 1961

Card 4/5

SHCHUKAREV, S.A.; LOBANEVA, O.A.

Spectrophotometric study of complex cobalt bromides in alcohol solutions. Zhur.neorg.khim. 6 no.4:804-808 Ap '61.
(MIRA 14:4)

(Cobalt compounds—Spectra)

SHCHUKAREV, S.A.; SUVOROV, A.V.

Thermodynamic investigation of certain chloro derivatives of molybdenum and tungsten. Vest. LGU 16 no.4:87-99 '61.
(MIRA 14:3)

(Systems(Chemistry)) (Tungsten compounds)
(Molybdenum compounds)

SHCHUKAREV, S.A.; KOLBIN, N.I.; RYABOV, A.N.

Anhydrous ruthenium tribromide. Vest. LGU 16 no.4:100-104 '61.
(MIRA 14:3)

(Ruthenium bromide)

SHCHUKAREV, S.A.; KOLBIN, N.I.; RYABOV, A.N.

Ruthenium triiodide. Zhur.neorg.khim. 6 no.5:1013-1015 My '61. (MIRA 14:4)

1. Leningradskiy gosudarstvennyy universitet.

(Rrutenium iodide)

SHCHUKAREV, S.A.; KOLBIN, N.I.; SEMENOV, I.N.

Preparation of osmium tribromide. Zhur.neorg.khim. 6 no.5:1246-1247 My '61. (MIRA 14:4)

(Osmium bromide)

SHCHUKAREV, S.A.; MOROZOVA, M.P.; STOLYAROVA, T.A.

Enthalpy of the formation of compounds of manganese with the elements of the main sub-group of group V. Zhur.ob.khim. 31 no.6:1773-1777 Je '61. (MIRA 14:6)

1. Leningradskiy gosudarstvennyy universitet imeni A.A.Zhdanova.
(Manganese compounds) (Enthalpy)

SHCHUKAREV, S.A.; SUVOROV, A.V.

Thermodynamic study of chloro derivatives of molybdenum and tungsten.
Zhur.neorg.khim. 6 no.6:1488-1489 Je '61. (MIRA 14:11)
(Molybdenum chloride) (Tungsten chloride)

24420
S/079/61/031/007/002/008
D229/D305

5 2200

AUTHORS: Shchukarev, S.A., Semenov, G.A., Rat'kovskiy, I.A., and Perevoshchikov, V.A.

TITLE: Determination of saturated vapor pressures of indium oxide

PERIODICAL: Zhurnal obshchey khimii, v. 31, no. 7, 1961, 2090 - 2092

TEXT: This is a report on determining very low saturated vapor pressure of indium oxide by the flow method using a radioactive tracer - In^{114} in the range of temperature from 1290° to 1490°. It is known (Ref. 1: S.V. Bleshinskiy, and V.F. Abramova, Khimiya indiya. Izd. AN Kirgizsk SSSR, 1958) that the ignition of In_2O_3 at the temperature up to 1200° did not lead to a change in weight of indium oxide. The attempt to measure the vapor pressure of In_2O_3 at 1060° using the flow method was unsuccessful. In view of the above it was decided to determine vapor pressure of In_2O_3 by a

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Determination of saturated ...

flow method at much higher temperatures (1290°-1490°) with air as a carrier gas suppressing the dissociation of indium oxide. Air was found to be satisfactory, as it is proved (Ref. 1: Op.cit.) that indium nitride if formed, burned up in the air, forming oxide. It was assumed that indium oxide vapor is monomeric. After describing the indium oxide preparation method, the authors note that its radiochemical purity was checked by a γ-spectrometer (illustrated in this article). The rate of flow of carrier gas at its saturation with In_2O_3 vapor was determined for three temperatures: 1290°, 1445° and 1490°C. The values of molar concentration at the flow rates less than 4 ml/min were not taken into account when extrapolating for zero rate, as they showed discrepancies. The flow rate of 5-7 ml/min was chosen. The values of indium oxide molar concentration obtained by extrapolation for the zero rate and measured at the low rate of 5-7 ml/min varied roughly by 8 %. Saturated vapor pressure of indium oxide was measured in the temperature range of 1290° - 1490°C and the dependence of the saturated vapor pressure of indium oxide on temperature is shown in Fig. 2. Results were taken from

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Determination of saturated ... S/079/61/031/007/002/008
D229/D305

three independent experiments with preparations of different total activity. The total determination error of indium oxide vapor pressure consists of: Determination error of total activity of preparation(± 1.2 %), error in measuring activity (± 6 %), determination error of preparation temperature (± 0.5 %), error in measuring volume of passed carrier gas (± 2 %). The determination error of indium oxide vapor pressure calculated on the basis of these values amounts to 6 %. Enthalpy of sublimation of indium oxide was found to be 118 ± 2Kcal/mol. Entropy of the process of sublimation of In_2O_3 was calculated taking the heat capacity values of indium oxide in the temperature range of 0^o-100^oC (Ref. 1: Op.cit.), as no value of C_p of In_2O_3 at high temperature could be found in technical literature. Calculated $S^o{}_{298}$ amounts to 42 ± 1Kcal/mol. degree. There are 2 figures, 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet imeni A.A. Zhdanova (Leningrad State University imeni A.A. Zhdanov)

SUBMITTED: June 21, 1960

Card 3/4

S/078/61/006/008/016/018
B127/B226

5.4210

25516

AUTHORS: Shchukarev, S. A., Semenov, G. A., Rat'kovskiy, I. A.

TITLE: Determination of pressure of saturated gallium-oxide vapor

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1973

TEXT: The authors worked according to the flow method in an oxygen atmosphere at 1523 - 1682°C. The experiments were conducted in a platinum boat attached to the end of a movable alundum bar. This arrangement was contained in an alundum tube and fixed in a furnace with a tungsten spiral in an alcohol atmosphere. The temperatures of the samples used were measured with a platinum - platinum-rhodium thermocouple and a ПП-1 (PP-1) potentiometer with optical pyrometer. The gas production rate was measured at 1562 - 1592°C. The values of the molar Ga_2O_3 concentration obtained by extrapolating for zero velocity, and those measured at a gas production rate of 11 - 13 ml/min did not differ by more than 6%. The results obtained are shown in a figure, and may be written as: $\log = -\frac{27098}{T} + 13.339$ mm Hg. In the vapor phase, Ga_2O_3 proved monomeric. Enthalpy and

Card 1/[illegible]

Determination of pressure... 25516 S/078/61/006/008/016/018
B127/B226

entropy of sublimation of gallium oxide calculated from the slope of the straight line: $\log p = f(\frac{1}{T})$ is 126±2kcal/mole and 49±1kcal/mole·deg. Under standard conditions entropy and enthalpy of Ga_2O_3 formation were calculated to be 137±6kcal/mole, 57±4kcal/mole·deg. and -127±6kcal/mole, -15±4kcal/mole·deg. There are 1 figure and 5 references: 1 Soviet-bloc and 4 non-Soviet-bloc. The two references to English-language publications read as follows: Ref. 4: E. King, A. Christensen. J. Amer. Chem. Soc., 80, 1799 (1958). Ref. 5: L. Brewer. Chem. Rev., 52, I (1953).

SUBMITTED: February 27, 1961

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Card 2/3

SHCHUKAREV, S.A.; LOBANEVA, O.A.; IVANOVA, M.A.; KONONO . M.A.

Spectrophotometric study of complex palladium (I chlorides in aqueous solutions. Vest.LGU 16 no.10:152-155 1. (MIRA 14:5)
(Palladium compounds) (Spectrop ometry)

30183
S/07[illegible] 61/006/012/011/[illegible]
B12 /[illegible]110

5 2200

AUTHORS: Shchukarev, S. A., Semenov, G. A., R[illegible]kovskiy, I. A.

TITLE: Determination of the saturated vapor pressure of thallium oxide

PERIODICAL: Zhurnal neorganicheskoy khimii, v. , no. 12, 1961, 2817-2818

TEXT: The pressure of saturated Tl_2O_3 vapor was measured using flow in an oxygen atmosphere. Thallic oxide was prepared by solving the pure metal in HNO_3 and additional oxidation by means of bromine water; excess bromine was removed by boiling. Thallium hydroxide was precipitated with ammonia and converted by boiling under water to the crystalline form. The Tl_2O_3 was subsequently dried in a current of dry oxygen at 250°C for 4 hours. The temperature of the boat in the furnace was measured with a Pt-PtRh thermocouple equipped with the potentiometer ПП-1 (PP-1). The velocity of the carrier-gas current corresponding to saturation with Tl_2O_3 vapors was measured at 670, 700 and 750°C. When extrapolation to

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30183
S/078/61/006/012/011/011
B124/B110

Determination of the...

zero velocity was performed, the change in molar concentration was made no allowance for at rates of flow below 3 ml/min., since considerable deviations were found to occur at these rates. A rate of flow equal to 3 ml/min was chosen, with maximum deviation of the extrapolated molar concentrations of Tl_2O_3 from measured values being 4%. Experimental data obtained are illustrated in the Figure; they are described in good approximation by the equations: ${Tl_2O_3}_{sol} \rightarrow {Tl_2O_3}_{gas}$ log p = -(12,196/T) + 13,440 and ${Tl_2O_3}_{liq} \longrightarrow {Tl_2O_3}_{gas}$ log p = -(11,429/T) + 12,663. Tl_2O_3 was supposed to be present in the vapor in monomer form. Sublimation enthalpies of thallium oxide calculated from the slope of the straight line log p = f(1/T) were 55.8 ± 1 kcal/mole and 52.3 ± 1 kcal/mole, respectively, sublimation entropies 48.3 ± 1 kcal/mole·degree and 44.9 ± 1 kcal/mole·degree, respectively, the melting point 716 ± 2°C, the boiling point 1169°C, the heat of vaporization at boiling temperature 50.0 ± 1 kcal/mole, and the heat of fusion 3.5 ± 1 kcal/mole. There are 1 figure and 5 references: 2 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: A. B. F. Dunkan. J. Amer. Chem. Soc. 51, 3667

Card 2/3

SHCHUKAREV, S.A.; ANDREYEV, S.N.; BALICHEVA, T.G.; NECHAYEVA, L.N.

Infrared absorption spectra of aqueous solutions of some perchlorates in the region of the fundamental frequency of O-H valence oscillations. Vest LGU 16 no.16:120-124 '61. (MIRA 14:8)

(Perchlorates--Spectra)

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; ORANSKAYA, M.A. [deceased];
TSINTSIUS, V.M.; SUBBOTINA, N.A.

Determination of the enthalpy of vanadium tribromide formation.
Vest LGU 16 no.16:125-129 '61. (MIRA 14:8)
(Vanadium chloride)
(Enthalpy)

PERFILOVA, I.L.; KOZLOVA, I.V.; SHCHUKAREV, S.A.; VASIL'KOVA, I.V.

Enthalpy of vanadium oxychloride formation. Vest LGU 16
no.16:130-135 '61. (MIRA 14:8)
(Vanadium chloride)
(Enthalpy)

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; ZAYTSEVA, N.D.

Study of molybdenum halides, determination of the enthalpy of molybdenum tetrabromide formation. Vest LGU 16 no.22:127-129 '61. (MIRA 14:11)

(Molybdenum halides) (Heat of formation)

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; SHARUPIN, B.N.

Molybdenum halides. Part 5: Thermodynamics of MoO_2Cl and $MoO_2Cl_2 \cdot H_2O$. Vest LGU 16 no.22:130-134 '61. (MIRA 14:11)
(Molybdenum halides)

SHCHUKAREV, Sergey Aleksandrovich; TOLMACHEVA, T.A., otv.red.;
PIASTRO, V.D., red.; ZHUKOVA, Ye.G., tekhn.red.

[Lectures on the general chemistry course] Lektsii po obshchemu kursu khimii. Leningrad, Izd-vo Leningr.univ. Vol.1. 1962. 405 p. (MIRA 15:5)

(Chemistry—Study and teaching)

38967
S/020/62/145/001/016/018
B145/B101

21210

AUTHORS: Shchukarev, S. A., Semenov, G. A., and Frantseva, K. Ye.

TITLE: Determination of the saturation vapor pressure of niobium dioxide

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 1, 1962, 119 - 121

TEXT: The saturation vapor pressure of niobium dioxide was measured in the range 1938 - 2122°K using a variant of Knudsen's effusion method (see T. E. Phipps, C. W. Sears, O. C. Simpson, Manhattan Project, Div. IV, 14b, The Transuranium Elements, N. Y., 1949, p. 704, and An. N. Nesmeyanov, Atomnaya energiya, 3, 227 (1957)), and the heat of sublimation and the dissociation energy of gaseous NbO_2 were calculated from the results. The cylindrical effusion chamber was of forged molybdenum (diameter of the effusion opening: 0.308 mm, ratio between the areas of the material to be vaporized and the effusion opening = 500 : 1; heating by electron bombardment; attainable vacuum: $1\cdot10^{-5}$ mm Hg; 2100°K). The oxide has the composition $NbO_{2.008}$ and was tagged with Nb^{95}. The values measured satis-

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Determination of the saturation ... S/020/62/145/001/016/018
B145/B101

fied the equation $-\log P = -30300/T + 12.42$ mm (heat of sublimation: 136 ± 2 kcal/mole). From the published values of $-(F^o_T - H^o_{298})/T$ and of $H^o_{298} - H^o_o$ for condensed and gaseous NbO_2, the sublimation enthalpy ΔH^o_o was calculated as 141 ± 0.4 kcal/mole. The dissociation energy of gaseous NbO_2, calculated from published data for the heat of sublimation of metallic Nb and the heat of atomization, worked out as 14.9 ± 0.1 ev. There are 2 figures and 1 table. The most important English-language references are: J. L. Margrave, Proc. of the Symposium on High Temperature - a Tool for the Future, Berkeley, California, 1956; Physicochemical Measurements at High Temperatures, Ed. Bockris, White, Mackenzie, Butterworths Sci. Publ., 1959; L. Brewer, G. M. Rosenblatt, Chem. Rev., 61, 3 257 (1961).

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: March 3, 1962, by A. N. Terenin, Academician

SUBMITTED: February 27, 1962

Card 2/2

S/054/62/000/002/011/012
B117/B101

AUTHORS: Shchukarev, S. A., Kurbanov, A. R.

TITLE: Thermodynamic investigation of some tantalum chlorides

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 2, 1962, 144 - 151

TEXT: The pressure of saturated and unsaturated tantalum pentachloride vapors between 425 and 1020°K and the thermal stability of tantalum tetrachloride were investigated. $TaCl_5$ was produced by direct chlorination of metallic tantalum with chlorine at 300 - 350°C. $TaCl_4$ was obtained by reduction of $TaCl_5$ with metallic aluminum and sheet tantalum. Sublimation and evaporation of $TaCl_5$ were studied at 425 - 530°K. It was found for the sublimation: $\Delta H = 22.7$ kcal/mole, $\Delta S = 45.2$ entropy units (e.u.), for the evaporation: $\Delta H = 14.9$ kcal/mole, $\Delta S = 29.3$ e.u. A melting temperature of 216°C and a boiling temperature of 235°C were determined from the equations for sublimation and evaporation. The difference in

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Thermodynamic investigation of...

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enthalpy and entropy of these two processes was used to calculate heat and entropy of melting of $TaCl_5$: $\Delta H = 7.8$ kcal/mole, $\Delta S = 15.9$ e.u. For the dissociation according to the reaction $(TaCl_5)_{gas} = (TaCl_4)_{gas} + 1/2\ Cl_2$, the following was found: $\Delta H = 33.55$ kcal/mole, $\Delta S = 31.3$ e.u. For the very slow disproportion (32 - 36 hr) of $TaCl_4$ according to $2[TaCl_4]_{solid} = [TaCl_3]_{solid} + (TaCl_5)_{gas}$: $\Delta H = 27.0$ kcal/mole, $\Delta S = 48.3$ e.u. When measuring the pressure of gaseous $TaCl_5$ over solid $[TaCl_3]$ in the absence of $[TaCl_4]$ at 450°C, the conproportion reaction $[TaCl_3]_{solid} + (TaCl_5)_{gas} = 2(TaCl_4)_{gas}$ was observed. In this case, $\Delta H = 33.4$ kcal/mole and $\Delta S = 32.3$ e.u. were determined. Enthalpy and entropy of sublimation of $TaCl_4$ were calculated from the disproportion and conproportion processes: $\Delta H = 30.2$ kcal/mole, $\Delta S = 40.4$ e.u. The results show a satisfactory agreement with published data. There are 2 figures and 2 tables.

SUBMITTED: July 7, 1961
Card 2/2

SHCHUKAREV, S.A.; ANDREYEV, S.N.; BURKOV, K.A.

Complex formation in the system $NiCl_2$ - HCl - H_2O. Dokl.AN SSSR 144 no.2:371-373 My '62. (MIRA 15:5)

1. Leningradskiy gosudarstvennyy universitet im. A.A.Zhdanova. Predstavleno akademikom I.I.Chernyayevym.
(Nickel chlorides) (Hydrochloric acid) (Complex compounds)

S/078/62/007/003/004/019
B110/B138

AUTHORS: Shchukarev, S. A., Semenov, G. A., Ratikovskiy, I. A.

TITLE: Determination of the saturated vapor pressure of metallic thallium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 469 - 471

TEXT: The saturated vapor pressure of thallium was measured with Tl^{204} using Knudsen's method. 10 - 15 measurements at temperatures up to 1200°C and residual pressure of about 10^{-5} mm Hg were made with a differential all-metal apparatus. A quartz effusion chamber was placed in a quartz furnace heated by a Mo spiral. The e.m.f. of one of the chromel/alumel thermocouples was measured on a ПП-1(PP-1) potentiometer, and an ЭПВ-01(EPV-01) thermoregulator for the other. The effusion opening evaporating surface ratio was 1:1000. The apparatus was calibrated against saturated Ag-metal vapor. $p = \left\{\left[17.153 I_T q_{st}(r^2 + h^2)\right]/A t I_{st} r^2\right\} \cdot \sqrt{T/M}$, where p = vapor pressure of the mixture of stable isotopes in question, mm Hg; A = area of effusion opening, cm^2; t = time of target exposure, sec; I_T = radioactivity of
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condensate deposited on target, imp/min; q_{st} = weight of initial radioactive substance in the sample, g; radius of collimator, cm; h = distance between effusion chamber and collimator, cm; T = temperature of effusion chamber, °K; M = molecular weight of the vapor of the substance examined. An МС-1(MS-1) mass spectrometer was used to determine the composition of Tl vapor during evaporation from an open surface, at an ionization voltage of 50-60 v, and an emission current of 1.2 ma. Tl^+, Tl^{2+}, Tl_2O^+, O_2^+, and Tl_2^+ ions were found in a ratio of 100:10:2:1:1. The Tl_2O^+ and Tl_2^+ currents decreased rapidly with time, but their ratio remained constant and temperature-independent. Tl_2O^+, O_2^+, and Tl_2^+ are probably the result of the dissociation of oxide films forming on the surface. This is in good agreement with mass-spectrometer examinations of Ga and In evaporation. Like Ga and In ($Me_2/Me = 10^{-3}$), Tl vapor is also assumed to have a monomer structure. Tl metal with Tl^{204} was reduced for 4-5 hrs in H_2 current at 250°C, and vacuum heated for 3-4 hrs at $\leqslant$ 700°C. Temperature dependence

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B110/B138

Determination of the saturated...

of pressure: $\log p = -8708/T + 7.3697$ (2) Heat and entropy of thallium evaporation for $\log p = f(1/T)$ and the temperature range 701-974°K were found to be 39.8 ± 0.5 kcal/g-atom and 20.9 ± 0.5 kcal/g-atom·degree. The boiling temperature of Tl, calculated by (2) was 1939°K, and the corresponding evaporation heat was 40.5 kcal/g-atom. There are 2 figures, 1 table, and 6 references: 3 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: F. F. Golemann, A. Egerton. Trans. Roy. Soc. (London), 234A, 177 (1935); S. Antkiv, V. H. Dibeler. J. Chem. Phys., 21, 1890 (1953).

SUBMITTED: April 24, 1961

Card 3/3

33131
S/020/62/144/003/029/030
B124/B101

11.2115

AUTHORS: Shchukarev, S. A., Andreyev, S. N., and Balicheva, T. G.

TITLE: Vibrational spectra of perchloric acid in the liquid and gaseous state

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 3, 1962, 606-608

TEXT: The state of the OH bond in perchloric-acid molecules in the gas
phase, anhydrous 100% $HClO_4$, and solid $HClO_4 \cdot H_2O$ was studied in the
region of fundamental-tone valence frequency vibrations of OH. The
respective vibrational spectra were investigated using the recording
infrared spectrometer ИКС-14 (IKS-14) and the nonrecording infrared
spectrometer ИКС-6 (IKS-6) (Fig. 1). Calibration was performed using
the rotation vibration spectra of NH_3, HCl, HBr, CO, CH_4, and C_6H_6.
Results: (1) Gaseous $HClO_4$ is monomeric in the same way as a 0.001 M
solution of $HClO_4$ in CCl_4. (2) The line-shift of anhydrous $HClO_4$ amounting
to 170 cm^{-1} is accounted for by the H bonds which have an energy amounting

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SHCHUKAREV, S.A.; ANDREYEV, S.N.; BALICHEVA, T.G.

Infrared spectra of perchloric acid and its solutions in the region of 3700 - 2300 cm^{1}. Vest. LGU 17 no.4:128-134 '62. (MIRA 15:3)
(Perchloric acid-spectra)

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; KOROL'KOV, D.V.; NIKOL'SKIY, S.S.

Thermodynamic study of molybdenum dibromide. Vest. LGU 17 no.4:
148-153 '62. (MIRA 15:3)
(Molybdenum bromides—Thermal properties)

S/153/62/005/005/001/011
E071/E133

AUTHORS: Shchukarev, S.A., Semenov, G.A., and Frantseva, K.Ye.

TITLE: A mass spectrometric study of the evaporation of NbO

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Khimiya i khimicheskaya tekhnologiya, v.5, no.5, 1962, 691-693

TEXT: Niobium monoxide for the investigation was obtained by the reduction of pure niobium pentoxide (99.96%) in dry hydrogen. A specimen of NbO was placed on a tungsten or iridium strip in the ionic source of a mass spectrometer МИ-1305 (MI-1305). The temperature was measured with a calibrated tungsten-rhenium thermocouple welded to the strip. The presence in the vapour of the following ions was established: Nb^+, NbO^+ and NbO_2^+. In order to determine the origin of NbO^+ ions, the potential of their appearance was evaluated by plotting the dependence of ionic current NbO^+ against the ionising potential. This was evaluated as 10.5 eV. Complete absence of Nb^+ ions at an ionising potential of 15 V indicated that these were formed due to dissociation ionisation. Thus there were two types of ions corresponding to the neutral molecules present in the vapour NbO_2 and NbO.

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Card 1/2

SHCHUKAREV, S. A.; SEMENOV, G. A.

Evaporation of hafnium dioxide. Izv. vys. ucheb. zav.; khim. i khim. tekh. 5 no.5:845 '62. (MIRA 16:1)

1. Leningradskiy gosudarstvennyy universitet imeni A. A. Zhdanova, kafedra neorganicheskoy khimii.

(Hafnium oxides) (Evaporation)

S/078/62/007/006/001/024
B124/B138

AUTHORS: Shchukarev, S. A., Smirnova, Ye. K., Vasil'kova, I. V., Borovkova, N. I.

TITLE: Formation enthalpy of niobium pentabromide and oxytribromide

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 6, 1962, 1213-1215

TEXT: This was determined from their measured hydrolysis enthalpies for a newly developed method of separating niobium and tantalum by fractionating their bromine compounds. $NbBr_5$ free from oxybromide was produced by making niobium pentoxide react with CBr_5 in sealed ampoules evacuated with a forepump. A mixture of Nb_2O_5, $NbOBr_3$, and unreacted CBr_4 was obtained by 18-20 hr heating at 200°C. The ampoule was cooled, the gaseous reaction products were removed, the ampoule was sealed again and heated for 8-10 hr at 360-380°C. The reaction products CO, $COBr_2$, and Br_2 were drawn off with a forepump at 70°C. The resulting $NbBr_5$ was purified

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Formation enthalpy of niobium ...

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from Nb_2O_5 by double sublimation in vacuo. $NbOBr_3$ was produced by oxidation of $NbBr_5$ at 150-160°C and bromination of Nb_2O_5 with CBr_4 at 190-200°C. The heat released during hydrolysis of the bromides was determined calorimetrically at 26°C to be 68.3 ± 0.9 kcal/mole ($NbBr_5$) and 34.8 ± 0.6 kcal/mole ($NbOBr_3$). The enthalpies calculated on the basis of published data were: $\Delta H^o_{NbBr_5} = -135.2 \pm 1.2$ kcal/mole and $\Delta H^o_{NbOBr_3} = -179.3 \pm 1.0$ kcal/mole. There are 3 tables. The three most important English-language references are: K. M. Alexander, F. Faibrother, J. Chem. Soc. (London), p. 223 (1949); F. Fairbrother, A. H. Cowley, N. Scott, J. of the Less. Common Metals, 1, 206 (1959); G. Z. Humpley, J. Amer. Chem. Soc. 76, 978 (1954).

SUBMITTED: July 14, 1961

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S/078/62/007/006/002/024
B124/B138

AUTHORS: Shchukarev, S. A., Smirnova, Ye. K., Shemyakina, T. S., Ryabov, E. N.

TITLE: Hydrolysis and formation enthalpy of niobium oxytrichloride

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 6, 1962, 1216-1218

TEXT: The formation enthalpy of $NbOCl_3$ was determined from the heat released during its hydrolysis. $NbOCl_3$ was produced at 650-700°C by chlorination of Nb_2O_5 in a dry chlorine flow saturated with CCl_4 vapor, and purified from small amounts of $NbCl_5$ by vacuum sublimation. After removing $NbCl_5$, the oxychloride was sublimed, a gray powder being left behind. The same powder was obtained by heating oxytrichloride in a sealed ampoule previously stored in moist air. X-ray patterns and chemical analyses revealed a chemical substance of the composition $Nb_4O_9Cl_2$ formed during hydrolysis of $NbOCl_3$ at 350-550°C. The mean heat of hydrolysis of the

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Hydrolysis and formation enthalpy ... S/078/62/007/006/002/024
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oxytrichloride was found to be -35.2 ± 0.5 kcal/mole on the basis of measurements made at 25°C with an isothermal calorimeter. The formation enthalpy calculated from published data for $NbOCl_3$ was ΔH^o_{298} = -212.2 ± 0.9 kcal/mole. This value is in good agreement with the formation enthalpy of solid $NbOCl_3$ calculated by H. Schäfer and F. Kahlenberg from the heats of a solution of $NbOCl_3$ in hydrochloric and hydrofluoric acids (-210.2 kcal/mole). There are 1 figure and 3 tables. The two English-language references are: Selected Values of Chemical Thermodynamic Properties, Washington, 1952; G. Z. Hamfray, J. Amer. Chem. Soc. 76, 978 (1954).

SUBMITTED: July 14, 1961

Card 2/2

SHCHUKAREV, S.A.; TOLMACHEVA, T.A.; TSINTSIUS, V.M.

Dismutation of vanadium tribromide at high temperatures. Zhur.neorg.khim. 7 no.7:1505-1508 Jl '62. (MIRA 16:3)

(Vanadium bromide)

SHCHUKAREV, S.A.; VASIL'KOVA, I.V.; PERFILOVA, I.L.; CHERNYKH, L.V.

Enthalpy of vanadium trichloride formation. Zhur.neorg.khim. 7 no.7: 1509-1511 Jl '62. (MIRA 16:3)

(Vanadium chloride) (Heat of formation)

SHCHUKAREV, S.A.; MOROZOVA, M.P.; FRON', G.F.

Enthalpy of the formation of calcium compounds with elements of the main subgroup of the IVth group. Zhur.ob.khim. 32 no.7:2069-2072 Jl '62. (MIRA 15:7)

1. Leningradskiy gosudarstvennyy universitet.
(Calcium compounds) (Heat of formation)

S/080/62/035/007/001/013
D267/D304

AUTHORS: Shchukarev, S.A., Semenov, G.A. and Rat'kovskiy, I.A.

TITLE: Study of the evaporation of gallium, indium and thallium by means of a mass spectrometer

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 7, 1962, 1454-1459

TEXT: In view of the increasing use of these metals in science and engineering the vapor composition above Ga_2O_3, Tl_2O_3, In_2O_3 and In_2O has been studied, the method used being essentially that described by [illegible] Aldrich. Honig's method of evaluating the potential of [illegible] of various ions was used to determine their nature (ionization of neutral particles vs. dissociation ionization). The sesquioxides were obtained from pure metals via chlorides and hydroxides. In_2O was obtained from indium oxalate by decomposition at 335°C; X-ray analysis of this oxide showed only the lines of In_2O_3 and In. The mass spectra of the vapors of Ga_2O_3 (at 1150 -

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Study of the evaporation of gallium,... S/0[illegible]/62/035/007/001/013
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1450°C), In_2O_3 ([illegible]00 - 1450°C) and Tl_2O_3 (300 - 600°C) were characterized by the complete absence of ionic currents corresponding to M_2O_3 (where M = metal) and by the presence of intensive currents of O_2^+, M^+ and M_2O^+ (in this sequence of decreasing intensities). Besides, a current corresponding to GaO^+ (and a very feeble current corresponding to InO^+) was observed. The following scheme of decomposition was adopted: (1) $M_2O_3 \rightleftharpoons MO \longrightarrow M_2O \longrightarrow MO + O_2$; (2) $M_2O_3 \longrightarrow M_2O_{solid} + O_2$; (3) $MO_{solid} \longrightarrow M_2O_{solid} + M_2O_{3solid} + O_2$; (4) $M_2O_{solid} \longrightarrow M_2O_{gas}$; (5) $M_2O_{gas} \xrightarrow{+e} M_2O^+$; (6) $M_2O_{solid} \longrightarrow M_{solid} + O_2$; (7) $M_{solid} \xrightarrow{+e} M_{gas}^+$. There are 4 figures and 1 table. The most important of the English-language references reads as follows: I. Antkiv and V. Dibeler, J. chem. Physics, 21, 1390 (1953).

SUBMITTED: May 25, 1961

Card 2/2

S/080/62/035/007/002/013
D267/D307

AUTHORS: Shchukarev, S.A., Vasil'kova, I.V. and Shalukukhina, L.M.

TITLE: Thermodynamic analysis of the chlorination of molybdates with the gaseous mixture of chlorine with sulphur chlorides

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 7, 1962, 1459 1463

TEXT: It was shown earlier that a mixture of Cl_2 with sulphur chlorides begins to react with calcium and lead molybdates and with MoO_3 at about 160 [illegible], giving rise to volatile Mo chlorides, chlorides of the corresponding metal and SO_2. To evaluate the processes involved from the thermodynamic standpoint and to find thereby the most probable reactions of chlorination, the values of enthalpies, free energies and log K were calculated in the interval 293 - 800°K for all possible reaction schemes between $CaMoO_4$, $PbMoO_4$ and MoO_3, on the one hand and mixtures of Cl_2 with S_2Cl_2 (or pure Cl_2),

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Thermodynamic analysis ...

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on the other. Most of these reactions are exothermic; the analysis of the obtained thermodynamic magnitudes yielded the most probable reaction schemes and showed that the chlorination with the mixture of Cl_2 with sulphur chlorides is more advantageous than chlorination with Cl_2 alone There is 1 figure and 1 table.

SUBMITTED May 29 1961

Card 2/2

SHCHUKAREV, S.A. (Leningrad); MAKARENYA, A.A. (Leningrad)

Evolution of the representations of secondary periodicity. Vop. ist. est. i tekh. no.13:76-79 '62. (MIRA 16:5)

(Periodic table)

SHCHUKAREV, S.A. (Leningrad)

From my reminiscences of N.S. Kurnakov. Vop. ist. est. i tekh.
no.13:105-106 '62. (MIRA 16:5)

(Kurnakov, Nikolai Semenovich, 1861-1941)

S/078/62/007/009/005/007
B144/B101

AUTHORS: Shchukarev, S. A., Smirnova, Ye. K., Shemyakina, T. S.

TITLE: Thermographic study of the systems $NbOCl_3$ - NaCl and $NbOCl_3$ - KCl

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 9, 1962, 2217-2219

TEXT: The thermograms of $NbOCl_3$ purified from $NbCl_5$ and mixed with NaCl or KCl were taken at 300 - 900°C. Conclusions from the resulting constitution diagrams: 1) In the $NbOCl_3$ - KCl system two compounds are formed: $KNbOCl_4$ ($NbOCl_3 \cdot KCl$; 50 mole-% KCl) melting congruently at 440°C; K_2NbOCl_5 ($NbOCl_3 \cdot 2KCl$; 66.7 mole-% KCl) melting incongruently, eutectics at 388 and 422°C, peritectic at 486°C, monotectic transition at 546°C. 2) In the $NbOCl_3$ - NaCl system only the one compound, $NaNbOCl_4$ ($NbOCl_3 \cdot NaCl$; 50 mole-% NaCl), is formed melting congruently at 430°C, eutectics at 380 and 410°C, monotectic transition at 760°C;

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Thermographic study of the systems ... B144/B101

the formation of minute amounts of $NbCl_5$ and of further oxychlorides is assumed. Demixing was observed in both systems. There are 2 figures.

SUBMITTED: July 11, 1961

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SHCHUKAREV, S.A.; KURBANOV, A.R.

Thermodynamic study of some tantalum chlorides. Vest.LGU 17
no.10:144-151 '62. (MIRA 15:5)
(Tantalum chlorides--Thermal properties)

SHEMYAKINA, T.S.; SMIRNOVA, Ye.K.; SHCHUKAREV, S.A.

Enthalpy of the formation of double compounds of niobium oxytrichloride with NaCl and KCl. Vest. LGU 17 no.16:155-157 '62. (MIRA

(Niobium compounds) (Enthalpy)

SHCHUKAREV, S.A.; STROGANOV, Ye.V.; ANDREYEV, S.N.; PURVINSKIY, O.F.

Crystal structure of the crystal hydrates of transition metal salts. Structure of $CoI_2 \cdot 6H_2O$. Zhur.strukt.khim. 4 no.1:63-66 Ja-F '63. (MIRA 16:2)

1. Leningradskiy gosudarstvennyy universitet.
(Cobalt iodides) (Crystallography)

SHCHUKAREV, S.A.; PERFILOVA, I.L.

Interaction of vanadium trichloride with sodium, potassium, and rubidium chlorides. Zhur.neorg.khim. 8 no.9:2106-2108 S '63. (MIRA 16:10)

SHCHUKAREV, S.A.; SMIRNOVA, Ye.K.; VASIL'KOVA, I.V.

Thermographic analysis of the system $RbCl$ - $CbOCl_3$ and $CsCl$ - $NbOCl_3$. Vest. LGU. 18 no.16:132-133 '63. (MIRA 16:11)

SHCHUKAREV, S.A., prof., otv. red.; PIASTRO, V.D., red.

[Chemistry of the rare elements] Khimiia redkikh elementov.
Leningrad, Izd-vo Leningr. univ., 1964. 160 p.
(MIRA 17:5)

1. Leningrad. Universitet.

SHCHUKAREV, S.A.; KOKOVIN, G.A.

Determination of the heats of formation of WO_2Br_2 and $WOBr_4$.

Zhur. neorg. khim. 9 no.7:1565-1569 Jl '64.

(MIRA 17:9)

1. Leningradskiy gosudarstvennyy universitet i Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR.

[illegible]

[illegible]

[illegible]

SHCHUKAREV, S.A.; SMIRNOVA, Ye.K.; VASIL'KOVA, I.V.; KOTOVA, M.S.

Enthalpy of formation of sodium and potassium chlorotantalates. Vest. LGU 18 no.22:174-176 '63. (MIRA 17:1)

[illegible] [illegible] ...ich; [illegible], otv. red.;
[illegible], V.N., red.

[Lectures in general chemistry] Lektsii po obshchemu kursu khimii. Leningrad, Izd-vo Leningr. univ. Vol.2. 196[illegible]. [illegible] p.
(MIRA [illegible]:8)

1. Kafedra neorganicheskoy khimii Leningradskogo gosudarstvennogo universiteta (for Tolmacheva).

KURBANOV, A.R.; SUVOROV, A.V.; SHCHUKAREV, S.A.; NOVIKOV, G.I.

Thermodynamics of tantalum chlorides. Zhur. neorg. khim. 9
no.3:520-525 Mr '64. (MIRA 17:3)

SHCHUKAREV, S.A.; SHEMYAKINA, T.S.; SMIRNOVA, Ye.K.

Compounds of niobium oxytrichlorides with sodium and potassium chlorides. Zhur. neorg. khim. 9 no.3:547-549 Mr '64. (MIRA 17:3)

[illegible]

SHCHUKAREV, S.A.; TOLMACHEVA, T.A.; SLAVUTSKAYA, G.M.

Thermal dissociation of platinum iodides. Zhur. neorg. khim.
9 no.11:2501-2506 N '64 (MIRA 18:1)

1. Leningradskiy gosudarstvennyy universitet imeni Zhdanova,
Kafedra neorganicheskoy khimii.

SHCHUKAREV, S.A.; TOLMACHEVA, T.A.; PAZUKHINA, Yu.L.

Dissociation pressure of palladium iodide. Zhur. neorg. khim. 9 no.11:2507-2510 N '64 (MIRA 18:1)

1. Leningradskiy gosudarstvennyy universitet, Kafedra neorganicheskoy khimii.

SHCHUKAREV, S.A.; LOBANEVA, O.A.; IVANOVA, M.A.; KONONOVA, M.A.

Formation constants of complex divalent palladium bromides. Zhur. neorg. khim. 9 no.12:2791-2792 D '64. (MIRA 18:2)

1. Leningradskiy gosudarstvennyy universitet, kafedra neorganicheskoy khimii.