USSR/Chemistry - Lead, Theorium Systems Jan/Feb 52

"Physicochemical Analysis of Systems of Importance to Analytical Chemistry. XX. The Solubility of Precipitates in Complex (Really Existing) Analytical Systems," I. V. Tananayev, I. B. Misetskaya, A. D. Vinogradova, Inst of Gen and Inorg Chem, Acad Sci USSR

"Zhur Analit Khim" Vol VII, No 1, pp 14-20

Studied soly in the system $PbSO_4$ - $Th(NO_3$ - Li_2SO_4- H_2O at 25°C. The Debye-Hueckel formula for calcg the soly of $PbSO_4$ is not suitable for this system, because of the marked chem interaction accompanied

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USSR/Chemistry - Lead, Theorium Systems (Contd) Jan/Feb 52

by formation of ions of the type $ThSO_2^{2+}$. Considers the importance of physicochem analysis for theory and practice of pptn reactions, and a diagram shows the following types of ternary systems: ppt - electrolyte with common ion - water, embracing all possible systems with ppts in dependence on the ion type of the components and the character of the process of interaction in the system.

(CA 47 no. 19: 9849 '53)

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TANANAYEV, I. V.

TANANAYEV, I.V.

USSR

The isotherm of solubility of the system lithium fluoride–hydrofluoric acid–water at 25°. I. V. Tananaev. *Khim. Redkikh Elementov, Akad. Nauk S.S.S.R., Inst. Obshchei i Neorg. Khim.* 1, 33-9(1954).—At concns. of HF from 0 to 76% there exist two salts in this system: LiF and LiF.HF. The latter forms at about 30% HF concn., below which the solid phase is LiF. LiF.HF is an incongruently sol. salt which at room temp. loses its HF in the solid state; this makes it a convenient source of pure HF. This property can be used for detn. of Li and Na in their salts since NaF-HF is stable at 90°. The solubilities in the systems LiF–HF–H_2O at 25°, NaF–HF–H_2O at 0°, and KF–HF–H_2O at 20° are shown in triangular coördinates (cf. *C.A.* 35, 6179^4). G. M. Kosolapoff

TANANAYEV, I.V.; GLUSHKOVA, M.A.; SEYFER, G.B.
[redacted]

Chemistry of lanthanum ferrocyanides and their application in analytic chemistry. Khim.redk.elem. no.1:58-86 '54. (MLRA 8:3)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova AN SSSR.

(Lanthanum ferrocyanide)

TANANAYEV, I.V.; DEYCHMAN, E.N.

[redacted] Study of the solutions of indium fluoride and oxalate. Khim. redk.elem. no.1:87-94 '54. (MIRA 8:3)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova AN SSSR.
(Indium salts)

TANANA'YEV, I.V.

Indium fluorides. E. N. Deichman and I. V. Tananaev. *Khim. Redkikh Elementov, Akad. Nauk S.S.S.R., Inst. Obshchei i Neorg. Khim. im. N. S. Kurnakova* 1, 95-101 (1954).—Soln. of 30 g. In in 100 g. pure 40% HF with gentle heating in the presence of H_2O_2, followed by destruction of excess H_2O_2, concn., washing of the ppt. with 50% EtOH and air-drying 2-3 days gave colorless *$InF_3.3H_2O$*, tetragonal prisms, *nβ* 1.450, *nα* 1.427, sol. in H_2O (5.8% at 25°), sol. in HCl and HNO_3, less sol. in H_2SO_4; reacts with NaOH but gives no ppt. with $CaCl_2$. The x-ray diagram is given. On heating, the salt shows endothermic effects at 140-60 and 430°; the 1st corresponds to loss of $4H_2O$ and 2HF, the 2nd to loss of H_2O and HF to form $In_2F_2O_2$. In the system InF_3-NaF-H_2O at 25°, below 0.15% NaF supersatd. solns. are formed; $InF_3.3H_2O$ is the solid phase. At 0.15% NaF and 0.89% InF_3 there are formed InF_3 and $3NaF.InF_3$; at NaF concns. up to 2.5, the solid phase is *$3NaF.InF_3$*, somewhat sol. in EtOH, sol. in HCl, HNO_3 and H_2O, yielding a ppt. with $CaCl_2$. Its x-ray diagram differs considerably from that of NaF or $InF_3.3H_2O$. $3NaF.InF_3$ shows endothermic effects at 720, 800, and 870°, possibly caused by partial loss of F; the complex melts above 1000°. G. M. Kosolapoff

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TANANAYEV, I.V.

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Physicochemical analysis of systems having value in ~~analytical chemistry. XXIV~~. Study of reaction of formation of aluminum hydroxide by measurement of the apparent volumes of the precipitates. I. V. Tananaev and M. A. Glushkova. *Trudy Komissii anal. Khim., Akad. Nauk* ~~*S.S.S.R., Otdel.*~~ *Khim. Nauk* 5(8), 22-53(1954); cf. *C.A.* 47, 9349*f*; 48, 8012*a*.—The apparent vol. of the ppt. is used to study the pptn. of $Al(OH)_3$. The vol. of ppt. is plotted against the ratio OH:Al in the original mixt. Carbonate-free NaOH soln., and $Al(NO_3)_3$ and $Al_2(SO_4)_3$ solns. contg. no free acid were used. Into a 25-ml. graduated tube introduce the Al soln., H_2O, and NaOH, in such amts. that after addn. of the NaOH the vol. is 25 ml. Stopper the tube and then invert approx. 200 times. After a detd. interval read the upper boundary of the ppt. In expts. with const. Al content (0.01-0.04*M*) sepn. of ppt. begins when the ratio OH:Al is approx. 2.4. The curve has a max. at OH:Al = 3. At OH:Al = 2.8, Al cannot be detected in soln. and the vol. of ppt. is much less than at OH:Al = 3. At OH:Al somewhat above 4, the ppt. dissolves completely. After 1 hr. the max. could be noticed clearly. After 24 hrs. the vol. of ppt. was const. After several hrs. at room temp. the ppts. which started out with OH:Al > 3 became whiter but the others did not change. If 1-2 ml. concd. HCl is added to each tube and mixed, the ppts. formed with OH:Al < 3 quickly dissolve but the others remain insol. for 24 hrs. In expts. where the sum of $Al(NO_3)_3$ and NaOH concns. always equalled 0.1*M*, addn. of $NaNO_3$ (0.5 and 1*M*) before the NaOH does not change the general outline of the curve but pptn. begins earlier. With the system $Al(NO_3)_3$-NH_4OH-H_2O the vol. of the ppt. is a max. at OH:Al = 3 but be-

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I. V. TANANAEV

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creases sharply when more NH_4OH is added. When NH_4NO_3 (0.1 and 0.3*M*) is added before NH_4OH this max. is displaced to the left immediately after pptn. but on standing restores the max. to OH:Al = 3. At NH_4NO_3 = 1*M* the max. is displaced slightly to the right and vol. of ppt. does not decrease so sharply when excess NH_4OH is added. Pptn. occurs earlier than OH:Al = 2. With $Al_2(SO_4)_3$ = 0.01*M* and NaOH, pptn. begins approx. where it does with $Al(NO_3)_3$. Then 2 max. are observed, at OH:Al = 2.5 and at 3, with a min. between them. The min. develops more clearly by aging. With $Al_2(SO_4)_3$ = 0.02*M* and with NaOH, there is only 1 max. at 2.5. For $Al_2(SO_4)_3$ = 0.02*M* and with NH_4OH, the first max. remains the same but second max. is less sharp. $(NH_4)_2SO_4$ is added to system $Al(NO_3)_3$-NH_4OH-H_2O with $Al(NO_3)_3$ = 0.04*M*. With no sulfate pptn. begins at OH:Al = 2.5. With 0.003*M* of $(NH_4)_2SO_4$ added the ppt. is stable at OH:Al = 2 and the vol. is larger. The max. is still at 3. With $(NH_4)_2SO_4$ at 0.01*M* this max. is at 2.6–3.7 and a very weak second max. is displaced to the right. At $(NH_4)_2SO_4$ = 0.03*M* the first max. is at 2.5–2.7 and the second max. is more noticeable. At $(NH_4)_2SO_4$ = 0.3*M* the first max. is at 2.5 and the second max. disappears. In significant concn. of sulfate the max. vol. of ppt. is obtained at a point corresponding to a basic salt, $10Al(OH)_3.Al_2(SO_4)_3$. No Al ions are detected in soln. at OH:Al = 2.4. Existence of second max. depends on many conditions. It is suggested that with a large excess of Al^{3+} the ions $Al(OH)^{++}$ and $Al(OH)_2^+$ are formed; with small excess of Al^{3+} colloidal $Al(OH)_3$ is formed. Since, even in the presence of electrolytes, $Al(OH)_3$ is not sepd. earlier than OH:Al = 2, that value may be the boundary between the forms. The intermediate stage would be a colloidal micelle, $[Al(OH)_3]_n.[Al(OH)_2^+]_mCl^-$, for NaOH or NH_4OH systems. AcO^-, F^-, and oxalate cause early pptn. of Al. In the sepn. of Al^{3+} as $Al(OH)_3$ from bivalent cations by addn. of NaOAc, an excess of NaOAc copptn. the bivalent ions. Addn. of a little of SO_4^{--} and then careful neutralization of the free acid is suggested. Emilia Mayerle

TANANAYEV, I.V.

GRINBERG, A.A. (Leningrad); BABAYEVA, A.V.(Moscow); YATSIMIRSKIY. K.B. (Ivanovo); GOREMYKIN, V.I. (Moscow); BOLIY, G.B. (Moscow); FIALKOV, Ya.A. (Kiyev); YAKSHIN, M.M. (Moscow); KEDROV, B.M. (Moscow); GEL'MAN, A.D. (Moscow); FEDOROV, I.A. (Moscow); MAKSIMYUK, Ye.A. (Leningrad); VOL'KENSHTEYN, M.V. (Leningrad); ZHDANOV, G.S. (Moscow); PTITSYN, B.V. (Leningrad); ABLOV, A.V. (Kishinev); VOLSHTEYN, L.M. (Dnepropetrovsk); TROITSKAYA, A.D. (Kazan'); KLOCHKO, M.A. (Moscow); BABAYEVA, A.V.; TRONEV, V.G. (Moscow); RUBINSHTEYN, A.M.(Moscow) CHERNYAYEV, I.I.; GRINBERG, A.A.; TANANAYEV, I.V.

Explanation of the transeffect. Izv.Sekt.plat.i blag.met. no.28: 56-126 '54. (MLRA 7:9)
(Compounds, Complex) (Platinum)

TANANAYEV, I. V. and BAUSOVA, N. V.

"On the Formation reaction of gallium hydroxide", Khimiya Redkikh Elementov, No. 2, p.12, 1955.

The mechanism of the formation of gallium hydroxide was investigated by a study of the system $GaCl_3$-NaOH-H_2O. The measurements of solubility, light absorption and volumes of precipitates were used for the investigation. The reaction takes place in five stages, depending on the molar ratios of NaOH to $GaCl_3$ in the initial mixture, with the successive formation of $Ga(OH)Cl_2$, $Ga(OH)_2Cl_2$, $Ga(OH)_2Cl$ (soluble basic salts), $Ga(OH)_{2.8}Cl_{0.2}$ (insoluble basic salt), $Ga(OH)_3$ and then soluble gallate.

SO: D-413171

TANANAYEV, I. V. and BAUSOVA, N. V.

"A study of the chemistry of gallium fluorides and their utilization for the separation of gallium from other metals", Khimiya Redkikh Elementov, No. 2, p 21, 1955.

A method of preparation of $GaF_3 3H_2O$ by the action of hydrofluoric acid on metallic gallium. The reaction between $GaCl_3$ + and HF in aqueous solutions was investigated, the formation of a stable GaF_2 ion was established. Solubility in the system: GaF_3-NaF-H_2O at 25°C was investigated. The formation of a double salt of the composition 13NaF. $5GaF_3$, practically insoluble in sodium fluoride solutions was established. On the basis of the latter a method of quantitative precipitation of gallium from Zn, Co, Ni, W, Mo, Cd and Cu was developed.

SO: D-413171

TANANAYEV, I. V. and DEYCHMAN, E. N.

"On indium ferrocyanides", Khimiya Redkikh Elementov, No. 2, p 37, 1955.

The systems: $InCl_3$ -$Li_4Fe(CN)_6$-H_2O; $INCl_3$-$Na_4Fe(CN)_6H_2O$ and $INCl_3$-K_4Fe $(CN)_6$-H_2O were investigated using solubility electroconductivity, potentiometric and turbidometric methods. Concentrations of components were those used uncer normal analytical conditions. It was found that in the first two systems indium ions react forming salts of the normal composition $In_4[Fe(CN)_6]_3$ and in the third system, in addition to the normal, a double salt is formed uncer certain conditions.

SO: D-413171

TANANAYEV, I.V.

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Reaction of ions of zirconium and fluorine in solution. I. V. Tananaev and L. S. Guzeeva (N. S. Kurnakov Inst. Gen. Inorg. Chem., Moscow). *Khim. Redkikh Elementov, Akad. Nauk S.S.S.R., Inst. Obshchei Neorg. Khim.* 1955, No. 2, 46–50.—Detn. of e.m.f. and cond. in the system $ZrOCl_2$–HF–H_2O showed that $ZrOCl_2$ reacts with HF in discrete steps forming ZrO(OH)F, ZrF_4, and H_2ZrF_6, which appear in the property-compn. plots as changes of slope of the curves. The results appear typical for ions such as TiO^{++}, HfO^{++}, and VO^{++}. G. M. Kosolapoff

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TANAKAYEV, I.V.

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Yttrium and cerium ferrocyanides. I. V. Tananaev and G. B. Seifer. *Zhur. Neorg. Khim.* 1, No. 1, 63-68(1956).—In the system $Ce(NO_3)_3-Li_4[Fe(CN)_6]-H_2O$, with $Ce(NO_3)_3$ concn. initially at 0.05 mol./l., addn. of $Li_4[Fe(CN)_6]$ causes stoichiometric pptn. of $Ce_4[Fe(CN)_6]_3 \cdot 20H_2O$, (I), whose water soly. at 25° ± 0.1° is 1.3×10^{-4} mole/l. In the system $Ce(NO_3)_3-Na_4[Fe(CN)_6]-H_2O$, I is pptd. initially. If $Na_4[Fe(CN)_6]$ is added in excess, the solid phase becomes $Na_4Ce_8[Fe(CN)_6]_7 \cdot xH_2O$, whose soly. is 2.1×10^{-4} mole/l. In the system $Y(NO_3)_3-K_4[Fe(CN)_6]-H_2O$, only $K_4Y_8[Fe(CN)_6]_7 \cdot 30H_2O$ ppts. (soly. 6.2×10^{-4} mole/l.). In the system $Ce(NO_3)_3-K_4[Fe(CN)_6]-H_2O$ the ppt. is $KCe[Fe(CN)_6] \cdot 2H_2O$ (soly. 2.4×10^{-4} mole/l.). In $Y(NO_3)_3-Rb_4[Fe(CN)_6]-H_2O$ only $RbY[Fe(CN)_6] \cdot 2H_2O$ is pptd. (soly. 1.8×10^{-4} mole/l.). In $Ce(NO_3)_3-Rb_4[Fe(CN)_6]-H_2O$ the ppt. is $RbCe[Fe(CN)_6] \cdot 2H_2O$ (soly. 7.1×10^{-4} mole/l.). In $Y(NO_3)_3-Cs_4[Fe(CN)_6]-H_2O$ the ppt. is $CsY[Fe(CN)_6] \cdot 2H_2O$ (soly. 5.3×10^{-4} mole/l.). In $Ce(NO_3)_3-Cs_4[Fe(CN)_6]-H_2O$ the ppt. is $CsCe[Fe(CN)_6] \cdot 2H_2O$ (soly. 1.7×10^{-4} mole/l.). In the systems $Y(NO_3)_3-Li_4[Fe(CN)_6]-H_2O$ and $Y(NO_3)_3-Na_4[Fe(CN)_6]-H_2O$, no Y ferrocyanide is pptd. It is therefore suggested that pptn. with $Na_4[Fe(CN)_6]$ or $Li_4[Fe(CN)_6]$ may be useful in sepg. Ce from Y. C. H. E.

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TANANAYEV, I-V.

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Mixed ferrocyanide of lithium and cesium. I. V. Tananaev and G. B. Seifer. *Zhur. Neorg. Khim.* 1, No. 1, 64-6(1956).—$Cs_3Li[Fe(CN)_6]$ is obtained by the addn. of CsCl to a strong soln. of $Li_4[Fe(CN)_6]$, filtering the ppt. after 12 hrs., washing with 25% EtOH, and drying in air. 2

C. H. Fuchsman

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TANANAYEV, I.V.

TARANNAYEV, I.V.

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TANANAEV I.V.

[illegible] of zinc hydroxide 7

Inst. Gen. + Inorganic Chem im N.S. Kurnakov

TANANAYEV, I. V.

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The formation of cadmium hydroxide. I. V. Tananaev and N. V. Mzareulishvili. *Zhur. Neorg. Khim.* 1, 2225-31 (1956).—The system $CdSO_4$-NaOH-H_2O was studied by the methods of soly., elec. cond., and potentiometry. The vol. of the ppt. and the extinction of the system were measured. The reaction [illegible] NaOH in dil. solns. [illegible] $CdSO_4$ [illegible]. It was demonstrated that the [illegible] method can be used successfully for the quant. detn. of Cd by titrating with alkali to form the basic salt. The method is sufficiently sensitive to det. Cd in quantities of [illegible] g. and less.

J. Rovtar Leach

TANANAYEV I V

USSR/Physical Chemistry - Thermodynamics. Thermochemistry. Equilibrium. Physico-chemical Analysis. Phase Transitions, B-8

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 380

Author: Tananayev, [redacted] Nikolayev, N. S., Buslayev, Yu. A.

Institution: None

Title: Investigation of the System $HF-ZrF_4-H_2O$ by the Isothermal Solubility Method (Isotherm 0.5°)

Original Periodical: Zh. neorgan. khimii, 1956, Vol 1, No 2, 274-281

Abstract: The solubility at 0.5° in the system $HF-ZrF_4-H_2O$ has been investigated for the range 0-100 percent HF. The following solid phases were found in the system: $ZrOF_2 \cdot 2H_2O$(I), $ZrF_4 \cdot 3H_2O$(II), $H_2ZrF_6 \cdot H_2O$(III), and ZrF_4. From thermographic data thermal decomposition reactions for I, II, III, and $ZrOF_2$ have been established. A method has been developed for the determination of both F and Zr when present together.

Card 1/1

TAMANAYEV, I.V.; MZAREULISHVILI, N.V.

[redacted]

Study of the formation of silver hydroxide. Zhur.neorg.khim. 1 no.8:1826-1831 Ag '56. (MLRA 9:11)
(Silver hydroxide)

TANANAYEV, I.V.

USSR/Inorganic Chemistry - Complex Compounds. C.

Abs Jour : Ref Zhur - Khimiya, No 9, 1957, 30291

Author : Tananayev, I.V., Seyfer, G.B.

Inst :

Title : Mixed Ferrocyanides of Magnesium, Rubidium and Cesium

Orig Pub : Zh. neorgan. khimii, 1956, 1, No 9, 2017-2023

Abst : On the basis of the results of a study of the system $MCl - Mg_2[Fe(CN)_6]-H_2O$, wherein M is Rb or Cs, by the solubility method, it was found that the composition of the solid phase that separates, corresponds to the formula $3M_4[Fe(CN)_6].4Mg_2[Fe(CN)_6].12H_2O$. The composition is not altered on use of an excess of both components, in the case of Rb, while in the case of Cs, an excess of $Mg_2[Fe(CN)_6]$ causes the formation of $Cs_4[Fe(CN)_6].2Mg_2[Fe(CN)_6].10H_2O$.

Card 1/1

TANANAYEV, I.V.,

USSR/Inorganic Chemistry. Complex Compounds. C

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26490.

Author : Tananayev, I.V., Mzareulishvili, N.V.
Inst :
Title : Study of Reaction of Zinc Hydroxide Formation.

Orig Pub : Zh. neorgan. khimii, 1956, 1, No. 10, 2216 - 2224.

Abstract : The system $ZnSO_4$ - NaOH - H_2O was studied by the solubility, the electrical conductivity, the potentiometric methods and the methods of light extinction and of precipitate volume measurement. It was established that the reaction between $ZnSO_4$ and NaOH in an aqueous solution proceeds with the formation first of $4Zn(OH)_2.ZnSO_4$ (I) and of $Zn(OH)_2$ (II) after that. Considering

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USSR/Inorganic Chemistry. Complex Compounds. C

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26490.

the obtained data, the conclusion was arrived at that the quantitative determination of Zn^{2+} by titration with an alkali solution is possible by the following methods:

a) geometrical (by the formation of I and II)

b) conductometric (by the formation of I), and

c) potentiometric (by the formation of II).

Card 2/2

TANANAYEV, I.V.

USSR/Inorganic Chemistry. Complex Compounds. C

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26493.

Author : Tananayev, I.V., Mzareulishvili, N.V.
Inst :
Title : Study of Reaction of Cadmium Hydroxide Formation.

Orig Pub : Zh. neorgan. khimii, 1956, 1, No. 10, 2225 - 2231.

Abstract : The system $CdSO_4$ - NaOH - H_2O was studied by the solubility, the electrical conductivity, the potentiometric methods and the methods of light extinction and of precipitate volume measurement. It was established that the reaction between $CdSO_4$ and NaOH in a diluted aqueous solution proceeds with the formation first of $4Cd(OH)_2.CdSO_4$ and of

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USSR/Inorganic Chemistry. Complex Compounds. C

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26493.

$Cd(OH)_2$ after that. Considering the obtained data, the conclusion was arrived at that the method of light extinction is applicable to the quantitative determination of Cd^{2+} by titration with an alkali solution.

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TANANAYEV, I.V.; UL'YANOV, A.I.

Physicochemical analysis of systems important in analytical chemistry. Part 25. Study of the coprecipitation of alkali metal sulfates with $BaSO_4$. Trudy Kom.anal.khim. 7:3-20 '56 . (MIRA 9:9)

1. Institut obshchey i neorganicheskoy khimii imeni N.S.Kurnakova AN SSSR. (Sulfates)

TANANAYEV, I. V.

"The possibility of separating francium from cesium."

report presented at The Use of Radioactive Isotopes in Analytical Chemistry, Conference in Moscow, 2-4 Dec 1957
Vestnik Ak Nauk SSSR, 1958, No. 2, (author Rodin, S. S.)

TANANAYEV, I.V.; LEVINA, M.I.

Neodymium ferrocyanides. Khim.redk.elem. no.3:28-40 '57. (MLRA 10:8)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova Akademii nauk SSSR. (Neodymium ferrocyanides)

TANANAYEV. I. V.

137-58-2-4398

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 300 (USSR)

AUTHORS: Tananayev, I.V., Bausova, N.V.

TITLE: Gallium Ferrocyanides and Their Analytical Significance (Ferrotsianidy galliya i ikh analiticheskoye znacheniye)

PERIODICAL: Khimiya redkikh elementov, Nr 3, 1957, pp 41-56

ABSTRACT: Tests of solubility, light absorption, electrical conductivity, and e.m.f. were used to study the reaction of Ga ions with the ferrocyanides of Li, K, and Na. In all the systems studied it was found that $Ga_4[Fe(CN)_6]_3$ forms. Whenever surplus $K_4[Fe(CN)_6]$ and $Na_4[Fe(CN)_6]$ were present, formation was observed of mixed salts of $NaGa[Fe(CN)_6]$ (the H_2O dissociating) and $KGa[Fe(CN)_6]$ (soluble congruently). On the basis of the data obtained, new methods are proposed for determining Ga. Potentiometric titration with an $Na_4[Fe(CN)_6]$ solution made possible the determination of Ga in the presence of an Al content 100 times greater. With $Na_4[Fe(CN)_6]$ in a 100-cc solution it was possible to determine 0.2-30 mg of Ga by means of the heterodyne method. Amperometric titration with a $K_4[Fe(CN)_6]$ solution could be carried out in the presence of

Card 1/2

137-58-2-4398

Gallium Ferrocyanides and Their Analytical Significance

large quantities of Al, since the presence of the Al was reflected only in the slope of the titration curve.

N.G.

1. **Gallium ferrocyanides—Analysis**

Card 2/2

TANANAYEV, I.V

DEYCHMAN, E.N.; TANANAYEV, I.V.

Study of the reaction of indium hydroxide formation. Khim.;redk. elem. no.3:73-86 '57. (MLRA 10:8)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova Akademii nauk SSSR.

(Indium hydroxides)

TANANAYEV I. V.

62-12-1/20

AUTHOR: Tananayev, I.V.

TITLE: New Data Concerning the Chemistry of Some Rare Elements (Novyye dannyye o khimii nekotorykh redkikh elementov) Lecture Delivered at the Meeting of the Department of Chemical Sciences of the AN USSR on October 31, 1957 (Doklad na sessii otdeleniya khimicheskikh nauk Akademii nauk SSSR 31 oktyabrya 1957g).

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1957, Nr 12, pp. 1421-1428 (USSR)

ABSTRACT: Among the questions of greatest interest at present in physical chemistry there is also that of the elaboration of new reactions of rare alkaline metals. Nearly all of them form practically unsoluble mixed ferrocyanides with alkaline metals (see table 1). When solving the problem concerning easier methods for the production of a particularly pure liquid fluorine hydrogen and fluorine, the fluorine compounds of lithium, rubidium and cesium will attain particular importance. The lecture contains new data concerning the composition and the physical properties of various compounds of some rare elements. Among other things, also a survey is given of the insoluble mixed ferrocyanides, composed of various metals with lithium,

Card 1/2

62-12-1/20

New Data Concerning the Chemistry of Some Rare Elements. Lecture Delivered at the Meeting of the Department of Chemical Sciences of the AN USSR on October 31, 1957

rubidium and cesium. In this connection the lecturer recommends a number of new reagent precipitations. A rule governing the modification of the composition of mixed ferrocyanides containing rare alkaline earth metals was determined. Further, new details are given concerning the composition and durability of fluorides, oxalates, tartrates, and other compounds of gallium, indium, zirconium and germanium. There are 2 tables.

ASSOCIATION:	Institute for General and Inorganic Chemistry imeni N.S.Kurnakov AN USSR (Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova Akademii nauk SSSR).
SUBMITTED:	October 9, 1957
AVAILABLE:	Library of Congress
Card 2/2	1. Chemical engineering-Conference 2. Flourine-Liquid 3. Flourine hydrogen-Liquid 4. Lithium 5. Rubium

TANANAYEV, I.V.

560

AUTHOR: Tananaev, I.V., Seifer, G.B., and Glushkova, M.A.

TITLE: Ferrocyanides of Trivalent Iron (O Ferrotsianidakh Trekhvalent-novo Zheleza.)

PERIODICAL: "Zhurnal Neorganicheskoy Khimii" (Journal of Inorganic Chemistry,
Vol.II, No.2, pp.268-280. (U.S.S.R.) 1957

ABSTRACT:
In this investigation the behaviour of the cyanides of trivalent
iron in systems with lithium, sodium, potassium, rubidium and
caesium has been studied by two methods: that of solubility and
that of e.m.f. measurement. The equilibrium solutions obtained
in the solubility experiments were used for the parallel study o
the systems by the e.m.f. method using a platinum electrode with
a saturated calomel electrode. From the results obtained conclu
sions are drawn on the general behaviour of trivalent iron ions
in and ferrocyanides of different alkali metals when present to-
gether in systems. Differences due to the nature of the individ
ual alkali metals were also noted. The tendency, to all the alk
li metals was the formation of mixed ferrocyanides of iron al-
though the nature of these compounds was very different for the
different alkali metals. The stoichiometrically normal iron
ferrocyanide $Fe_4[Fe(Cn)_6]_3$ is not formed with any of the systems
studied. On incomplete precipitation of iron it either becomes
adsorbed (systems with $Li_4[Fe(Cn)_6]$, and $Na_4[Fe(Cn)_6]$), or remai

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Ferrocyanides of Trivalent Iron (Cont.) 560

in excess (systems with $K_4(Rb_4, Cs_4)[Fe(Cn)_6]$), an effect evidently due to coprecipitation of the alkali metal.

$M_4[Fe(Cn)_6]$ enters the precipitate as soon as the precipitation of iron is complete even with lithium and sodium. This is especially pronounced with rubidium and caesium. The contents of alkali metal in the precipitate increased according to the series K - Rb - Cs.

It appears that with potassium, rubidium and caesium mixed salts of the simplest type $M\,Fe[Fe(Cn)_6]$ are formed at first. It is very likely that the salts $RbFe[Fe(Cn)_6]$ and $CsFe[Fe(Cn)_6]$ do exist, but they react easily with $M_4[Fe(Cn)_6]$ to form a second mixed salt of the composition $M_6Fe_2[Fe(Cn)_6]_3$.

Although the continued adsorption of $M_4[Fe(Cn)_6]$ by the precipitate makes the interpretation of the experimental curves difficult the possibility of the formation of new incongruently soluble mixed salts of definite composition is not excluded.

As regards the strength of the bond in mixed ferrocyanides of iron and alkali metals, the latter can be arranged in the usual series with caesium having the greater strength and lithium the least. Apparently in the mixed salts the alkali metals can mutuall replace each other according to the above order. From this point o view mixed ferrocyanides of trivalent iron can be considered as inorganic prototypes of ion-exchange resins.

14 Figures and 5 Tables.

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TANANAYEV, I.V.

AUTHOR: Tananaev, I.V. and Glushkova, M.A.

TITLE: Mixed Ferrocyanides of Thallium. I. Mixed Ferrocyanides of Thallium with Magnesium, Calcium and Strontium. (Osmeshannykh Ferrotsianidakh Talliya. I. Smeshannye Ferrotsianidy talliya s Magniem, Kal'tsiem i Strontsiem).

PERIODICAL: "Zhurnal Neorganicheskoy Khimii" (Journal of Inorganic Chemistry Vol.II, No.2, pp.281-286. (U.S.S.R.) 1957

ABSTRACT: With the object of embracing as large a number of possible types of compounds formed by ferrocyanides of thallium with the ferrocyanides of other metals, systems for investigation were chosen in such a way that the valency of the metals represented in them should be different. In the present communication results of the study of solubility in the systems $TlNO_3 - E_2 [Fe(CN)_6] - H_2O$ (E = Mg, Ca, Sr) by the physico-chemical analysis method. It was found that mixed ferrocyani of the type $TlE [Fe(CN)_6]$ were formed, except with magnesium for which a second mixed salt of the composition $Tl_{10}Mg_7 [Fe(CN)_6]_6$ was isolated. The solubility of the mixed ferrocyanides of thallium and the alkali metals increased from magnesium to strontium being 2×10^4, 3.4×10^{-4} and 3.6×10^{-3} mol/litre at 25°C. Comparison of data from the liter on the composition of mixed ferrocyanides of alkali-earth alkali metals and those obtained in the present investigat shows that the analogous thallium compounds we obtained c

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Mixed Ferrocyanides of Thallium. I. Mixed Ferrocyanides of Thallium with Magnesium, Calcium and Strontium (Cont.)

resemble them: this is indicated by the fact that they all belong to the single type $M_2E [Fe(CN)_6]$. As regards solubility in water, the compounds of thallium considered most closely resemble the corresponding rubidium and caesium compounds.

There are 7 references, one of them Russian.

There are 3 figures and 3 tables.

Received on 22nd October, 1956.

Card 2/2

TANANAYEV, I. V.

78-3-12/35

AUTHORS: Tananayev, I. V. and Levina, M. I.

TITLE: Some Data on the Structure of Mixed Ferrocyanides. (Nekotoryye dannyye o stroyenii smeshannykh ferrotsianidov).

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1957, Vol.II, Nr.3, pp. 576-585. (USSR)

ABSTRACT: The addition of silver nitrate to an aqueous suspension of any mixed ferrocyanide leads to the displacement by the silver ions of both cations of the mixed salt from the precipitate into the solution. If the silver nitrate is added gradually and the concentration of the cations of the mixed salt in the solution is determined on each addition, the order and degree of replacement of the heavy and alkali metals of the mixed salt by silver can be found. This is the basis of the method used in the present investigation, except that the process was followed by determining the silver concentration in the supernatent liquid by measuring its radioactivity. Ag^{110} was used as the tracer. The following compounds were studied: $K_4Ni_4[Fe(CN)_6]_3$ and

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Some Data on the Structure of Mixed Ferrocyanides.

$5Co_2[Fe(CN)_6].K_4[Fe(CN)_6]$ and also $Ni_2[Fe(CN)_6]$. The method used enabled the relative strength of the bonds of the metals in the outer sphere of mixed ferrocyanides with ferrocyanide ions to be found, and it is suggested that this should influence the way in which the chemical formulae of metal mixed ferrocyanides should be written. Based on a study of the conditions for the formation of $KAg[Fe(CN)_6]$ analytical methods are recommended for the determination of small quantities of silver and ferrocyanide in solutions radiometrically with the use of Ag^{110} and also potentiometrically. There are 7 figures, 13 tables, and 11 references, 8 of which are Slavic.

SUBMITTED: October 27, 1956.

AVAILABLE: Library of Congress.
Card 2/2

Tananayev, I.V.

78-3-13/35

AUTHORS: Tananayev, I. V. and Glushkova, M. A.

TITLE: Mixed Ferrocyanides of Thallium. (O smeshannykh ferrotsianidakh talliya.) II. Mixed Ferrocyanides of Thallium with Copper and Nickel. (II. Smeshannyye ferrotsianidy talliya s med'yu i nikelem.)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1957, Vol.II, Nr.3, pp. 586-593. (USSR)

ABSTRACT: This investigation had as its aim to fill the gap in the literature on the nature of the reaction of copper and nickel ions with ferrocyanide ions in the presence of thallium. The potential importance of such an investigation is that the information it provided will be used to decide whether thallium in very low concentration could be isolated from solutions containing certain non-ferrous metals. Ordinary methods of chemical analysis were used in this investigation to study systems consisting of Tl^+, E^{2+} ($E = Cu, Ni$) and $[Fe(CN)_6]^{4-}$. It is concluded that the slightly soluble mixed ferrocyanide of thallium and copper,

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Mixed Ferrocyanides of Thallium. II.

$Tl_2Cu_2[Fe(CN)_6]_2$, is formed from the appropriate ions for the whole range of concentrations dealt with. The solubility of the compound formed as a result of the displacement of Cu^{2+} ions by Tl^+ ions from a precipitate of $Cu_2[Fe(CN)_6]$ was found to be so small that a suspension of this precipitate can be used to separate small quantities of thallium from solution. The mixed salt $Tl_4Ni_4[Fe(CN)_6]_3$ was formed by the reaction of Tl^+ with Ni^{2+} and $[Fe(CN)_6]^{4-}$ ions. The solubility of the precipitate of this salt, formed by the reaction of Tl^+ ions with a precipitate of nickel ferrocyanide is so low that it, too, can be used for separating small quantities of thallium from solution. There are 4 figures, 7 tables, and 6 references 2 of which are Slavic.

SUBMITTED: October 26, 1956.

AVAILABLE: Library of Congress.
Card 2/2

TANANAYEV, I. V.

78-3-14/35

AUTHORS: Tananayev, I. V. and Glushkova, M. A.

TITLE: Ferrocyanides of Thallium. (O Ferrotsianidakh talliya.) III. Mixed ferrocyanides of thallium with uranyl. (III. Smeshannyye ferrotsianidy talliya s uranilom.)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1957, Vol.II, Nr.3, pp. 594-599. (USSR)

ABSTRACT: An account is given of the study of the solubility of the system $TlNO_3$-$UO_2(NO_3)_2$-$Li_4[Fe(CN)_6]$-H_2O at 25°C. Solutions of these compounds were used, the molarity of the thallium nitrate solution being determined by precipitating thallium as chromate, that of lithium cyanide by titration of a known volume of the original solution by potassium manganate in sulphuric acid using crystal violet as an indicator. The concentration of the uranium salt was determined by precipitation of $(UO_2)^{2+}$ in the presence of carbonate-free ammonium nitrate, the precipitate after washing and calcining being weighed as U_3O_8. No formation was observed of

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Ferrocyanides of Thallium. III.

78-3-14/35

the simple ferrocyanide of uranyl, the reaction of the ions leading to the formation of two mixed ferrocyanides of thallium and uranium with the compositions: $Tl_2(UO_2)_3[Fe(CN)_6]_2$ and $Tl_4(UO_2)_4[Fe(CN)_6]_3$. All the alkaline metals and thallium can be arranged in the following series with respect to their ability to displace $[UO_2]^{2+}$ ions from the precipitate of $(UO_2)_2[Fe(CN)_6]$: Tl is $\gg$ Cs $>$ Rb $>$ K $>$ Na $>$ Li, from which it follows that suspensions of this precipitate can be used for separating small quantities of thallium from solution. There are 2 figures, 6 tables, and 5 references 2 of which are Slavic.

SUBMITTED: November 19, 1956.

AVAILABLE: Library of Congress.

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TANANAYEV, I. V.

78-3-15/35

AUTHORS: Tananayev, I. V. and Seyfer, G. B.

TITLE: Mixed Ferrocyanides of Calcium with Rubidium and Caesium. (Osmeshannykh ferrotsianidakh kal'tsiya s rubidiyem i tseziyem.)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1957, Vol.II, Nr.3, pp. 600-603. (USSR)

ABSTRACT: All methods previously proposed for utilizing the reaction of the formation of mixed calcium ferrocyanides have lacked a proper experimental foundation, and thus lead only to qualitative results. The provision of experimental data sufficiently accurate and full to enable quantitative results to be obtained is the object of the present investigation. Solubility methods were used to study the systems in the $MCl - Ca_2[Fe(CN)_6] - H_2O$, where $M = Rb^+$ or Cs^+, which enabled the influence of excess of the components on the composition of the compound formed to be followed. The experimental method used has been previously described[7]. For the rubidium system it was found that the ratio of

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Mixed Ferrocyanides of Calcium with Rubidium and Caesium.

$[Fe(CN)_6]^{4-}$: Rb^+ and of $[Fe(CN)_6]^{4-}$: Ca^{2+} do not depend on the ratio of either component in the mixture, that is the precipitate obtained is constant in composition. The mixed ferrocyanide obtained is represented by the formula $Rb_2Ca[Fe(CN)_6]$. Similar results were obtained for the caesium system, the precipitate here being $Cs_2Ca[Fe(CN)_6]$. Although results obtained suggested that the formation of the mixed ferrocyanides of calcium could be used for the gravimetric determination of rubidium and caesium, it was found that this could only be done with perfectly pure solutions, since the solubility of the precipitates formed is very strongly affected by the ionic strength of the solution; further, the small difference in the solubilities of the rubidium and caesium salts makes it unlikely that the reaction could be used for separating rubidium and caesium. There are 2 figures, 2 tables, and 8 references 2 of which are Slavic.

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78-3-15/35

Mixed Ferrocyanides of Calcium with Rubidium and Caesium.

ASSOCIATION: Institute of General and Inorganic Chemistry imeni N. S. Kurnakov. of the Academy of Sciences of the USSR. (Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR.)

SUBMITTED: October 27, 1956.

AVAILABLE: Library of Congress.

Card 3/3

TANANAYEV, I. V.

USSR/Physical Chemistry - Solutions, Theory of Acids and Bases.

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3945.

Author : I.V. Tananayev, Ye. P. Shcheglova.

Inst :

Title : Interaction of Aqueous Be$(NO_3)_2$ Solutions with Some Organic Acids.

Orig Pub: Zh. neorgan. khimii, 1957, 2, No 6, 1365-1373.

Abstract: pH of Be$(NO_3)_2$ (I) solution mixtures with organic acids were measured at a constant summary molarity and variable ratios I : acid. The character of H^+ concentration divergence from additivity indicates that the interaction of Be^{2+} ions in an acid medium with the acids under study is insignificant and does not proceed further than the formation of neutral or acid salts. The interaction becomes weaker in accordance with the following acid series: oxalic = malonic > salicylic > maleic-citric > tartaric > succinic > lactic. The sharp difference between the solubility of CaC_2O_4

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USSR/Physical Chemistry - Solutions, Theory of Acids and Bases.

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3945. B-11

in I solutions and Al$(NO_3)_2$ solutions can be used for determination of Al in presence of Be.

Card : 2/2

TANANAYEV, I. V.

TANANAYEV, I.V.; VINOGRADOVA, A.D.

Composition and stability of fluoaluminates in solutions. Zhur. neorg. khim. 2 10:2455-2467 O '57. (MIRA 11:3)
(Fluoaluminates) (Solution (Chemistry))

TANANAYEV, I.V.; IONOVA, Ye.A.

Zirconium ferrocyanides. Part 1: Interaction of $ZrOCl_2$ with $Na_4[Fe(CN)_6]$ and $K_4[Fe(CN)_6]$ in aqueous solutions. Zhur. neorg. khim. 2 10:2468-2474 O '57. (MIRA 11:3)

1. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova AN SSSR.
(Zirconium compounds) (Sodium ferrocyanide)
(Potassium ferrocyanide)

TANANAYEV, I.V.; GLUSHKOVA, M.A.

Thallium ferrocyanides. Part 4: Mixed ferrocyanides of thallium
with lanthanum and cerium. Zhur. neorg. khim. 2 10:2474-2482
O '57. (MIRA 11:3)
(Thallium ferrocyanide) (Lanthanum) (Cerium)

TANANAYEV, I.V.; BOKMEL'DER, M.Ya.

Investigating the formation of nickel hydroxide in aqueous solutions.
Zhur. neorg. khim. 2 no.12:2700-2708 D '57. (MIRA 11:2)

1. Moskovskiy inzhenerno-fizicheskiy institut, Kafedra khimii.
(Nickel hydroxide)

TANANAYEV, I.V.

JOURNAL OF ANALYTICAL CHEMISTRY
Vol XII, Nr 4, 1957

[illegible] BY THE LIGHT ABSORPTION [illegible]

I. V. Tananaev and [illegible]
Moscow Engineering-Physical Institute

Heterogeneous systems [illegible] have been studied by the method of light absorption [illegible]

[illegible] and the solubility [illegible]

75-6-2/23

AUTHORS: Tananayev, I. V., Shcheglova, Ye. P.

TITLE: Investigations of the System $BeSO_4$-$NaOH$-H_2O and its Analytical Application (Issledovaniye sistemy $BeSO_4$-$NaOH$-H_2O i yeye analiticheskoye primeneniye).

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1957, Vol. 12, Nr 6, pp. 671-676 (USSR).

ABSTRACT: The solubility in the system $BeSO_4$-$NaOH$-H_2O at 25°C was investigated. It was stated hereby that with the formation of $Be(OH)_2$ first, soluble basic salts are fermed and then follows the formation of insoluble basic salts of variable composition. Beryllium hydroxide dissolves in alkaline lye-solution when the content of alkaline lye attains 0,025 mol per liter. A combined alkali-oxy-quinolate methoc is preferred for the determination of beryllium in the presence of larger quantities of aluminum. The complete separation of berylliu and aluminum on the strength of the different solubility of their hydroxides in alkaline lyes does not lead to a quantitative separation of aluminum and beryllium.
There are 1 figure, 3 tables, and 8 references, 4 of which are Slavic.

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Investigations of the System $BeSO_4$-$NaOH$-H_2O and its Analytical Application. 75-6-1/23

ASSOCIATION: **Moscow Institute of Engineering Physics (Moskovskiy inshenerno-fizicheskiy institut).**

SUBMITTED: January 4, 1957.

AVAILABLE: Library of Congress.

1. Chemistry-USSR 2. Beryllium hydroxide-Solubility 3. Alkaline lye solution-Applications 4. Aluminum-Beryllium content-Determination

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5(4) p. 2, p. 3, 7. 9,

AUTHORS: Vasil'yev, V. P., Korableva, V. D., Yatsimirskiy, K. B. SOV/153-58-3-30/30

TITLE: Conference Discussion on the Methods of Investigating the Complex Formation in Solutions (Soveshchaniye-diskussiya po metodam izucheniya kompleksoobrazovaniya v rastvorakh)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1958, Nr 3, pp 173 - 174 (USSR)

ABSTRACT: From February 18 to 21, 1958 a conference discussion took place at the town of Ivanovo; it dealt with the subjects mentioned in the title. It was called on a decision of the VIIth All-Union Conference on the Chemistry of Complex Formations. More than 200 persons attended the conference, among them 103 delegates from various towns of the USSR. At the conference methods of determining the composition of the complexes in solutions were discussed, as well as the methods of calculating the instability constants according to experimental data and problems concerning the influence of the solvent upon the processes of complex formation. I. I. Chernyayev, Member, Academy of Sciences, USSR, stressed in his inaugural lecture the great importance and actuality

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Conference Discussion on the Methods of Investigating the Complex Formation in Solutions SOV/153-58-3-30/30

of the problems to be dealt with, and wished the conference all the best in its work. I. V. Tananayev, on behalf of the Orgkomitet (Organization Committee) held a lecture on: "The Method of Determining the Composition of Compounds Formed in Solutions". In his lecture, V. N. Tolmachev dealt with the problem of the graphical interpretation of the method by Ostromyslenskiy-Zhob. It was proved that this method can also be used in such cases where the equilibrium of complex formation was turned complex by the hydrolysis or dimerization of the central ion. In the lecture by A. K. Babko and M. M. Tananayko, "Physical and Chemical Analysis of the Systems With 3 Colored Complexes in the Solution", the results of a systematic investigation in copper-quinoline-salicylate, as well as in copper-pyridine-salicylate systems by means of the optical method were dealt with. In the lecture by Ya. A. Fialkov the idea of a further investigation of the complex formation processes in solutions was developed. Besides the determination of the composition and stability of the complexes also the physical and chemical properties, the chemical nature and the structure of the complex compounds must be investi-

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gated. The lecture by K. B. Yatsimirskiy dealt with the conditions of checking the usefulness of the method of isomolar series in the determination of the complex composition. To be able to obtain objective results the position of the maximum at various concentrations of the components must be checked. A. K. Babko made several critical remarks concerning the lecture by I. V. Tananayev. He pointed out that such a method of investigation must be chosen that is connected with the characteristic properties of the system investigated. A. P. Komar' mentioned in his lecture that for the time being the method by Ostromyslenskiy-Zhob is the best for determining the complex composition, and should be employed as often as possible. This demands, however, that all instructions concerning this method are strictly obeyed. I. S. Mustafin, L. P. Adamovich and V. I. Kuznetsov took part in the discussion. K. B. Yatsimirskiy proved in his lecture "Hydrolytic Equilibria and the Polymerization in Solutions" that, if the hydrolysis products are polymerized, the "inclusion into the complex" and the "formation function" at a constant pH value are varied with the modification of the total concentration of

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Conference Discussion on the Methods of Investigating the Complex Formation in Solutions

the metal. Therefore all those methods may be employed for investigating the polymerization of this type which make the determination of at least one of the two functions mentioned possible. It was proved that the hypotheses on the existence of complexes of the type "nucleus + chain members" can also be founded from the viewpoint of structural concepts: particles the charge of which does not exceed unity can occur as "chain members". The usefulness of the characterization of areas of existence of pdymers by means of surface diagrams: "total concentration of the metal - pH" was proved as well. I. I. Alekseyeva and K. B. Yatsimirskiy in their lecture "Investigation of the Polymerization of Iso-Poly Acids in Solutions" mentioned experimental results of the investigation of the polymerization in solutions of molybdic acid. The authors proved that especially the molybdic acid within a certain range of the pH values and the concentrations exists as a number of compounds that can be expressed by an overall formul $MoO_4(HMoO_4)^{n-2}$. In the lecture by N. V. Aksel'rud and V. B. Spivakovskiy investigation results on basic salts taking into

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account the complex formation in solutions by means of the potentiometric method were mentioned for systems with zinc, cadmium and indium. In the evaluation of their results the authors employed the method of the table difference. The calculation of the consecutive constants was carried out according to the interpolation formula by Newton. M. A. Chepelevtskiy held a lecture on "pH Measurement Method of the Solutions in Combination With the System Analysis of the Solubility Diagram of the System Cu^{2+}-HCl - H_2O in Investigating Complex Copper Compounds in Saturated Solutions". It was found that the substance at the bottom of the liquid is more basic than the solution: furthermore, the increased acidity of the solution from the viewpoint of the formation of hydroxy-chloro complexes in the solution was explained. V. I. Kuznetsov opened the discussion with his lecture; he pointed out the necessity of utilizing the concepts worked out in the investigations of the polymerization in organic chemistry in the chemistry of polynuclear complexes. A. A. Grinberg thinks that the new approach of the hydrolysis

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investigation as developed by the Scandinavian school is of high value. He also pointed to the necessity of studying the kinetics of the polymerization process and a quantitative determination of the strength of the polymers. A. K. Babko pointed out that the study of the polymer structure was necessary. N. P. Komar' mentioned in his lecture that the rather widely spread polymerization type according to the scheme "nucleus + chain members" is not obtained in all cases The following scientists took part in the discussion: V. N. Tolmachev, A. V. Ablov, I. S. Mustafin, I. V. Tananayev and K. B. Yatsimirskiy. A. K. Babko then discussed in his lectur "Methods of Determining the Dissociation Constant of the Complex Groups in Solutions" the main principles of determini the instability constants. N. P. Komar' discussed in his lecture "Calculation Methods of the Instability Constants of the Complex Compounds According to Experimental Data" the possibilities of using the known calculation methods of the instability constants for various cases of the complex formation in solution. If several mononuclear complexes are form the displacement method by Abegg and Bodlender (completed by

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A. K. Babko) cannot be recommended for the calculation of the instability constant. The lecturer discussed the dissolution methods of the polynomials proposed by B'yerrum, Leden, Rossoti, Sketchard, Edsolloy and other authors. The constants calculated in this way are not very accurate. It was proved that the method of successive approximations can lead to wrong conclusions as to the chemical processes taking place in the system investigated. The most probable value of the physical constants can be obtained by the method of the least squares. B. V. Ptitsyn, Ye. N. Tekster and L. I. Vinogradova described the determination methods of the instability constants of the oxalate complexes of niobium, uranium and iron which are based on the investigation of the equilibrium displacement of the complex formation by silver ions. N. K. Bol'shakova, I. V. Tananayev and G. S. Savchenko held a lecture on "The Role of the Time Factor in the Investig tion of the Complex Formation". In the discussion on the lectures A. A. Grinberg mentioned that due to the slow adjustment of the equilibria the methods discussed of determining the instability constants (palladium and cobalt

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complexes) can often not be employed. A. V. Ablov pointed out the necessity of devising direct methods of proving the existence of intermediate forms in a step-wise complex formation. K. B. Yatsimirskiy mentioned that the instability constants of slowly dissociating complexes can be calculated from thermochemical data. L. P. Adamovich, A. M. Golub among others took part in the discussion on the lectures. A. K. Babko requested inclusion in the next conference on the chemistry of complex compounds a lecture in which various calculation methods of the instability constants should be discussed by the example of actual cases. This should clarify to which divergencies of the values of the constants different methods of evaluating the experimental data can lead. N. P. Komar' stressed that in the determination of the instability constants all chemical equilibria should be taken into account that render complex the complex formation process in the solution, especially the hydrolysis processes of the central ion and the addendum. In the lecture delivered by V. M. Peshkova and A. P. Zozulya "Application of the Distribution Method to the Investigation of the Stability Constants

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Conference Discussion on the Methods of Investigating the Complex Formation in Solutions

of Some Thorium Complex Compounds" results obtained from the experimental investigation of the distribution of thorium compounds in the systems: acetylacetone - benzene - water, and 2-oxy-1,4,-naphthoquinone - chloroform - water were given. From these data the instability constants of the thorium complexes with acetyl-acetone and 2-oxy-1,4-naphthoquinone were calculated. I. V. Tananayev, G. S. Savchenko and Ye. V. Goncharov held a lecture on the application of the solubility method in the determination of the stability of complex compounds in solutions. In this lecture also other methods of investigating complex formation processes in the solution were discussed (pH measurement, measurement of the optical density, as well as of the heat of mixing). B. D. Berezin held a lecture on the "Application of the Solubility Method in Studying the Phthalocyanine Complexes of Metals". He used the determined quantitative characteristics of the reaction of the transition of the phthalocyanides of cobalt, nickel, copper and zinc, as well as of the free phthalocyanine into the sulfuric acid solution for the theoretical reasoning, and as an experimental proof of the existence of

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π-bonds in the complexes investigated. These characteristics also served him as a proof of new electronic formulae of phthalocyanine and its complex derivatives. In the lecture delivered by I. L. Krupatkin on "The Method of the Two Solvents as a Method of Investigating the Formation and Properties of Organic Complexes" it was proved that this method makes it possible to determine the number of complexes formed in the system, their composition and relative stability. V. I. Kuznetsov, A. K. Babko, N. P. Komar', I. S. Mustafin and Ya. I. Tur'yan took part in this discussion. In the lecture delivered by A. A. Grinberg and S. P. Kiseleva on the complex palladium compounds (II) with a coordination number above four it was proved that in the case of a large chlorine and bromine ion excess complexes with the coordination number 5 are formed. The instability constants of these complexes were estimated. L. P. Adamovich mentioned a new manipulation in the spectrophotometric investigation of the complex compounds that can be used in systems with the formation (or predomination) of one single complex. This method makes it possible to determine the composition and instability constan

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Conference Discussion on the Methods of Investigating the Complex Formation in Solutions

of the complex. In the lecture delivered by K. B. Yatsimirskiy and V. D. Korableva the application of the theory of crystalline fields for the determination of the composition and structure of the chloride complexes of cobalt, nickel and copper according to the absorption spectra of these complexes was discussed. It was proved that in a hydrochloric acid concentration above 5 mole/liter in the solution there exists an equilibrium between the tetrahedric and octahedric form of the cobalt chloro complexes. Yu. P. Nazarenko proved in his lecture "The Application of Radioactive Isotopes in the Investigation of the Solvation Equilibrium in Solutions of Complex Compounds" the possibility of using data on the isotope exchange to clarify the structure of the complex and mechanism of the hydration processes. V. Klimov mentioned in his lecture the use of radioactive isotopes in the study of tin and antimony complexes in non-aqueous solutions. A. V. Ablov, V. N. Tolmachev, V. I. Kuznetsov and A. M. Golub took part in the discussion of the lectures. The usefulness of employing the theory of the crystalline fields in explaining the results obtained from the absorption spectra of the com-

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plex compounds was stressed. In the lecture delivered by I. A. Shek on "The Investigation of the Complex Formation by the Method of the Dielectric Permeability and the Polarization" the principles of the methods mentioned were presented. This method was employed for investigating the compounds of the type of the "affiliation" products. The lecture delivered by I. A. Shek and Ye. Ye. Kriss "Employing the Method of the Dielectric Constant for Investigating Complex Compounds of the Type of Crystal Solvates in Solutions" dealt with the investigation of the solvates of lanthanum and cerium chlorides with ketones, as well as with the study of the compounds formed in heterogeneous systems with tributyl phosphate and nitric acid. V. F. Toropova gave in her lecture "The Polarographic Method of Investigating the Complex Formation in Solutions" a survey of the applications of the polarographic method in the study of the complex compounds, and illustrated several fine characteristic features of this method. In the lecture delivered by T. N. Sumarokova "The Cryoscopic Method of Investigating the Complex Formation Reactions" a survey of the possibilities of the cryoscopic method was given, and its

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applicability in the study of several complex compounds of stannic chloride with organic substances was proved. A. M. Golub described the results of his investigations of thiocyanate complexes of several metals. A vivid discussion took place on the lectures held. Ya. A. Fialkov and Yu. Ya. Fialkov considered the cryoscopic method of investigating complex compounds to be of considerable value. K. B. Yatsimirskiy pointed out that the publication of the surveys on individual methods of investigating the complex formation reactions would be desired; this concerns especially the polarographic method. The cryoscopic method should be brought to a level that makes the calculation of the equilibrium constants of the processes to be investigated possible. The problem of the method of evaluating the experimental results becomes more and more important. Many scientists use the instability constants without taking into account the way in which they had been obtained. The calculation methods employed by A. M. Golub are one step back, as compared to those employed at present. In his lecture N. P. Komar' pointed out the extremely great importance of the mathematical

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evaluation of the results obtained, as well as of the plotting of curves. A. K. Babko suggested selecting one or two systems that are experimentally well investigated, and to evaluate the results obtained according to different methods so that it is possible to check and evaluate them. Ya. I. Tur'yan took part in the discussion. Ya. A. Fialkov discussed in his lecture "The Effect of the Solvent on the Complex Formation Process as Well as on the State of Equilibrium in the Solutions of Complex Compounds" the influence exerted by the solvents upon the molecular state, upon the solvation of the system components, upon the stabilization of the complexes formed in the system, upon the step-wise dissociation of the complexes and upon a number of other processes. The influence exercised by the dielectric constant upon the complex formation process was discussed. It was concluded that a direct relation does not exist, and that the chemical nature of the solvent must be taken into account. A. V. Ablov and L. V. Nazarova held a lecture on "The Spectroscopic Investigation of Nickel Cobalt 'Pyridinates' in Various Solvents". The instability constants of the complexes were determined and it was proved that the

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stability of the 'pyridinates' is changed in dependence on the solvent. Ya. I. Tur'yan in his lecture "The Influence of the Solvent Upon the Composition and Stability of Complex Ions" discussed the polarographic investigation method of the chloride and thiocyanate complexes of lead in aqueous ethanol solutions at different content of the non-aqueous solvent and at a constant ionic strength. A step-wise character of the complex formation was found as well as the instability constants of the complexes. The influence of the dielectric constant of the solution on the stability of the investigated complexes was proved. In the lecture by V. P. Vasil'yev on the "Investigation of Aquo Complexes in Mixed Solvents" the main attention was devoted to the necessity of the qualitative recording of the solvation effects in the complex formation. The applicability of the polarographic method in the determination of the composition and stability of the aquo complexes in mixed solvents was proved and experimental material on the thermodynamics of the dissociation of the cadmium-aquo complexes in aqueous ethanol solutions was mentioned. V. N. Tolmachev, V. I. Kuznetsov

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and I. V. Tananayev stressed in their lectures the necessity of a more complete and general investigation of the solvation processes. A. K. Babko and A. M. Golub pointed out the great importance of the investigations of the complex formation equilibria in non-aqueous solutions, and made several critical comments on the lecture by Ya. I. Tur'yan. The following scientists took part in this discussion: L. P. Adamovich, O. I. Khotsyanovskiy, A. P. Moskvin and A. G. Mustakhov. At the final meeting of the conference A. A. Grinberg, Corresponding Member, AS USSR, said in his speech that such a conference was very urgent. A detailed discussion of the determination methods of the composition of the complexes, as well as of the method used in the study of the quantitative characteristics of the stepwise complex formation was extremely useful for all who attended this conference.

Card 16/16
USCOMM-DC-60976

TANANAYEV, I.V.

78-3-5-2/39

AUTHORS: Tananayev, I. V., Petushkova, S. M., Shpineva, G. V.

TITLE: On the Preparation of Water-Free Lithium Iodide (O poluchenii bezvodnogo yodistogo litiya)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol 3, Nr 5, pp 1071-1074 (USSR)

ABSTRACT: Various methods for the preparation of lithium iodide were tested and are here described:

1. Preparation of lithium iodide by the application of organic reagents,
2. Immediate interaction between lithium and iodine,
3. Dehydration of lithium iodide in a HJ-current at 300°C,
4. Dehydration of lithium iodide melts in a vacuum.

All the above-mentioned methods gave unsatisfactory results. In a specially constructed vacuum destillation apparatus, water-free lithium iodide was produced by heating its watery salts in a vacuum at 800-850°C and at a pressure of 0,01 Hg. The water-free lithium iodide is highly hygroscopic and decomposes under the influence of light.

Card 1/2

78-3-5-2/39

On the Preparation of Water-Free Lithium Iodide

There are 1 figure and 5 references, 5 of which are Soviet.

SUBMITTED: May 21, 1957

AVAILABLE: Library of Congress

1. Lithium iodide--Preparation--Test results

Card 2/2

78-3-6-1/30

AUTHORS: **Tananayev**, I. V., Bokmel'der, M. Ya.

TITLE: Investigations of the Reaction of the Production of Zirconium Hydroxide (Issledovaniye reaktsii obrazovaniya gidrookisi tsirkoniya)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 6, pp. 1273 - 1280 (USSR)

ABSTRACT: In the present paper the process of formation of zirconium hydroxide in the interaction between diluted solutions of zirconium sulfate and zirconium oxichloride with soda lye is investigated. The precipitation of zirconium hydroxide was performed by means of the physico-chemical analyses, especially by the methods of the solubility determination, the p_H-determination, the determination of the electric conductivity and of the volume of the zirconium hydroxide precipitations. It was found in the investigations of the system $Zr(SO_4)_2$-$NaOH$-H_2O that the reaction of zirconium sulfate with soda lye takes place in three stages. First, soluble, basic salt $3Zr(SO_4)_2 \cdot Zr(OH)_4$ forms, then the basic salt of the composition $(ZrO \cdot OH)SO_4$

Card 1/2

78-3-6-1/30

Investigations of the Reaction of the Production of Zirconium Hydroxide

precipitates which at further addition of alkali hydroxide passes into pure zirconium hydroxide.In the system $ZrOCl_2$-$NaOH$-H_2O the formation of zirconium hydroxide equally takes place in three stages. First, soluble basic salt $ZrO(OH)Cl$ forms, then the precipitation of the unstable basic salt $7ZrO(OH_2)ZrOCl_2$ precipitates which furthermore passes into the hydroxide form under the action of NaOH. The zirconium hydroxide precipitations adsorb considerable quantities of alkalies from the solution, which fact corresponds to the amphoteric character of zirconium hydroxide. There are 12 figures, 2 tables, and 21 references, 5 of which are Soviet.

SUBMITTED: May 21, 1957

AVAILABLE: Library of Congress

Card 2/2 1. Zirconium hydroxide--Production 2. Chemical reactions--Analysis

SOV/78-3-9-8/38

AUTHORS: Tananayev, I. V., Levina, M. I.

TITLE: On Uranyl Ferrocyanides (O ferrotsianidakh uranila)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2045-2052 (USSR)

ABSTRACT: The interaction in an aqueous medium in the system $UO_2(NO_3)_2$ - $M_4[Fe(CN)_6]$ - H_2O was investigated, where M denotes Li, Na, K, Rb and Cs. The investigations were carried out by determining the solubility, by potentiometric determination, and by recording the absorption spectrum. In the system $UO_2(NO_3)_2$-$Li_4[Fe(CN)_6]$ - H_2O the normal uranyl ferrocyanide $(UO_2)_2[Fe(CN)_6]$ was eliminate as solid phase. Also in the system $UO_2(NO_3)_2$-$Na_4[Fe(CN)_6]$ - H_2O only normal uranyl ferrocyanide is formed. When adding a surplu of LiR and NaR colloidal solutions are formed. In the systems with $M_4[Fe(CN)_6]$, where M denotes K, Rb, Cs, solid phases of th type $M_4(UO_2)_4[Fe(CN)_6]_3$, as well as the solid intermediate phas of the type $M_2(UO_2)_3[Fe(CN)_6]_3$ are formed. In the system with

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SOV/78-3-9-8/38

On Uranyl Ferrocyanides

$K_4[Fe(CN)_6]$ in the presence of a surplus of the ion $[Fe(CN)_6]^{4-}$ and K^+ 6-8% K_2SO_4 the compound $K_{12}(UO_2)_8[Fe(CN)_6]_7$ is formed. There are 4 figures, 4 tables, and 12 references, 7 of which are Soviet.

SUBMITTED: November 29, 1957

Card 2/2

AUTHORS: Tananayev, I. V., Avduyevskaya, K. A. SOV/78-3-9-26/38

TITLE: The Interaction in the System GeO_2-HF-H_2O at a Temperature of 25°C (O vzaimodeystvii v sisteme GeO_2-HF-H_2O pri 25°)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2165-2171 (USSR)

ABSTRACT: The forms and conditions of production of fluorine compounds of germanium in the system GeO_2-HF-H_2O were analyzed with physico-chemical methods. The methods used were the determinatio of solubility and electric conductivity. A diagram of solubility in the system GeO_2-HF-H_2O was established. In the case of an HF content of 0-35% there is a linear increase of the solubilit of germanium oxide until a molar ratio of HF : GeO_2 = 4 is reached. In the range of between 35 and 41% HF the solubility curve changes the direction. In this point a transformation of $GeF_4 \cdot 3H_2O$ into hexafluorine germanic acid - $H_2GeF_6 \cdot 2H_2O$ - takes place. By determining the solubility and electric conductivity, as well as the pH-value of the solution it was

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SOV/78-3-9-26/38

The Interaction in the System GeO_2-HF-H_2O at a Temperature of 25°C

shown that the compounds of the solid phase also exist in the aqueous medium. In the system GeO_2-HF-H_2O only $H_2[GeOF_4]$ and $H_2[GeF_6]$ are formed. Besides GeO_2 also $H_2[GeOF_4]\cdot H_2O$ and $H_2[GeF_6]\cdot 2H_2O$ appear as solid phases in the system. The formation of these complex acids is confirmed by the determination of electric conductivity. There are 5 figures, 6 tables, and 13 references, 3 of which are Soviet.

SUBMITTED: July 24, 1957

Card 2/2

AUTHORS: Tananayev, I. V., Avduyevskaya, K. A. SOV/78-3-9-27/38

TITLE: Analysis of the Interaction in the System GeO_2-$H_2C_2O_4$-H_2O at 25°C (Issledovaniye vzaimodeystviya v sisteme GeO_2-$H_2C_2O_4$-H_2O pri 25°)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2172-2177 (USSR)

ABSTRACT: In the paper under review the interaction of GeO_2-$H_2C_2O_4$ in aqueous solutions was analyzed by the potentiometric method as well as by determining the electric conductivity and solubility at 25°C. In the interaction of germanium oxide and oxalic acid the concentration of hydrogen ions increases. There is a continuous increase of the concentration of hydrogen ions and conductivity until a ratio of $H_2C_2O_4 : GeO_2 = 3 : 1$ is reached, after which it remains constant. The resulting conclusion is that a complex of germanic acid with the formula $H_2[Ge(C_2O_4)_3]$ exists in solution. The analyses of solubility at 25°C showed that 0,045 mol per liter dissolve in oxalic acid. In a saturate solution of germanic acid with excess oxalic acid added

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SOV/78-3-9-27/38

Analysis of the Interaction in the System $GeO_2-H_2C_2O_4-H_2O$ at 25°C

germanium oxalic acid crystallizes in colorless needle-shaped crystals. This compound has the following composition: $H_2[Ge(C_2O_4)_3]\cdot 6H_2O$. The result of the analysis was as follows: Ge = 16,7%, C_2O_4 = 60,19%, H_2O = 23,64%. In an acid medium germanium oxalic acid exists as an ion only $[Ge(C_2O_4)_3]^{2-}$. A lessening of the acidity of the solution gives rise to ions with a lower ratio of $(C_2O_4)^{2-} : GeO_2$. Thermograms of a complex of germanium oxalic acid were recorded. At 43°C an endothermic effect occurs, which corresponds to the melting point of this compound. Ammonium and potassium salts of germanium oxalic acid were produced: $(NH_4)_2[Ge(OH)_2(C_2O_4)_2]\cdot 3H_2O$ and $K_2[Ge(OH)_2(C_2O_4)_2]\cdot 3H_2O$.
There are 5 figures, 3 tables, and 10 references, 1 of which is Soviet.

SUBMITTED: April 7, 1958

Card 2/3

75-1-2/26

AUTHORS: Tananayev, I. V., Kogan, Ya. L.

TITLE: The Investigation of the Formation Reaction of Silver Chloride and Silver Bromide by Means of the Method of Light Absorption (Issledovaniye reaktsiy obrazovaniya khlorida i bromida serebra metodom svetopogasheniya)

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1958, Vol 13, Nr 1, pp. 11-17 (USSR)

ABSTRACT:

In an earlier paper (ref. 1) different systems with silver iodide were investigated by measuring light absorption. It was shown that a connection exists between the solubility of a suspension of AgJ and its light absorption. In the present article the results of the analogous investigations of systems with silver bromide and silver chloride are described. The composition of the precipitates in the systems $AgNO_3 - KBr - H_2O$ and $AgNO_3 - KCl - H_2O$ was investigated by measurement of the light absorption. The clearly marked maximum of the absorption of the developing suspension is attained at a concentration ratio $AgNO_3 : KX = 1$(X = Br, Cl).

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75-1-2/26

The Investigation of the Formation Reaction of Silver Chloride and Silver Bromide by Means of the Method of Light Absorption

The curve and with it also the degree of dispersion of the precipitate is almost symmetrically modified toward both sides of the end point. Investigations of the systems AgBr - KBr - H_2O and Ag Cl - KCl - H_2O showed that an increase in the concentration of the halogen ions causes an increase in absorption which is explained by the increase in the solubility of the suspension by the addition of bromide and chloride ions. In a comparison of the results obtained with those already known for the respective systems with AgJ, the uniform shape of the curves is remarkable. The absorption maximum in all 3 systems is near similar values of the concentration of the potassium halide, between 10^{-1} and 2.10^{-1} Mol/liter. The absorption of a suspension of AgCl changes only slightly in concentrations of NaCl from 10^{-3} to 10^{-2} Mol/liter, whereas at higher concentrations of NaCl the absorption increases rapidly. The rapid increase in light absorption takes place within the same concentration range of NaCl where the solubility of silver chloride also rapidly increases. When the quantity of the solid phase becomes somewhat less, due to the increasing solubility, the value of the absorption maximum does not change. The loss

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The Investigation of the Formation Reaction of Silver Chloride and Silver Bromide by Means of the Method of Light Absorption

of solid phase is compensated by an increase in absorption based on an increase in particles. The investigation of the systems $AgBr - NH_3 - H_2O$ showed that after the addition of very little ammonia to a suspension of silver bromide a very rapid increase in light absorption takes place. A comparison with the system $AgJ - NH_3 - H_2O$ showed great differences which are due to the highly different solubility of AgJ and AgBr in NH_3.

The system $AgBr - AgNO_3 - NH_3 - H_2O$ was investigated in order to determine the influence of excess silver ions in the presence of ammonia upon the absorption of a suspension of silver bromide. It became evident that the nature of the curves of light absorption as against the system without excess $AgNO_3$ does not change. In both cases the extinction increases with increasing concentration of ammonia, runs through a maximum, and then decreases to 0, corresponding to a complete dissolution of AgBr. The higher the excess of $AgNO_3$, the more does the domain of the maximum widen. Therefore, the complete dissolution of the precipitate is only attained at considerably higher concentrations of ammonia.

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75-1-2/

The Investigation of the Formation Reaction of Silver Chloride and Silver Bromide by Means of the Method of Light Absorption

A comparison with the corresponding system with AgJ showed great differences in the influence of ammonia upon the absorption of AgBr and AgJ respectively. In the system with AgJ the absorption maximum is attained at much higher concentrations of ammonia. At these concentrations the precipitate is already completely dissolved in the system with AgBr and the extinction is therefore equal to 0. This fact shows the possibility of a phototurbidimetric determination of iodides in the simultaneous presence of bromides. This possibility was proved by experiments. It was also attempted to determine silver phototurbidimetrica with the aid of a calibration curve. The accuracy of the results proved to be satisfactory. There are 9 figures, 8 tables, and 2 references, 1 of which is Slavic.

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

SUBMITTED: January 4, 1957

Card 4/5

The Investigation of the Formation Reaction of Silver Chloride and Silver Bromide by Means of the Method of Light Absorption 75-1-2/26

AVAILABLE: Library of Congress

1. Silver chloride - Chemical reactions 2. Silver bromide - Chemical reactions 3. Light - Absorption - Measurement

Card 5/5

75-13-2-7/27

AUTHORS: Deychman, E. N., Tananayev, I. V.

TITLE: Determination of Small Quantitites of Indium by Titrimetric and Photometric Methods (Opredeleniye malykh kolichestv indiya titrimetricheskim i fotometricheskim metodom)

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1958, Vol. 13, Nr 2, pp. 196-2oo (USSR)

ABSTRACT: One of the best known titrimetric methods for the determination of indium is based upon the potentiometric titration by means of potassium ferrocyanide (Ref. 1). The composition $KIn_5[Fe(CN)_6]$ is ascribed to the compound formed here. Kol'tgof (Ref. 2) says, however, that the composition of the precipitating deposit was not yet investigated. In the investigation of the systems of indium chloride and of the ferrocyanides of the alkaline metals (Refs. 3,4) it was found that the following order applies for the tendency to form mixed ferrocyanides with indium difficult to be solved: $Li < Na < K < Rb < Cs$. On the strength of the investigation of the authors it is very probable that the inaccu=

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Determination of Small Quantities of Indium by
Titrimetric and Photometric Methods

75-13-2-7/27

racy of the mentioned potentiometric method is due to the variable composition of the formed precipitation, since in the case of a ratio of $K_4[Fe(CN)_6]$: $InCl_3$=0.75 in the initial mixture a normal ferrocyanide of indium precipitates which then continues to react with $K_4[Fe(CN)_6]$ under formation of the mixed salt $KIn[Fe(CN)_6]$. In consequence of this reaction the modification of the potential is not obvious enough. A uniform compound of a certain composition is formed only in the reaction of indium ions with the ferrocyanides of lithium and sodium. The point of equivalence in the potentiometric titration lies in this case at a ratio of the components which corresponds to the formation of $In_4[Fe(CN)_6]$. Hence follows that the analytical determination of indium the ferrocyanides of lithium and sodium are to be preferred to the ferrocyanides of potassium, rubidium, and cesium. A method for the determination of indium by means of potentiometric titration with sodium ferrocyanide was worked out. Diphenylamine

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75-13-2-7/27

Determination of Small Quantities of Indium by
Titrimetric and Photometric Methods

was used here as indicator. Diphenylamine is oxydized in acid solutions under the influence of oxydizing agents to colorless phenyl benzidine and then to violet diphenylbenzidine (Ref. 5). In to a great extent acid solutions a part of the diphenylbenzidine can be oxidized, before all diphenylamine is transformed into diphenylbenzidine. It was found that sulphuric acid is best suited for the titration of indium. In a solution of 5% of H_2SO_4 a stable and sufficiently intensive coloration is formed after 2 - 3 minutes. The best results were obtained in a concentration of 0,02-0,005 g indium in a solution of 50 ml. Small quantities of chlorides and sulfates do not disturb the determination, the coloration of the indicator is, however, formed much more slowly. Oxalic acid reduces to a small extent the coloration, phosphoric acid disturbs. Disturbing cations are chromium, tungsten, copper and great quantities of iron. In presence of diphenylamine also zinc, cobalt, aluminum and tin show colorations, the disturbing influence of these elements

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Determination of Small Quantities of Indium by Titrimetric and Photometric Methods

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can, however, be eliminated by addition of citric acid. Furthermore the authors worked out also a photometric method of determining small quantities of indium. In the case of adding a solution of potassium ferricyanide and diphenylamine to a diluted solution of an indium salt a coloration is produced the intensity of which is proportional to the concentration of indium. A solution of sulfuric acid of 5% is best suited as medium. The smallest quantity of indium which can be determined this way amounts to 4.10^{-5} g in a solution of 25 ml. Be, Ca, Mg, La, Cd, Ga, Ti, U, Th, Al, Co, Ni, Zn and Mn do not disturb the determination. In presence of zinc the coloration is produced sooner and to a greater degree. it corresponds, however, after 10 minutes to the normal coloration of the solution without foreign ions. Cr, Ni, Cu, Fe and Tl disturb. There are 7 tables and 5 references, 3 of which are Soviet.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova AN SSSR, Moskva (Moscow Institute of General and Inorganic Chemistry imeni N.S. Kurnakov, AS USSR)

SUBMITTED: December 29, 1956 1. Indium--Determination 2. Indium--Volumetric analysis 3. Photometry 4. Diphenylamine--Applications

Card 4/4

SOV/75-13-4-6/29

AUTHORS: Ponomarev, V. D., Tananayev, I. V.

TITLE: Investigation of the Formation Reaction of Mixed Ferrocyanides of Copper and Alkali Metals by a Potentiometric Method (Izucheniye reaktsii obrazovaniya smeshannykh ferrotsianidov medi i shchelochnykh metallov potentsiometricheskim metodom)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol. 13, Nr 4, pp. 417-422 (USSR)

ABSTRACT: The potentiometric titration of ferrocyanides, which nowadays is applied with varying success in the determination of a whole series of metals (Ref 1), has one shortcoming. The position of the end point frequently is dependent on the kind of the alkali metal which forms the cation of the ferrocyanide and also on the concentration of alkali metals in the solution. Knowledge of the mechanism of the formation reaction of an insoluble mixed ferrocyanide would disclose new possibilities of the analytical application of ferrocyanides. For this purpose it is indispensable to investigate the relation between the composition of the mixed ferrocyanides and the presence of one or the other alkali metal in the solution, and its concentration. The present paper deals with potentiometric titration of coppe

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SOV/75-13-4-6/29

Investigation of the Formation Reaction of Mixed Ferrocyanides of Copper and Alkali Metals by a Potentiometric Method

ions by $[Fe(CN)_6]^{4-}$. Despite a series of published articles on this problem (Refs 3, 4), no satisfactory potentiometric method of titrating copper by ferrocyanides has hitherto been known. In all of these investigations it is titrated by $K_4[Fe(CN)_6]$, however, the possible influence of other alkali metals being present on the titration was not investigated. In some of the papers reference is made to the lowered solubility of the mixed ferrocyanides of copper in dependence on the ion radius of the alkali metal which is contained in the corresponding sediment (Refs 5-7). The authors of the present paper investigated the system consisting of the ions Cu^{2+} and $Me_4[Fe(CN)_6]$ (Me = Li, Na, K, Rb, Cs). The redox-potentials were determined on a potentiometer of the type ЛП-6. It was found that common $Cu_2[Fe(CN)_6]$ is produced in the titration by ferrocyanides of lithium and sodium. In presence of ions of the remaining alkali metals, however, mixed ferrocyanides develop: $K_4Cu_{10}[Fe(CN)_6]_6$, $Rb_4Cu_4[Fe(CN)_6]_3$, and $Cs_2Cu[Fe(CN)_6]$. Among

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SOV/75-13-4-6/29

Investigation of the Formation Reaction of Mixed Ferrocyanides of Copper and Alkali Metals by a Potentiometric Method

the potentiometric methods of titrating copper the titration by rubidium ferrocyanide or by the ferrocyanides of the other alkali metals in presence of rubidium salts is the most suitable one. The way of carrying out the investigations based on redox-potentials is described in detail. There are 3 figures, 3 tables, and 8 references, 6 of which are Soviet.

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

SUBMITTED: May 29, 1957

1. Titration--Materials 2. Iron cyanide--Chemical reactions 3. Copper--Chemical reactions 4. Alkali metals--Chemical reactions 5. Metals--Determination

Card 3/3

TANANAYEV, I.V., akademik, prof.; SHAPIRO, L.M., kand.khim, nauk

Phototurbidimetric titration of cobalt ions with rubeanic acid.
Sbor.nauch.rab.Bel.politekh.inst. no.63:159-163 '58.
(MIRA 12:4)

(Cobalt--Analysis) (Oxamide)

SOV/30-59-1-30/57

5(0)

AUTHOR: Tananayev, I. V., Academician

TITLE: News in Brief (Kratkiye soobshcheniya) Congress of Austrian Chemists (S"yezd avstriyskikh khimikov)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 1, pp 117 - 118 (USSR)

ABSTRACT: The congress was held [illegible] October 15 until 18, 1958 in memory of the 100th Anniversary of Auer von Welsbach (Auer fon Vel'sbakh) who is well-known for his research work in the field of the chemistry of rare elements. The symposium which took place in the course of the Congress of Austrian Chemists was devoted to the survey of achievements in the field of division of rare earth elements as well as to the research of their properties and the viscous elements and compounds. Apart from the reports delivered by western scientists only L. Wolf and I. Massonn (both from the German Democratic Republic) gave a report. Wolf dealt with problems of complex formation and their utilization in the emanation of rare earths and Massonn reported on the separation of large quantities of rare earths by cationites with trinitryl acetic acid serving as extractor.

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SOV/78-4-1-20/48

5(2)

AUTHORS: Tananayev, I. V., Lyutaya, M. D.

TITLE: I. On the Mixed Hexanitritonickelates of Lanthanum and Potassium (I. O smeshannykh geksanitronikeleatakh lantana i kaliya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 1, pp 97-102 (USSR)

ABSTRACT: Solubility in the system $La(NO_3)_3-K_4[Ni(NO_2)_6]-H_2O$ was investigated at 25°. The solid phases separated out were analyzed and the thermograms of these compounds drawn. The solubility curves indicate the gradual formation of three solid phases with a rise of $K_4[Ni(NO_2)_6]$ content. The following solid phases are formed: $K_6La_2[Ni(NO_2)_6]_3$; $K_{21}La_5[Ni(NO_2)_6]_9 \cdot H_2O$; $K_5La[Ni(NO_2)_6]_2 \cdot H_2O$. The individuality of these compounds was proved by their thermograms. The thermograms of $K_6La_2[Ni(NO_2)_6]_3$ show an endothermic effect within the temperature range 220-265°. Thereby the color of the salts changes from brown to black. The thermograms of

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$K_{21}La_5[Ni(NO_2)_6]_9 \cdot H_2O$ show two endothermic effects. The first effect at 130° indicates the dehydration of the salt. The second one at 230-270° indicates the decomposition of the salt. The thermogram of $K_5La[Ni(NO_2)_6]_2 \cdot H_2O$ shows an endothermic effect at 130° indicating the dehydration of the salt and an endothermic effect at 230-250° indicating the decomposition of the salt. The solubility of $K_5La[Ni(NO_2)_6]_2 \cdot H_2O$ in KNO_2 solutions (1-7 mol/l) was investigated. It was found that at the same time salting out takes place whereby the solid initial phase is changed to $K_6La_2[Ni(NO_2)_6]_3$. Rare earths can be separated by KNO_2 solutions by fractional crystallization of their mixed hexanitritonickelates. There are 6 figures, 4 tables, and 2 references.

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AUTHORS: Tananayev, I. V., Lyutaya, M. D.

TITLE: II. On Mixed Hexanitritonickelates of Praseodymium and Neodymium (II. O smeshannykh geksanitronikeleatakh prazeodima i neodima)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 1, pp 103-109 (USSR)

ABSTRACT: Solubility in the systems $Pr(NO_3)_3$-$K_4[Ni(NO_2)_6]$-H_2O and $Nd(NO_3)_3$-$K_4[Ni(NO_2)_6]$-H_2O was investigated at 25°C. In the first system the phases $K_{21}Pr_5[Ni(NO_2)_6]_9 \cdot H_2O$ and $K_5Pr[Ni(NO_2)_6]_2 \cdot H_2O$ are gradually formed. The second system also shows the gradual formation of two solid phases: $K_{21}Nd_5[Ni(NO_2)_6]_9 \cdot H_2O$ and $K_5Nd[Ni(NO_2)_6]_2 \cdot H_2O$. The thermograms were drawn and are shown in the figures 3, 4, and 8, 9. The solubility of $K_5Pr[Ni(NO_2)_6]_2 \cdot H_2O$ and $K_5Nd[Ni(NO_2)_6]_2 \cdot H_2O$ in KNO_2 solutions (1-7 mol/l) was investigated. It was found that

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the solid phases thereby change to $K_{21}Pr_5[Ni(NO_2)_6]_9 \cdot H_2O$ and $K_{21}Nd_5[Ni(NO_2)_6]_9 \cdot H_2O$. There are 10 figures, 8 tables, and 1 Soviet reference.

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