"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

BOBRO, Yu.G., kand.tekhn.nauk; TANANKO, I.A., kand.tekhn.nauk

Nitriding of high-strength alloyed cast irons. Mashinostroenie no.1:39-41 Ja-F '64. (MIRA 17:7)

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"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

ACCESSION NR: AP4024988

S/0070/64/009/002/0209/0212

AUTHORS: Palatnik, L. S.; Tananko, I. A.; Bobro, Yu. G.

TITLE: Nature of the ε -phase in alloys of Fe - Al - C

SOURCE: Kristallografiya, v. 9, no. 2, 1964, 209-212

TOPIC TAGS: epsilon phase, Fe Al C alloy, x ray structure, metallographic analysis, chemical analysis, carbide, Fe sub 3 AlC, eutectic, austenite

ABSTRACT: The authors have studied the high-carbon ε-phase of Fe-Al-C alloys by x-ray structure, metallographic, and chemical analyses. This phase was found to be an interstitial phase (carbide) corresponding to the formula Fe_3AlC. It was found that this carbide, like other carbide phases, forms during crystallization from liquid solutions as a primary phase and in eutectic proportions. It also forms during the breakdown of austenite. The macrohardness of the ε-phase of slowly cooled alloys ranges from 600 to 750 units of $H\mu$. The lattice constant a depends on the carbon content in the fashion shown in Fig. 1 on the Enclosure.

Card 1/3 2

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ACCESSION NR: AP4024988

Yu. S. Rodchenkova participated in the experimental part of this work. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnical Institute)

SUBMITTED: 24May63 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: SS, MM NO REF SOV: 003 OTHER: 006

Card 2/2

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TAYANAI[illegible], A.

Tekhnologia proizvodstva stali splavov (Production technology of steel and silos).

Moscow 1946.

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TARANAYEV, A.

Bezstruzhkovi metod analiza chernikh ovetnikh i dragocennikh splavov (Chip-free/non destructive/ method os analsis of ferrous and non ferrous alloys and of precious metals).

Moscow 1948.

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TANANAYEV, A. V., Candidate Tech Sci (diss) -- "The technical-economic principles of the dimensions of the outlet pipes in the design of hydroelectric power stations". Leningrad, 1959. 18 pp (Min Higher Educ USSR, Leningrad Polytech Inst im M. I. Kalinin), 150 copies (KL, No 26, 1959, 126)

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TANANAYEV, A.V., kand.tekhn.nauk

Basis for choosing the parameters of the blading of a hydraulic turbine. Izv. vys. ucheb. zav.; energ. 4 no.10:110-115 O '61.
(MIRA 14:11)

1. Leningradskiy politekhnicheskiy institut imeni M.I.Kalinina. Predstavlena kafedroy ispol'zovaniya vodnoy energii.
(Hydraulic turbines)

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

ACC NR: AP7005436 SOURCE CODE: UR/0382/66/000/002/0130/01

BOGDANOV, Yu. V.; BRANOVER, G. G.; LIYELAUSIS, O. A.; LIYELPETER, YA. YA.; and TANANAYEV, A. V.

ORG: none

"Hydraulic Properties of Electromagnetic Pump Ducts; I"

Riga, Magnitnaya Gidrodinamika. (Magnetohydrodynamics), No. 2, 1966, pp 130-134

TOPIC TAGS: electromagnetic pump, friction coefficient, hydraulic resistance

Abstract: The flow pattern is studied and the coefficients of hydraulic friction of electromagnetic pump duct models are determined neglecting the effect of the magnetic field. The effect of the shape of the convergent and divergent parts of the electromagnetic pump duct on the coefficient of friction is estimated. The duct model investigated consists of a rectangular section with circular inlet and outlet sections tapering down to the rectangular duct.

Details of the experimental configuration and equipment are given. Results of measurements are presented in a table. Results of the flow pattern study will be presented in a future paper. The studies were carried out at the Hydroelectric and Hydroengineering Laboratory of the Kalinin-Leningrad Polytechnical Institute. Orig. art. has: 5 figures and 1 table. [JPRS: 38,764]

SUB CODE: 20 / SUBM DATE: 13Feb66

Card 1/1 UDC: 532.542.4:538.4

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

VASIL'YEV, Yu.S., dots., kand. tekhn. nauk; VEL'NER, Kh.A., dots., kand. tekhn. nauk; GINDUS, D.O., inzh.; GOLOVACHEVSKIY, N.I., dots., kand. tekhn. nauk; GROMOV, A.I., inzh.; DOMANSKIY, L.K., inzh.; ISAYEV, Yu.M., inzh.; KULESH, N.P., dots., kand. tekhn. nauk; MIKHALEV, B.N., dots., kand. tekhn. nauk; MOROZOV, A.A., prof., doktor tekhn. nauk [deceased]; NALIMOV, S.M., st. nauchn. sotr., kand. tekhn. nauk; REZNIKOVSKIY, A.Sh., kand. tekhn. nauk; SVANIDZE, G.G., doktor tekhn. nauk; TANANAYEV, A.V., dots., kand. tekhn. nauk; KHAZANOVA, A.Z., inzh.; CHERNYATIN, I.A., st. nauchn. sotr., kand. tekhn. nauk; SHCHAVELEV, D.S., prof., doktor tekhn. nauk; YAGODIN, N.N., st. nauchn. sotr., kand. tekhn. nauk; LEONOVA, B.I., red.

[Utilization of water power] Ispol'zovanie vodnoi energii. Moskva, Energiia, 1965. 563 p. (MIRA 19:1)

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

SOV/84-58-5-28/57

AUTHOR: Tananayev, F., Chairman, Committee of a Unit

TITLE: Widening the Local Route Network (Rasshiryayem set' mestnykh vozdushnykh liniy)

PERIODICAL: Grazhdanskaya aviatsiya, 1958, Nr 5, p 29 (USSR)

ABSTRACT: The article reports local initiative and achievements in organizing new local air routes in Kuban' Oblast. Five new permanent routes have been opened recently. The flow of passengers has been brought to near-capacity level.

1. Civil aviation--Development

Card 1/1

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"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TANANAYKO, M.M.; BLUKKE, L.A.

Extraction-photometric determination of molybdenum as a diantipyrylmethane-thiocyanate complex. Ukr. khim.zhur. 29 no.9:974-978 '63. (MIRA 17:4)

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TANANAYEV, I.V.; KOROL'KOV, A.P.

Formation reaction and methods of preparation of acid cobalt ferrocyanide. Izv. AN SSSR. Neorg. mat. 1 no.9:1577-1581 S '65. (MIRA 18:11)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni Lomonosova.

APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8"

"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

L 13320-66 EWP(e)/EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG/WH

ACC NR: AP6003373 SOURCE CODE: UR/0363/66/002/001/0165/0168

AUTHOR: Tananayev, I. V.; Belyakov, I. M.; Dzhurinskiy, B. F.; Berul', S. I. 52 B

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences, SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Reactions of neodymium and cerium oxides with sodium borate melts 55 27 27

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 1, 1966, 165-168

TOPIC TAGS: rare earth, neodymium, oxide, cerium ~~oxide~~, borate, borate glass, neodymium glass, ~~neodymium borate~~, single crystal growing, crystallization, single crystal

ABSTRACT: Reactions in the liquid phase have been studied in the $Na_2O-B_2O_3-Nd_2O_3$ and $Na_2O-B_2O_3-CeO_2$ systems under isothermal and polythermal conditions to obtain data on solubility of the rare earths in sodium borate melts and crystallization of the rare-earth element borates. These data are required for growing single crystals of rare earth element borates and for preparing glasses 15,54 activated with rare-earth element ions. Solubility of Nd_2O_3 and CeO_2 was determined at

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900 and 1000C in the melts containing B_2O_3 and Na_2O in a ratio of from 2:1 to 17:1. This region of compositions was selected as practically the most important from the viewpoint of glass formation. It was noted that the behavior of Nd_2O_3 and CeO_2 in these melts differed. The solubility of Nd_2O_3 was significantly higher than that of CeO_2 because of the formation of neodymium borates, $NdBO_3$ and $Nd(BO_2)_3$, which crystallize in the 2—3.72 and 3.72—17 B_2O_3/Na_2O range, respectively. CeO_2 apparently does not form any compound and its solubility is only slightly dependent on the composition of melts. The great solubility of Nd_2O_3 in the Na_2O-B_2O_3 melts made it possible to grow $NdBO_3$ acicular single crystals up to several millimeters in size. Such crystals were grown by slow cooling of the borax melt saturated with Nd_2O_3 at 1000C. Liquidus curves of the $Na_2B_4O_7$-Nd_2O_3 section and $Na_2B_4O_7$-CeO_2 section of the phase diagrams were established for both systems studied. The liquidus branch of the $Na_2B_4O_7$-Nd_2O_3 system in the 690—1000C range, and the branch of the $Na_2B_4O_7$-CaO_2 system in the 740—1100C range corresponded to $NdBO_3$ and CeO_2 crystallization, both without any polymorphic conversion. Transition points on the liquidus curves at 910C for $Na_2B_4O_7$-Nd_2O_3 and 930C for $Na_2B_4O_7$-CeO_2 systems were attributed to some structural changes in the polymeric $Na_2B_4O_7$ melt.

[JK]

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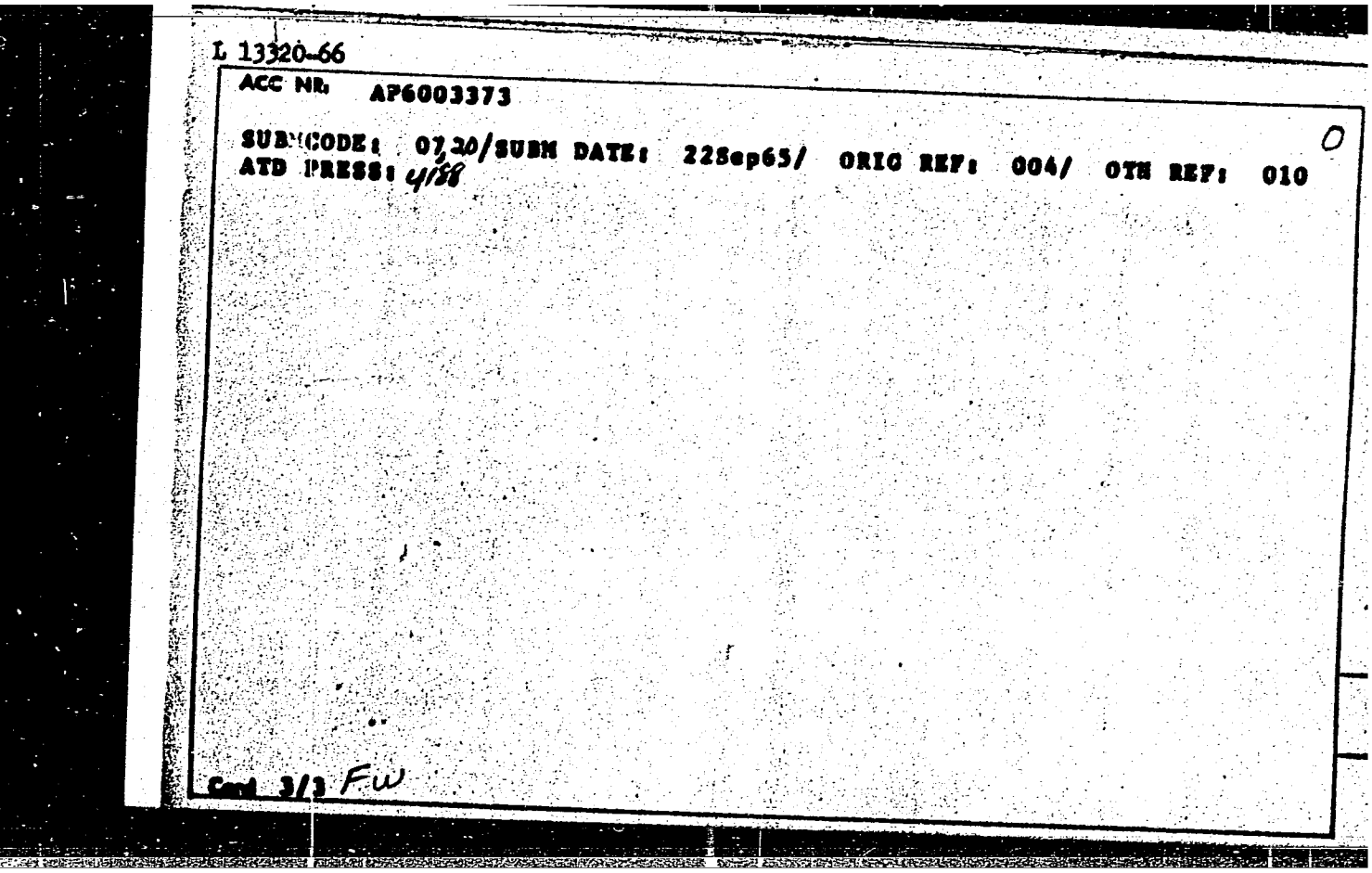

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ACC NR. AP6003373
SUB CODE: 07,20/SUBM DATE: 22Sep65/ ORIG REF: 004/ OTH REF: 010
ATD PRESS: 4188
Card 3/3 FW

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"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

TERESHIN, G.S.; RUBINSHTEYN, A.R.; TANANAYEV, I.V.

Yttrium complex formation with methylthymol blue. Zhur. anal. khim. 20 no.10:1082-1092 '65. (MIRA 18:11)

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

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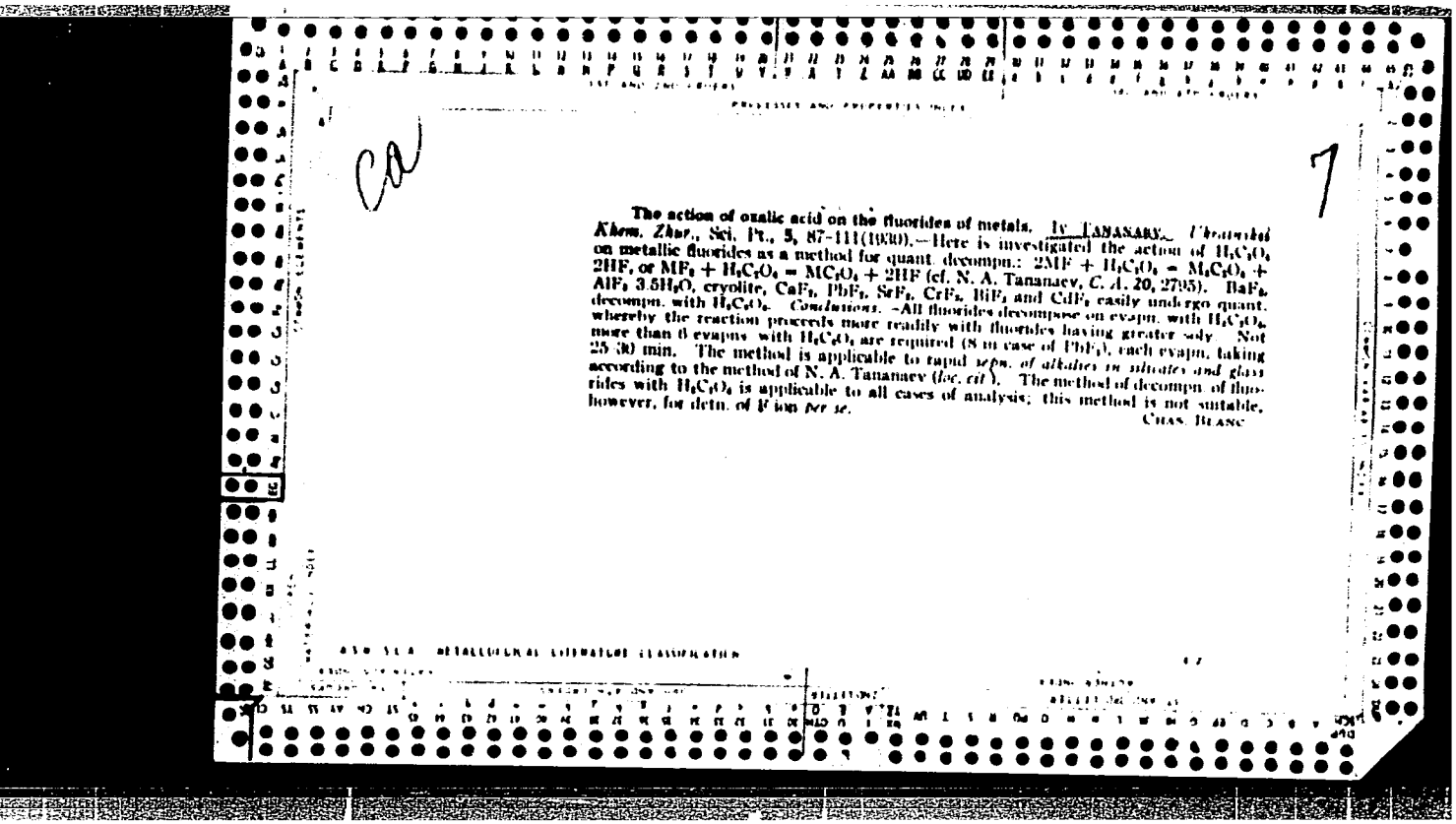

CA

7

The action of oxalic acid on the fluorides of metals. IV. TANANAEV. *Uchenye Zapiski Khim. Zhur.*, Sci. Pt., **5**, 87–111(1930).—Here is investigated the action of $H_2C_2O_4$ on metallic fluorides as a method for quant. decompn.: $2MF + H_2C_2O_4 = M_2C_2O_4 + 2HF$, or $MF_2 + H_2C_2O_4 = MC_2O_4 + 2HF$ (cf. N. A. Tananaev, *C. A.*, **20**, 2795). BaF_2, $AlF_3 \cdot 3.5H_2O$, cryolite, CaF_2, PbF_2, SrF_2, CrF_3, BiF_3 and CdF_2 easily undergo quant. decompn. with $H_2C_2O_4$. *Conclusions.*—All fluorides decompose on evapn. with $H_2C_2O_4$, whereby the reaction proceeds more readily with fluorides having greater sdy. Not more than 6 evapns with $H_2C_2O_4$ are required (8 in case of PbF_2), each evapn. taking 25–30 min. The method is applicable to rapid *sepn. of alkalies in silicates and glass* according to the method of N. A. Tananaev (*loc. cit.*). The method of decompn. of fluorides with $H_2C_2O_4$ is applicable to all cases of analysis; this method is not suitable, however, for detn. of F ion *per se*.

CHAS. BLANC

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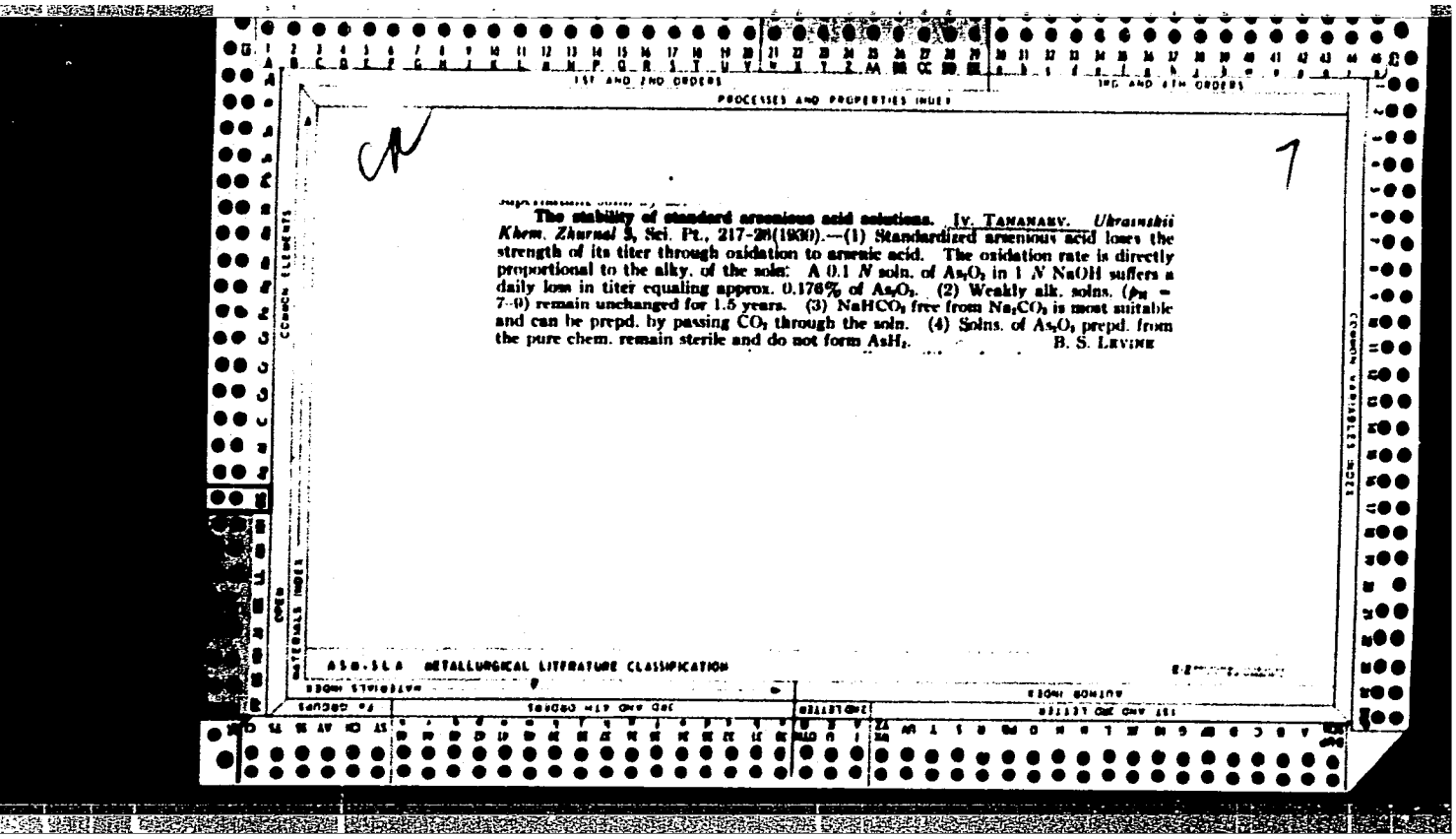

The stability of standard arsenious acid solutions. IV. TANANAEV. *Ukrainskii Khem. Zhurnal* 5, Sci. Pt., 217-28(1930).—(1) Standardized arsenious acid loses the strength of its titer through oxidation to arsenic acid. The oxidation rate is directly proportional to the alky. of the soln: A 0.1 *N* soln. of As_2O_3 in 1 *N* NaOH suffers a daily loss in titer equaling approx. 0.176% of As_2O_3. (2) Weakly alk. solns. (p_H = 7–9) remain unchanged for 1.5 years. (3) $NaHCO_3$ free from Na_2CO_3 is most suitable and can be prepd. by passing CO_2 through the soln. (4) Solns. of As_2O_3 prepd. from the pure chem. remain sterile and do not form AsH_3.

B. S. LEVINE

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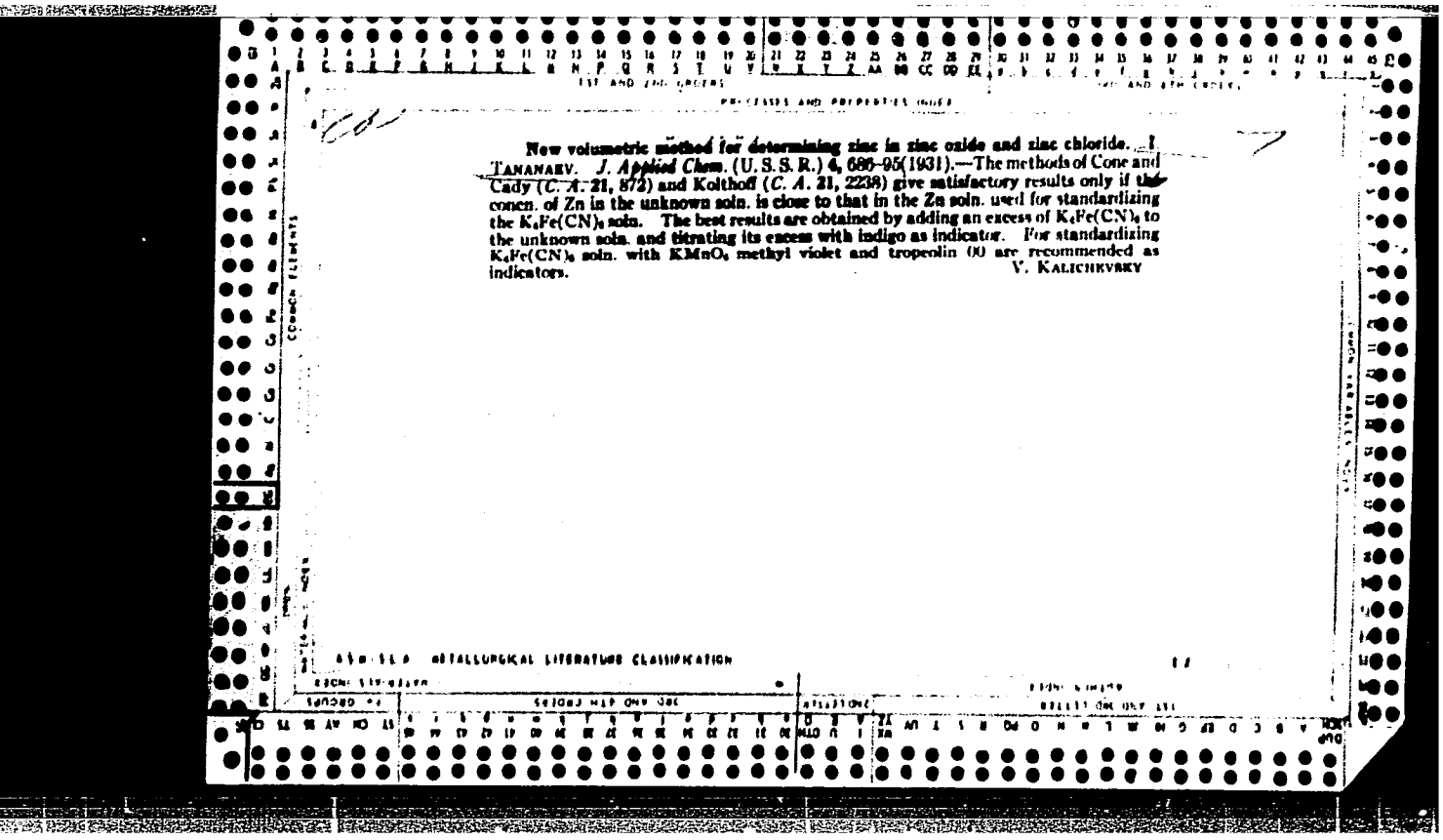

New volumetric method for determining zinc in zinc oxide and zinc chloride. I. TANANAEV. *J. Applied Chem.* (U. S. S. R.) 4, 686–95(1931).—The methods of Cone and Cady (*C. A.* 21, 872) and Kolthoff (*C. A.* 21, 2238) give satisfactory results only if the concn. of Zn in the unknown soln. is close to that in the Zn soln. used for standardizing the $K_4Fe(CN)_6$ soln. The best results are obtained by adding an excess of $K_4Fe(CN)_6$ to the unknown soln. and titrating its excess with indigo as indicator. For standardizing $K_4Fe(CN)_6$ soln. with $KMnO_4$ methyl violet and tropeolin 00 are recommended as indicators.

V. KALICHEVSKY

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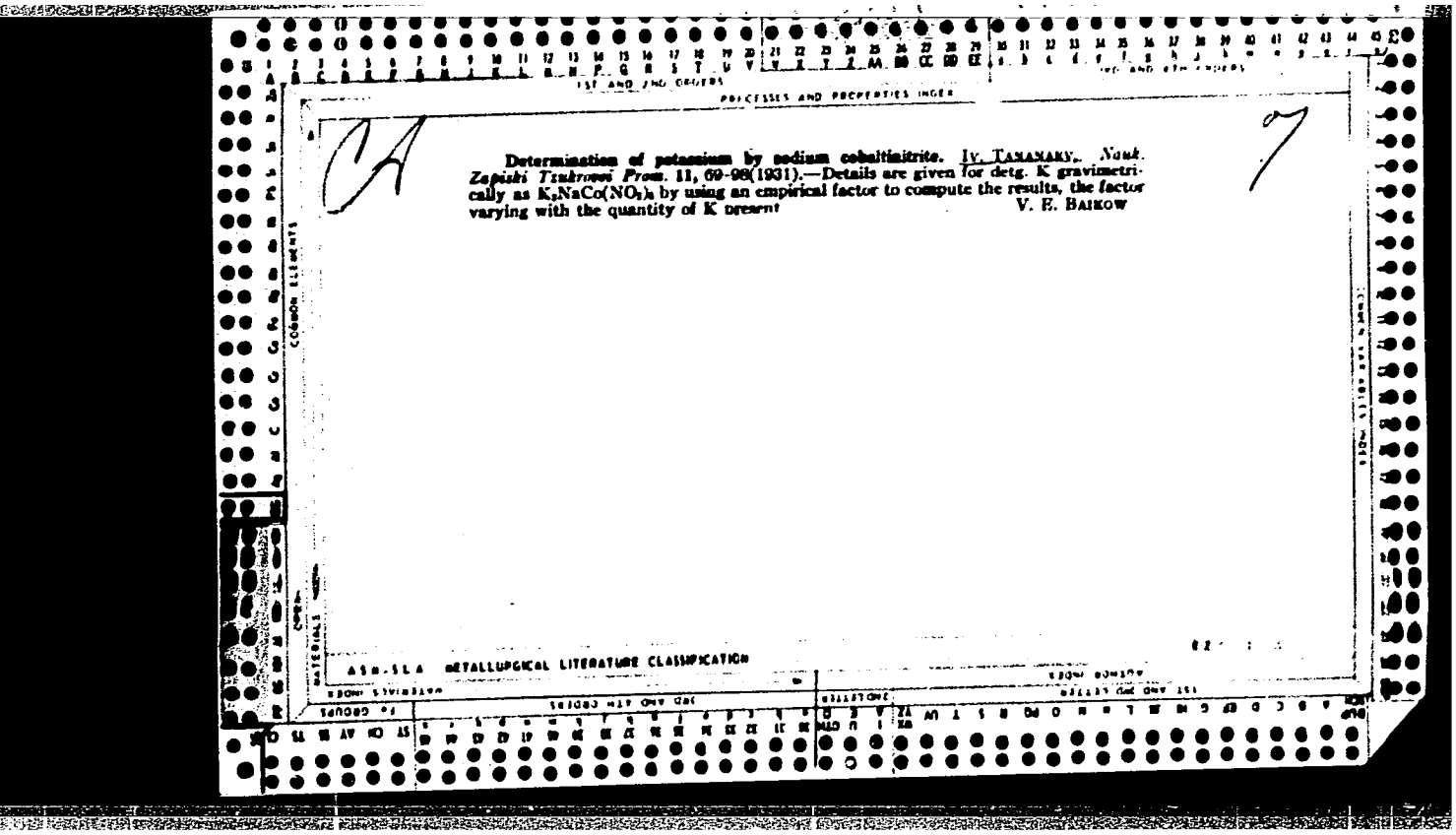

CA

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Determination of potassium by sodium cobaltinitrite. Iv. Tananaev. *Nauk. Zapiski Tsukrovoi Prom.* 11, 69-98(1931).—Details are given for detg. K gravimetrically as $K_2NaCo(NO_2)_6$ by using an empirical factor to compute the results, the factor varying with the quantity of K present. V. E. Baikow

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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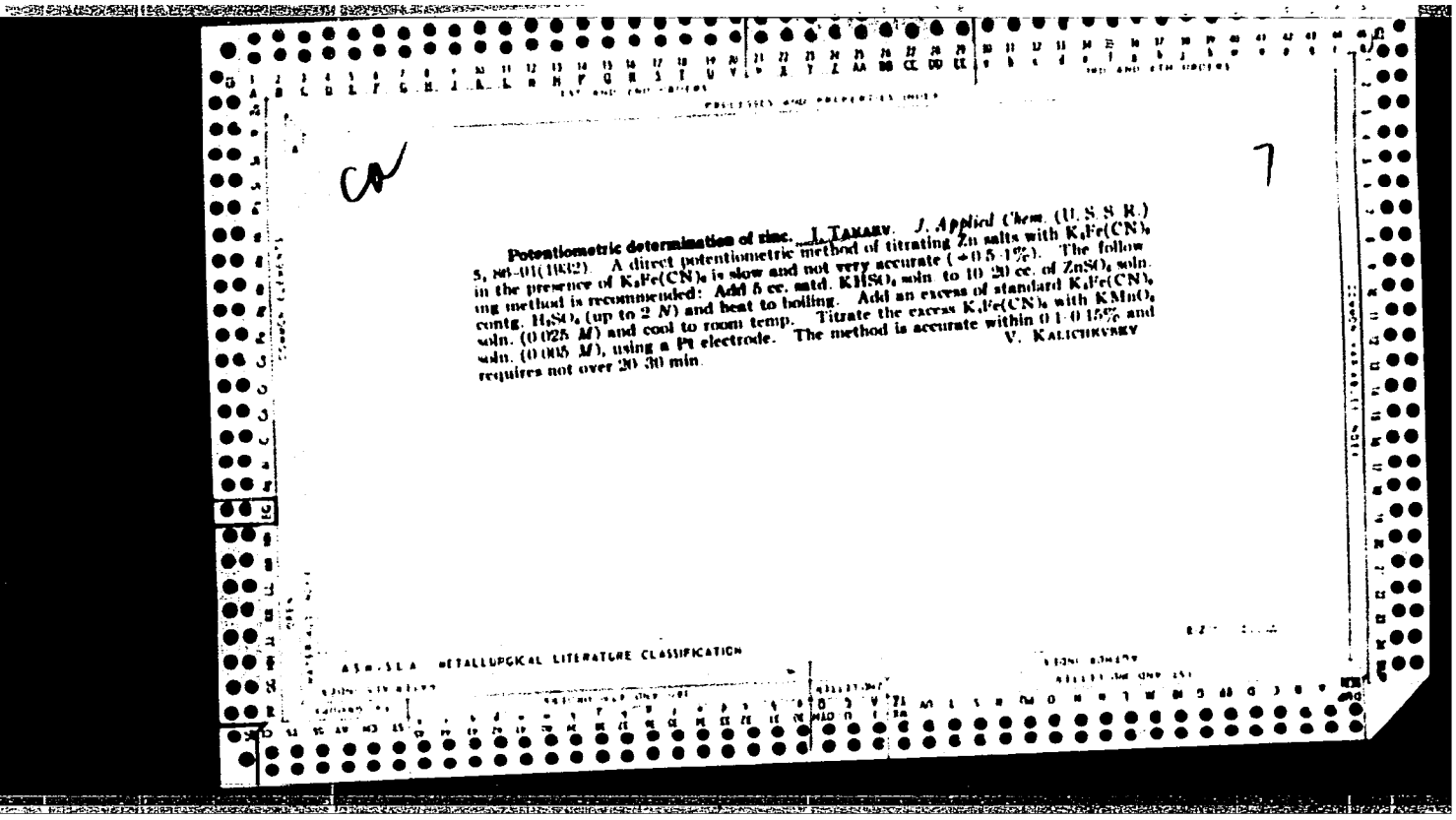

Potentiometric determination of zinc. I. Tanaev. *J. Applied Chem.* (U.S.S.R.) 5, 86-91(1932). A direct potentiometric method of titrating Zn salts with $K_4Fe(CN)_6$ in the presence of $K_4Fe(CN)_6$ is slow and not very accurate (+0.5-1%). The following method is recommended: Add 5 cc. satd. $KHSO_4$ soln. to 10-20 cc. of $ZnSO_4$ soln. contg. H_2SO_4 (up to 2 *N*) and heat to boiling. Add an excess of standard $K_4Fe(CN)_6$ soln. (0.025 *M*) and cool to room temp. Titrate the excess $K_4Fe(CN)_6$ with $KMnO_4$ soln. (0.005 *M*), using a Pt electrode. The method is accurate within 0.1-0.15% and requires not over 20-30 min.

V. Kalichevsky

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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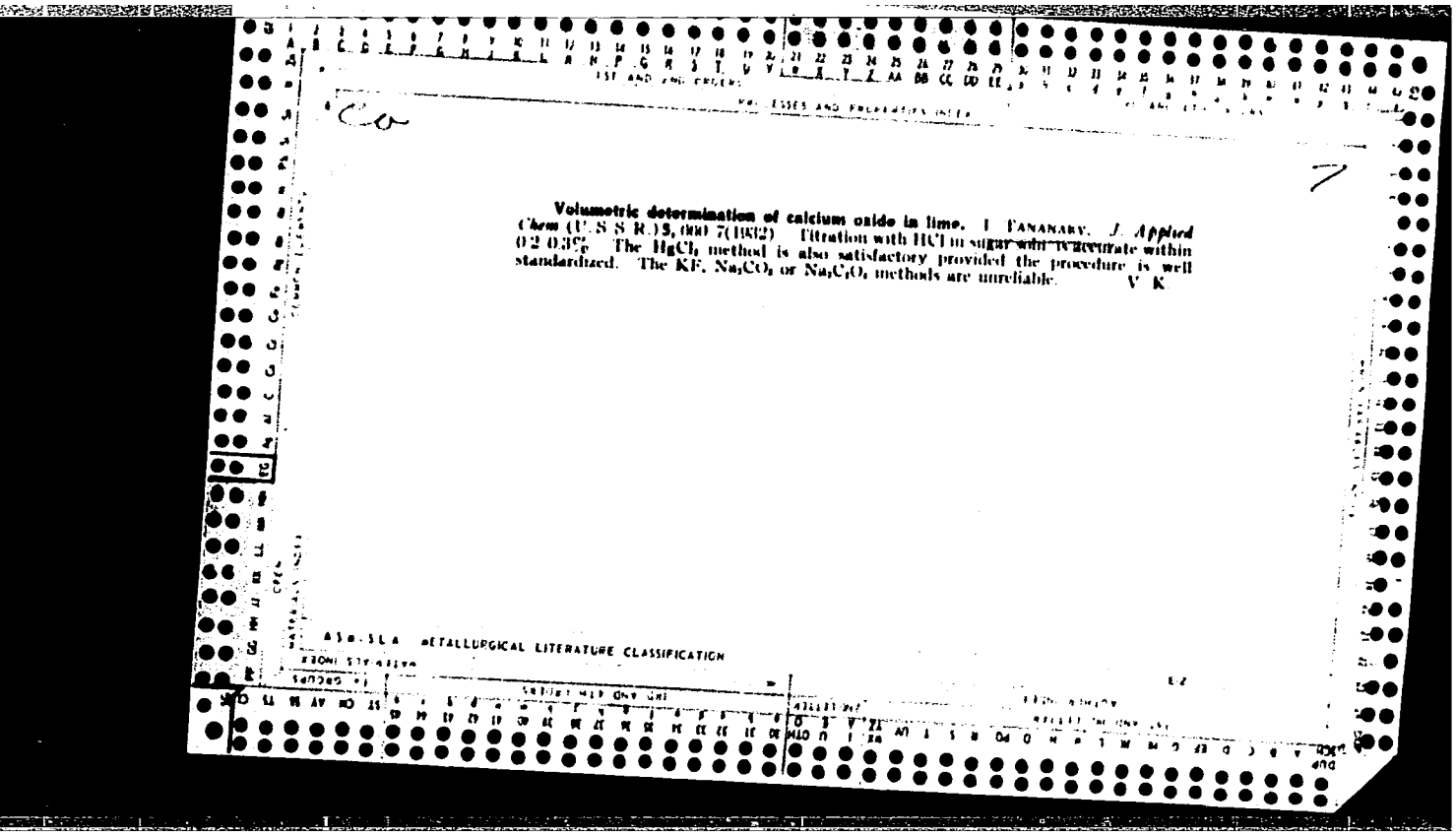

Volumetric determination of calcium oxide in lime. I. Fananary. *J. Applied Chem.* (U.S.S.R.) 5, 000 7(1932). Titration with HCl in sugar soln. is accurate within 0.2-0.3%. The $HgCl_2$ method is also satisfactory provided the procedure is well standardized. The KF, Na_2CO_3 or $Na_2C_2O_4$ methods are unreliable. V. K.

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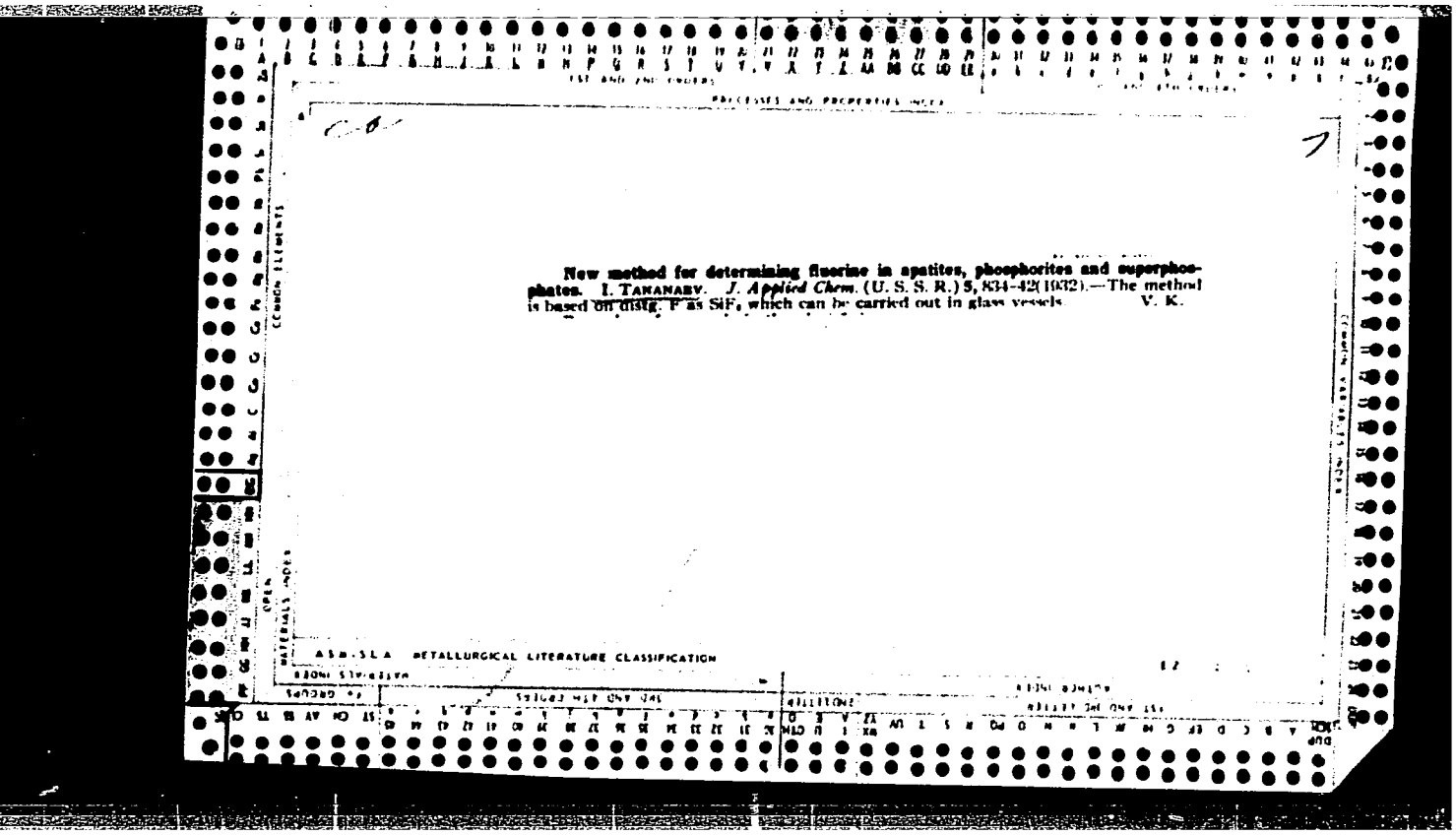

New method for determining fluorine in apatites, phosphorites and superphosphates. I. TANANAEV. *J. Applied Chem.* (U. S. S. R.) 5, 834–42(1932).—The method is based on distg. F as SiF_4 which can be carried out in glass vessels. V. K.

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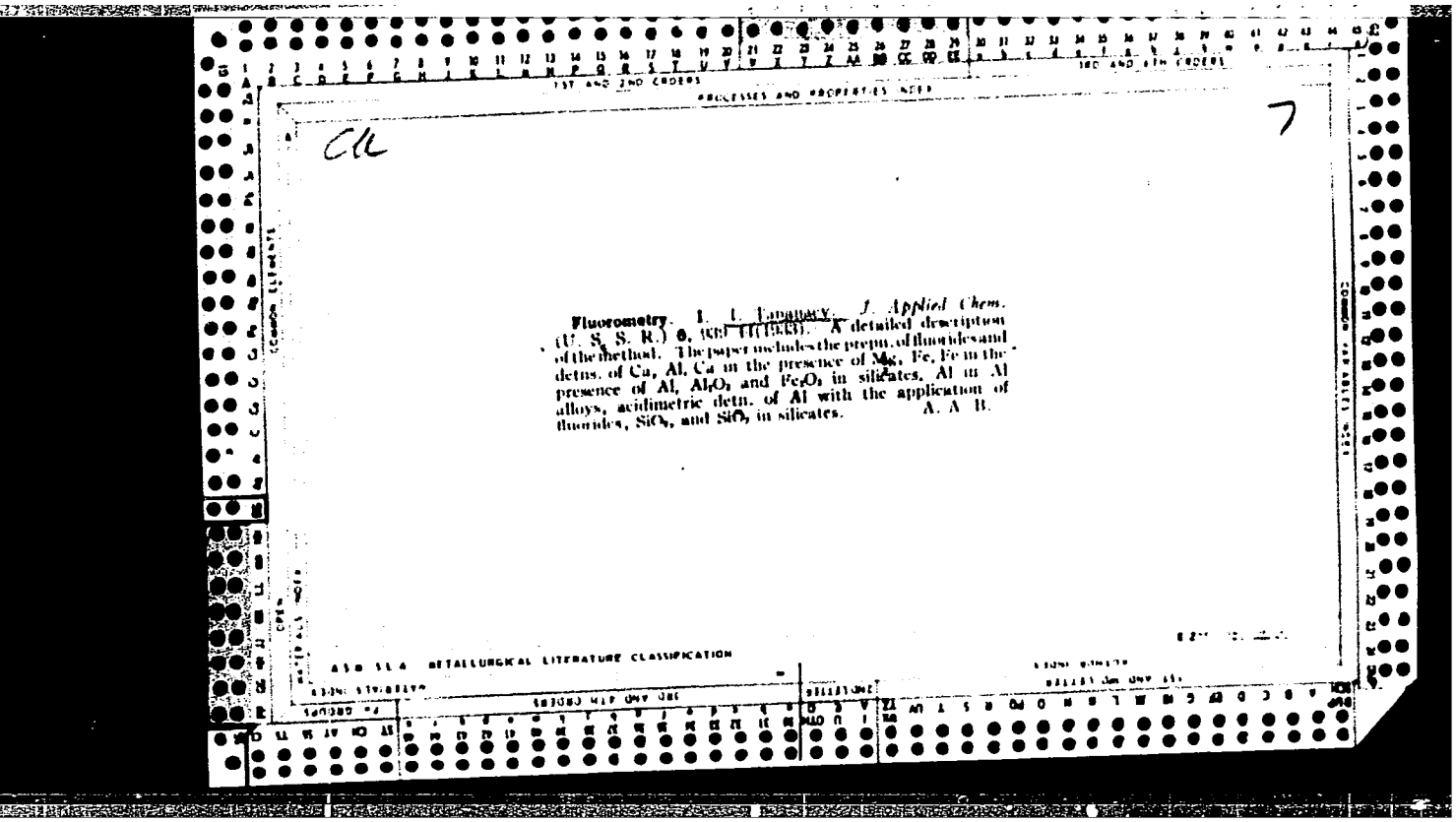

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Cu

7

Fluorometry. I. I. Tananaev. *J. Applied Chem.* (U. S. S. R.) 6, [illegible]. A detailed description of the method. The paper includes the prepn. of fluorides and detns. of Ca, Al, Ca in the presence of Mg, Fe, Fe in the presence of Al, Al_2O_3 and Fe_2O_3 in silicates, Al in Al alloys, acidimetric detn. of Al with the application of fluorides, SiO_2, and SiO_2 in silicates. A. A. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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"APPROVED FOR RELEASE: 07/13/2001 CIA-RDP86-00513R001754820006-8

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

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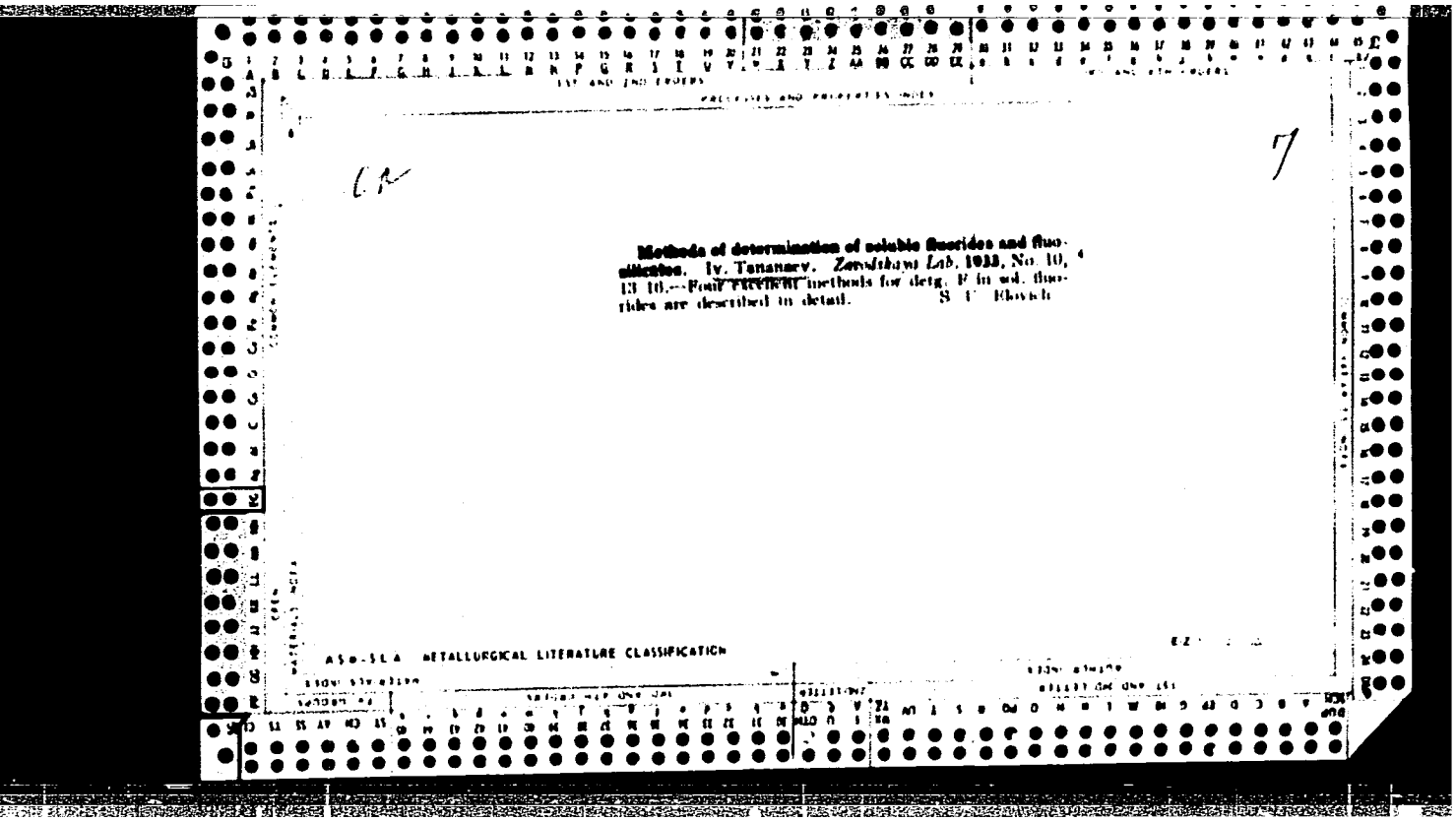

Methods of determination of soluble fluorides and fluosilicates. Iv. Tananaev. *Zavodskaya Lab.* 1933, No. 10, 13-16.—Four excellent methods for detg. F in sol. fluorides are described in detail. S. C. Elovich

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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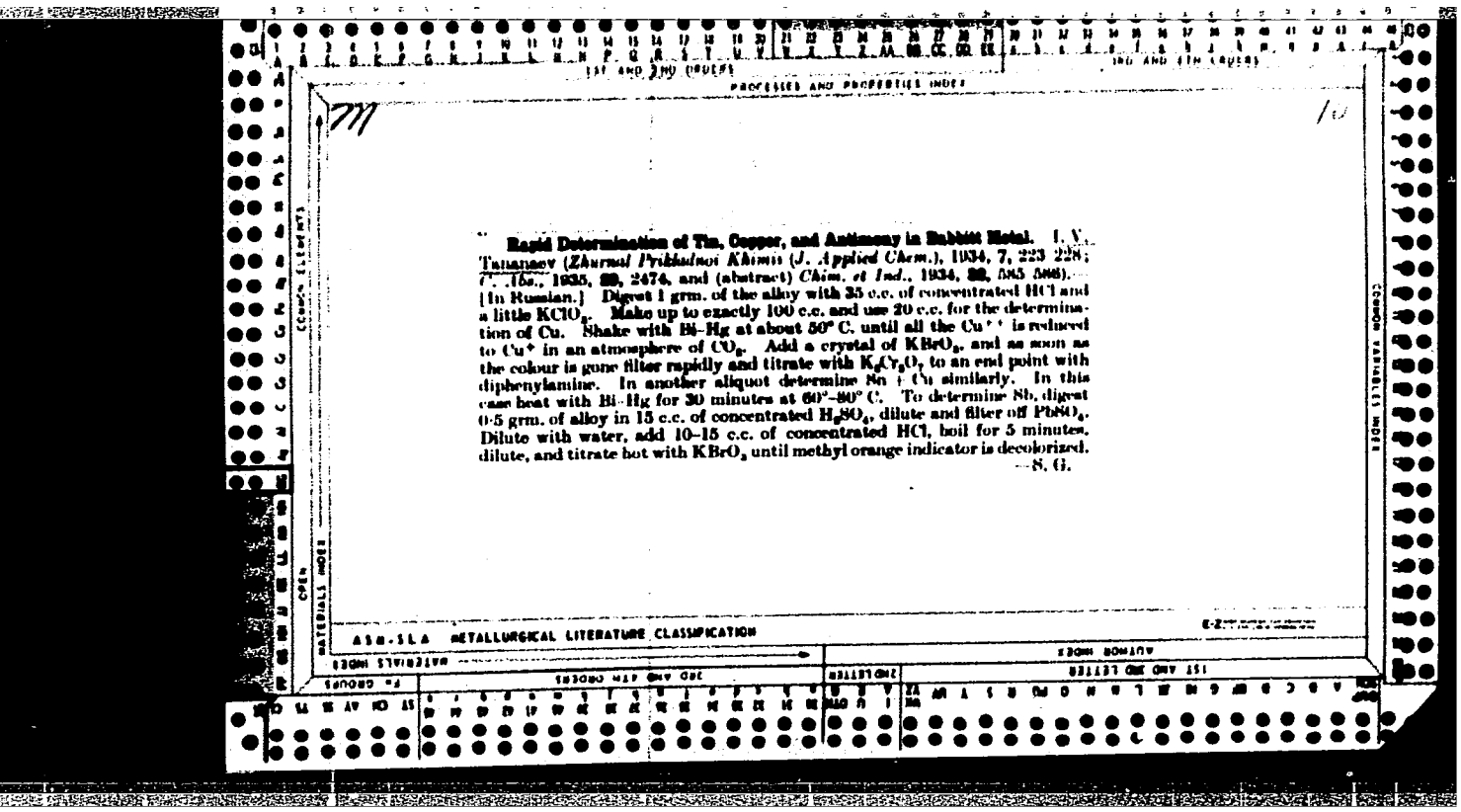

Rapid Determination of Tin, Copper, and Antimony in Babbitt Metal. I. V. Tananaev (*Zhurnal Prikladnoi Khimii* (*J. Applied Chem.*), 1934, 7, 223–228; *C.*, 1935, **29**, 2474, and (abstract) *Chim. et Ind.*, 1934, **32**, 585–586). [In Russian.] Digest 1 grm. of the alloy with 35 c.c. of concentrated HCl and a little $KClO_3$. Make up to exactly 100 c.c. and use 20 c.c. for the determination of Cu. Shake with Bi–Hg at about 50° C. until all the Cu^{++} is reduced to Cu^{+} in an atmosphere of CO_2. Add a crystal of $KBrO_3$, and as soon as the colour is gone filter rapidly and titrate with $K_2Cr_2O_7$ to an end point with diphenylamine. In another aliquot determine Sn + Cu similarly. In this case heat with Bi–Hg for 30 minutes at 60°–80° C. To determine Sb, digest 0·5 grm. of alloy in 15 c.c. of concentrated H_2SO_4, dilute and filter off $PbSO_4$. Dilute with water, add 10–15 c.c. of concentrated HCl, boil for 5 minutes, dilute, and titrate hot with $KBrO_3$ until methyl orange indicator is decolorized.

—S. G.

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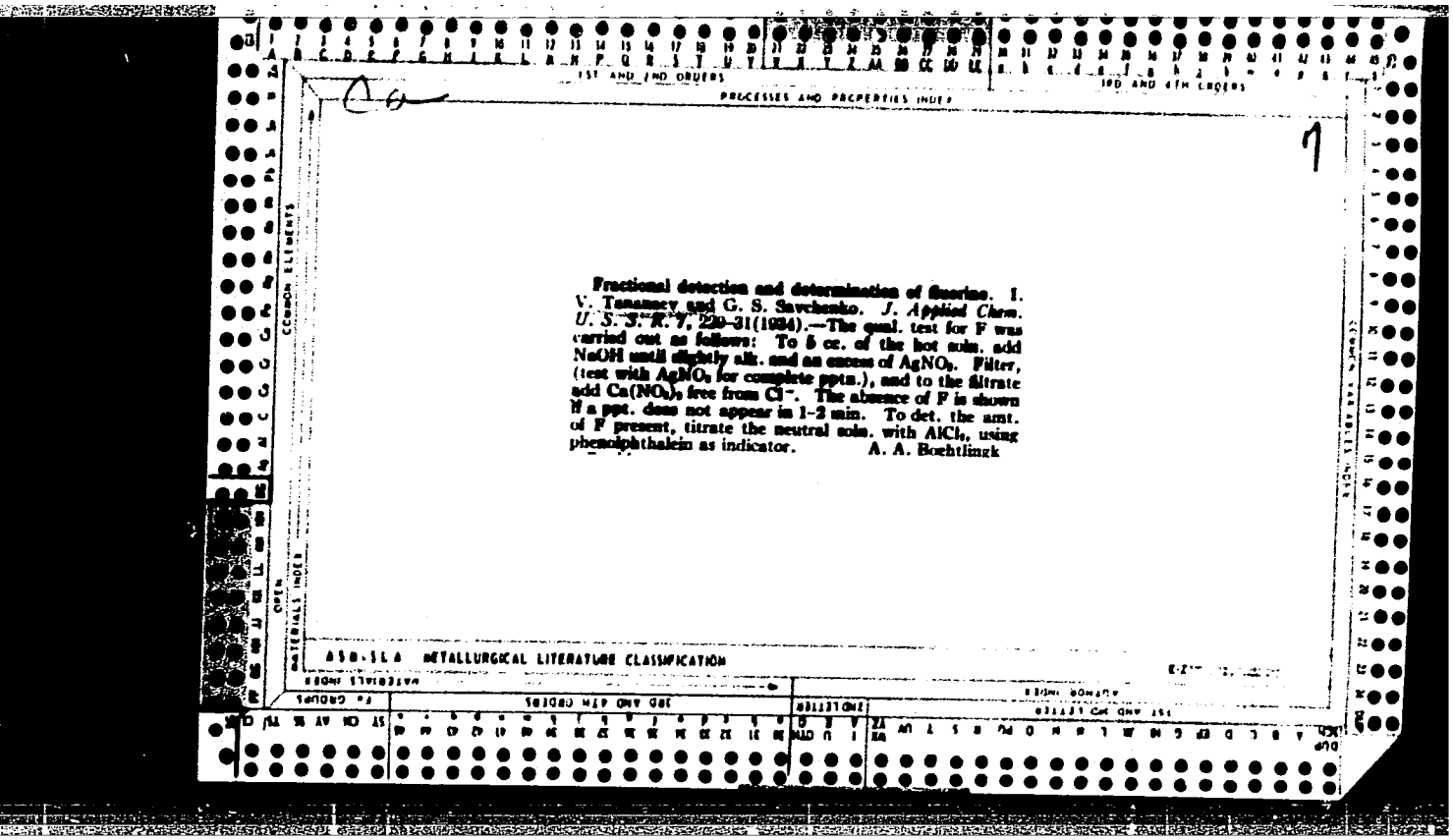

Fractional detection and determination of fluorine. I. V. Tananaev and G. S. Savchenko. *J. Applied Chem. U. S. S. R.* 7, 229–31(1934).—The qual. test for F was carried out as follows: To 5 cc. of the hot soln. add NaOH until slightly alk. and an excess of $AgNO_3$. Filter, (test with $AgNO_3$ for complete pptn.), and to the filtrate add $Ca(NO_3)_2$ free from Cl^-. The absence of F is shown if a ppt. does not appear in 1–2 min. To det. the amt. of F present, titrate the neutral soln. with $AlCl_3$, using phenolphthalein as indicator. A. A. Boehtlingk

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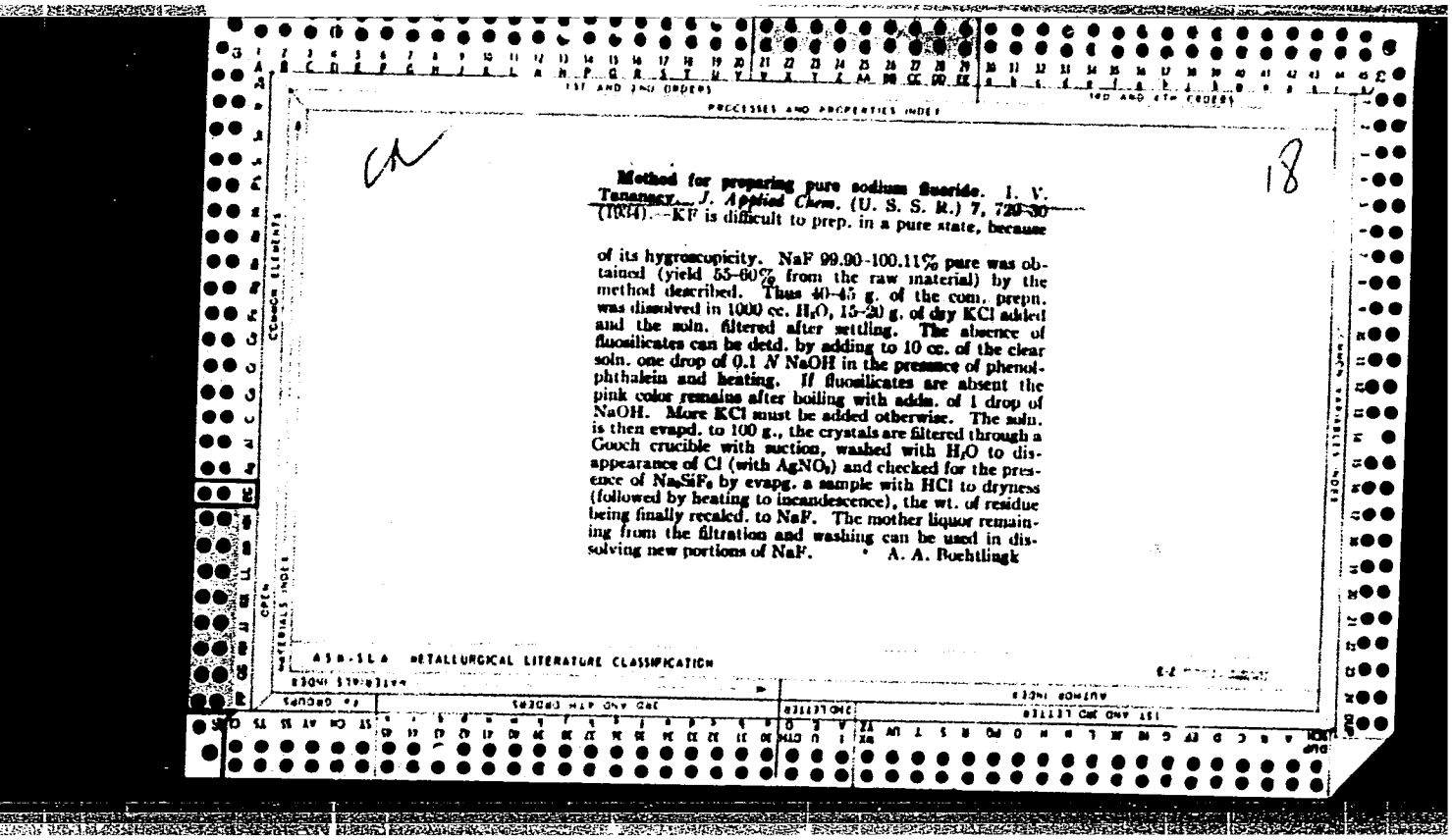

PROCESSES AND PROPERTIES INDEX

18

Method for preparing pure sodium fluoride. I. V. Tananaev. *J. Applied Chem.* (U. S. S. R.) 7, 726-30 (1934).—KF is difficult to prep. in a pure state, because of its hygroscopicity. NaF 99.90-100.11% pure was obtained (yield 55-60% from the raw material) by the method described. Thus 40-45 g. of the com. prepn. was dissolved in 1000 cc. H_2O, 15-20 g. of dry KCl added and the soln. filtered after settling. The absence of fluosilicates can be detd. by adding to 10 cc. of the clear soln. one drop of 0.1 *N* NaOH in the presence of phenolphthalein and heating. If fluosilicates are absent the pink color remains after boiling with addn. of 1 drop of NaOH. More KCl must be added otherwise. The soln. is then evapd. to 100 g., the crystals are filtered through a Gooch crucible with suction, washed with H_2O to disappearance of Cl (with $AgNO_3$) and checked for the presence of Na_2SiF_6 by evapg. a sample with HCl to dryness (followed by heating to incandescence), the wt. of residue being finally recalcd. to NaF. The mother liquor remaining from the filtration and washing can be used in dissolving new portions of NaF. A. A. Boehtlingk

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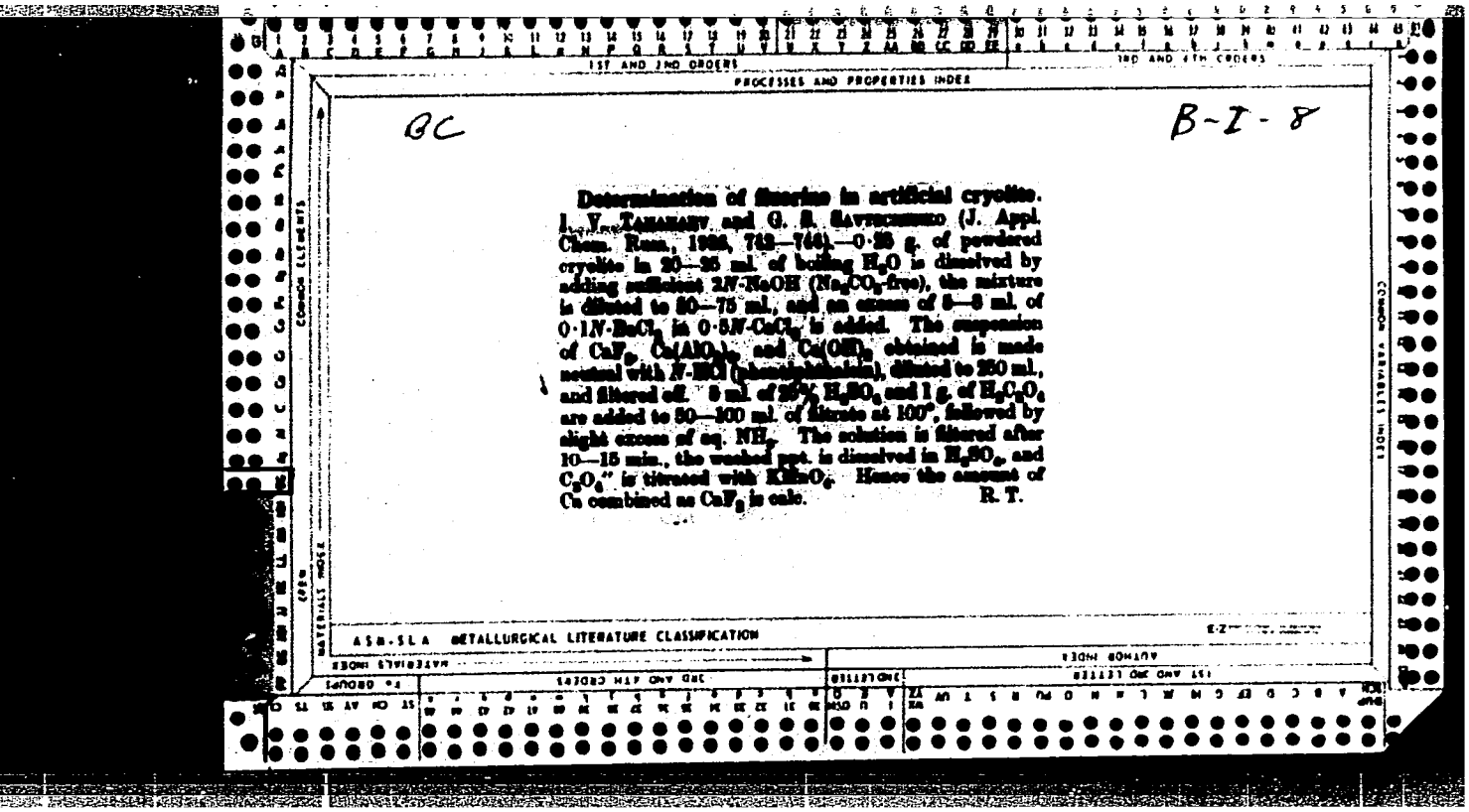

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

QC

B-I-8

Determination of fluorine in artificial cryolite. I. V. Tarasiev and G. S. Gavrusenko (J. Appl. Chem. Russ., 1956, 742—744).—0·25 g. of powdered cryolite in 20—25 ml. of boiling H_2O is dissolved by adding sufficient 2*N*-NaOH (Na_2CO_3-free), the mixture is diluted to 50—75 ml., and an excess of 5—8 ml. of 0·1*N*-$BaCl_2$ in 0·5*N*-$CaCl_2$ is added. The suspension of CaF_2, $Ca(AlO_2)_2$, and $Ca(OH)_2$ obtained is made neutral with *N*-HCl (phenolphthalein), diluted to 250 ml., and filtered off. 5 ml. of 25% H_2SO_4 and 1 g. of $H_2C_2O_4$ are added to 50—100 ml. of filtrate at 100°, followed by slight excess of aq. NH_3. The solution is filtered after 10—15 min., the washed ppt. is dissolved in H_2SO_4, and C_2O_4'' is titrated with $KMnO_4$. Hence the amount of Ca combined as CaF_2 is calc. R. T.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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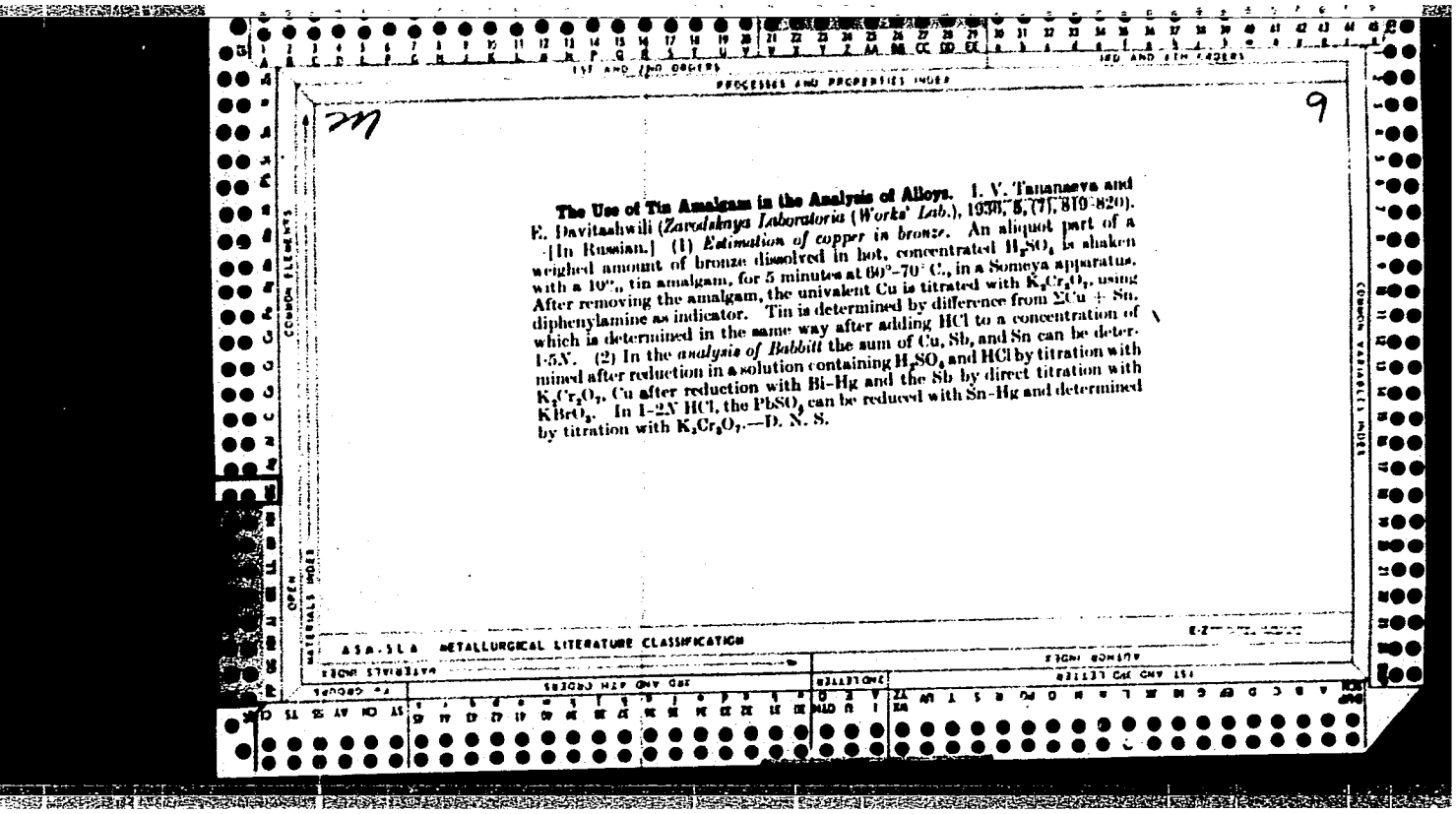

The Use of Tin Amalgam in the Analysis of Alloys. I. V. Tananaeva and E. Davitashwili (*Zavodskaya Laboratoria* (*Works' Lab.*), 1930, 8, (7), 819–820). [In Russian.] (1) *Estimation of copper in bronze.* An aliquot part of a weighed amount of bronze dissolved in hot, concentrated H_2SO_4 is shaken with a 10% tin amalgam, for 5 minutes at 60°–70° C., in a Someya apparatus. After removing the amalgam, the univalent Cu is titrated with $K_2Cr_2O_7$, using diphenylamine as indicator. Tin is determined by difference from ΣCu + Sn, which is determined in the same way after adding HCl to a concentration of 1-5*N*. (2) In the *analysis of Babbitt* the sum of Cu, Sb, and Sn can be determined after reduction in a solution containing H_2SO_4 and HCl by titration with $K_2Cr_2O_7$. Cu after reduction with Bi-Hg and the Sb by direct titration with $KBrO_3$. In 1-2*N* HCl, the $PbSO_4$ can be reduced with Sn-Hg and determined by titration with $K_2Cr_2O_7$.—D. N. S.

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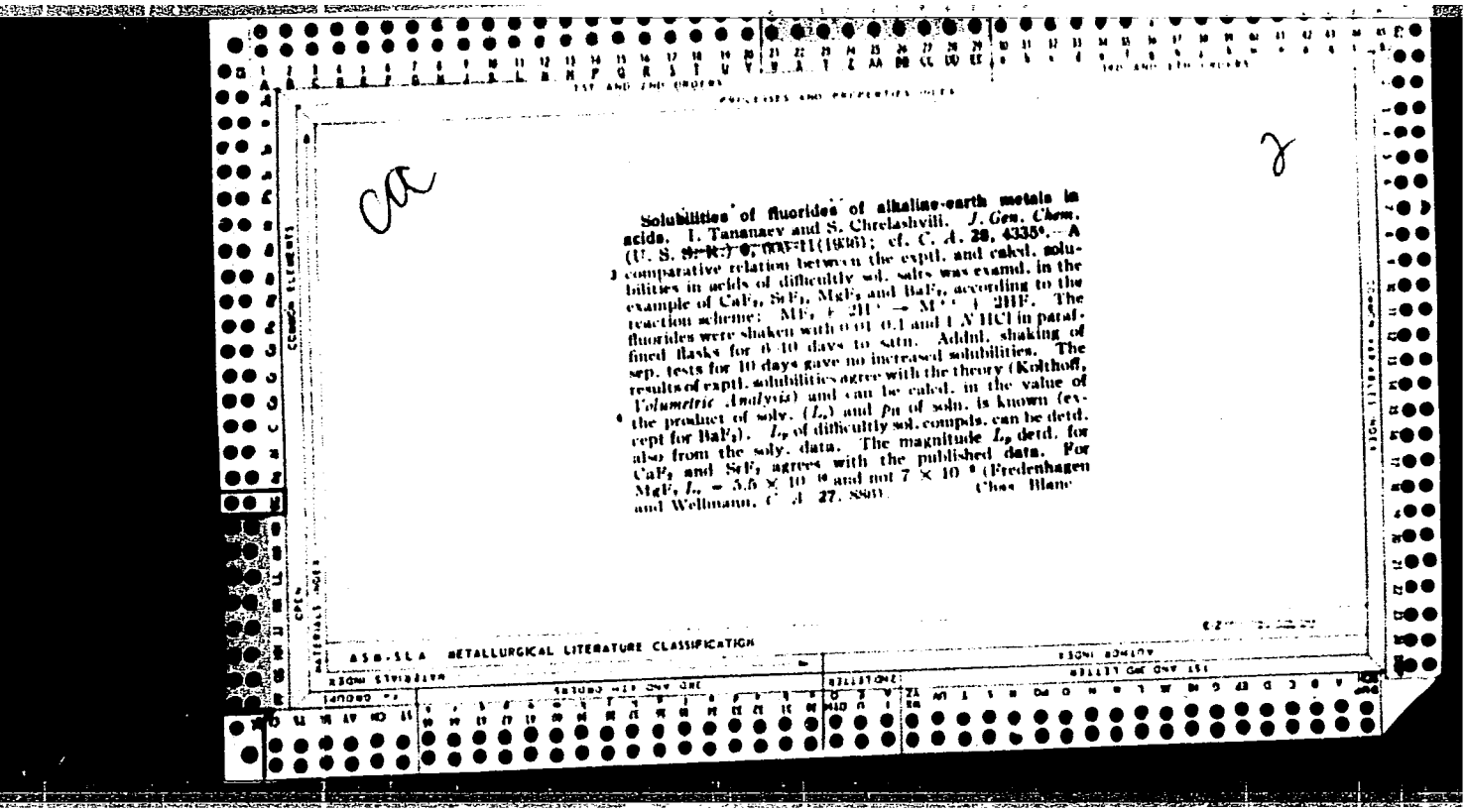

ca

2

Solubilities of fluorides of alkaline-earth metals in acids. I. Tananaev and S. Chrelashvili. *J. Gen. Chem.* (U. S. S. R.) 6, 000-11(1936); cf. C. A. 28, 4335[6].—A comparative relation between the exptl. and calcd. solubilities in acids of difficultly sol. salts was examd. in the example of CaF_2, SrF_2, MgF_2 and BaF_2, according to the reaction scheme: $MF_2 + 2H^+ \rightarrow M^{++} + 2HF$. The fluorides were shaken with 0.01-0.1 and 1 N HCl in paraffined flasks for 6-10 days to satn. Addnl. shaking of sep. tests for 10 days gave no increased solubilities. The results of exptl. solubilities agree with the theory (Kolthoff, *Volumetric Analysis*) and can be calcd. in the value of the product of soly. (L_p) and p_H of soln. is known (except for BaF_2). L_p of difficultly sol. compds. can be detd. also from the soly. data. The magnitude L_p detd. for CaF_2 and SrF_2 agrees with the published data. For MgF_2 $L_p = 5.5 \times 10^{-10}$ and not 7×10^{-9} (Fredenhagen and Wellmann, C. A. 27, 880). Chas. Blanc

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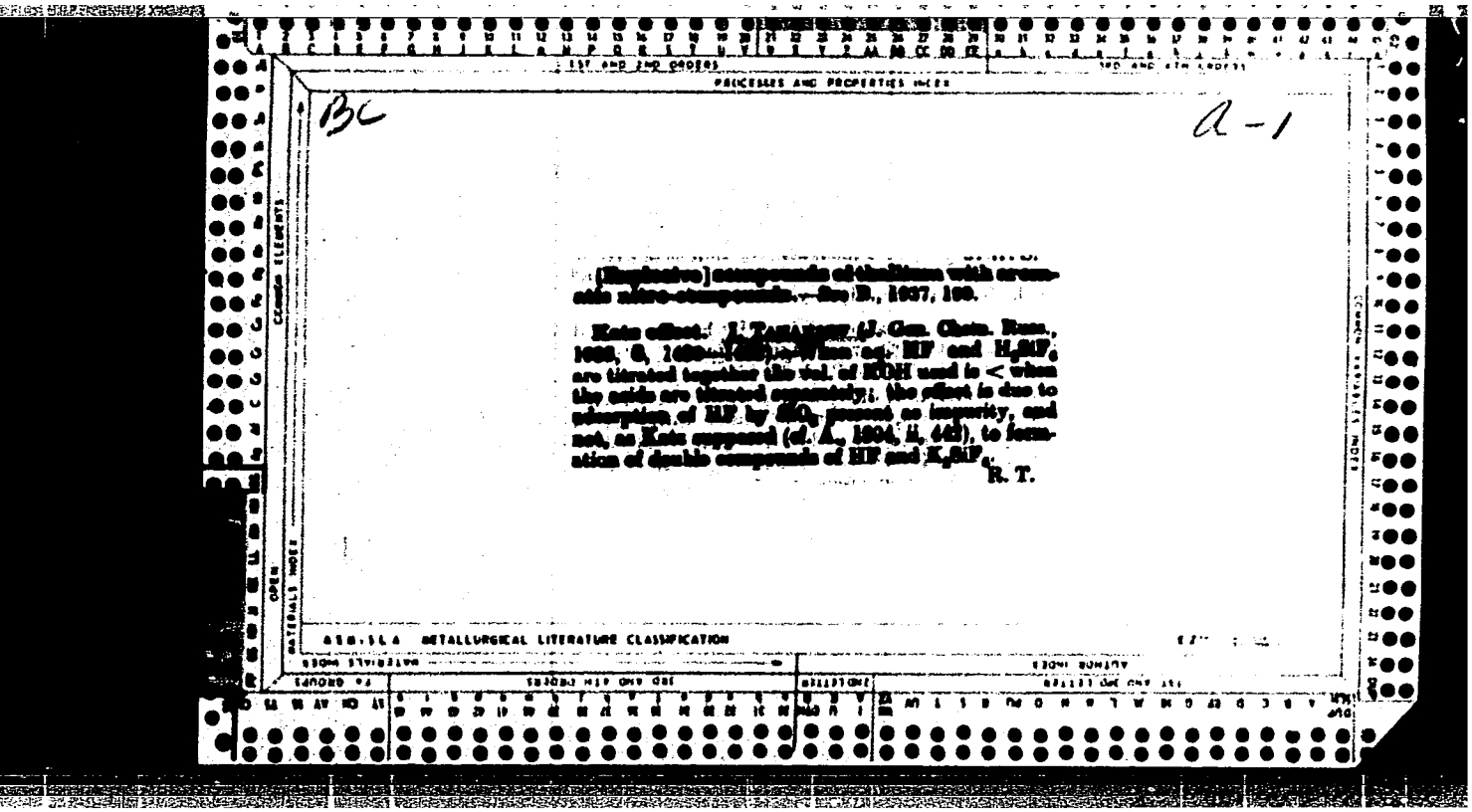

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

BC

a-1

[Explosive] compounds of thallium with aromatic nitro-compounds.—See B., 1937, 199.

Katz effect. I. Tananaev (J. Gen. Chem. Russ., 1938, 8, 1489—1492).—When aq. HF and H_2SiF_6 are titrated together the vol. of KOH used is < when the acids are titrated separately; the effect is due to adsorption of HF by SiO_2 present as impurity, and not, as Katz supposed (cf. A., 1904, ii, 442), to formation of double compounds of HF and K_2SiF_6.

R. T.

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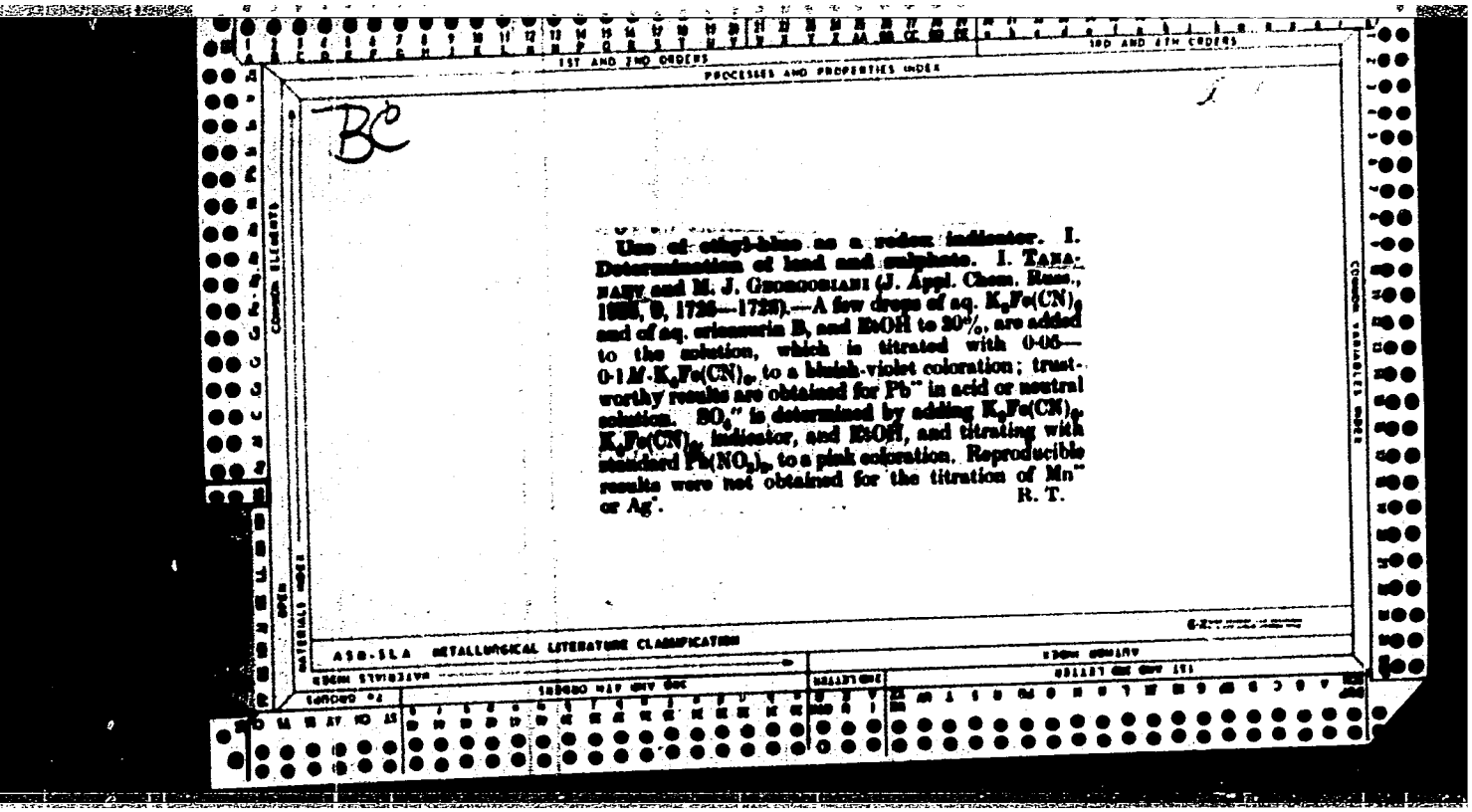

BC

Use of ethyl-blue as a redox indicator. I. Determination of lead and sulphate. I. TANANAEV and M. J. GRINBERGIANI (J. Appl. Chem. Russ., 1936, 9, 1726—1732).—A few drops of aq. $K_3Fe(CN)_6$ and of aq. eriosmarin B, and EtOH to 30%, are added to the solution, which is titrated with 0·05—0·1 M-$K_3Fe(CN)_6$ to a bluish-violet coloration; trustworthy results are obtained for $Pb^{"}$ in acid or neutral solution. SO_4'' is determined by adding $K_3Fe(CN)_6$, $K_4Fe(CN)_6$, indicator, and EtOH, and titrating with standard $Pb(NO_3)_2$ to a pink coloration. Reproducible results were not obtained for the titration of $Mn^{"}$ or $Ag^{'}$.

R. T.

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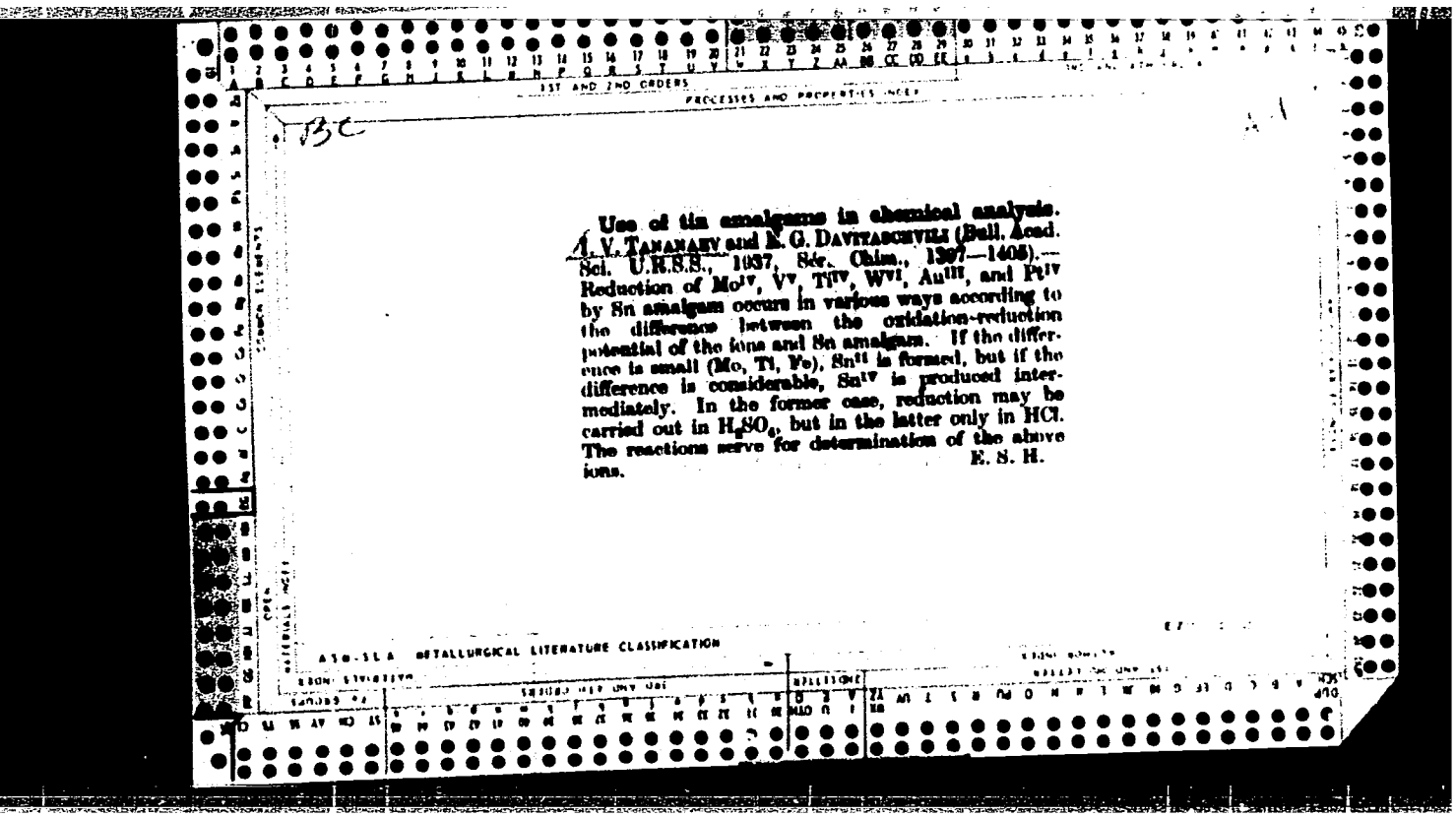

Use of tin amalgams in chemical analysis. A. V. Tananaev and N. G. Davtiashvili (Bull. Acad. Sci. U.R.S.S., 1937, Sér. Chim., 1397—1408).—Reduction of Mo^{IV}, V^{V}, Ti^{IV}, W^{VI}, Au^{III}, and Pt^{IV} by Sn amalgam occurs in various ways according to the difference between the oxidation-reduction potential of the ions and Sn amalgam. If the difference is small (Mo, Ti, Fe), Sn^{II} is formed, but if the difference is considerable, Sn^{IV} is produced intermediately. In the former case, reduction may be carried out in H_2SO_4, but in the latter only in HCl. The reactions serve for determination of the above ions.

E. S. H.

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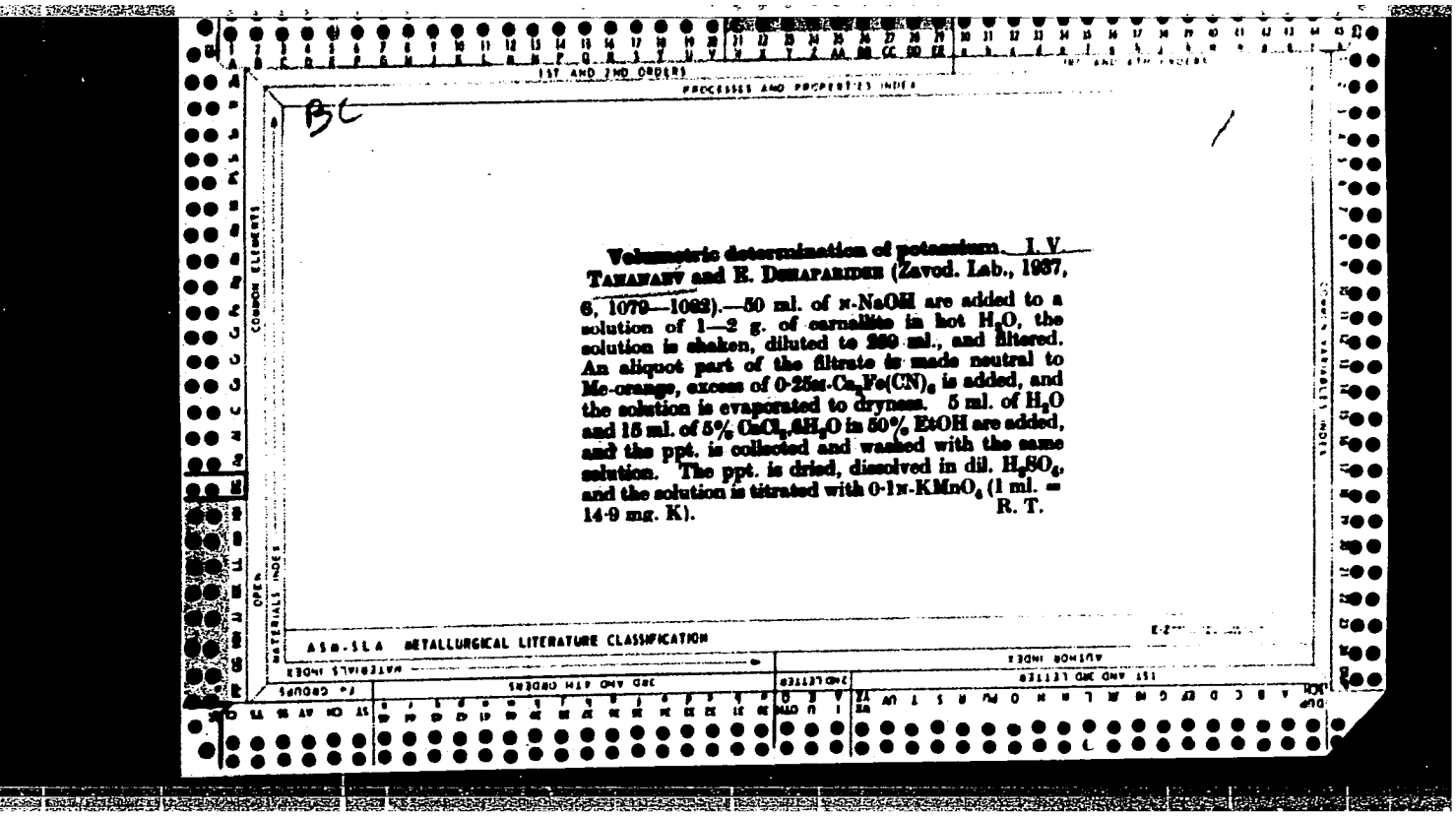

Volumetric determination of potassium. I. V. TANANAEV and E. DEMAPARIDZE (Zavod. Lab., 1937, 6, 1079—1082).—50 ml. of N-NaOH are added to a solution of 1—2 g. of carnallite in hot H_2O, the solution is shaken, diluted to 250 ml., and filtered. An aliquot part of the filtrate is made neutral to Me-orange, excess of 0·25M-$Ca_2Fe(CN)_6$ is added, and the solution is evaporated to dryness. 5 ml. of H_2O and 15 ml. of 5% $CaCl_2.6H_2O$ in 50% EtOH are added, and the ppt. is collected and washed with the same solution. The ppt. is dried, dissolved in dil. H_2SO_4, and the solution is titrated with 0·1N-$KMnO_4$ (1 ml. = 14·9 mg. K). R. T.

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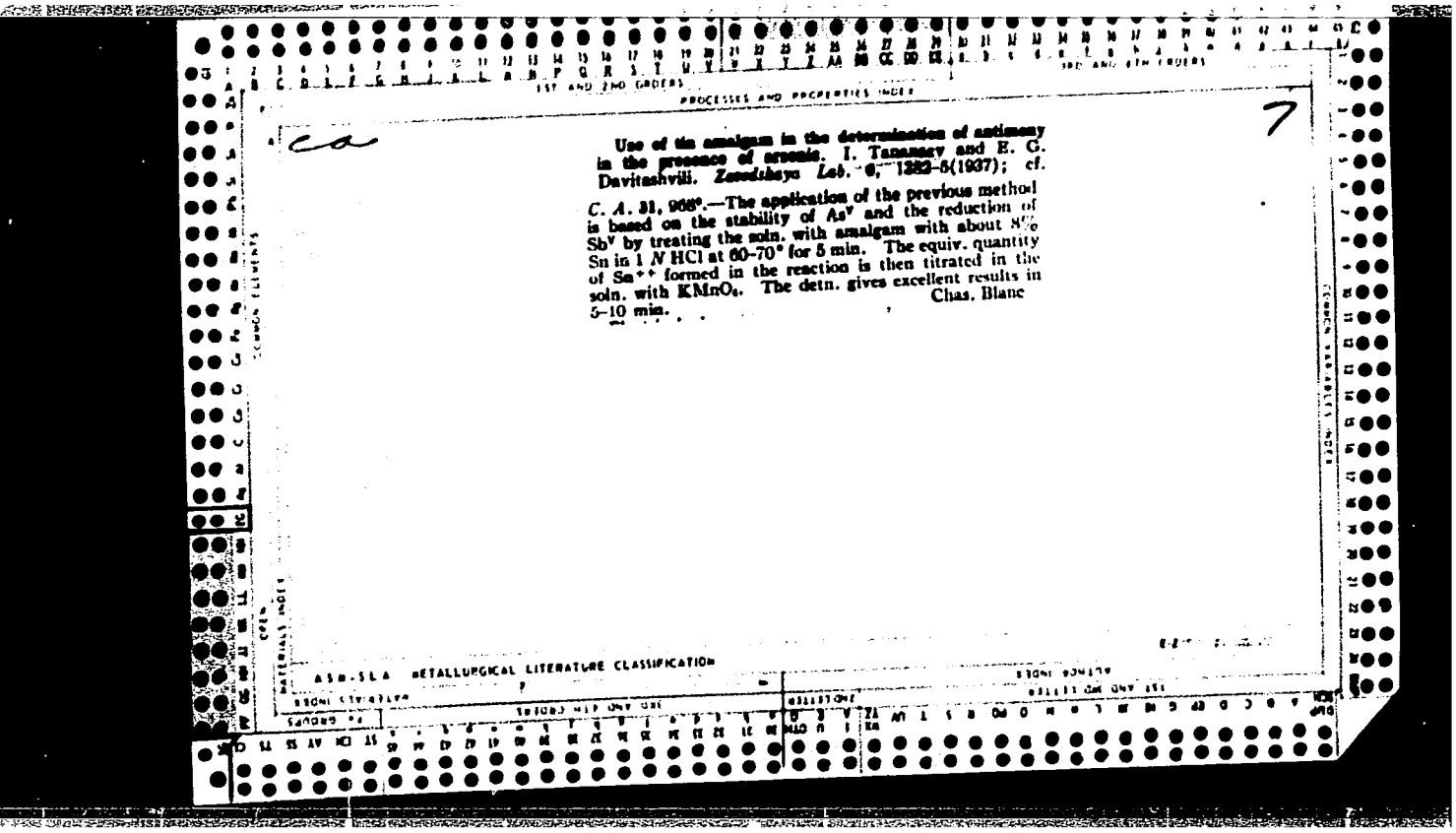

PROCESSES AND PROPERTIES INDEX

7

Use of tin amalgam in the determination of antimony in the presence of arsenic. I. Tananaev and E. G. Davitashvili. *Zavodskaya Lab.* 6, 1282–6(1937); cf. *C. A.* 31, 968°.—The application of the previous method is based on the stability of As^{V} and the reduction of Sb^{V} by treating the soln. with amalgam with about 8% Sn in 1 *N* HCl at 60–70° for 5 min. The equiv. quantity of Sn^{++} formed in the reaction is then titrated in the soln. with $KMnO_4$. The detn. gives excellent results in 5–10 min.

Chas. Blanc

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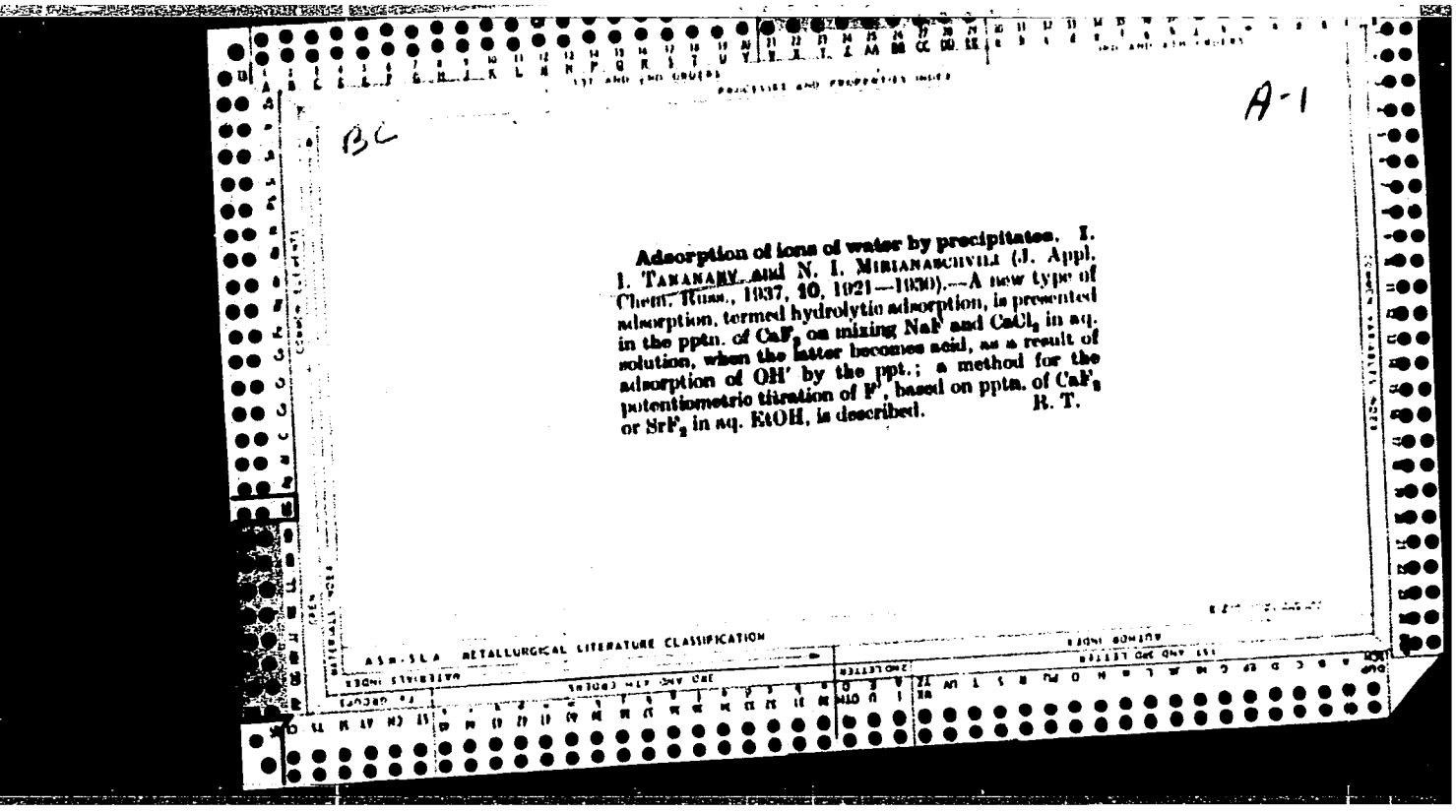

BC

A-1

Adsorption of ions of water by precipitates. I. I. TANANAEV and N. I. MIRIANASCHVILI (J. Appl. Chem. Russ., 1937, **10**, 1921—1930).—A new type of adsorption, termed hydrolytic adsorption, is presented in the pptn. of CaF_2 on mixing NaF and $CaCl_2$ in aq. solution, when the latter becomes acid, as a result of adsorption of OH' by the ppt.; a method for the potentiometric titration of F', based on pptn. of CaF_2 or SrF_2 in aq. EtOH, is described. R. T.

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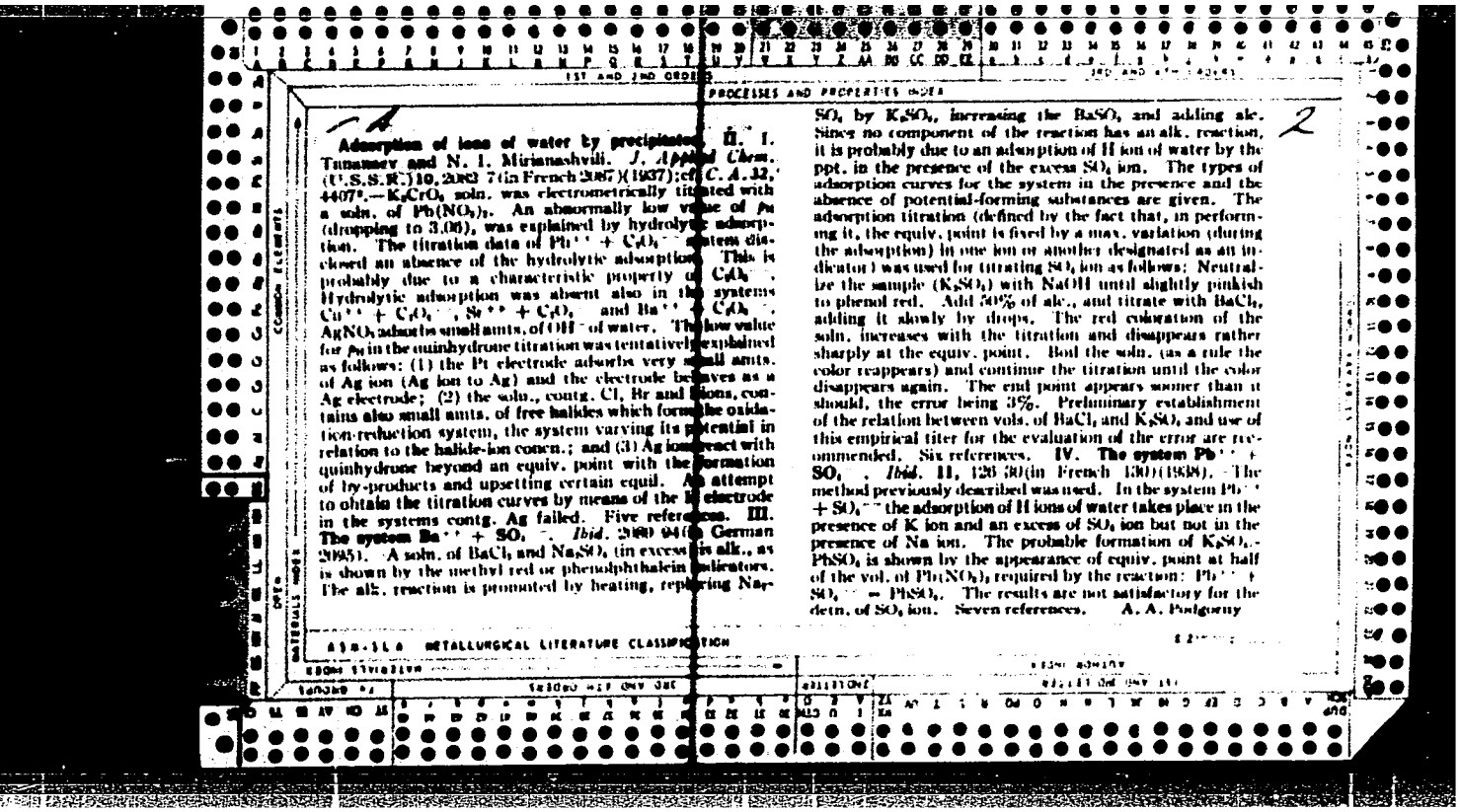

PROCESSES AND PROPERTIES INDEX

Adsorption of ions of water by precipitates. II. I. Tumanov and N. I. Mirianashvili. *J. Applied Chem.* (U.S.S.R.) 10, 2082-7 (in French 2087) (1937); cf. *C. A.* 32, 4407⁹.—K_2CrO_4 soln. was electrometrically titrated with a soln. of $Pb(NO_3)_2$. An abnormally low value of p_H (dropping to 3.00), was explained by hydrolytic adsorption. The titration data of $Pb^{++} + C_2O_4^{--}$ system disclosed an absence of the hydrolytic adsorption. This is probably due to a characteristic property of $C_2O_4^{--}$. Hydrolytic adsorption was absent also in the systems $Cu^{++} + C_2O_4^{--}$, $Sr^{++} + C_2O_4^{--}$, and $Ba^{++} + C_2O_4^{--}$. $AgNO_3$ adsorbs small amts. of OH^- of water. The low value for p_H in the quinhydrone titration was tentatively explained as follows: (1) the Pt electrode adsorbs very small amts. of Ag ion (Ag ion to Ag) and the electrode behaves as a Ag electrode; (2) the soln., contg. Cl, Br and I ions, contains also small amts. of free halides which form the oxidation-reduction system, the system varying its potential in relation to the halide-ion concn.; and (3) Ag ion reacts with quinhydrone beyond an equiv. point with the formation of by-products and upsetting certain equil. An attempt to obtain the titration curves by means of the H electrode in the systems contg. Ag failed. Five references. **III. The system $Ba^{++} + SO_4^{--}$.** *Ibid.* 2080-94 (in German 2095). A soln. of $BaCl_2$ and Na_2SO_4 (in excess) is alk., as is shown by the methyl red or phenolphthalein indicators. The alk. reaction is promoted by heating, replacing Na_2SO_4 by K_2SO_4, increasing the $BaSO_4$ and adding alc. Since no component of the reaction has an alk. reaction, it is probably due to an adsorption of H ion of water by the ppt. in the presence of the excess SO_4 ion. The types of adsorption curves for the system in the presence and the absence of potential-forming substances are given. The adsorption titration (defined by the fact that, in performing it, the equiv. point is fixed by a max. variation (during the adsorption) in one ion or another designated as an indicator) was used for titrating SO_4 ion as follows: Neutralize the sample (K_2SO_4) with NaOH until slightly pinkish to phenol red. Add 50% of alc., and titrate with $BaCl_2$, adding it slowly by drops. The red coloration of the soln. increases with the titration and disappears rather sharply at the equiv. point. Boil the soln. (as a rule the color reappears) and continue the titration until the color disappears again. The end point appears sooner than it should, the error being 3%. Preliminary establishment of the relation between vols. of $BaCl_2$ and K_2SO_4 and use of this empirical titer for the evaluation of the error are recommended. Six references. **IV. The system $Pb^{++} + SO_4^{--}$.** *Ibid.* II, 1205-30 (in French 1230) (1938). The method previously described was used. In the system $Pb^{++} + SO_4^{--}$ the adsorption of H ions of water takes place in the presence of K ion and an excess of SO_4 ion but not in the presence of Na ion. The probable formation of K_2SO_4-$PbSO_4$ is shown by the appearance of equiv. point at half of the vol. of $Pb(NO_3)_2$ required by the reaction: $Pb^{++} + SO_4^{--} = PbSO_4$. The results are not satisfactory for the detn. of SO_4 ion. Seven references. A. A. Podgorny

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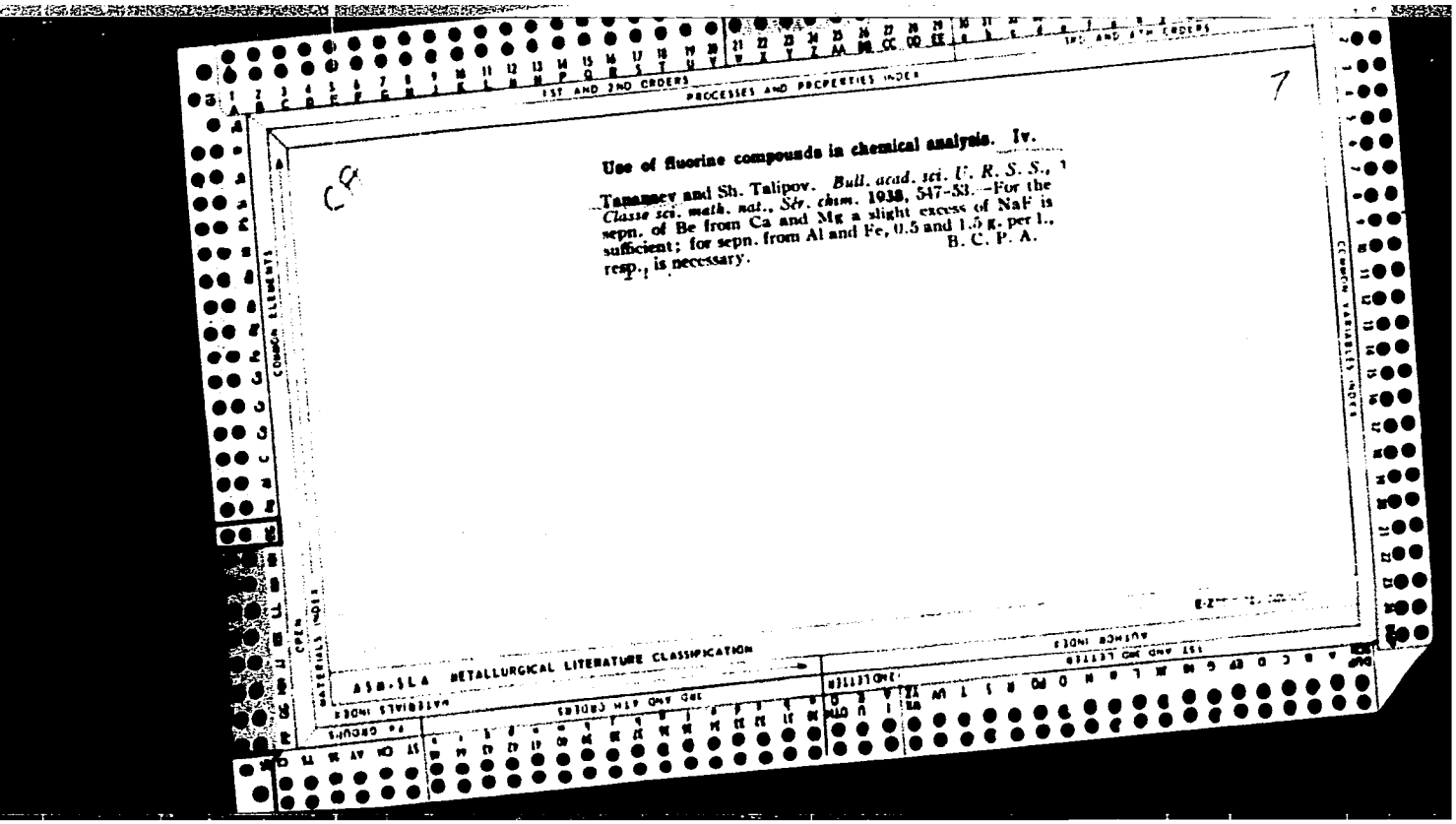

Use of fluorine compounds in chemical analysis. Iv.

Tananaev and Sh. Talipov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* 1938, 547-53.—For the sepn. of Be from Ca and Mg a slight excess of NaF is sufficient; for sepn. from Al and Fe, 0.5 and 1.5 g. per l., resp., is necessary.

B. C. P. A.

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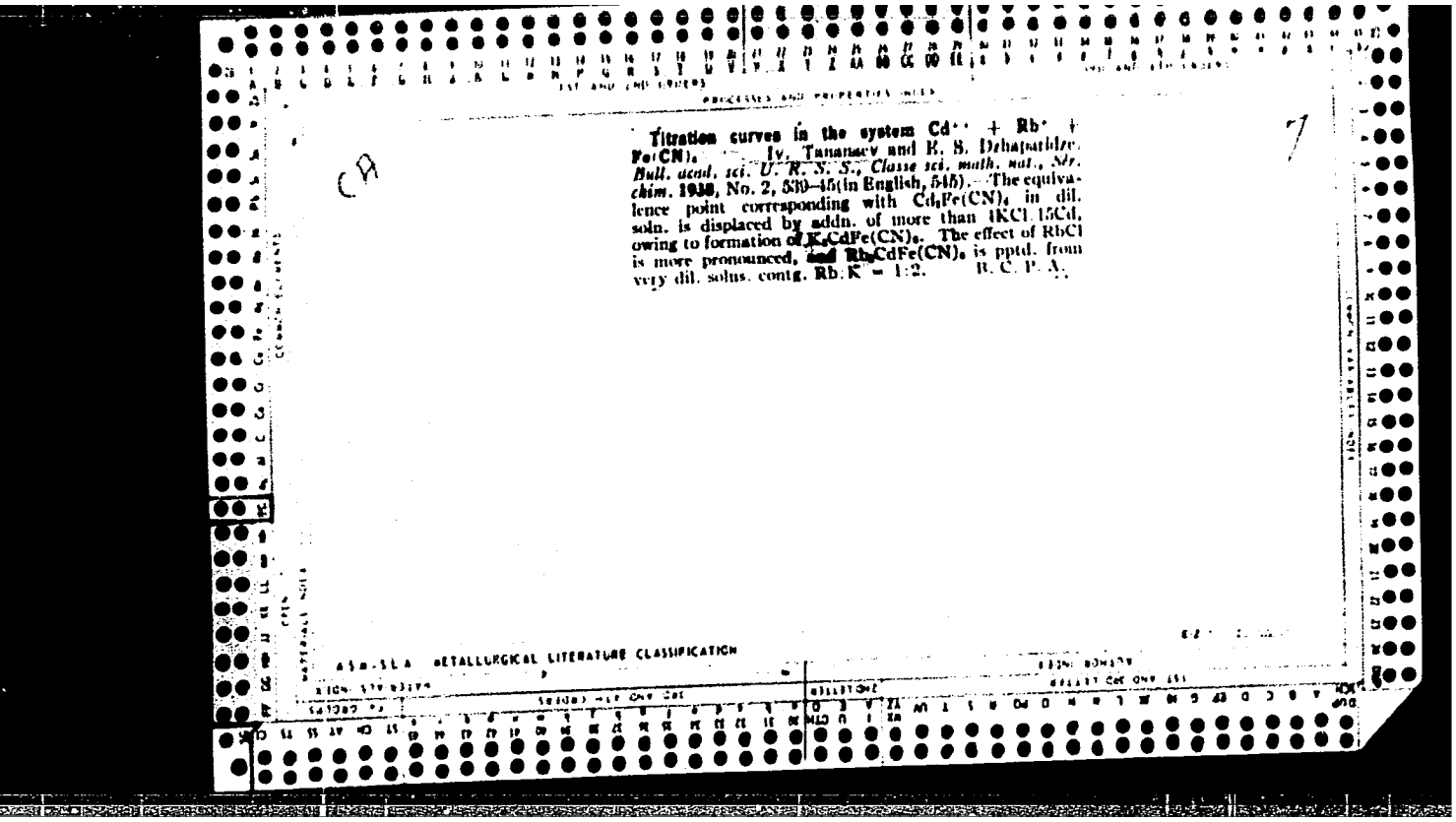

Titration curves in the system $Cd^{++} + Rb^{+} + Fe(CN)_6$. Iv. Tananaev and K. S. Dzhaparidze. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.* **1938**, No. 2, 539–45 (in English, 545). The equivalence point corresponding with $Cd_3Fe(CN)_6$ in dil. soln. is displaced by addn. of more than 1KCl.15Cd, owing to formation of $K_2CdFe(CN)_6$. The effect of RbCl is more pronounced, and $Rb_2CdFe(CN)_6$ is pptd. from very dil. solns. contg. Rb:K = 1:2. R. C. P. A.

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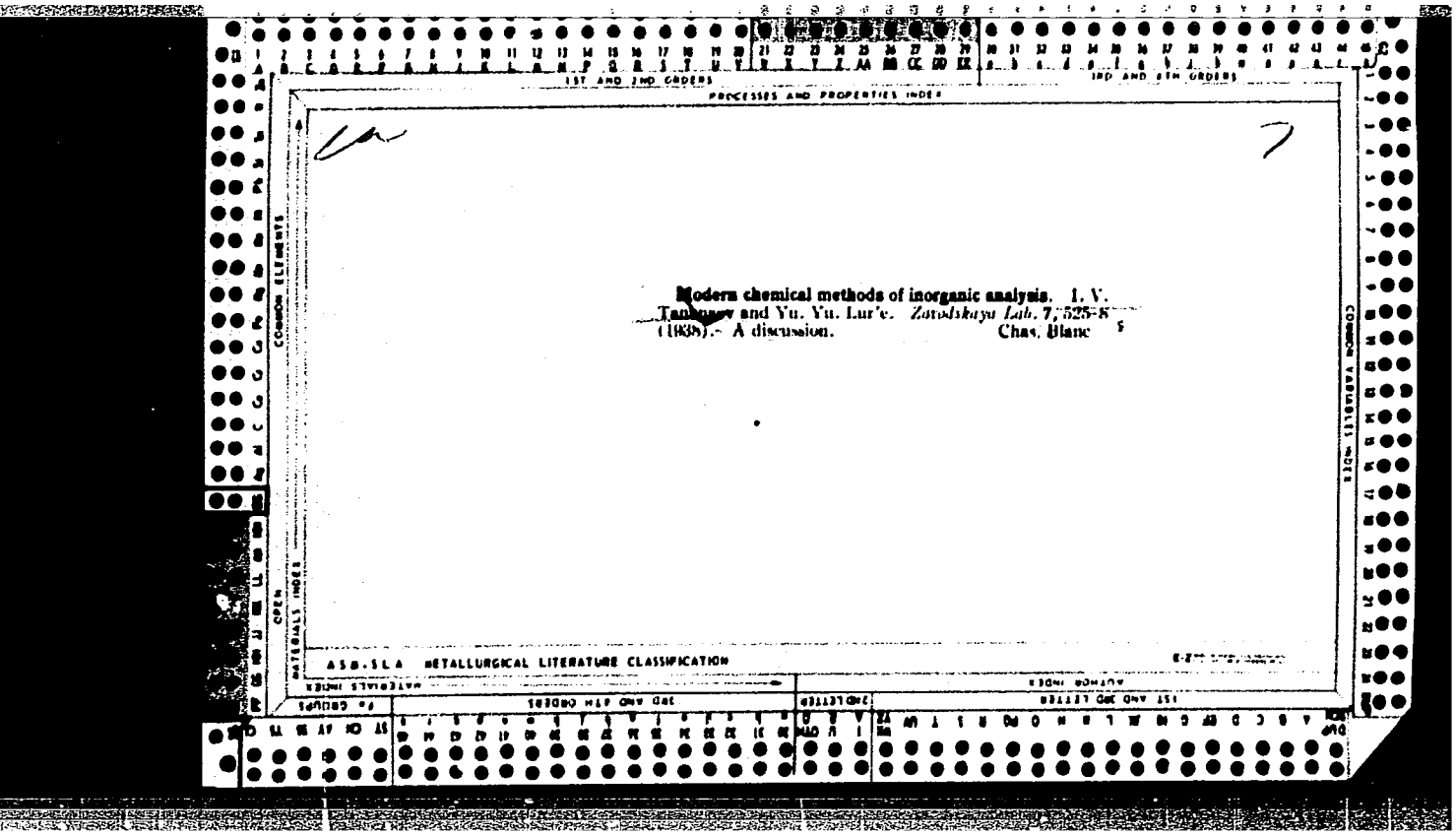

Modern chemical methods of inorganic analysis. I. V. Tanganov and Yu. Yu. Lur'e. *Zavodskaya Lab.* 7, 525-8 (1938).— A discussion. Chas. Blanc

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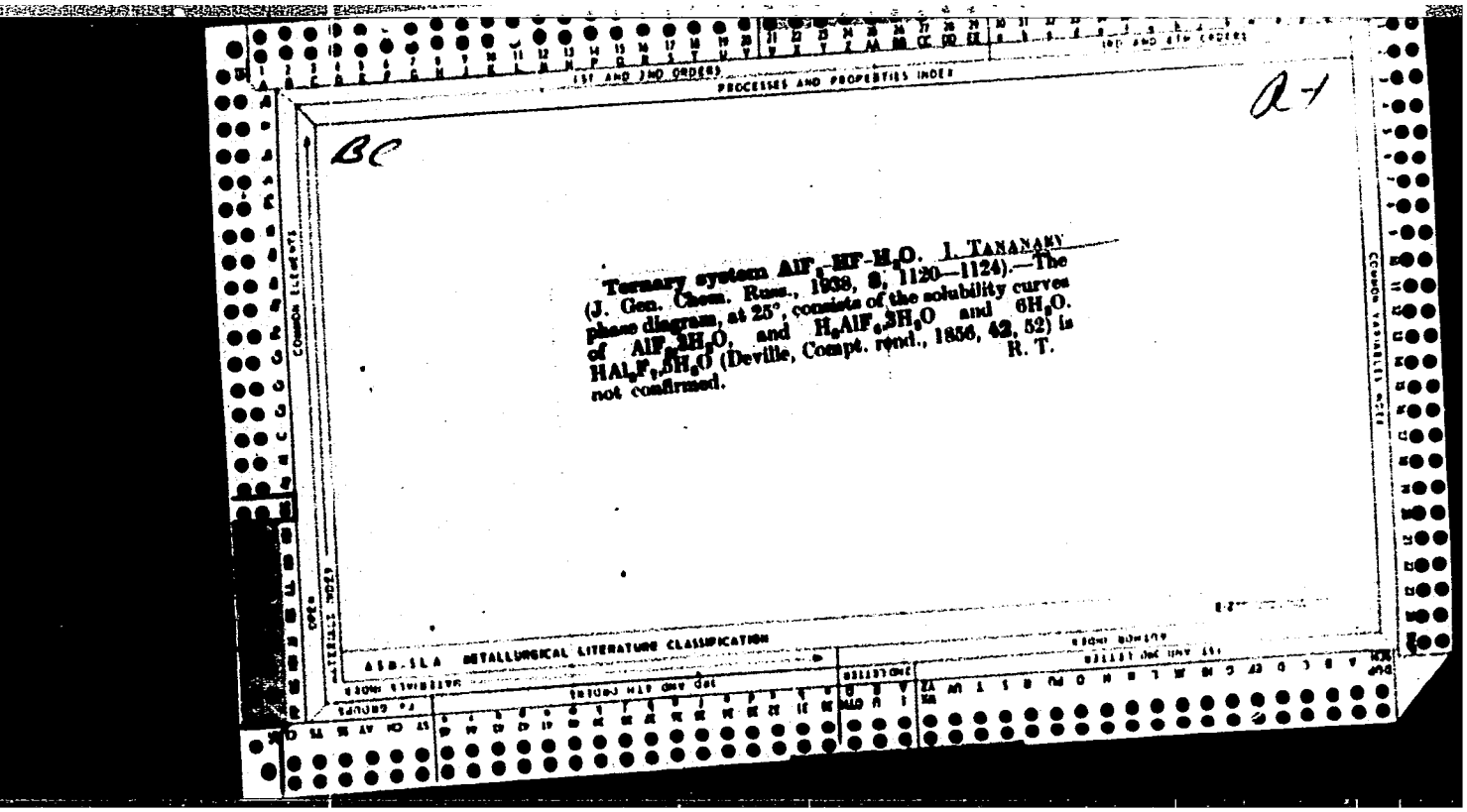

BC

A-1

Ternary system AlF_3-HF-H_2O. I. Tananaev (J. Gen. Chem. Russ., 1939, 9, 1120—1124).—The phase diagram, at 25°, consists of the solubility curves of $AlF_3.3H_2O$, and $H_3AlF_6.3H_2O$ and $6H_2O$. $HAlF_4.3H_2O$ (Deville, Compt. rend., 1856, 42, 52) is not confirmed. R. T.

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

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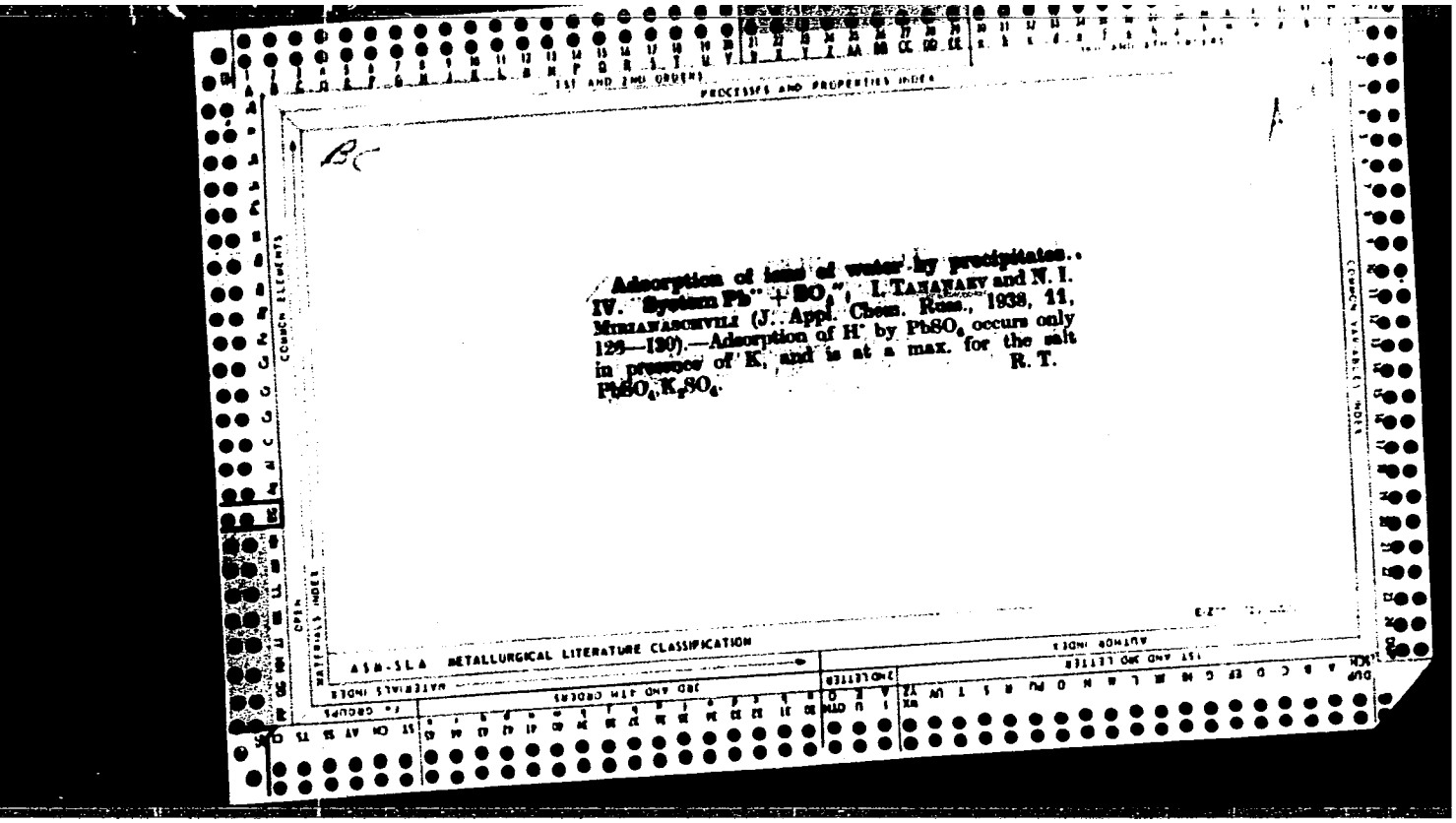

Adsorption of ions at surface of water by precipitates. IV. System $Pb^{++} + SO_4^{--}$. I. TANANAEV and N. I. MIKHAILOVSKII (J. Appl. Chem. Russ., 1938, 11, 129—130).—Adsorption of H^+ by $PbSO_4$ occurs only in presence of K^+, and is at a max. for the salt $PbSO_4.K_2SO_4$. R. T.

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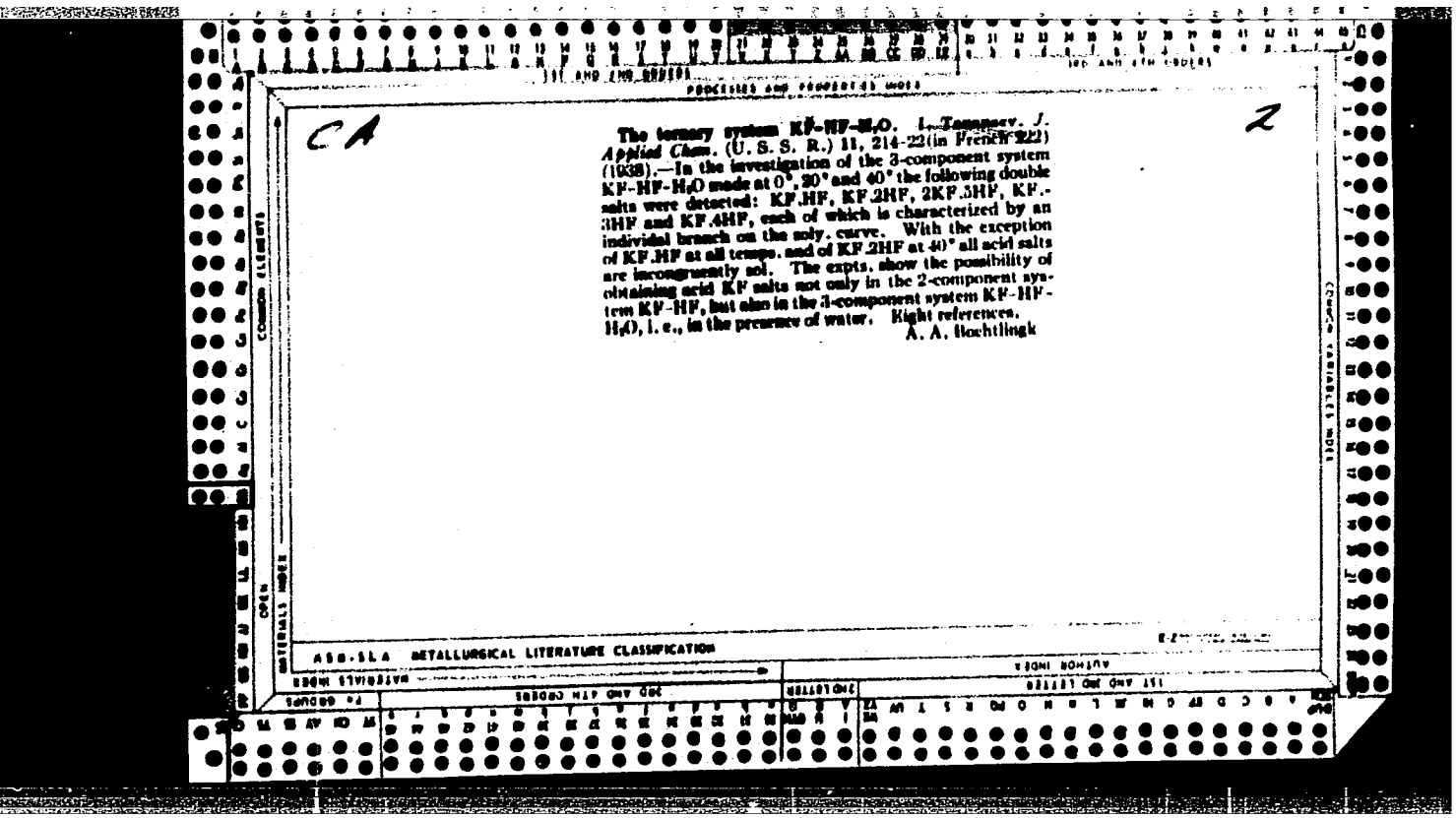

CA 2

The ternary system KF-HF-H_2O. I. Tananaev, J. *Applied Chem.* (U. S. S. R.) 11, 214-22(in French 222) (1938).—In the investigation of the 3-component system KF-HF-H_2O made at 0°, 20° and 40° the following double salts were detected: KF.HF, KF.2HF, 2KF.3HF, KF.3HF and KF.4HF, each of which is characterized by an individual branch on the soly. curve. With the exception of KF.HF at all temps. and of KF.2HF at 40° all acid salts are incongruently sol. The expts. show the possibility of obtaining acid KF salts not only in the 2-component system KF-HF, but also in the 3-component system KF-HF-H_2O), i. e., in the presence of water. Eight references.
A. A. Hochtlingk

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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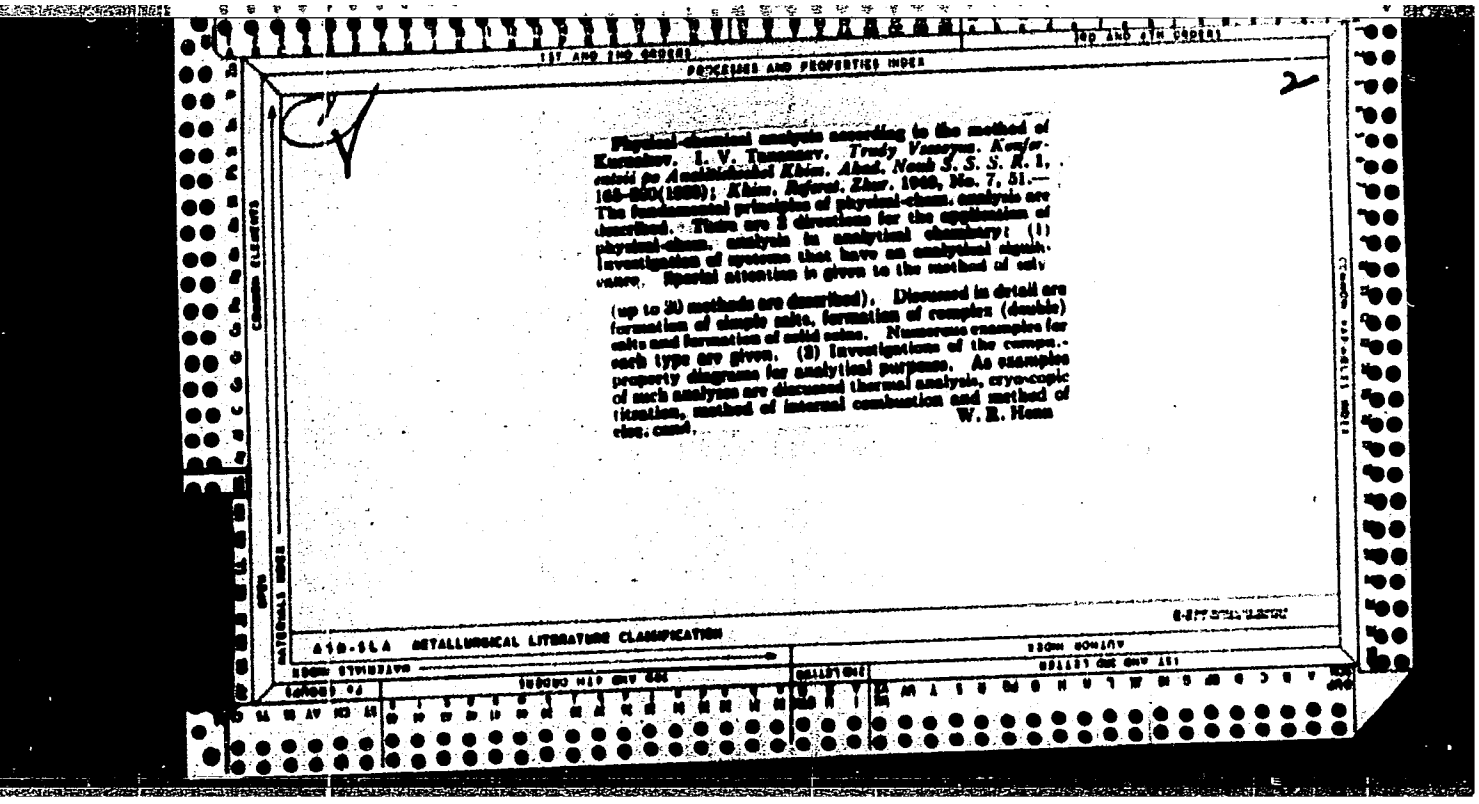
1ST AND 2ND ORDERS



PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

2

Physical-chemical analysis according to the method of Kurnakov. I. V. Tananaev. *Trudy Vsesoyuz. Konferentsii po Analiticheskoi Khim. Akad. Nauk S. S. S. R.* 1, 165-[illegible](1958); *Khim. Referat. Zhur.* 1960, No. 7, 51.—The fundamental principles of physical-chem. analysis are described. There are 2 directions for the application of physical-chem. analysis in analytical chemistry: (1) Investigation of systems that have an analytical significance. Special attention is given to the method of solv (up to 30 methods are described). Discussed in detail are formation of simple salts, formation of complex (double) salts and formation of solid solns. Numerous examples for each type are given. (2) Investigations of the compn.-property diagrams for analytical purposes. As examples of such analyses are discussed thermal analysis, cryoscopic titration, method of internal combustion and method of elec. cond.

W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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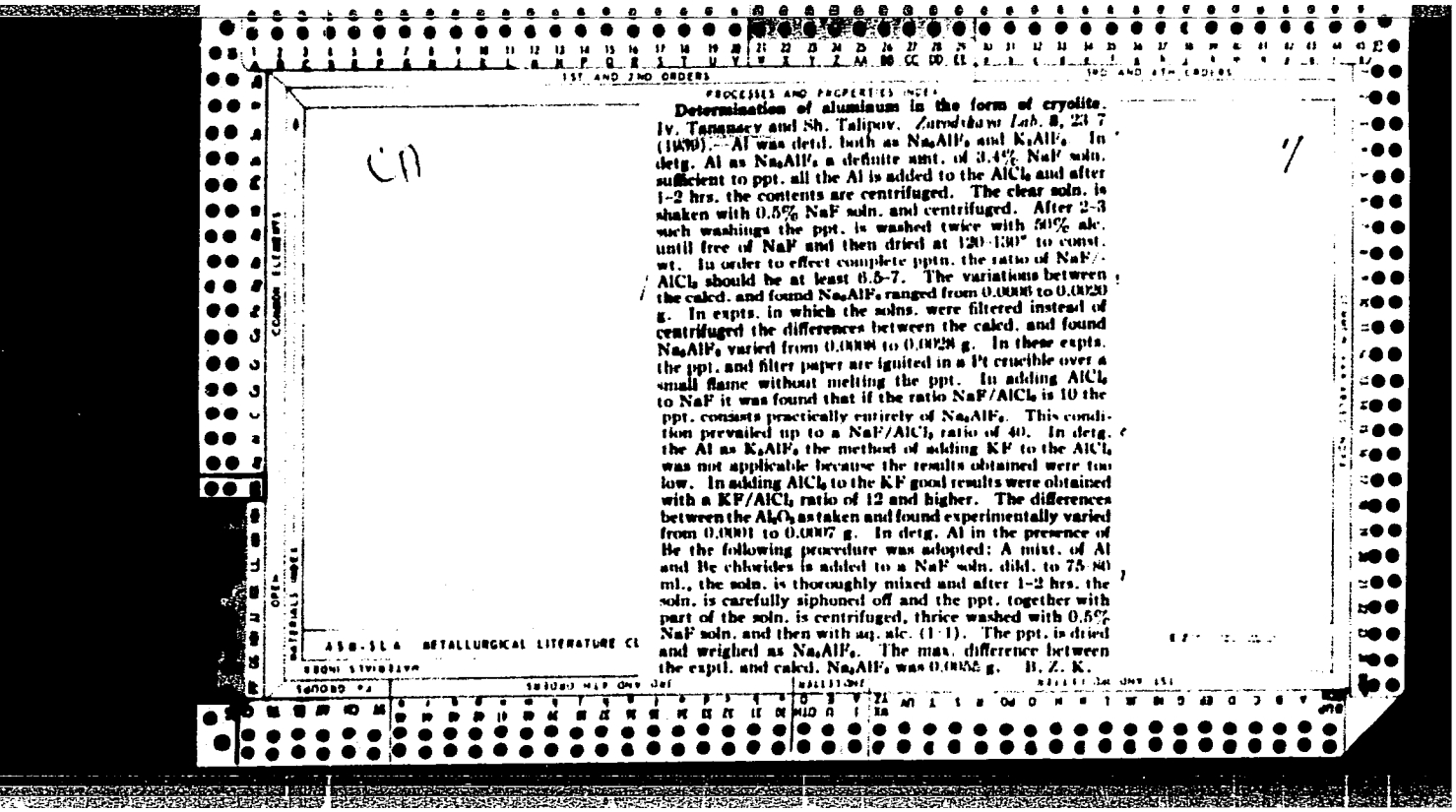

PROCESSES AND PROPERTIES INDEX

Determination of aluminum in the form of cryolite. Iv. Tananaev and Sh. Talipov. *Zavodskaya Lab.* 8, 237 (1939).—Al was detd. both as Na_3AlF_6 and K_3AlF_6. In detg. Al as Na_3AlF_6 a definite amt. of 3.4% NaF soln. sufficient to ppt. all the Al is added to the $AlCl_3$ and after 1–2 hrs. the contents are centrifuged. The clear soln. is shaken with 0.5% NaF soln. and centrifuged. After 2–3 such washings the ppt. is washed twice with 50% alc. until free of NaF and then dried at 120–130° to const. wt. In order to effect complete pptn. the ratio of NaF/$AlCl_3$ should be at least 6.5–7. The variations between the calcd. and found Na_3AlF_6 ranged from 0.0006 to 0.0020 g. In expts. in which the solns. were filtered instead of centrifuged the differences between the calcd. and found Na_3AlF_6 varied from 0.0008 to 0.0028 g. In these expts. the ppt. and filter paper are ignited in a Pt crucible over a small flame without melting the ppt. In adding $AlCl_3$ to NaF it was found that if the ratio NaF/$AlCl_3$ is 10 the ppt. consists practically entirely of Na_3AlF_6. This condition prevailed up to a NaF/$AlCl_3$ ratio of 40. In detg. the Al as K_3AlF_6 the method of adding KF to the $AlCl_3$ was not applicable because the results obtained were too low. In adding $AlCl_3$ to the KF good results were obtained with a KF/$AlCl_3$ ratio of 12 and higher. The differences between the Al_2O_3 as taken and found experimentally varied from 0.0001 to 0.0007 g. In detg. Al in the presence of Be the following procedure was adopted: A mixt. of Al and Be chlorides is added to a NaF soln. dild. to 75–80 ml., the soln. is thoroughly mixed and after 1–2 hrs. the soln. is carefully siphoned off and the ppt. together with part of the soln. is centrifuged, thrice washed with 0.5% NaF soln. and then with aq. alc. (1:1). The ppt. is dried and weighed as Na_3AlF_6. The max. difference between the exptl. and calcd. Na_3AlF_6 was 0.0052 g. B. Z. K.

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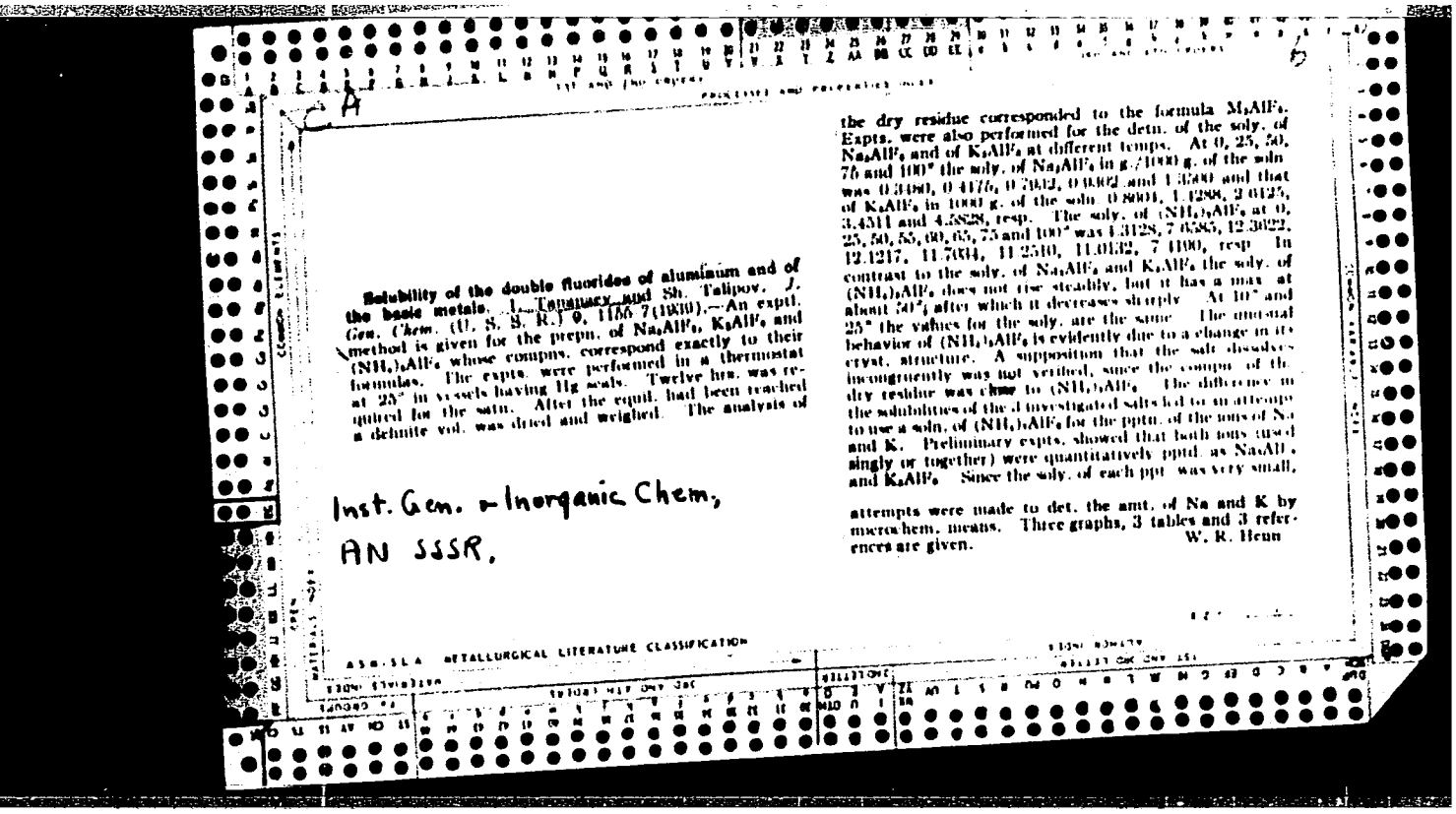

Solubility of the double fluorides of aluminum and of the basic metals. I. Tananaev and Sh. Talipov. *J. Gen. Chem.* (U. S. S. R.) 9, 1156-7 (1939).—An expt. method is given for the prepn. of Na_3AlF_6, K_3AlF_6 and $(NH_4)_3AlF_6$ whose compns. correspond exactly to their formulas. The expts. were performed in a thermostat at 25° in vessels having Hg seals. Twelve hrs. was required for the satn. After the equil. had been reached a definite vol. was dried and weighed. The analysis of the dry residue corresponded to the formula M_3AlF_6. Expts. were also performed for the detn. of the soly. of Na_3AlF_6 and of K_3AlF_6 at different temps. At 0, 25, 50, 75 and 100° the soly. of Na_3AlF_6 in g./1000 g. of the soln was 0.3480, 0.4176, 0.7052, 0.9802 and 1.3580 and that of K_3AlF_6 in 1000 g. of the soln 0.8001, 1.4288, 2.0125, 3.4511 and 4.8828, resp. The soly. of $(NH_4)_3AlF_6$ at 0, 25, 50, 55, 60, 65, 75 and 100° was 1.3128, 7.0385, 12.3022, 12.1217, 11.7034, 11.2510, 11.0132, 7.4100, resp. In contrast to the soly. of Na_3AlF_6 and K_3AlF_6 the soly. of $(NH_4)_3AlF_6$ does not rise steadily, but it has a max. at about 50°, after which it decreases sharply. At 10° and 25° the values for the soly. are the same. The unusual behavior of $(NH_4)_3AlF_6$ is evidently due to a change in its cryst. structure. A supposition that the salt dissolves incongruently was not verified, since the compn. of the dry residue was close to $(NH_4)_3AlF_6$. The difference in the solubilities of the 3 investigated salts led to an attempt to use a soln. of $(NH_4)_3AlF_6$ for the pptn. of the ions of Na and K. Preliminary expts. showed that both ions (used singly or together) were quantitatively ppted. as Na_3AlF_6 and K_3AlF_6. Since the soly. of each ppt. was very small, attempts were made to det. the amt. of Na and K by microchem. means. Three graphs, 3 tables and 3 references are given.

W. R. Henn

Inst. Gen. + Inorganic Chem, AN SSSR.

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M. A

2 Analysis

*Some Applications of Coagulation and Peptization in Chemical Analysis. Determination of Zinc.] I. Tananaev, D. I. Eristavi, Sh. N. Metatashvili, L. Galdava, and A. Partskhaladze (*Izvest. Gruzinskogo Indust. Inst.*, 1939, (9-10), 167-179; *Khim. Referat. Zhur.*, 1941, 4, 76; *C. Abs.*, 1943, 37, 1067). [In Russian.] In the reaction of Zn^{++}, K^{+}, and $Fe(CN)_6^{----}$, the equivalent point can be determined by observing the moment of peptization or coagulation of the precipitate formed. The method was used for the determination of Zn. The temperature affects the reaction velocity without displacing the equivalent point; the most suitable temperature is 60°–70° C. The ratio of the ions K^{+}, Zn^{++}, and $Fe(CN)_6^{----}$ affects the reaction velocity and the composition of the precipitate; thus, at small concentrations of Zn^{++} the equivalent point can be displaced slightly. The error, however, is small and for practical purposes has no effect on the determination of Zn. The error decreases with the increase in the titratable Zn. The equivalent point is displaced at high concentrations of K and Na salts. The presence of electrolytes decreases in general the sharpness of the end-point. Therefore, in the presence of electrolytes the solution under investigation is saturated with $K_4Fe(CN)_6$ to the formation of the sol and back-titrated with $ZnSO_4$. An acidity of approx. 0.01 N does not interfere with the titration. The effect of a higher acidity can be overcome by the addition of NH_4F. To determine Zn in an alloy containing Al, dissolve approx. 1 grm. of sample in a 250-c.c. measuring flask in a minimum amount of dilute HCl and add water to the mark. Dilute 25 c.c. of the solution to 50 c.c., heat to 60°–70° C., add $K_4Fe(CN)_6$ solution in 1 c.c. portions until a stable sol is obtained, and back-titrate with $ZnSO_4$ until the sol coagulates into flakes. The effect of H^{+} and Al^{+++} can be overcome by adding NH_4F in such amounts that no bluish colour is formed. For an alloy containing [illegible] of Zn as determined potentiometrically, the proposed method gave [illegible].

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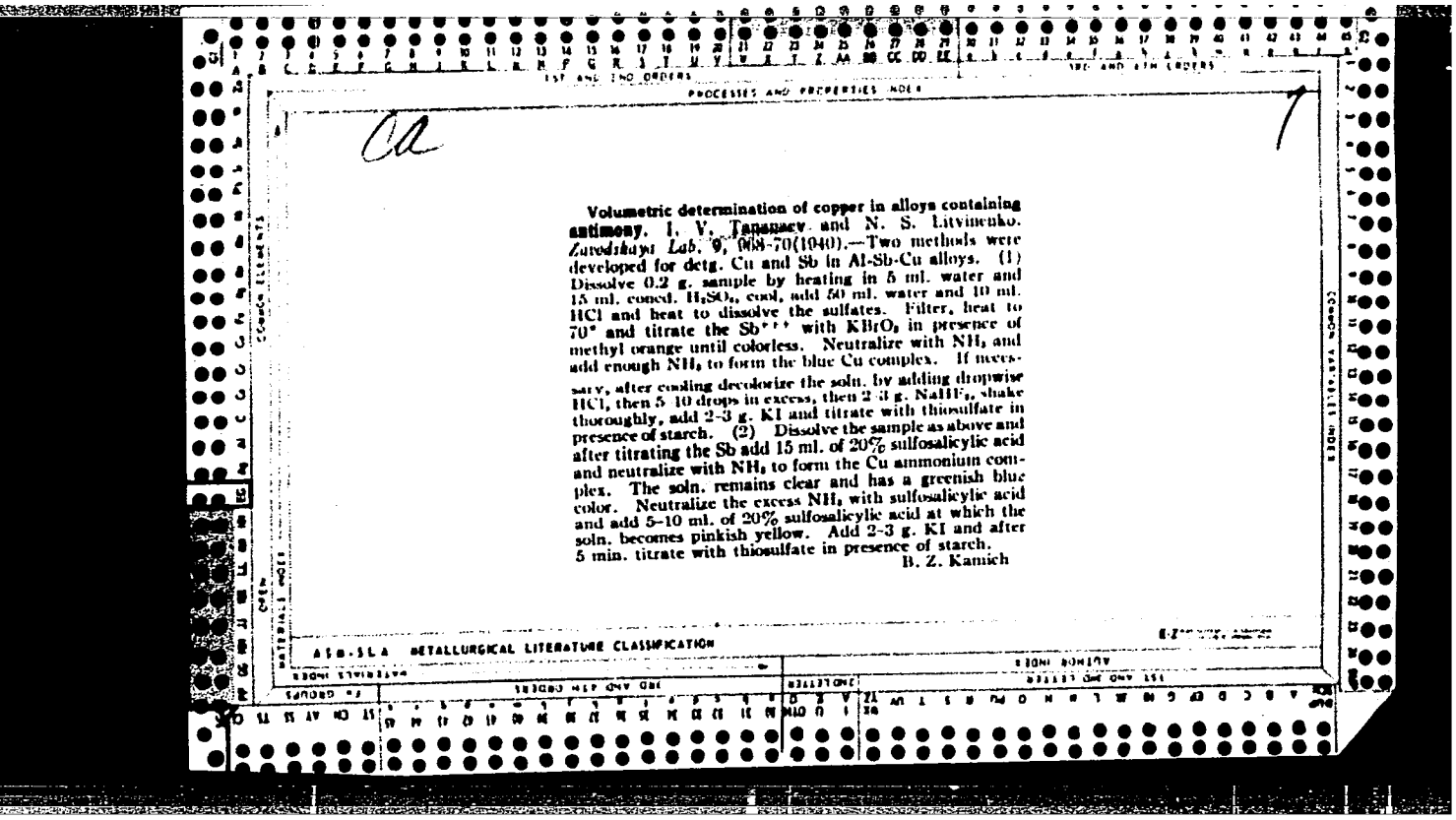

Volumetric determination of copper in alloys containing antimony. I. V. Tananaev and N. S. Litvinenko. *Zavodskaya Lab.* 9, 968-70(1940).—Two methods were developed for detg. Cu and Sb in Al-Sb-Cu alloys. (1) Dissolve 0.2 g. sample by heating in 5 ml. water and 15 ml. concd. H_2SO_4, cool, add 50 ml. water and 10 ml. HCl and heat to dissolve the sulfates. Filter, heat to 70° and titrate the Sb^{+++} with $KBrO_3$ in presence of methyl orange until colorless. Neutralize with NH_3 and add enough NH_3 to form the blue Cu complex. If necessary, after cooling decolorize the soln. by adding dropwise HCl, then 5–10 drops in excess, then 2–3 g. $NaHF_2$, shake thoroughly, add 2–3 g. KI and titrate with thiosulfate in presence of starch. (2) Dissolve the sample as above and after titrating the Sb add 15 ml. of 20% sulfosalicylic acid and neutralize with NH_3 to form the Cu ammonium complex. The soln. remains clear and has a greenish blue color. Neutralize the excess NH_3 with sulfosalicylic acid and add 5–10 ml. of 20% sulfosalicylic acid at which the soln. becomes pinkish yellow. Add 2–3 g. KI and after 5 min. titrate with thiosulfate in presence of starch.

B. Z. Kamich

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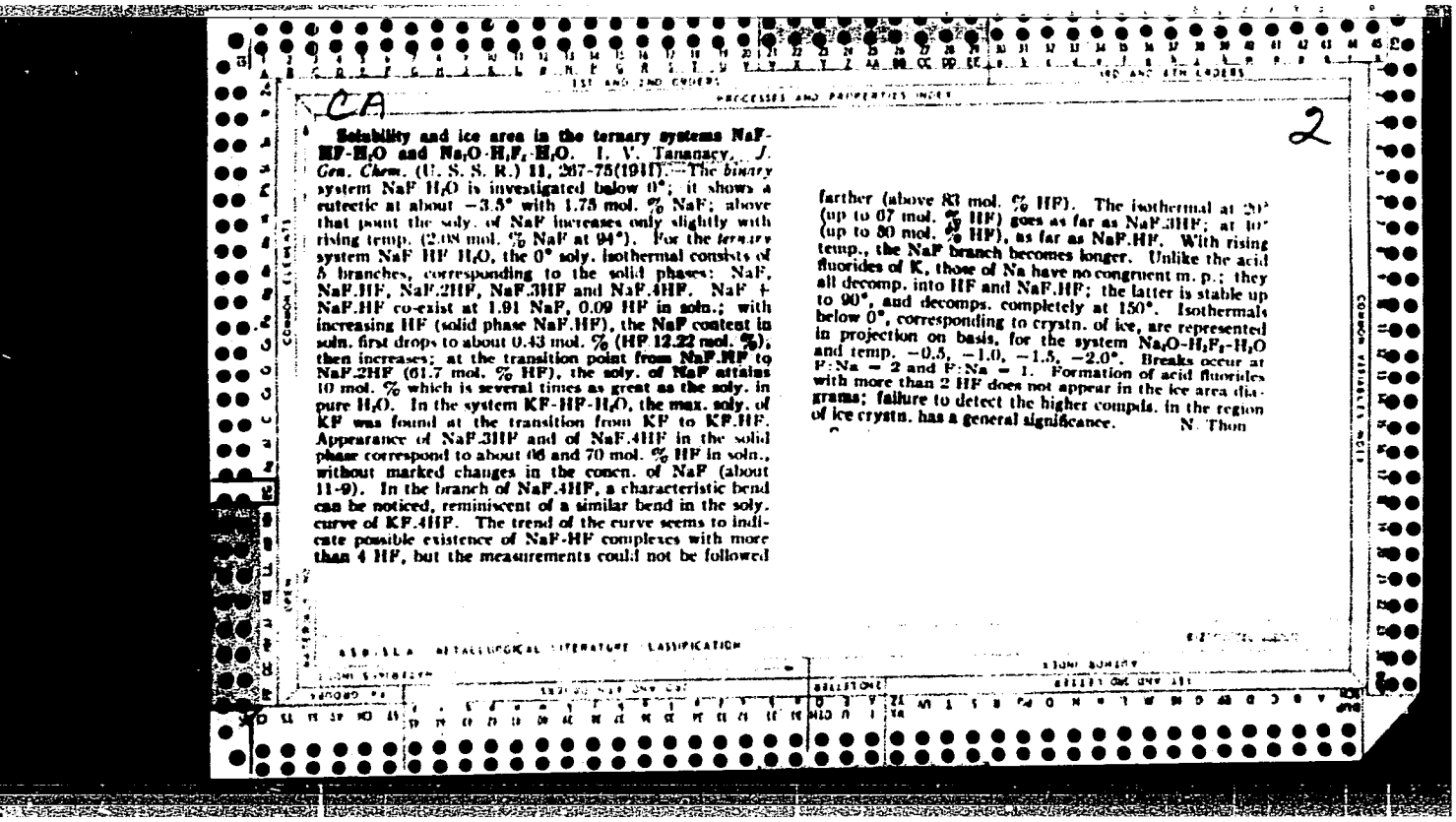

CA

2

Solubility and ice area in the ternary systems NaF-HF-H_2O and Na_2O-H_2F_2-H_2O. I. V. Tananaev. *J. Gen. Chem.* (U. S. S. R.) 11, 267-75(1941).—The *binary* system NaF H_2O is investigated below 0°; it shows a eutectic at about −3.5° with 1.75 mol. % NaF; above that point the soly. of NaF increases only slightly with rising temp. (2.08 mol. % NaF at 94°). For the *ternary* system NaF HF H_2O, the 0° soly. isothermal consists of 5 branches, corresponding to the solid phases: NaF, NaF.HF, NaF.2HF, NaF.3HF and NaF.4HF. NaF + NaF.HF co-exist at 1.91 NaF, 0.09 HF in soln.; with increasing HF (solid phase NaF.HF), the NaF content in soln. first drops to about 0.43 mol. % (HF 12.22 mol. %), then increases; at the transition point from NaF.HF to NaF.2HF (61.7 mol. % HF), the soly. of NaF attains 10 mol. % which is several times as great as the soly. in pure H_2O. In the system KF-HF-H_2O, the max. soly. of KF was found at the transition from KF to KF.HF. Appearance of NaF.3HF and of NaF.4HF in the solid phase correspond to about 66 and 70 mol. % HF in soln., without marked changes in the concn. of NaF (about 11-9). In the branch of NaF.4HF, a characteristic bend can be noticed, reminiscent of a similar bend in the soly. curve of KF.4HF. The trend of the curve seems to indicate possible existence of NaF-HF complexes with more than 4 HF, but the measurements could not be followed farther (above 83 mol. % HF). The isothermal at 20° (up to 67 mol. % HF) goes as far as NaF.3HF; at 10° (up to 80 mol. % HF), as far as NaF.HF. With rising temp., the NaF branch becomes longer. Unlike the acid fluorides of K, those of Na have no congruent m. p.; they all decomp. into HF and NaF.HF; the latter is stable up to 90°, and decomps. completely at 150°. Isothermals below 0°, corresponding to crystn. of ice, are represented in projection on basis, for the system Na_2O-H_2F_2-H_2O and temp. −0.5, −1.0, −1.5, −2.0°. Breaks occur at F:Na = 2 and F:Na = 1. Formation of acid fluorides with more than 2 HF does not appear in the ice area diagrams; failure to detect the higher compds. in the region of ice crystn. has a general significance. N. Thon

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N. G

9. Analysis

*Direct Determination of Aluminium in Alloys. I. V. Tananaev and S. T. Abilov (*Zhur. Priklad. Khimii (J. Applied Chem.)*, 1942, **15**, (1), 61–70; *C. Abs.*, 1943, **37**, 1668).—[In Russian.] A method is described for determining Al in alloys containing Fe, Cr, Ti, Si, Co, Ni, Zn, Mn; it is based on the formation of cryolite. The cryolite formed may be weighed as such in the presence of Co, Ni, Zn, and Cr. If Mn, Fe, or Ti is present, the precipitate does not correspond to the proper composition, and the Al is preferably weighed as Al_2O_3. Fe is co-precipitated with cryolite and reprecipitation is necessary. The precipitation of Al is made in the presence of all elements of the alloy. The procedure is as follows: Place the solution in a centrifuge cup, treat with NaF solution, centrifuge, remove the clear solution, treat the precipitate with more of a 0·5% solution of NaF, and again centrifuge. Do this 2–3 times. Wash the precipitate with 50% alcohol, dry at 130° C., and weigh as cryolite. In the presence of interfering elements, after washing the above precipitate with NaF, dissolve it in HCl solution containing H_3BO_3, transfer it to a Pt dish, and evaporate with H_2SO_4 until fumes appear. Dissolve the residue in dilute HCl, add NH_4OH, and continue as usual. If the cryolite precipitate is contaminated with Fe or Ti, repeat the NaF treatment after dissolving the first precipitate in HCl + H_3BO_3.

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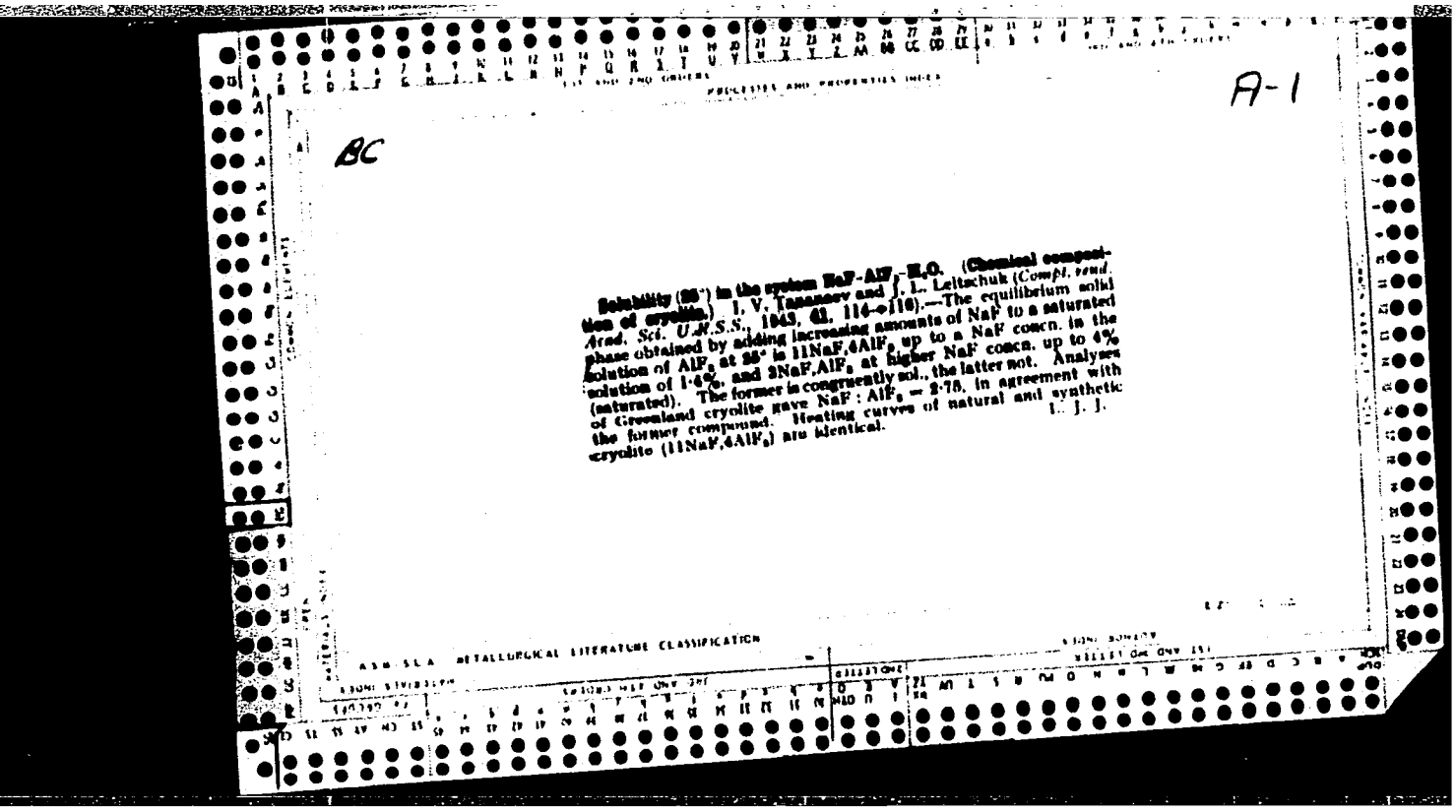

A-1

BC

Solubility (25°) in the system NaF-AlF$_3$-H$_2$O. (Chemical composition of cryolite.) I. V. Tananaev and J. L. Leitschuk (*Compt. rend. Acad. Sci. U.R.S.S.*, 1943, 41, 114–116).—The equilibrium solid phase obtained by adding increasing amounts of NaF to a saturated solution of AlF$_3$ at 25° is 11NaF,4AlF$_3$ up to a NaF concn. in the solution of 1·4%, and 3NaF,AlF$_3$ at higher NaF concn. up to 4% (saturated). The former is congruently sol., the latter not. Analyses of Greenland cryolite gave NaF : AlF$_3$ = 2·78, in agreement with the former compound. Heating curves of natural and synthetic cryolite (11NaF,4AlF$_3$) are identical. L. J. J.

A S M S L A METALLURGICAL LITERATURE CLASSIFICATION

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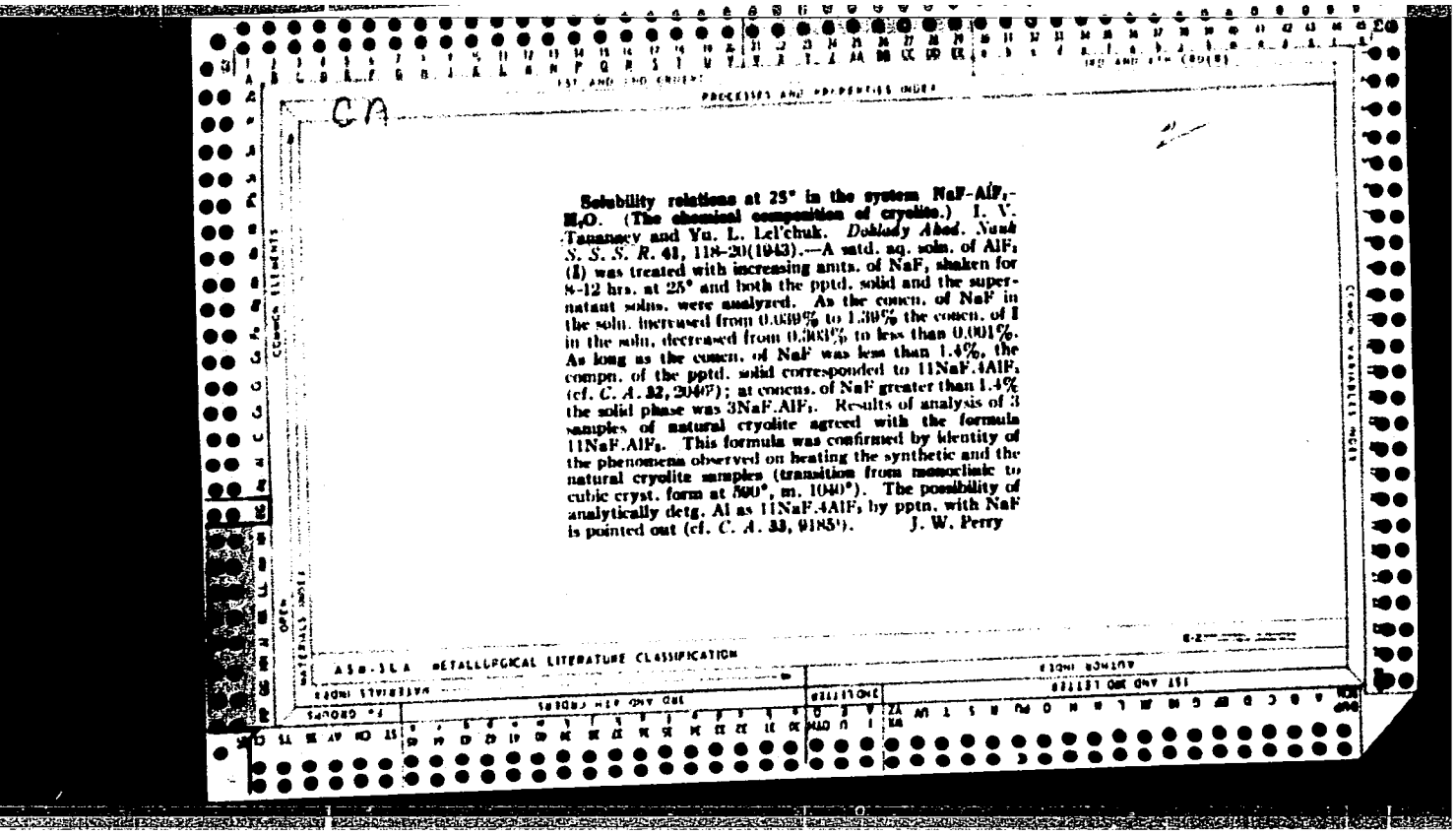

CA

Solubility relations at 25° in the system NaF-AlF$_3$-H$_2$O. (The chemical composition of cryolite.) I. V. Tananaev and Yu. L. Lel'chuk. *Doklady Akad. Nauk S. S. S. R.* **41**, 118–20(1943).—A satd. aq. soln. of AlF$_3$ (I) was treated with increasing amts. of NaF, shaken for 8–12 hrs. at 25° and both the pptd. solid and the supernatant solns. were analyzed. As the concn. of NaF in the soln. increased from 0.039% to 1.39% the concn. of I in the soln. decreased from 0.383% to less than 0.001%. As long as the concn. of NaF was less than 1.4%, the compn. of the pptd. solid corresponded to 11NaF.4AlF$_3$ (*cf. C. A.* **32**, 2047); at concns. of NaF greater than 1.4% the solid phase was 3NaF.AlF$_3$. Results of analysis of 3 samples of natural cryolite agreed with the formula 11NaF.AlF$_3$. This formula was confirmed by identity of the phenomena observed on heating the synthetic and the natural cryolite samples (transition from monoclinic to cubic cryst. form at 560°, m. 1040°). The possibility of analytically detg. Al as 11NaF.4AlF$_3$ by pptn. with NaF is pointed out (*cf. C. A.* **33**, 9185^1). J. W. Perry

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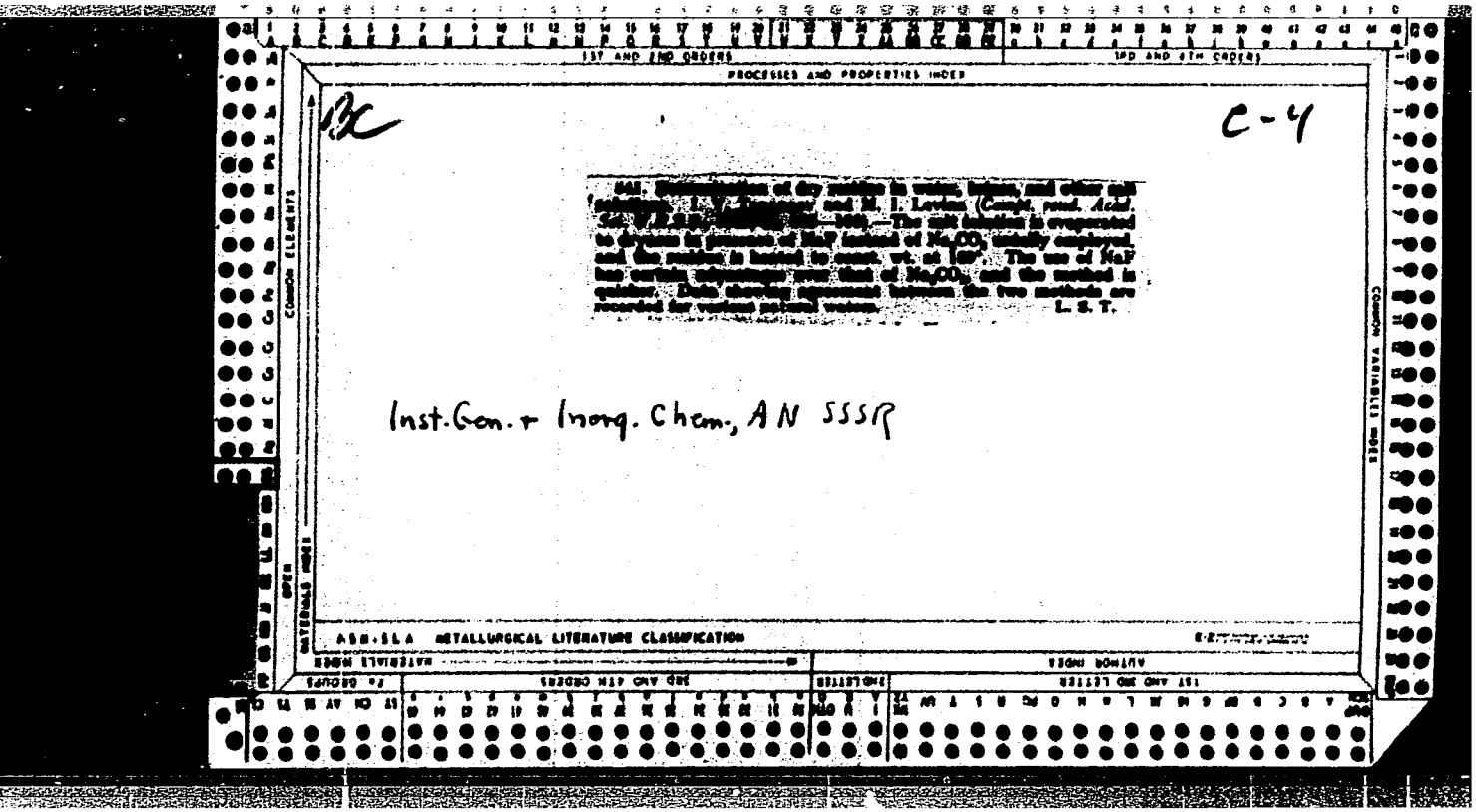

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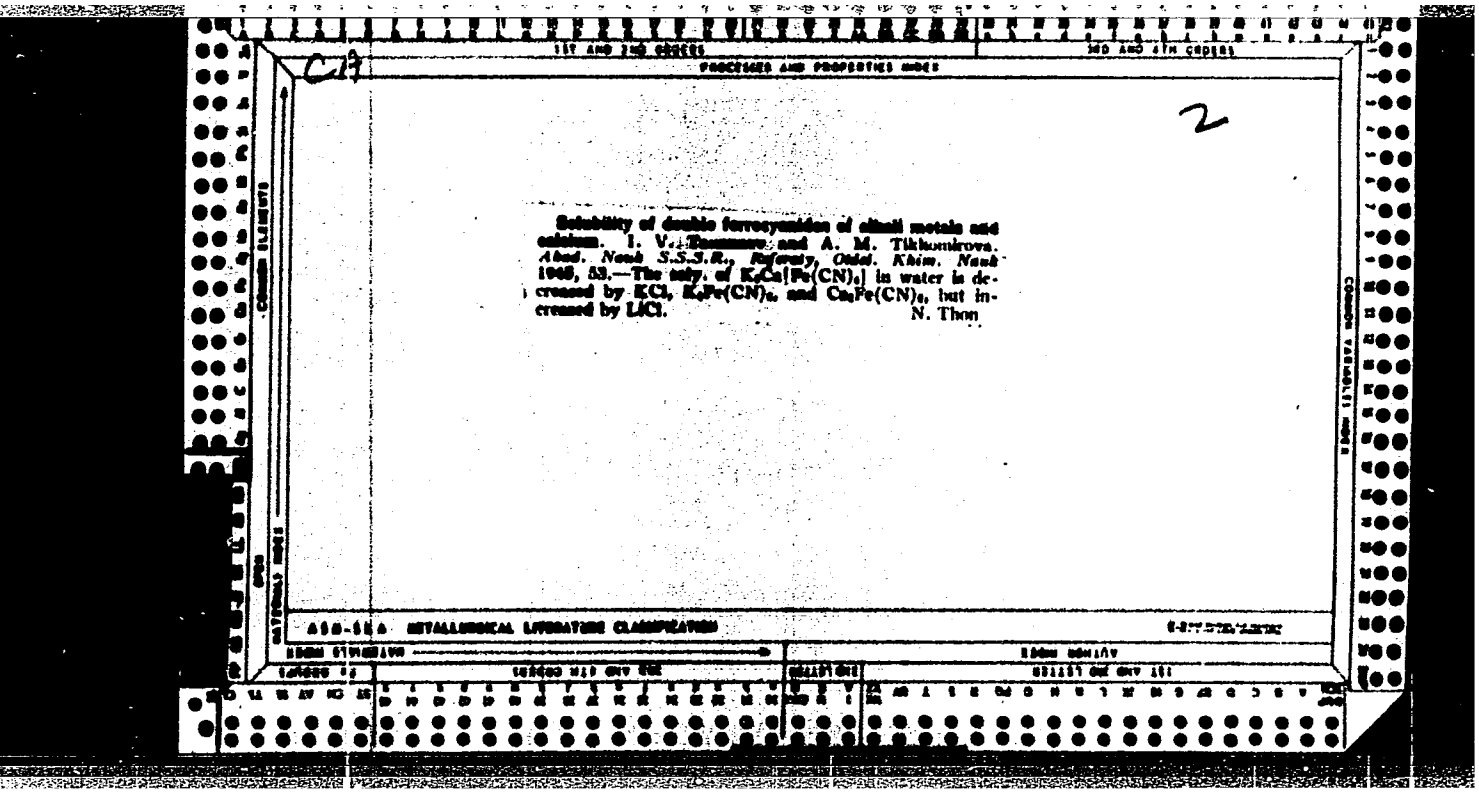

C17

2

Solubility of double ferrocyanides of alkali metals and calcium. I. V. Tikhomirova and A. M. Tikhomirova. *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1958, 53.—The solubility of $K_2Ca[Fe(CN)_6]$ in water is decreased by KCl, $K_4Fe(CN)_6$, and $Ca_2Fe(CN)_6$, but increased by LiCl.

N. Thon

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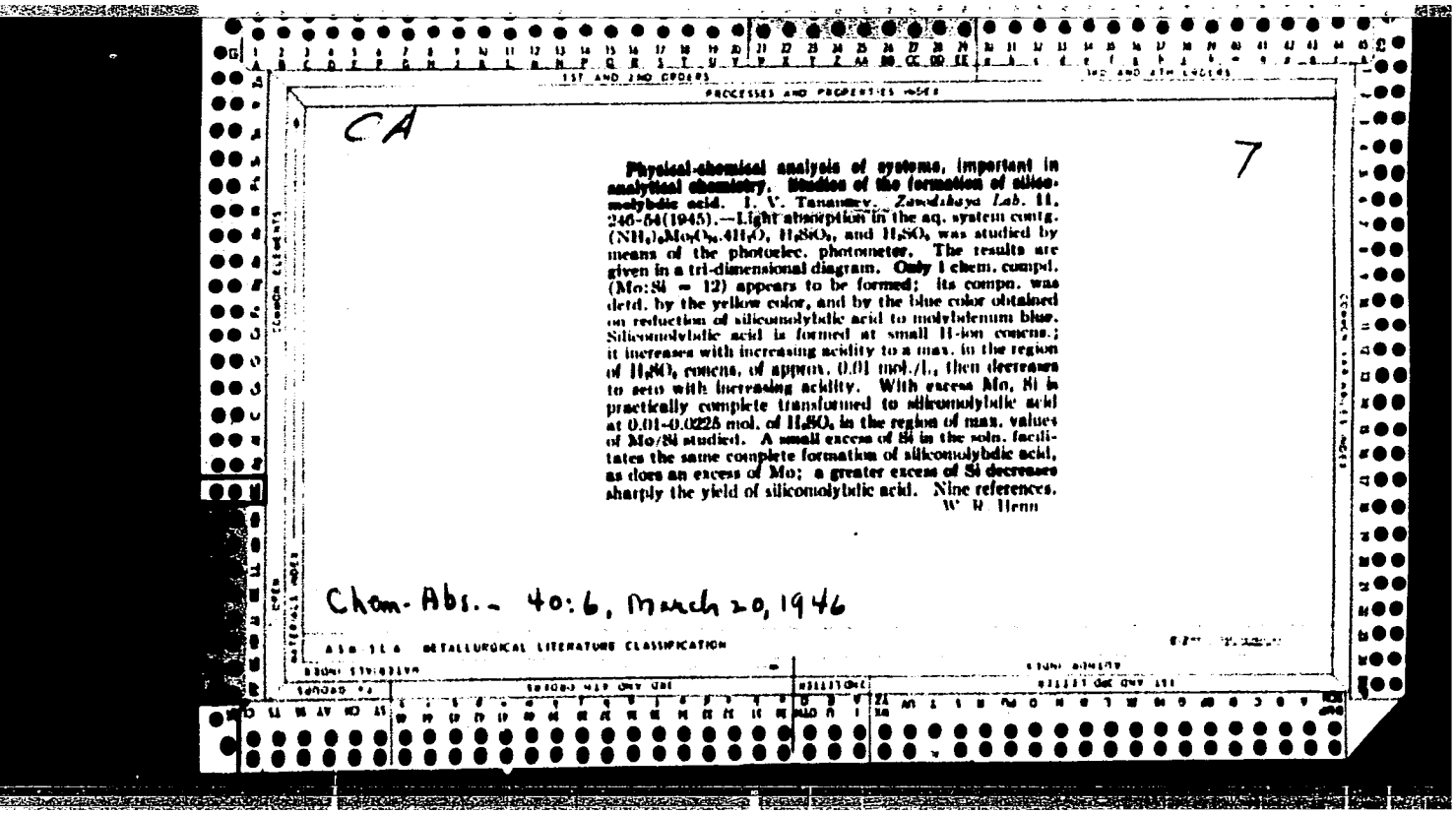

CA

7

Physical-chemical analysis of systems, important in analytical chemistry. Studies of the formation of silicomolybdic acid. I. V. Tananaev. *Zavodskaya Lab.* 11, 246-64(1945).—Light absorption in the aq. system contg. $(NH_4)_6Mo_7O_{24}.4H_2O$, H_2SO_4, and H_4SiO_4 was studied by means of the photoelec. photometer. The results are given in a tri-dimensional diagram. Only 1 chem. compd. (Mo:Si = 12) appears to be formed; its compn. was detd. by the yellow color, and by the blue color obtained on reduction of silicomolybdic acid to molybdenum blue. Silicomolybdic acid is formed at small H-ion concns.; it increases with increasing acidity to a max. in the region of H_2SO_4 concns. of approx. 0.01 mol./l., then decreases to zero with increasing acidity. With excess Mo, Si is practically complete transformed to silicomolybdic acid at 0.01-0.0225 mol. of H_2SO_4 in the region of max. values of Mo/Si studied. A small excess of Si in the soln. facilitates the same complete formation of silicomolybdic acid, as does an excess of Mo; a greater excess of Si decreases sharply the yield of silicomolybdic acid. Nine references.
W. B. Henn

Chem. Abs. - 40:6, March 20, 1946

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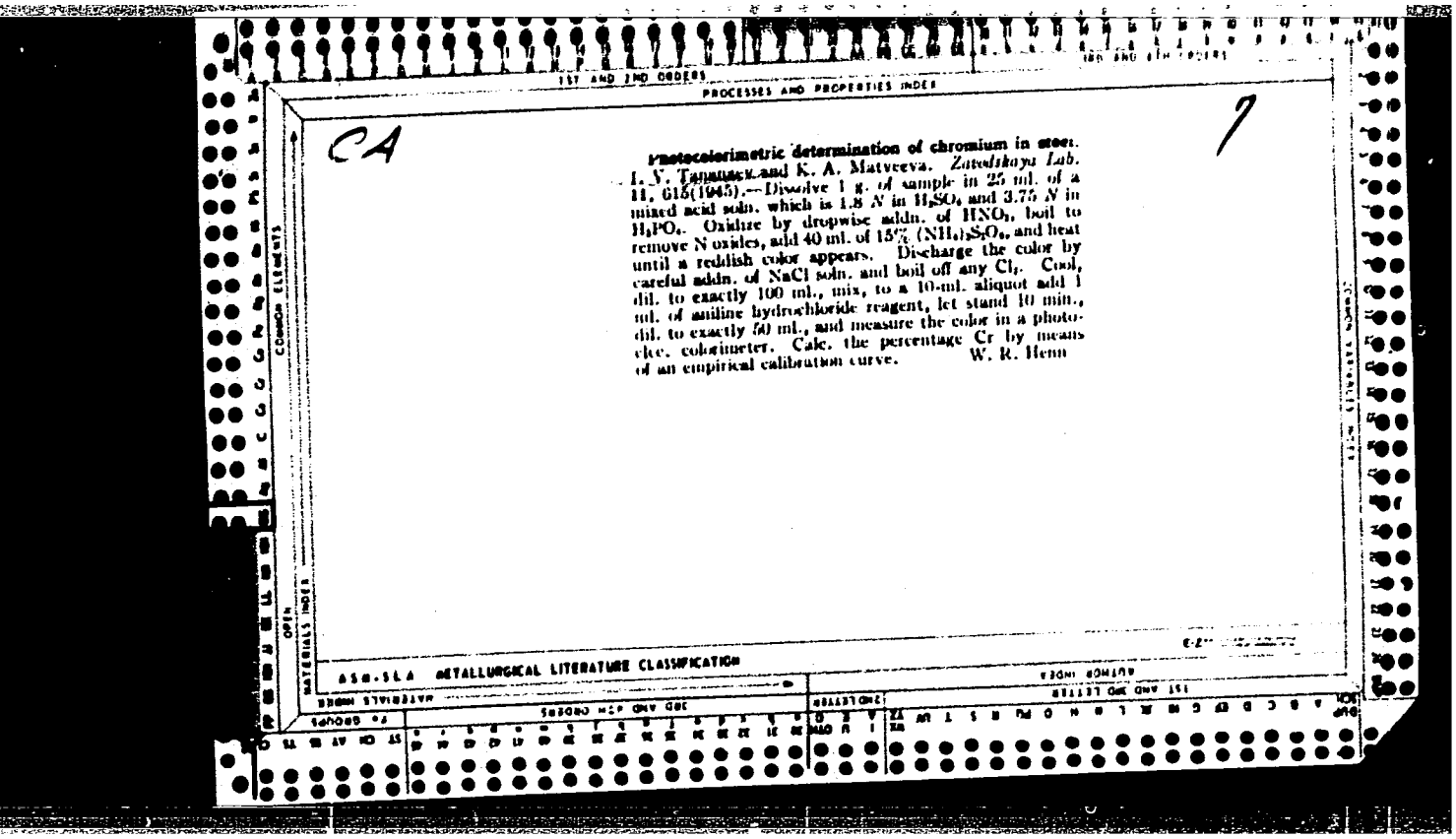

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

CA

7

Photocolorimetric determination of chromium in steel. I. V. Tananaev and K. A. Matveeva. *Zavodskaya Lab.* 11, 615(1945).—Dissolve 1 g. of sample in 25 ml. of a mixed acid soln. which is 1.8 *N* in H_2SO_4 and 3.75 *N* in H_3PO_4. Oxidize by dropwise addn. of HNO_3, boil to remove N oxides, add 40 ml. of 15% $(NH_4)_2S_2O_8$, and heat until a reddish color appears. Discharge the color by careful addn. of NaCl soln. and boil off any Cl_2. Cool, dil. to exactly 100 ml., mix, to a 10-ml. aliquot add 1 ml. of aniline hydrochloride reagent, let stand 10 min., dil. to exactly 50 ml., and measure the color in a photoelec. colorimeter. Calc. the percentage Cr by means of an empirical calibration curve. W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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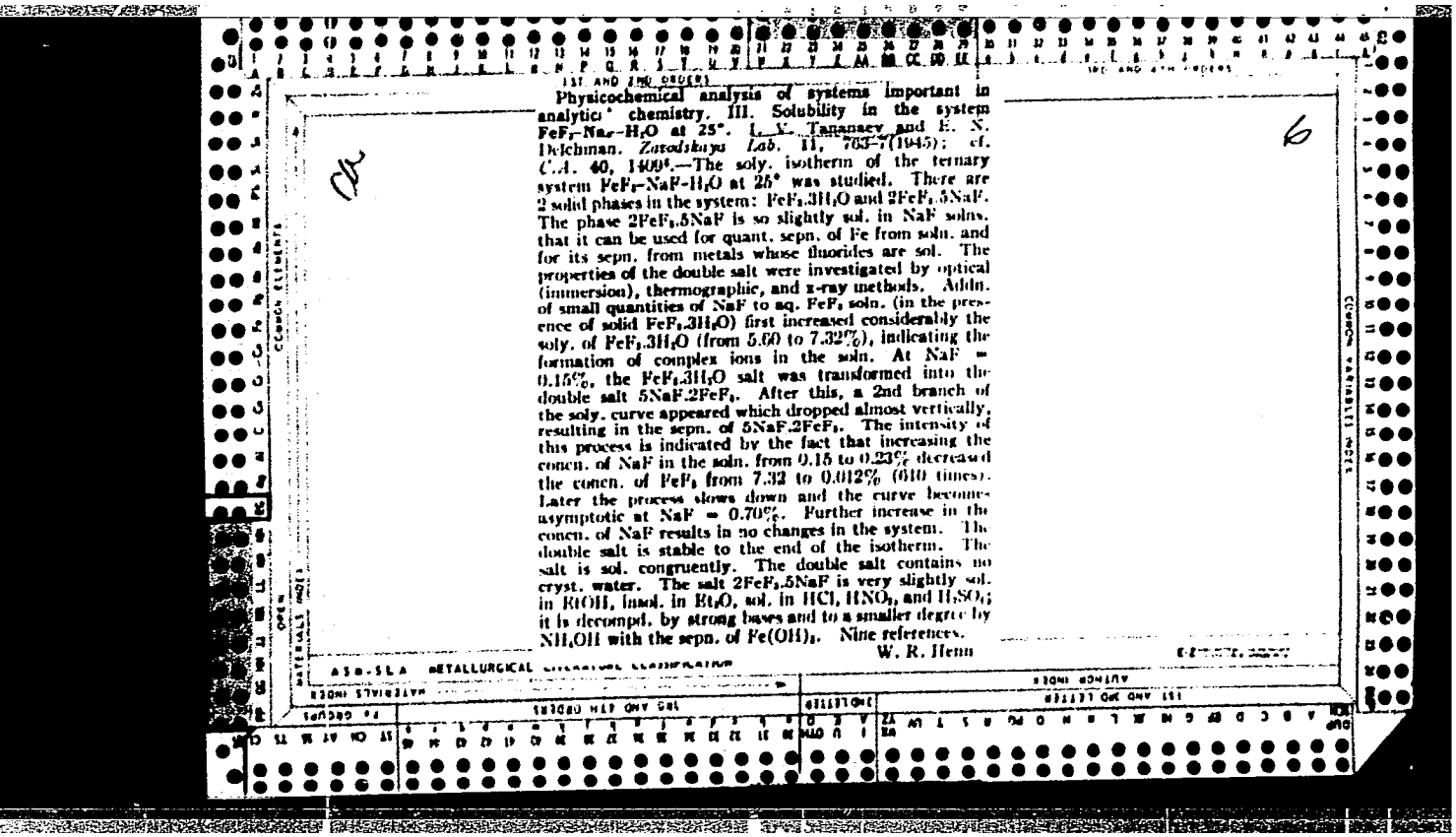

Physicochemical analysis of systems important in analytical chemistry. III. Solubility in the system FeF_3–NaF–H_2O at 25°. L. V. Tananaev and E. N. Belchman. *Zavodskaya Lab.* 11, 703–7(1945); cf. *C.A.* 40, 1409ᵍ.—The soly. isotherm of the ternary system FeF_3–NaF–H_2O at 25° was studied. There are 2 solid phases in the system: $FeF_3.3H_2O$ and $2FeF_3.5NaF$. The phase $2FeF_3.5NaF$ is so slightly sol. in NaF solns. that it can be used for quant. sepn. of Fe from soln. and for its sepn. from metals whose fluorides are sol. The properties of the double salt were investigated by optical (immersion), thermographic, and x-ray methods. Addn. of small quantities of NaF to aq. FeF_3 soln. (in the presence of solid $FeF_3.3H_2O$) first increased considerably the soly. of $FeF_3.3H_2O$ (from 5.60 to 7.32%), indicating the formation of complex ions in the soln. At NaF = 0.15%, the $FeF_3.3H_2O$ salt was transformed into the double salt $5NaF.2FeF_3$. After this, a 2nd branch of the soly. curve appeared which dropped almost vertically, resulting in the sepn. of $5NaF.2FeF_3$. The intensity of this process is indicated by the fact that increasing the concn. of NaF in the soln. from 0.15 to 0.23% decreased the concn. of FeF_3 from 7.32 to 0.012% (610 times). Later the process slows down and the curve becomes asymptotic at NaF = 0.70%. Further increase in the concn. of NaF results in no changes in the system. The double salt is stable to the end of the isotherm. The salt is sol. congruently. The double salt contains no cryst. water. The salt $2FeF_3.5NaF$ is very slightly sol. in ROH, insol. in Et_2O, sol. in HCl, HNO_3, and H_2SO_4; it is decompd. by strong bases and to a smaller degree by NH_4OH with the sepn. of $Fe(OH)_3$. Nine references.

W. R. Henn

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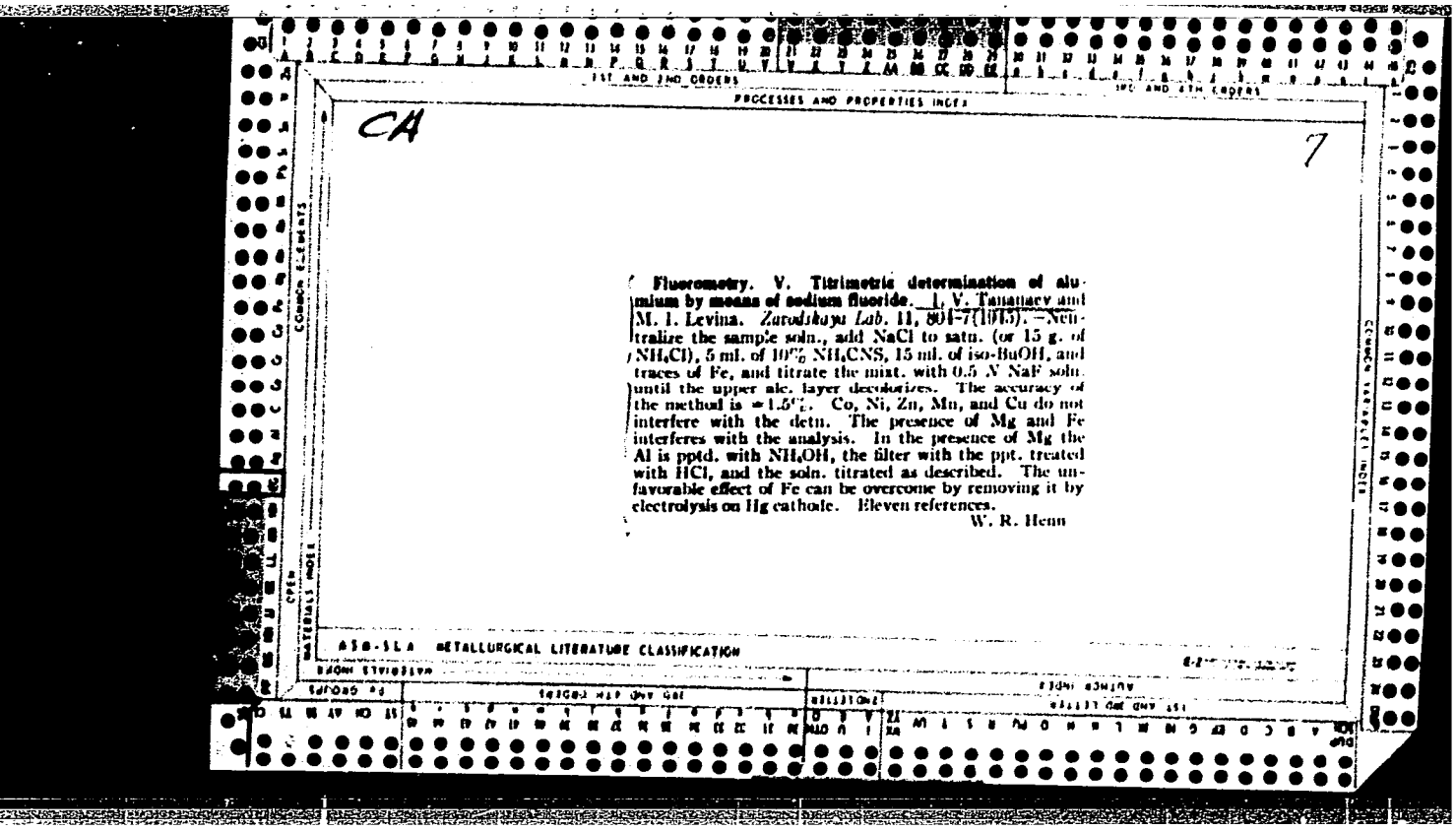

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Fluorometry. V. Titrimetric determination of aluminum by means of sodium fluoride. I. V. Tananaev and M. I. Levina. *Zavodskaya Lab.* 11, 801-7(1945).—Neutralize the sample soln., add NaCl to satn. (or 15 g. of NH_4Cl), 5 ml. of 10% NH_4CNS, 15 ml. of iso-BuOH, and traces of Fe, and titrate the mixt. with 0.5 *N* NaF soln. until the upper alc. layer decolorizes. The accuracy of the method is ±1.5%. Co, Ni, Zn, Mn, and Cu do not interfere with the detn. The presence of Mg and Fe interferes with the analysis. In the presence of Mg the Al is pptd. with NH_4OH, the filter with the ppt. treated with HCl, and the soln. titrated as described. The unfavorable effect of Fe can be overcome by removing it by electrolysis on Hg cathode. Eleven references.

W. R. Henn

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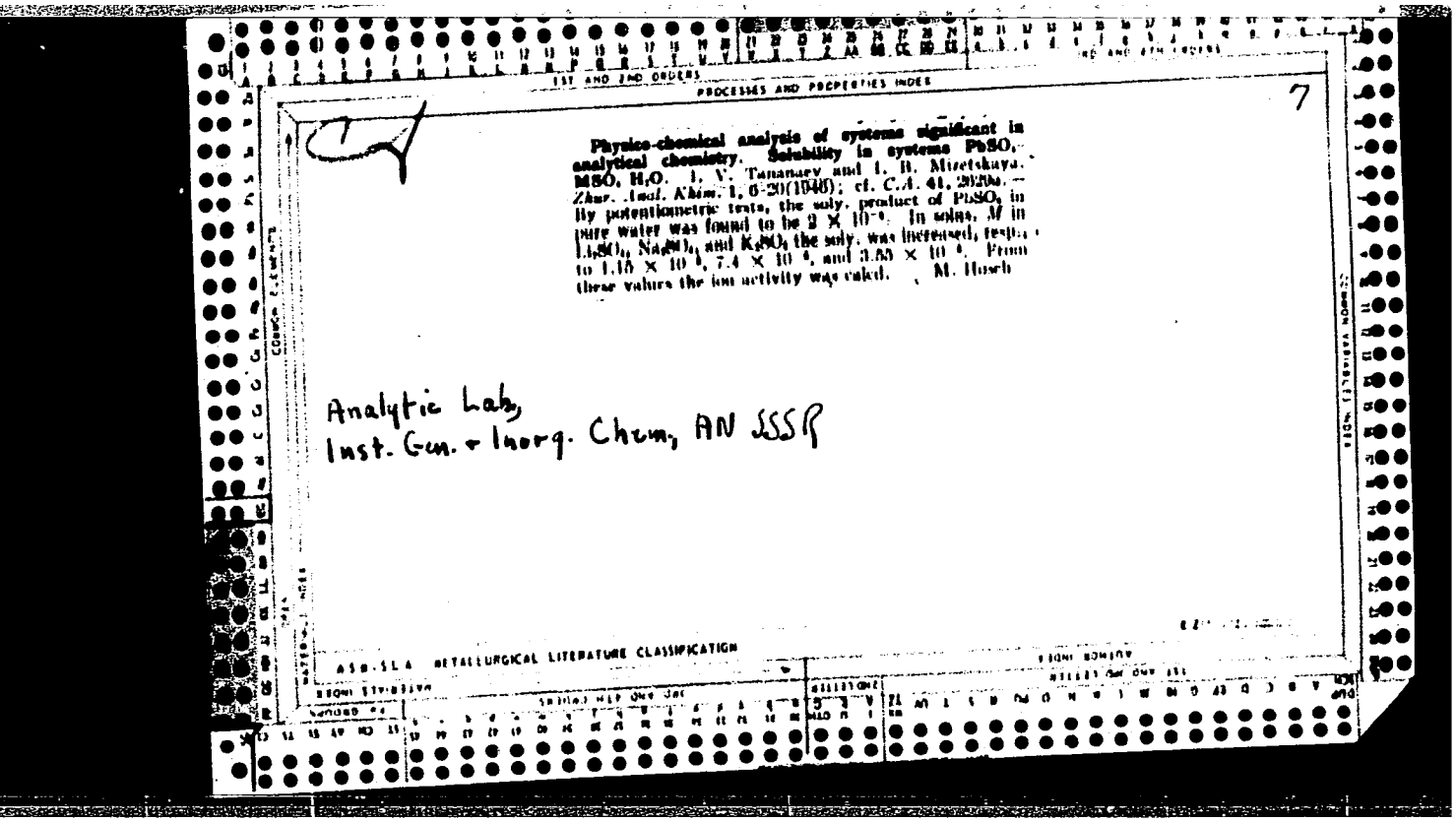

PROCESSES AND PROPERTIES INDEX

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Physico-chemical analysis of systems significant in analytical chemistry. Solubility in systems $PbSO_4$-MSO_4-H_2O. I. V. Tananaev and I. B. Mizetskaya. Zhur. Anal. Khim. 1, 6-20(1946); cf. C.A. 41, 2024a. — By potentiometric tests, the solv. product of $PbSO_4$ in pure water was found to be 2×10^{-8}. In solns. M in H_2SO_4, Na_2SO_4, and K_2SO_4 the solv. was increased, resp., to 1.15×10^{-4}, 7.4×10^{-4}, and 3.55×10^{-4}. From these values the ion activity was calcd. M. Hirsh

Analytic Lab,
Inst. Gen. + Inorg. Chem, AN USSR

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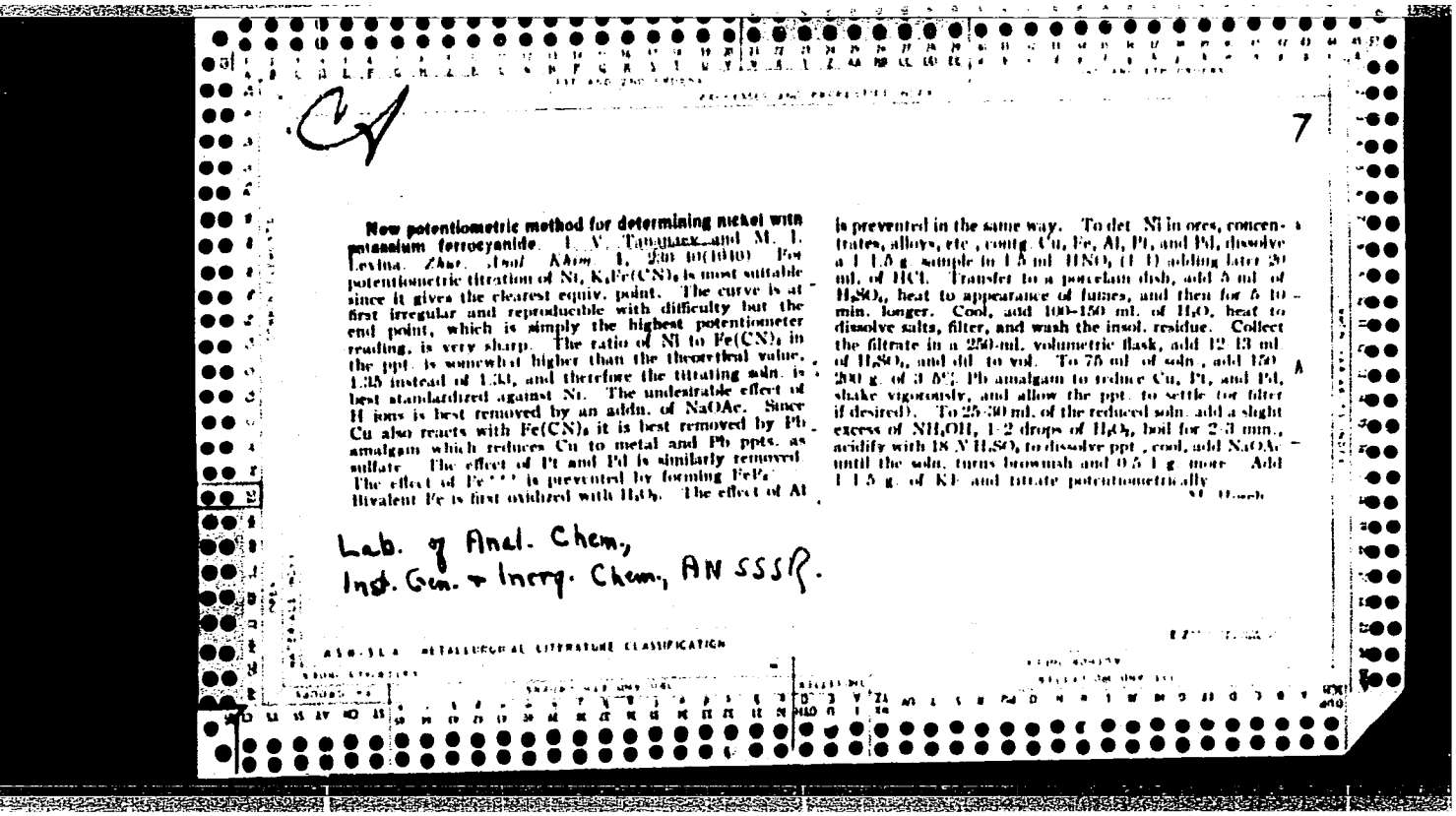

CA

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New potentiometric method for determining nickel with potassium ferrocyanide. I. V. Tananaev and M. I. Levina. *Zhur. Anal. Khim.* 1, 230-6(1946). For potentiometric titration of Ni, $K_4Fe(CN)_6$ is most suitable since it gives the clearest equiv. point. The curve is at first irregular and reproducible with difficulty but the end point, which is simply the highest potentiometer reading, is very sharp. The ratio of Ni to $Fe(CN)_6$ in the ppt. is somewhat higher than the theoretical value, 1.35 instead of 1.33, and therefore the titrating soln. is best standardized against Ni. The undesirable effect of H ions is best removed by an addn. of NaOAc. Since Cu also reacts with $Fe(CN)_6$ it is best removed by Pb amalgam which reduces Cu to metal and Pb ppts. as sulfate. The effect of Pt and Pd is similarly removed. The effect of Fe^{+++} is prevented by forming $FePo_4$. Bivalent Fe is first oxidized with H_2O_2. The effect of Al is prevented in the same way. To det. Ni in ores, concentrates, alloys, etc., contg. Cu, Fe, Al, Pt, and Pd, dissolve a 1-1.5 g. sample in 15 ml. HNO$_3$ (1:1) adding later 20 ml. of HCl. Transfer to a porcelain dish, add 5 ml. of H_2SO_4, heat to appearance of fumes, and then for 5-10 min. longer. Cool, add 100-150 ml. of H_2O, heat to dissolve salts, filter, and wash the insol. residue. Collect the filtrate in a 250-ml. volumetric flask, add 12-13 ml. of H_2SO_4, and dil. to vol. To 75 ml. of soln., add 150-200 g. of 3.5% Pb amalgam to reduce Cu, Pt, and Pd, shake vigorously, and allow the ppt. to settle (or filter if desired). To 25-30 ml. of the reduced soln. add a slight excess of NH_4OH, 1-2 drops of H_2O_2, boil for 2-3 min., acidify with 18 *N* H_2SO_4, to dissolve ppt., cool, add NaOAc until the soln. turns brownish and 0.5-1 g. more. Add 1-1.5 g. of KI and titrate potentiometrically. M. Hirsch

Lab. of Anal. Chem.,
Inst. Gen. + Inorg. Chem., AN SSSR.

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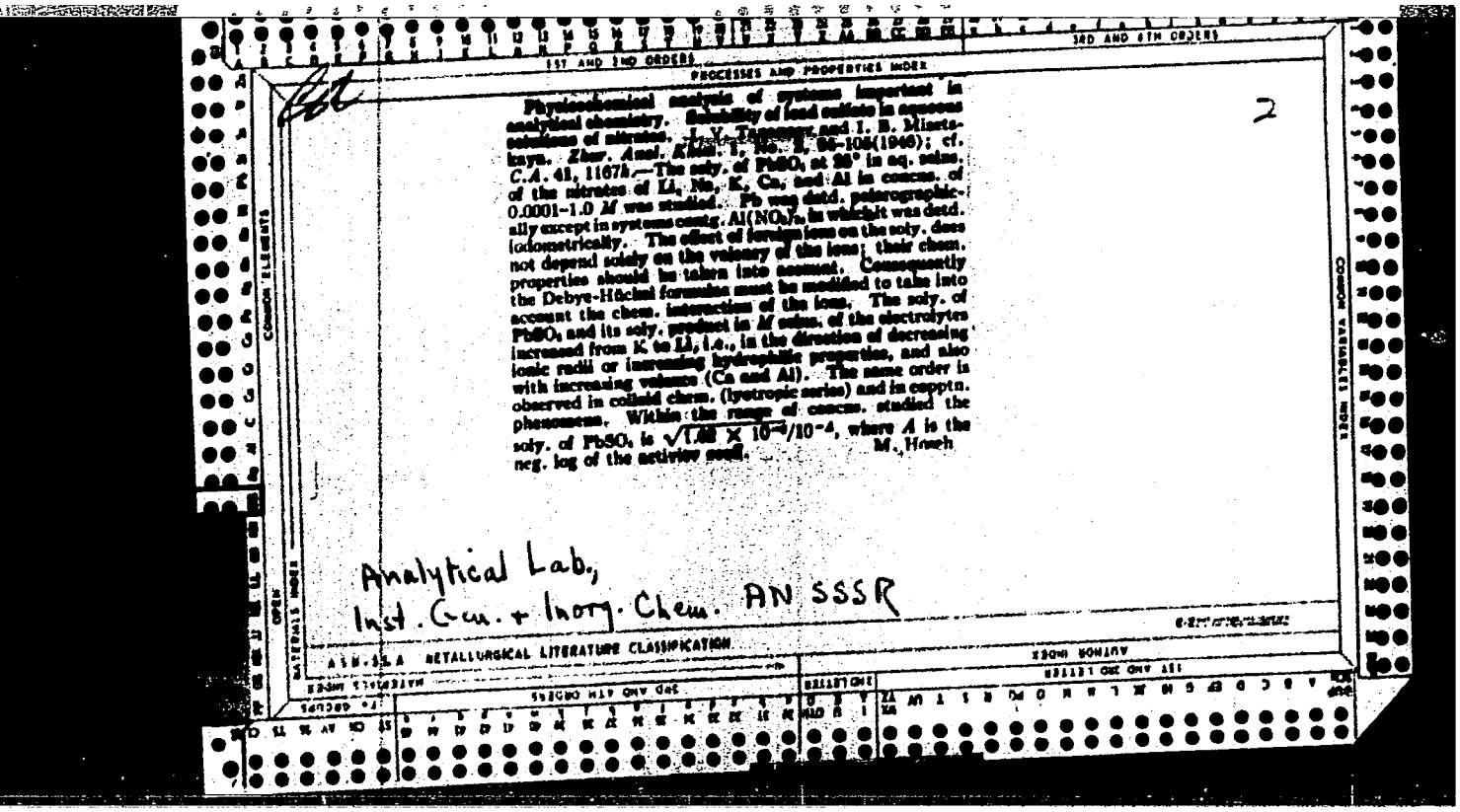

Physicochemical analysis of systems important in analytical chemistry. Solubility of lead sulfate in aqueous solutions of nitrates. I. V. Tananaev and I. B. Mineta-kaya. *Zhur. Anal. Khim.* 1, No. 2, 86-108(1946); cf. *C.A.* 41, 1167h.—The soly. of $PbSO_4$ at 25° in aq. solns. of the nitrates of Li, Na, K, Ca, and Al in concns. of 0.0001–1.0 *M* was studied. Pb was detd. polarographically except in systems contg. $Al(NO_3)_3$, in which it was detd. iodometrically. The effect of foreign ions on the soly. does not depend solely on the valency of the ions; their chem. properties should be taken into account. Consequently the Debye-Hückel formulas must be modified to take into account the chem. interactions of the ions. The soly. of $PbSO_4$ and its soly. product in *M* solns. of the electrolytes increased from K to Li, i.e., in the direction of decreasing ionic radii or increasing hydrophilic properties, and also with increasing valences (Ca and Al). The same order is observed in colloid chem. (lyotropic series) and in coagptn. phenomena. Within the range of concns. studied the soly. of $PbSO_4$ is $\sqrt{1.82 \times 10^{-8}}/10^{-A}$, where *A* is the neg. log of the activity coeff. M. Hoch

Analytical Lab.,
Inst. Gen. + Inorg. Chem. AN SSSR

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TANANAYEV, I. V.

Anal. Lab., Inst. of Gen. and Inorg. Chem., Acad. Sci., (-1946-)

"The Phys.-Chem. Analysis of Systems of Importance in Analytical Chemistry. A study of Ni So_4-Me_4 Fe $(CN)_6$- H_2O Systems,"

Zhur. Analit. Khim., No. 4, 1946

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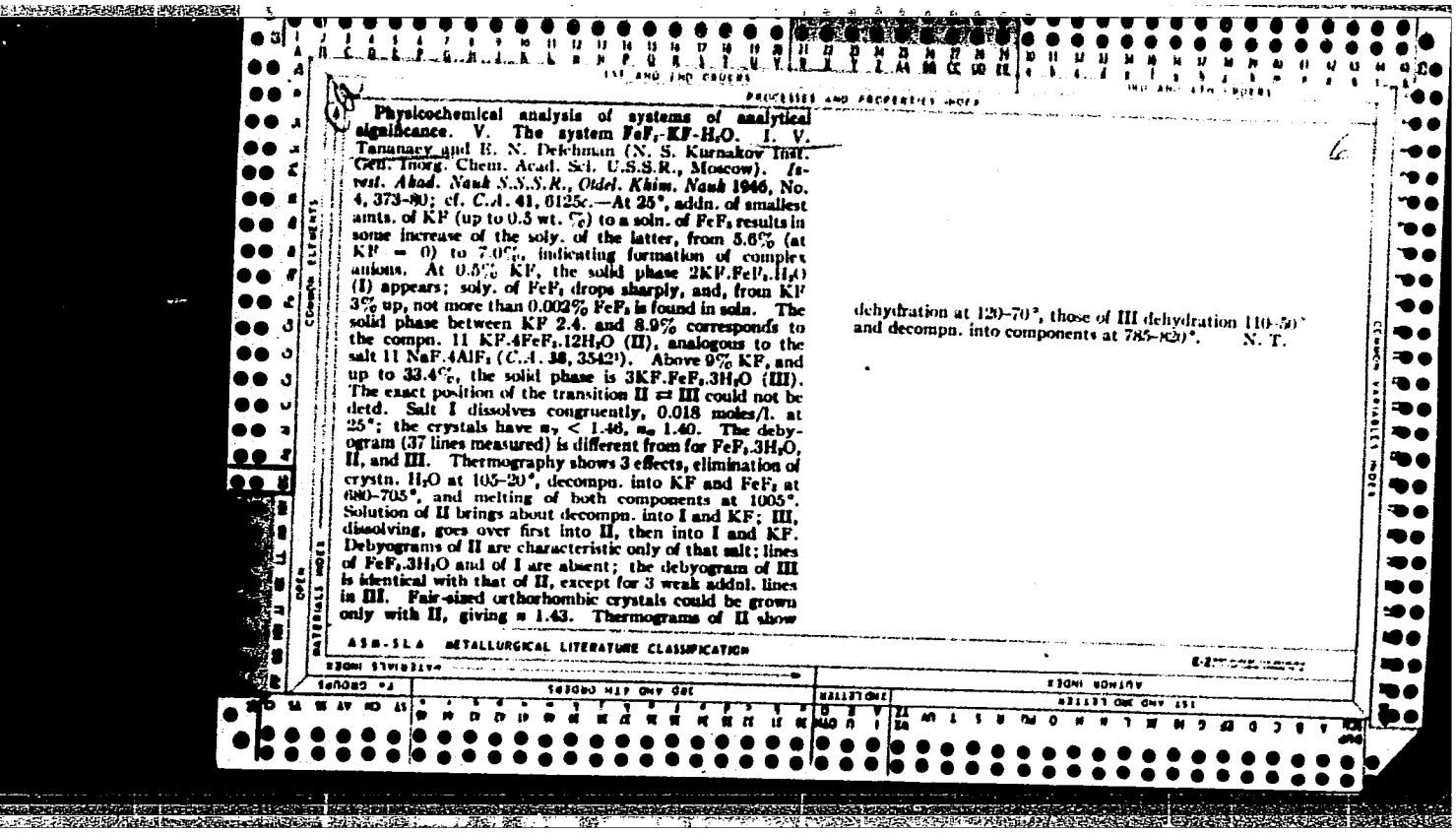

Physicochemical analysis of systems of analytical significance. V. The system FeF_3-KF-H_2O. I. V. Tananaev and B. N. Dekhman (N. S. Kurnakov Inst. Gen. Inorg. Chem. Acad. Sci. U.S.S.R., Moscow). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* **1946**, No. 4, 373–80; cf. *C.A.* **41**, 6125c.—At 25°, addn. of smallest amts. of KF (up to 0.5 wt. %) to a soln. of FeF_3 results in some increase of the soly. of the latter, from 5.6% (at KF = 0) to 7.0%, indicating formation of complex anions. At 0.5% KF, the solid phase $2KF.FeF_3.H_2O$ (I) appears; soly. of FeF_3 drops sharply, and, from KF 3% up, not more than 0.002% FeF_3 is found in soln. The solid phase between KF 2.4 and 8.9% corresponds to the compn. II $KF.4FeF_3.12H_2O$ (II), analogous to the salt II $NaF.4AlF_3$ (*C.A.* **38**, 3542[1]). Above 9% KF, and up to 33.4%, the solid phase is $3KF.FeF_3.3H_2O$ (III). The exact position of the transition II ⇄ III could not be detd. Salt I dissolves congruently, 0.018 moles/l. at 25°; the crystals have $n_g < 1.46$, n_m 1.40. The debyogram (37 lines measured) is different from for $FeF_3.3H_2O$, II, and III. Thermography shows 3 effects, elimination of crystn. H_2O at 105–20°, decompn. into KF and FeF_3 at 680–705°, and melting of both components at 1005°. Solution of II brings about decompn. into I and KF; III, dissolving, goes over first into II, then into I and KF. Debyograms of II are characteristic only of that salt; lines of $FeF_3.3H_2O$ and of I are absent; the debyogram of III is identical with that of II, except for 3 weak addnl. lines in III. Fair-sized orthorhombic crystals could be grown only with II, giving n_g 1.43. Thermograms of II show dehydration at 120–70°, those of III dehydration 110–50° and decompn. into components at 785–820°. N. T.

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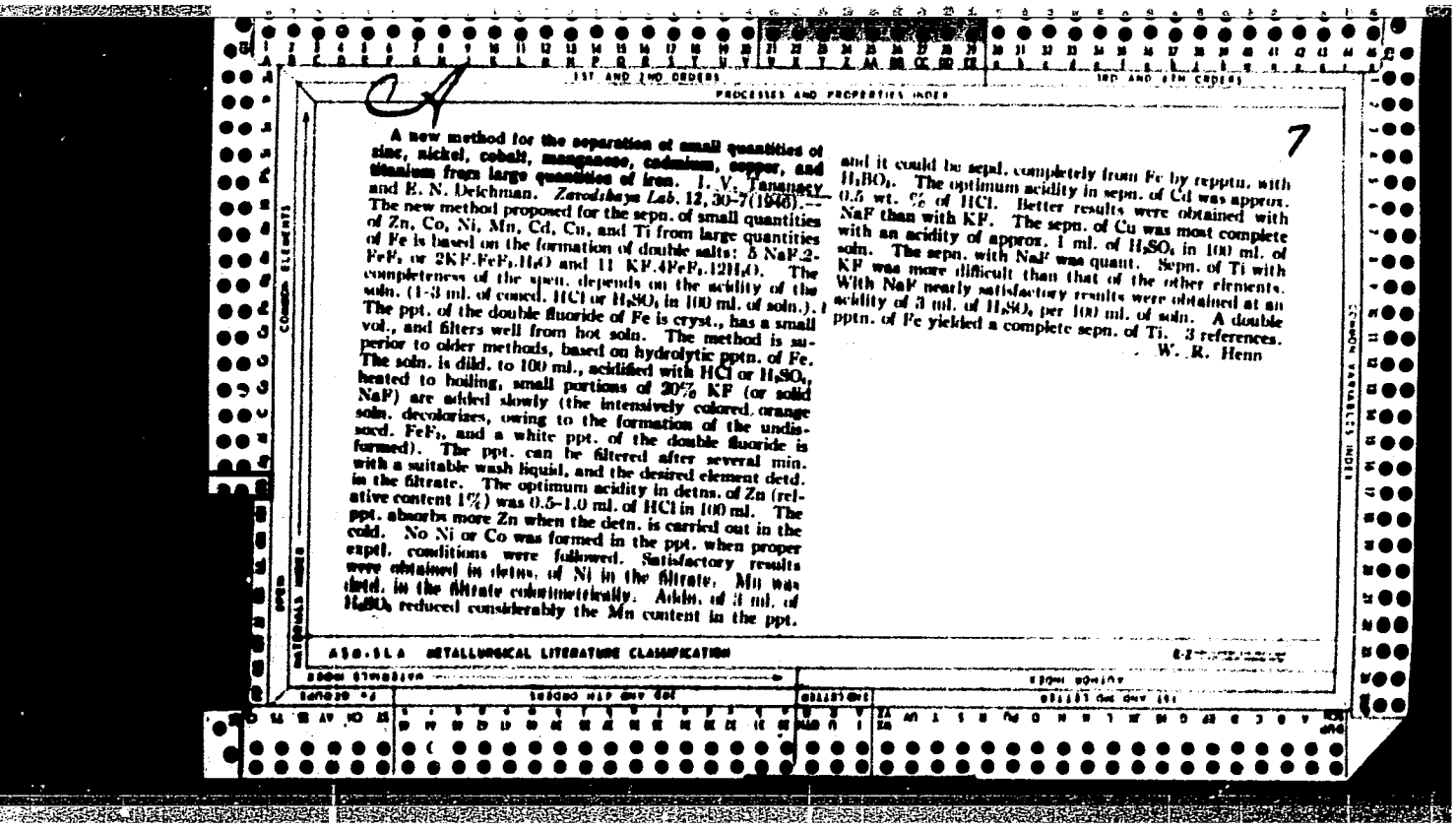

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

7

A new method for the separation of small quantities of zinc, nickel, cobalt, manganese, cadmium, copper, and titanium from large quantities of iron. I. V. Tananaev and E. N. Deichman. *Zavodskaya Lab.* 12, 30–7(1946).—The new method proposed for the sepn. of small quantities of Zn, Co, Ni, Mn, Cd, Cu, and Ti from large quantities of Fe is based on the formation of double salts: 5 NaF.2-FeF_3 or $2KF.FeF_3.H_2O$ and 11 $KF.4FeF_3.12H_2O$. The completeness of the sepn. depends on the acidity of the soln. (1–3 ml. of concd. HCl or H_2SO_4 in 100 ml. of soln.). The ppt. of the double fluoride of Fe is cryst., has a small vol., and filters well from hot soln. The method is superior to older methods, based on hydrolytic pptn. of Fe. The soln. is dild. to 100 ml., acidified with HCl or H_2SO_4, heated to boiling, small portions of 20% KF (or solid NaF) are added slowly (the intensively colored, orange soln. decolorizes, owing to the formation of the undissocd. FeF_3, and a white ppt. of the double fluoride is formed). The ppt. can be filtered after several min. with a suitable wash liquid, and the desired element detd. in the filtrate. The optimum acidity in detns. of Zn (relative content 1%) was 0.5–1.0 ml. of HCl in 100 ml. The ppt. absorbs more Zn when the detn. is carried out in the cold. No Ni or Co was formed in the ppt. when proper exptl. conditions were followed. Satisfactory results were obtained in detns. of Ni in the filtrate. Mn was detd. in the filtrate colorimetrically. Addn. of 3 ml. of H_3BO_3 reduced considerably the Mn content in the ppt. and it could be sepd. completely from Fe by repptn. with H_3BO_3. The optimum acidity in sepn. of Cd was approx. 0.5 wt. % of HCl. Better results were obtained with NaF than with KF. The sepn. of Cu was most complete with an acidity of approx. 1 ml. of H_2SO_4 in 100 ml. of soln. The sepn. with NaF was quant. Sepn. of Ti with KF was more difficult than that of the other elements. With NaF nearly satisfactory results were obtained at an acidity of 3 ml. of H_2SO_4 per 100 ml. of soln. A double pptn. of Fe yielded a complete sepn. of Ti. 3 references.

W. R. Henn

A50-51A METALLURGICAL LITERATURE CLASSIFICATION

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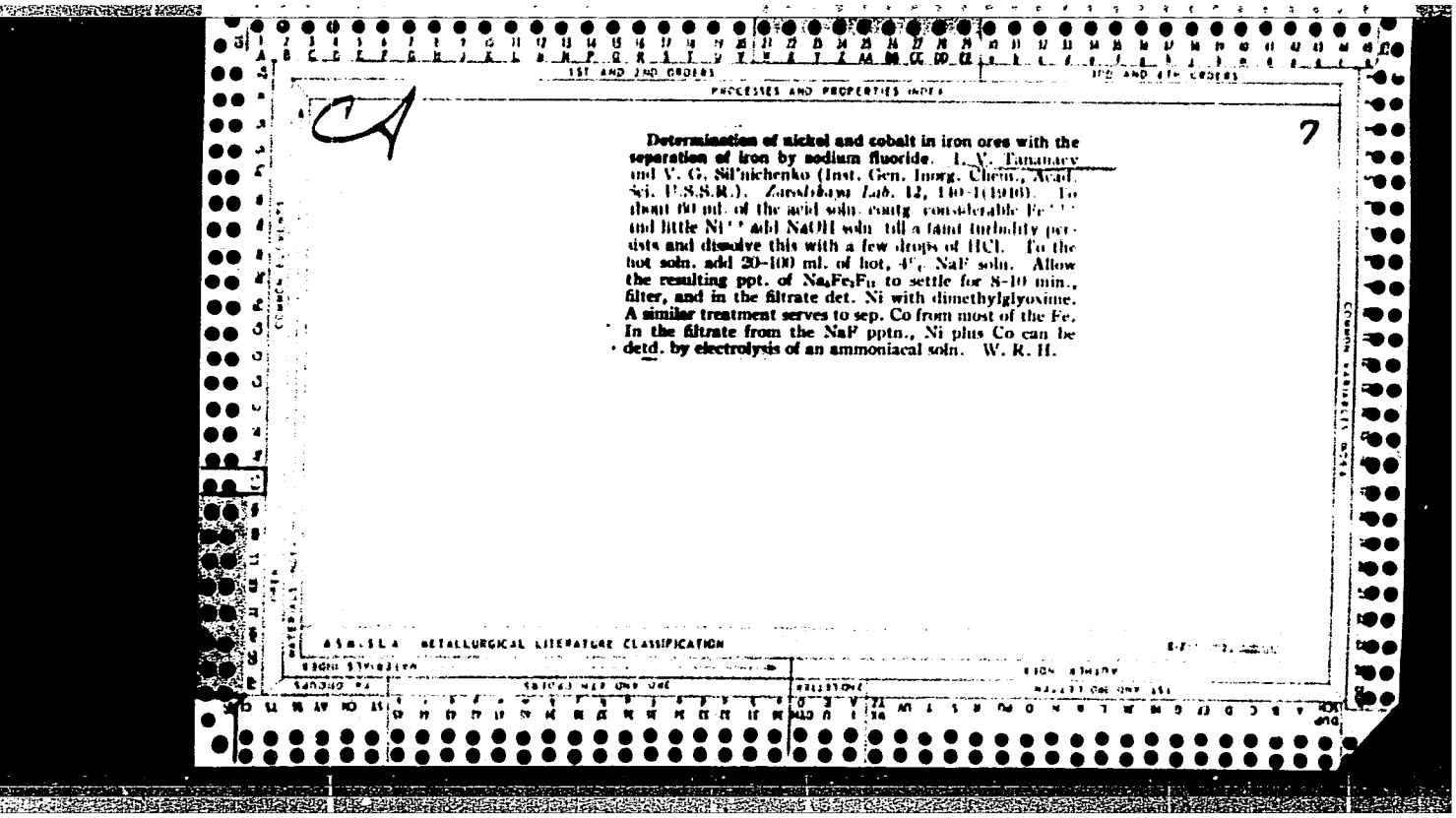

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

7

Determination of nickel and cobalt in iron ores with the separation of iron by sodium fluoride. I. V. Tananaev and V. G. Sil'nichenko (Inst. Gen. Inorg. Chem., Acad. Sci. U.S.S.R.). *Zavodskaya Lab.* 12, 140-1(1946). To about 50 ml. of the acid soln. containg considerable Fe^{+++} and little Ni^{++} add NaOH soln. till a faint turbidity persists and dissolve this with a few drops of HCl. To the hot soln. add 20-100 ml. of hot, 4% NaF soln. Allow the resulting ppt. of Na_3FeF_6 to settle for 8-10 min., filter, and in the filtrate det. Ni with dimethylglyoxime. A similar treatment serves to sep. Co from most of the Fe. In the filtrate from the NaF pptn., Ni plus Co can be detd. by electrolysis of an ammoniacal soln. W. R. H.

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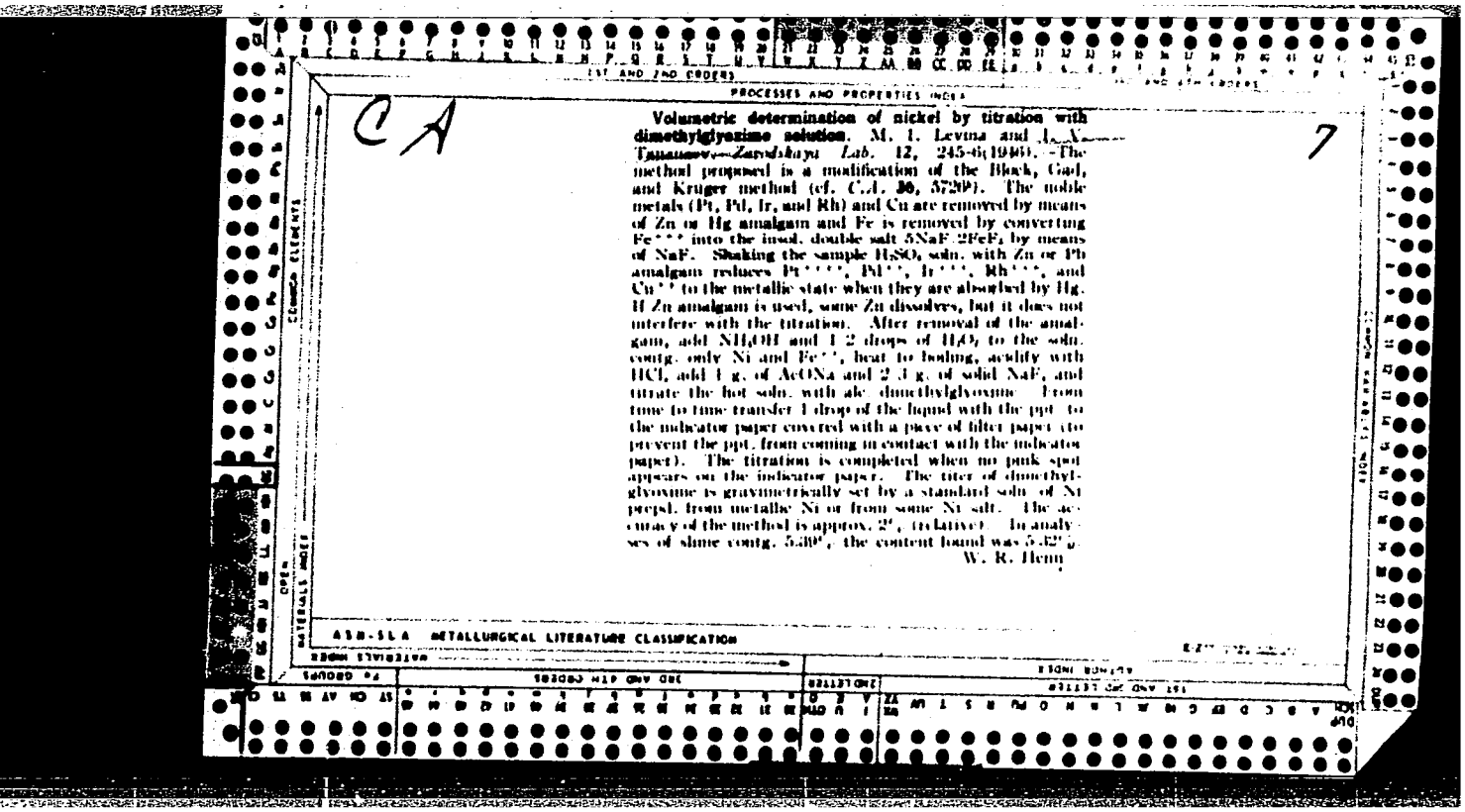

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PROCESSES AND PROPERTIES INDEX

Volumetric determination of nickel by titration with dimethylglyoxime solution. M. I. Levina and [illegible] Tumanova—*Zavodskaya Lab.* 12, 245-6(1946).—The method proposed is a modification of the Black, Gad, and Kruger method (cf. *C.A.* **36**, 5729). The noble metals (Pt, Pd, Ir, and Rh) and Cu are removed by means of Zn or Hg amalgam and Fe is removed by converting Fe^{+++} into the insol. double salt $5NaF \cdot 2FeF_3$ by means of NaF. Shaking the sample H_2SO_4 soln. with Zn or Pb amalgam reduces Pt^{++++}, Pd^{++}, Ir^{+++}, Rh^{+++}, and Cu^{++} to the metallic state when they are absorbed by Hg. If Zn amalgam is used, some Zn dissolves, but it does not interfere with the titration. After removal of the amalgam, add NH_4OH and 1-2 drops of H_2O_2 to the soln. contg. only Ni and Fe^{++}, heat to boiling, acidify with HCl, add 1 g. of AcONa and 2-3 g. of solid NaF, and titrate the hot soln. with alc. dimethylglyoxime. From time to time transfer 1 drop of the liquid with the ppt. to the indicator paper covered with a piece of filter paper (to prevent the ppt. from coming in contact with the indicator paper). The titration is completed when no pink spot appears on the indicator paper. The titer of dimethylglyoxime is gravimetrically set by a standard soln. of Ni prepd. from metallic Ni or from some Ni salt. The accuracy of the method is approx. 2% (relative). In analyses of slime contg. 5.80% the content found was 5.82%.

W. R. Henn

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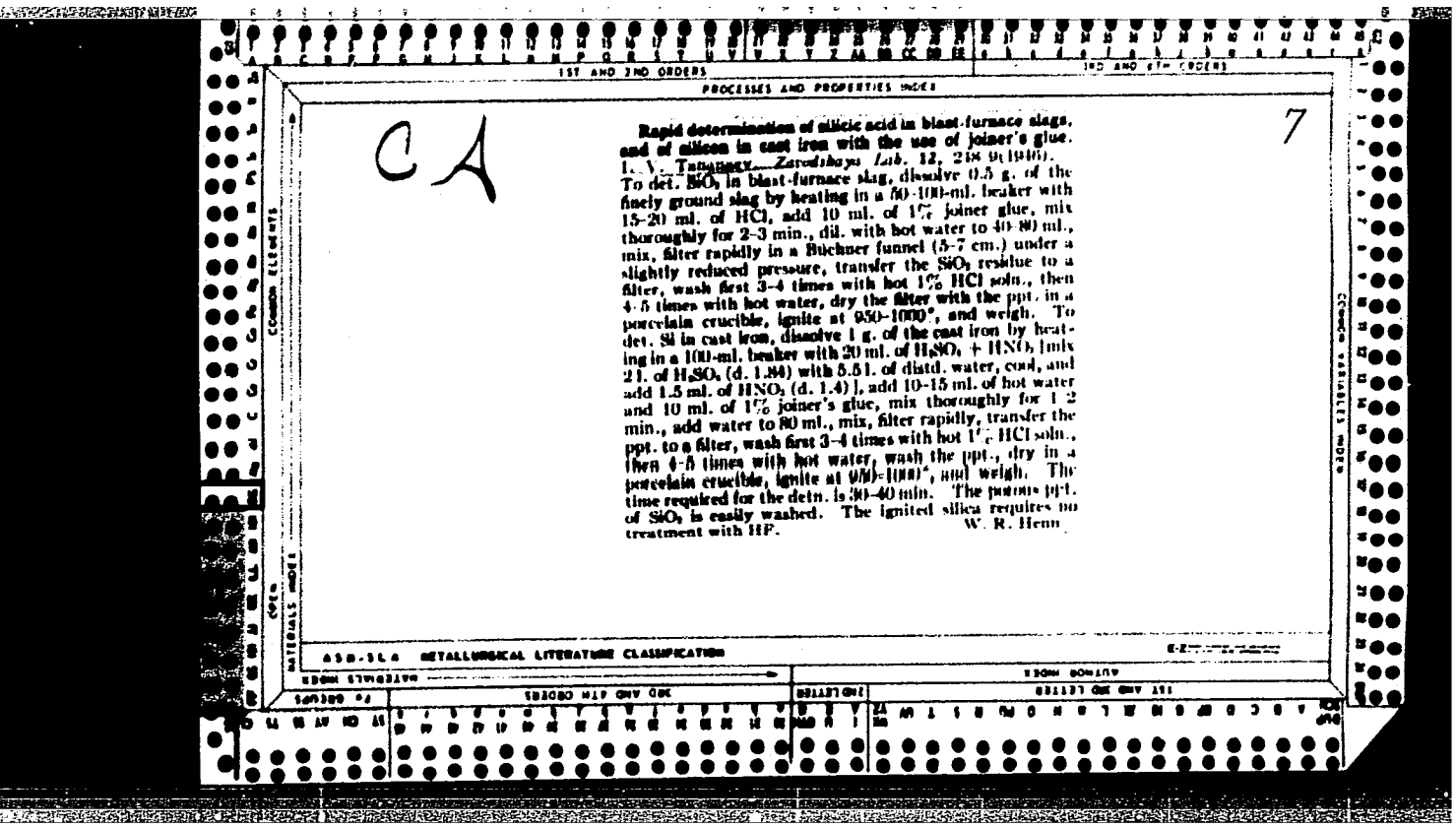

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Rapid determination of silicic acid in blast-furnace slags, and of silicon in cast iron with the use of joiner's glue. I. V. Tananaev. *Zavodskaya Lab.* 12, 248-9(1940). To det. SiO_2 in blast-furnace slag, dissolve 0.5 g. of the finely ground slag by heating in a 50-100-ml. beaker with 15-20 ml. of HCl, add 10 ml. of 1% joiner glue, mix thoroughly for 2-3 min., dil. with hot water to 40-80 ml., mix, filter rapidly in a Buchner funnel (5-7 cm.) under a slightly reduced pressure, transfer the SiO_2 residue to a filter, wash first 3-4 times with hot 1% HCl soln., then 4-5 times with hot water, dry the filter with the ppt. in a porcelain crucible, ignite at 950-1000°, and weigh. To det. Si in cast iron, dissolve 1 g. of the cast iron by heating in a 100-ml. beaker with 20 ml. of H_2SO_4 + HNO_3 [mix 21. of H_2SO_4 (d. 1.84) with 5.5 l. of distd. water, cool, and add 1.5 ml. of HNO_3 (d. 1.4)], add 10-15 ml. of hot water and 10 ml. of 1% joiner's glue, mix thoroughly for 1-2 min., add water to 80 ml., mix, filter rapidly, transfer the ppt. to a filter, wash first 3-4 times with hot 1% HCl soln., then 4-5 times with hot water, wash the ppt., dry in a porcelain crucible, ignite at 950-1000°, and weigh. The time required for the detn. is 30-40 min. The pptns ppt. of SiO_2 is easily washed. The ignited silica requires no treatment with HF. W. R. Henn

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

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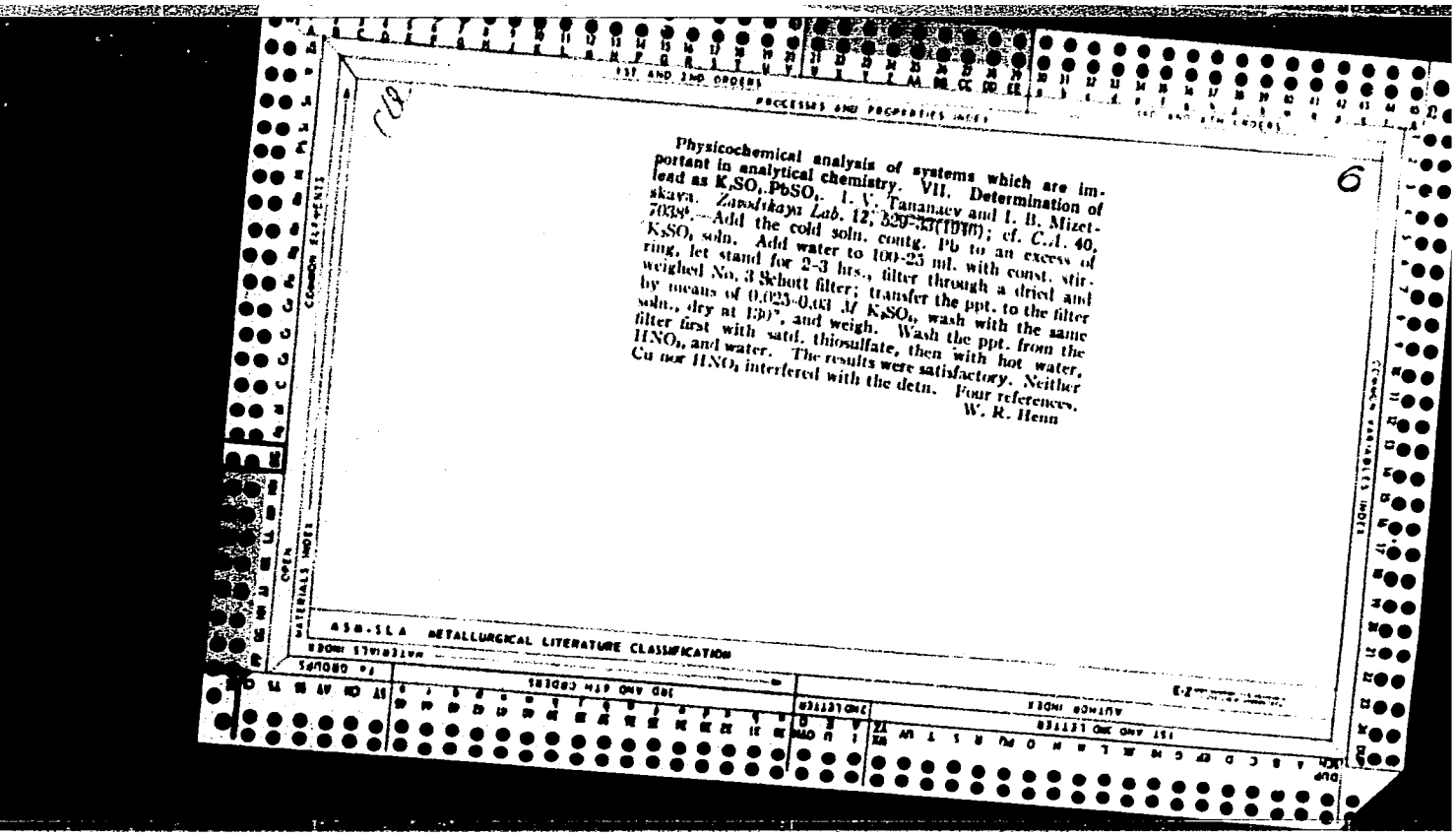

Physicochemical analysis of systems which are important in analytical chemistry. VII. Determination of lead as $K_2SO_4.PbSO_4$. I. V. Tananaev and I. B. Mizetskaya. *Zavodskaya Lab.* 12, 529-33(1946); cf. *C.A.* 40, 7038[6].—Add the cold soln. contg. Pb to an excess of K_2SO_4 soln. Add water to 100-25 ml. with const. stirring, let stand for 2-3 hrs., filter through a dried and weighed No. 3 Schott filter; transfer the ppt. to the filter by means of 0.025-0.03 *M* K_2SO_4, wash with the same soln., dry at 130°, and weigh. Wash the ppt. from the filter first with satd. thiosulfate, then with hot water, HNO_3, and water. The results were satisfactory. Neither Cu nor HNO_3 interfered with the detn. Four references.

W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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TANANAYEV, I.V.

PA 13T41

USSR/Chemistry - Systems
Chemistry - Iron compounds

Sep 1946

"Physico-chemical Analysis of Systems of an Analytical Significance: VI, On the Solubility (25°) in the System FeF_3 - HF - H_2O," I. V. Tananayev, E. N. Deichman, 11 pp

"Zhur Prik Khim" Vol XIX, No 4

Elaboration of a method of synthesis of $FeF_3 - 3H_2O$ and data on the optical, roentgenographical and thermographical investigations of this salt.

13T41

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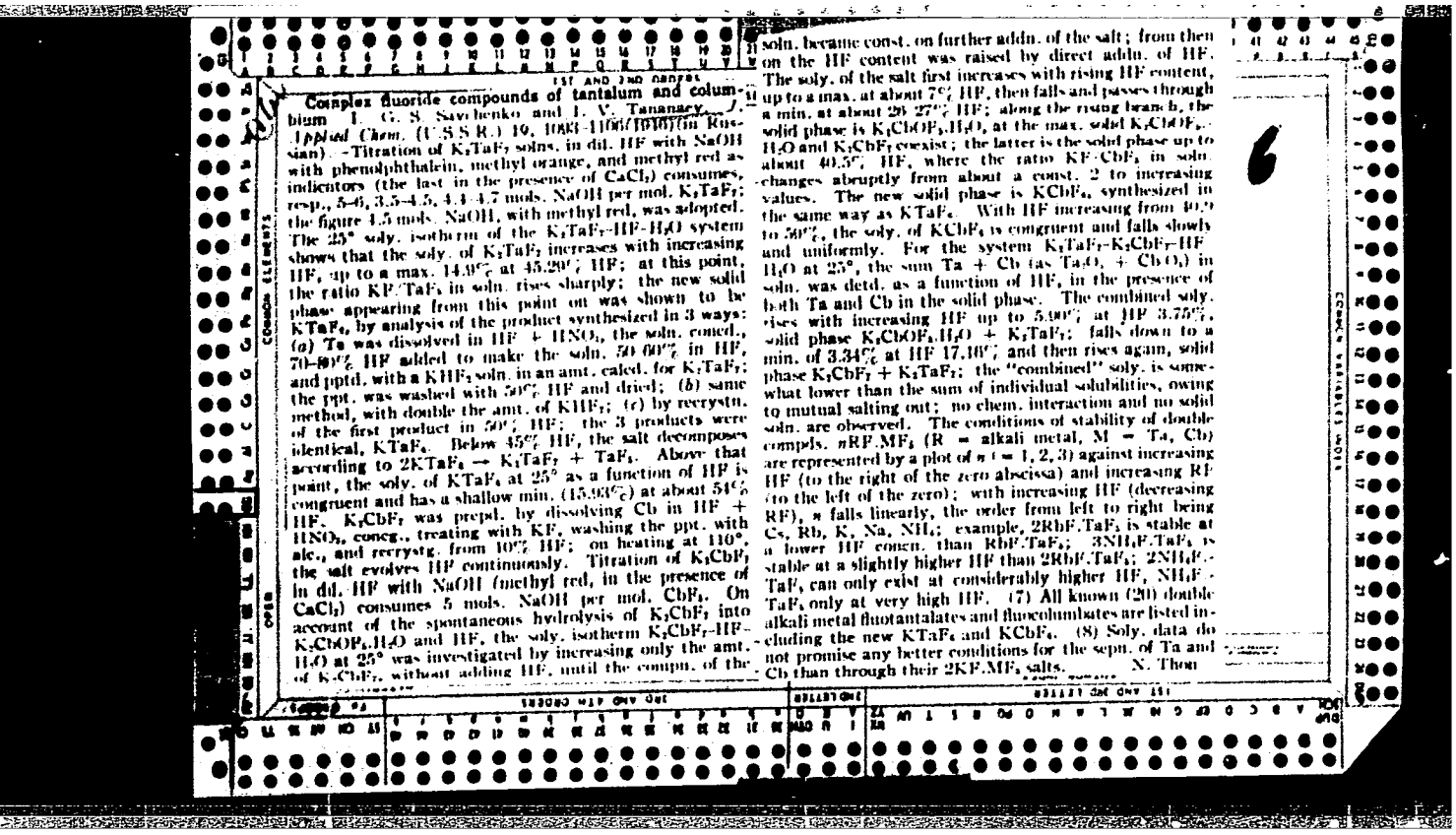

Complex fluoride compounds of tantalum and columbium. I. G. S. Savchenko and I. V. Tananaev. *J. Applied Chem.* (U.S.S.R.) 10, 1083–1100(1937)(in Russian).—Titration of K_2TaF_7 solns. in dil. HF with NaOH with phenolphthalein, methyl orange, and methyl red as indicators (the last in the presence of $CaCl_2$) consumes, resp., 5–6, 3.5–4.5, 4.4–4.7 mols. NaOH per mol. K_2TaF_7; the figure 4.5 mols. NaOH, with methyl red, was adopted. The 25° soly. isotherm of the K_2TaF_7–HF–H_2O system shows that the soly. of K_2TaF_7 increases with increasing HF, up to a max. 14.9% at 45.29% HF; at this point, the ratio KF:TaF_5 in soln. rises sharply; the new solid phase appearing from this point on was shown to be $KTaF_6$, by analysis of the product synthesized in 3 ways: (*a*) Ta was dissolved in HF + HNO_3, the soln. concd., 70–80% HF added to make the soln. 50.60% in HF, and pptd. with a KHF_2 soln. in an amt. calcd. for K_2TaF_7; the ppt. was washed with 50% HF and dried; (*b*) same method, with double the amt. of KHF_2; (*c*) by recrystn. of the first product in 50% HF; the 3 products were identical, $KTaF_6$. Below 45% HF, the salt decomposes according to $2KTaF_6 \rightarrow K_2TaF_7 + TaF_5$. Above that point, the soly. of $KTaF_6$ at 25° as a function of HF is congruent and has a shallow min. (15.93%) at about 54% HF. K_2CbF_7 was prepd. by dissolving Cb in HF + HNO_3, concg., treating with KF, washing the ppt. with alc., and recrystg. from 10% HF; on heating at 110°, the salt evolves HF continuously. Titration of K_2CbF_7 in dil. HF with NaOH (methyl red, in the presence of $CaCl_2$) consumes 5 mols. NaOH per mol. CbF_5. On account of the spontaneous hydrolysis of K_2CbF_7 into $K_2CbOF_5.H_2O$ and HF, the soly. isotherm K_2CbF_7–HF–H_2O at 25° was investigated by increasing only the amt. of K_2CbF_7, without adding HF, until the compn. of the soln. became const. on further addn. of the salt; from then on the HF content was raised by direct addn. of HF. The soly. of the salt first increases with rising HF content, up to a max. at about 7% HF, then falls and passes through a min. at about 26–27% HF; along the rising branch, the solid phase is $K_2CbOF_5.H_2O$, at the max. solid $K_2CbOF_5.H_2O$ and K_2CbF_7 coexist; the latter is the solid phase up to about 40.5% HF, where the ratio KF:CbF_5 in soln. changes abruptly from about 2 to increasing values. The new solid phase is $KCbF_6$, synthesized in the same way as $KTaF_6$. With HF increasing from 40.9 to 50%, the soly. of $KCbF_6$ is congruent and falls slowly and uniformly. For the system K_2TaF_7–K_2CbF_7–HF–H_2O at 25°, the sum Ta + Cb (as Ta_2O_5 + Cb_2O_5) in soln. was detd. as a function of HF, in the presence of both Ta and Cb in the solid phase. The combined soly. rises with increasing HF up to 5.90% at HF 3.75%, solid phase $K_2CbOF_5.H_2O$ + K_2TaF_7; falls down to a min. of 3.34% at HF 17.10% and then rises again, solid phase K_2CbF_7 + K_2TaF_7; the "combined" soly. is somewhat lower than the sum of individual solubilities, owing to mutual salting out; no chem. interaction and no solid soln. are observed. The conditions of stability of double compds., $nRF.MF_5$ (R = alkali metal, M = Ta, Cb) are represented by a plot of n (= 1, 2, 3) against increasing HF (to the right of the zero abscissa) and increasing RF (to the left of the zero); with increasing HF (decreasing RF), n falls linearly, the order from left to right being Cs, Rb, K, Na, NH_4; example, $2RbF.TaF_5$ is stable at a lower HF concn. than $RbF.TaF_5$; $3NH_4F.TaF_5$ is stable at a slightly higher HF than $2RbF.TaF_5$; $2NH_4F.TaF_5$ can only exist at considerably higher HF, $NH_4F.TaF_5$ only at very high HF. (7) All known (20) double alkali metal fluotantalates and fluocolumbates are listed including the new $KTaF_6$ and $KCbF_6$. (8) Soly. data do not promise any better conditions for the sepn. of Ta and Cb than through their $2KF.MF_5$ salts. N. Thon

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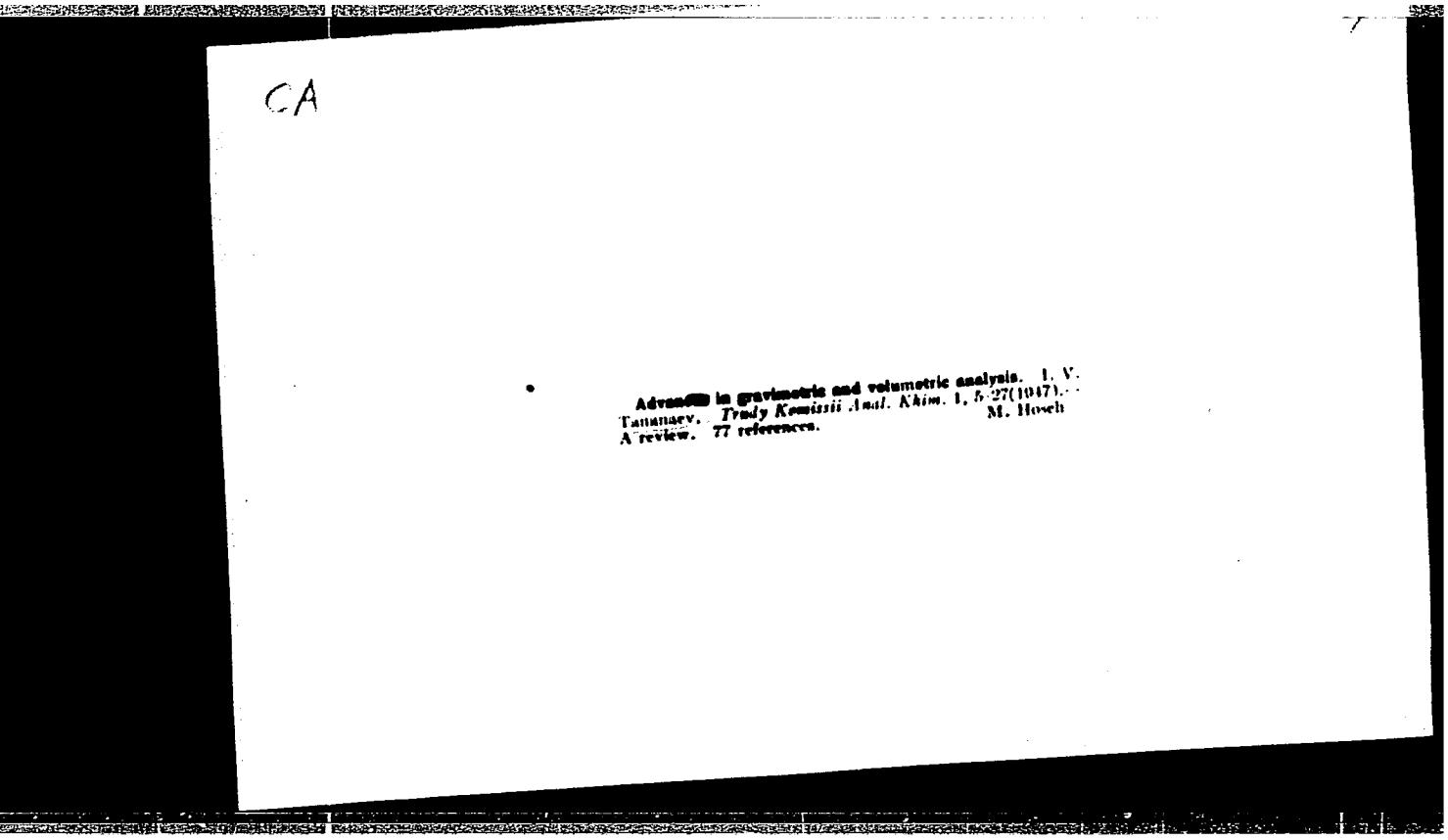

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Advances in gravimetric and volumetric analysis. I. V. Tananaev. *Trudy Komissii Anal. Khim.* I, 5-27(1947). M. Hoseh
A review. 77 references.

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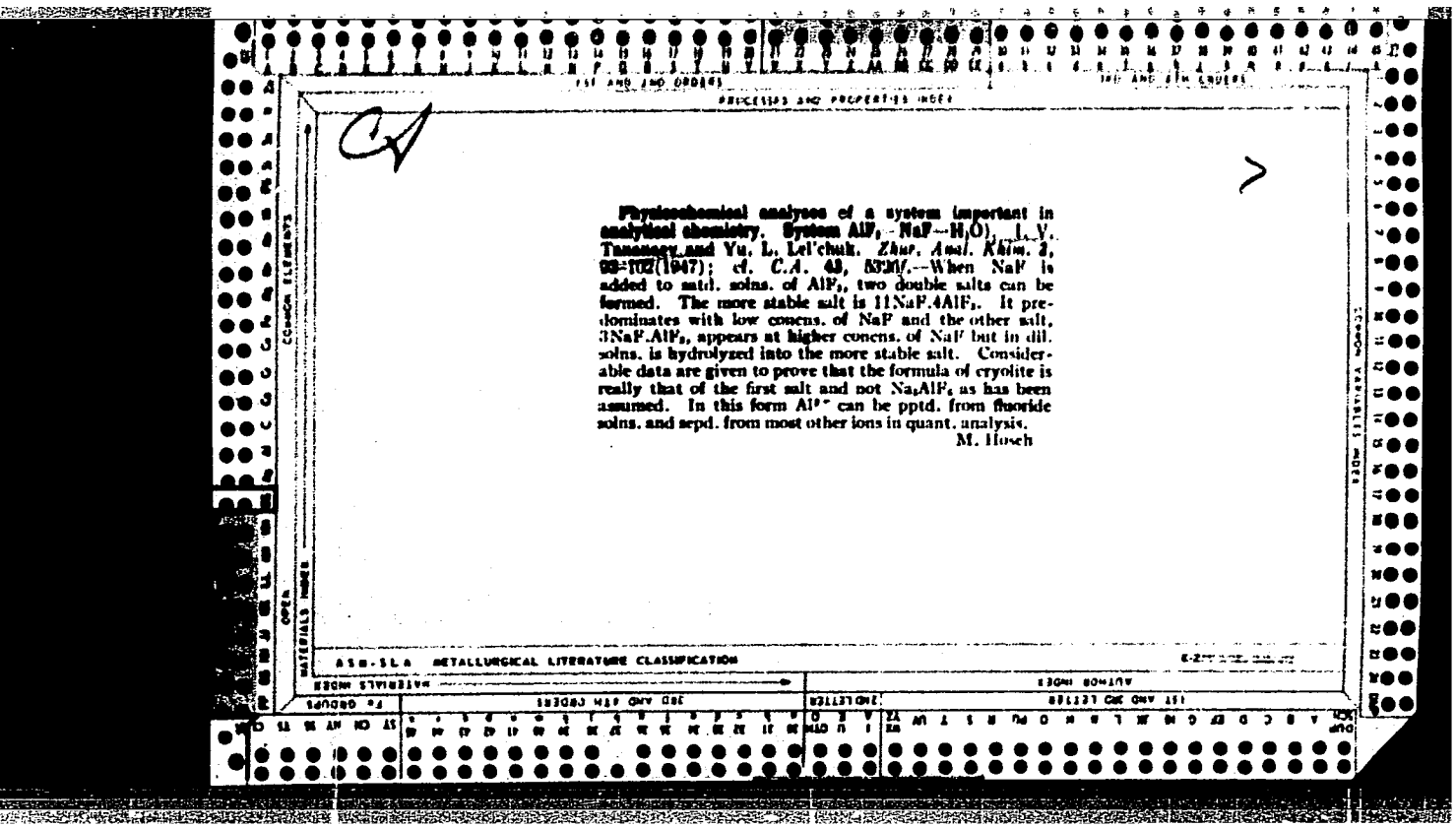

Physicochemical analyses of a system important in analytical chemistry. System AlF_3–NaF–H_2O). L. V. Tananaev and Yu. L. Lel'chuk. *Zhur. Anal. Khim.* 2, 93–102(1947); cf. *C.A.* 43, 8330f.—When NaF is added to satd. solns. of AlF_3, two double salts can be formed. The more stable salt is $11NaF.4AlF_3$. It predominates with low concns. of NaF and the other salt, $3NaF.AlF_3$, appears at higher concns. of NaF but in dil. solns. is hydrolyzed into the more stable salt. Considerable data are given to prove that the formula of cryolite is really that of the first salt and not Na_3AlF_6 as has been assumed. In this form Al^{+++} can be pptd. from fluoride solns. and sepd. from most other ions in quant. analysis.

M. Hosch

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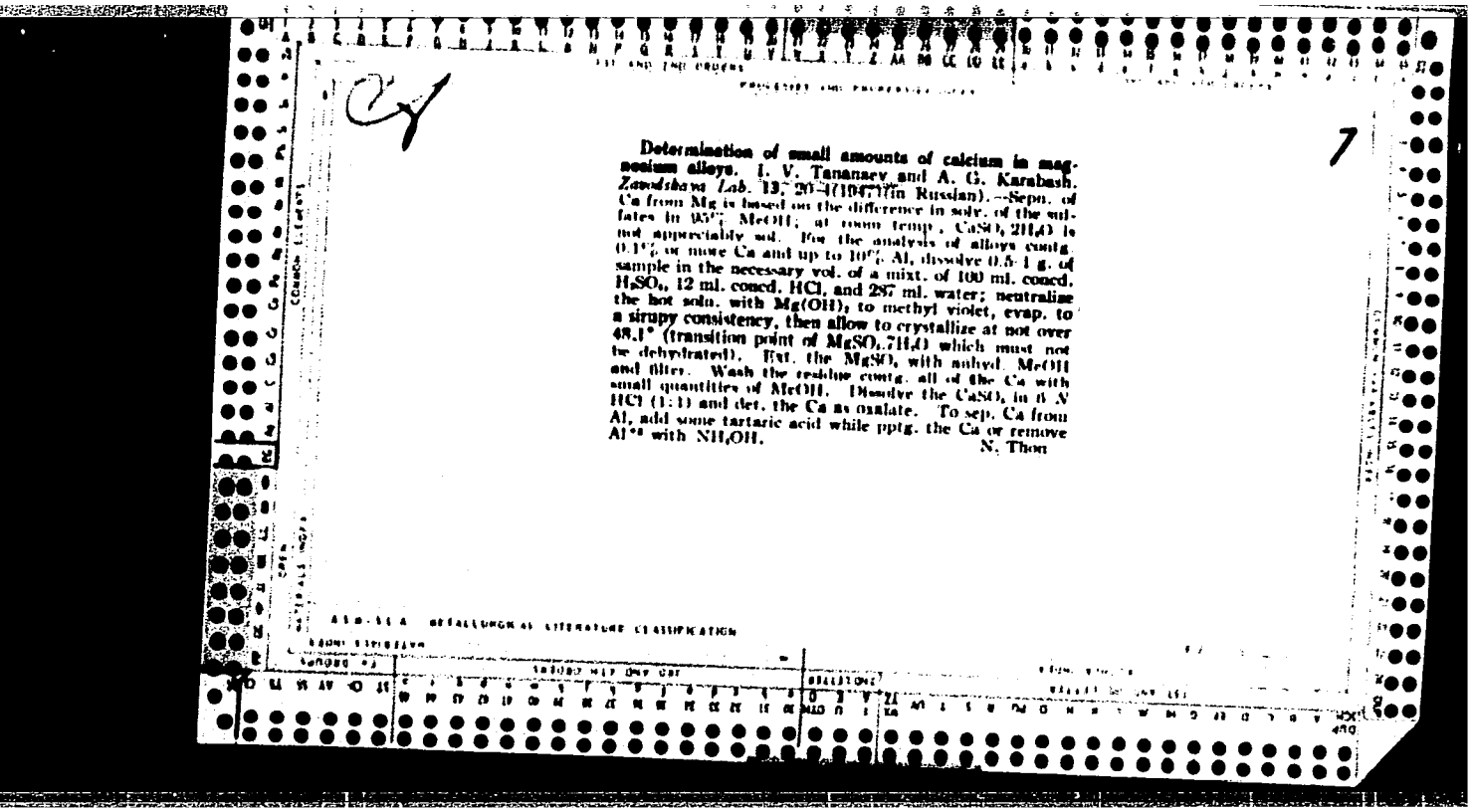

Determination of small amounts of calcium in magnesium alloys. I. V. Tananaev and A. G. Karabash. *Zavodskaya Lab.* 13, 20–4(1947)(in Russian).—Sepn. of Ca from Mg is based on the difference in solv. of the sulfates in 85% MeOH; at room temp. $CaSO_4.2H_2O$ is not appreciably sol. For the analysis of alloys contg. 0.1% or more Ca and up to 10% Al, dissolve 0.5–1 g. of sample in the necessary vol. of a mixt. of 100 ml. concd. H_2SO_4, 12 ml. concd. HCl, and 287 ml. water; neutralize the hot soln. with $Mg(OH)_2$ to methyl violet, evap. to a syrupy consistency, then allow to crystallize at not over 48.1° (transition point of $MgSO_4.7H_2O$ which must not be dehydrated). Ext. the $MgSO_4$ with anhyd. MeOH and filter. Wash the residue contg. all of the Ca with small quantities of MeOH. Dissolve the $CaSO_4$ in 0.*N* HCl (1:1) and det. the Ca as oxalate. To sep. Ca from Al, add some tartaric acid while pptg. the Ca or remove Al^{+3} with NH_4OH.

N. Thon

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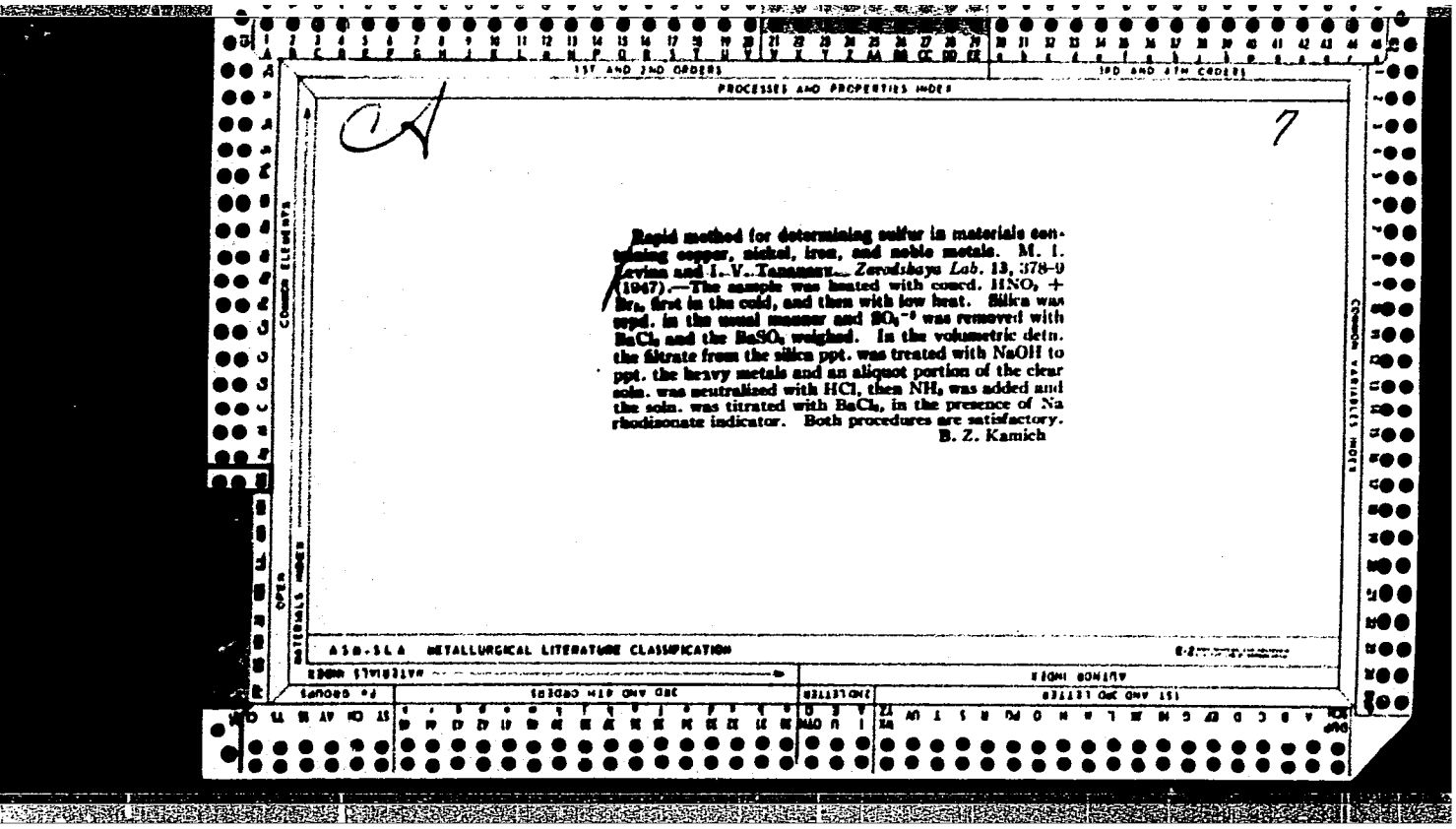

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

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Rapid method for determining sulfur in materials containing copper, nickel, iron, and noble metals. M. I. Levina and I. V. Tananaev. *Zavodskaya Lab.* 13, 378–9 (1947).—The sample was heated with concd. HNO_3 + Br_2, first in the cold, and then with low heat. Silica was ppd. in the usual manner and SO_4^{-2} was removed with $BaCl_2$ and the $BaSO_4$ weighed. In the volumetric detn. the filtrate from the silica ppt. was treated with NaOH to ppt. the heavy metals and an aliquot portion of the clear soln. was neutralized with HCl, then NH_3 was added and the soln. was titrated with $BaCl_2$, in the presence of Na rhodizonate indicator. Both procedures are satisfactory.
B. Z. Kamich

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

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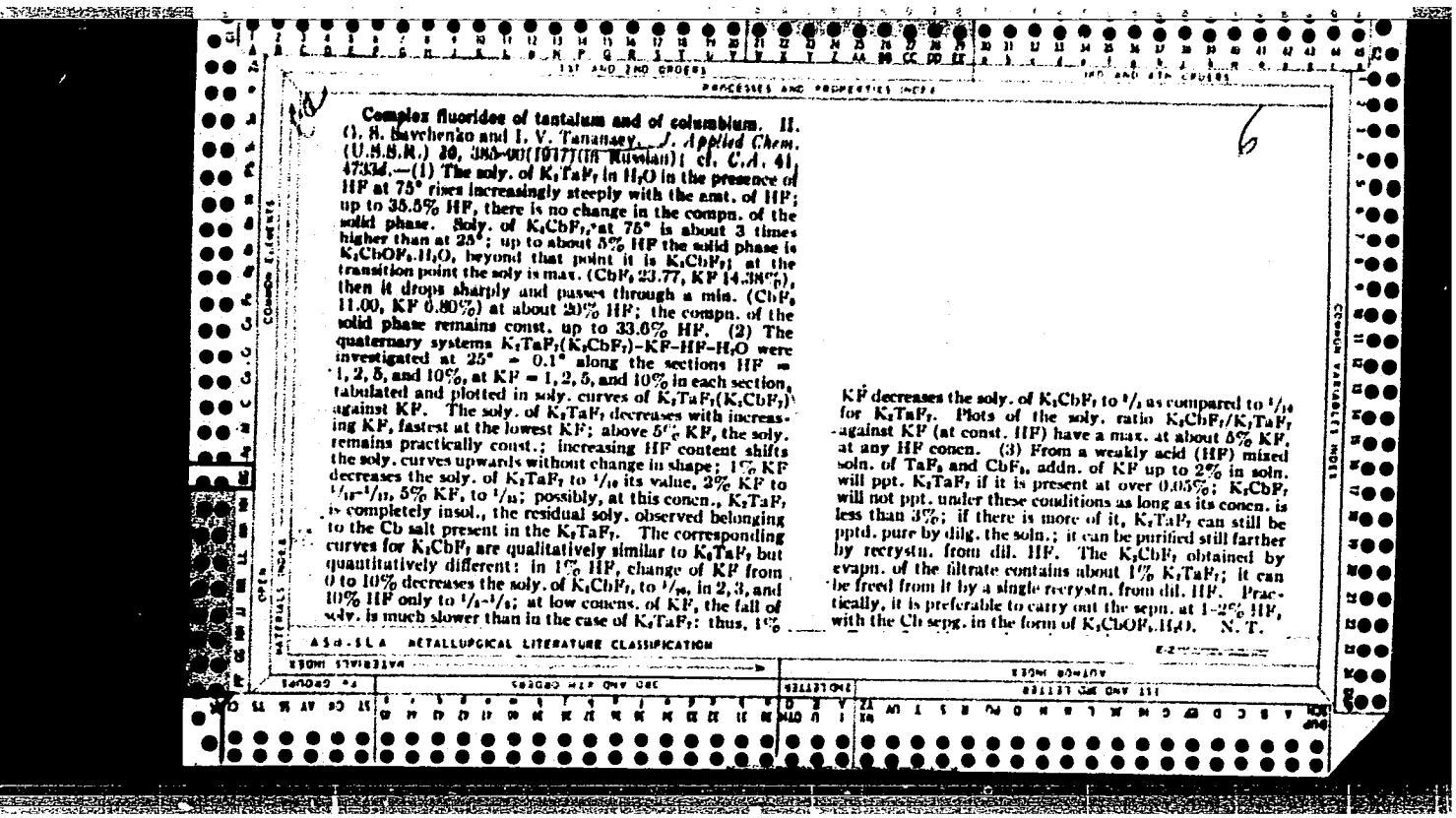

Complex fluorides of tantalum and of columbium. II. O. S. Ivavchenko and I. V. Tananaev. *J. Applied Chem. (U.S.S.R.)* **10**, 385-90 (1937) (in Russian); cf. *C.A.* **41**, 4733d.—(1) The soly. of K_2TaF_7 in H_2O in the presence of HF at 75° rises increasingly steeply with the amt. of HF; up to 35.5% HF, there is no change in the compn. of the solid phase. Soly. of K_2CbF_7 at 75° is about 3 times higher than at 25°; up to about 5% HF the solid phase is $K_2CbOF_5.H_2O$, beyond that point it is K_2CbF_7; at the transition point the soly. is max. (CbF_5 23.77, KF 14.38%), then it drops sharply and passes through a min. (CbF_5 11.00, KF 0.80%) at about 20% HF; the compn. of the solid phase remains const. up to 33.6% HF. (2) The quaternary systems $K_2TaF_7(K_2CbF_7)$–KF–HF–H_2O were investigated at 25° ± 0.1° along the sections HF = 1, 2, 5, and 10%, at KF = 1, 2, 5, and 10% in each section, tabulated and plotted in soly. curves of $K_2TaF_7(K_2CbF_7)$ against KF. The soly. of K_2TaF_7 decreases with increasing KF, fastest at the lowest KF; above 5% KF, the soly. remains practically const.; increasing HF content shifts the soly. curves upwards without change in shape; 1% KF decreases the soly. of K_2TaF_7 to $^1/_{10}$ its value, 2% KF to $^1/_{18}$–$^1/_{11}$, 5% KF, to $^1/_{31}$; possibly, at this concn., K_2TaF_7 is completely insol., the residual soly. observed belonging to the Cb salt present in the K_2TaF_7. The corresponding curves for K_2CbF_7 are qualitatively similar to K_2TaF_7 but quantitatively different: in 1% HF, change of KF from 0 to 10% decreases the soly. of K_2CbF_7 to $^1/_{16}$, in 2, 3, and 10% HF only to $^1/_{13}$–$^1/_6$; at low concns. of KF, the fall of soly. is much slower than in the case of K_2TaF_7: thus, 1% KF decreases the soly. of K_2CbF_7 to $^1/_3$ as compared to $^1/_{10}$ for K_2TaF_7. Plots of the soly. ratio K_2CbF_7/K_2TaF_7 against KF (at const. HF) have a max. at about 5% KF, at any HF concn. (3) From a weakly acid (HF) mixed soln. of TaF_5 and CbF_5, addn. of KF up to 2% in soln. will ppt. K_2TaF_7 if it is present at over 0.05%; K_2CbF_7 will not ppt. under these conditions as long as its concn. is less than 3%; if there is more of it, K_2TaF_7 can still be pptd. pure by dilg. the soln.; it can be purified still farther by recrystn. from dil. HF. The K_2CbF_7 obtained by evapn. of the filtrate contains about 1% K_2TaF_7; it can be freed from it by a single recrystn. from dil. HF. Practically, it is preferable to carry out the sepn. at 1–2% HF, with the Cb sepg. in the form of $K_2CbOF_5.H_2O$. N. T.

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1ST AND 2ND ORDERS

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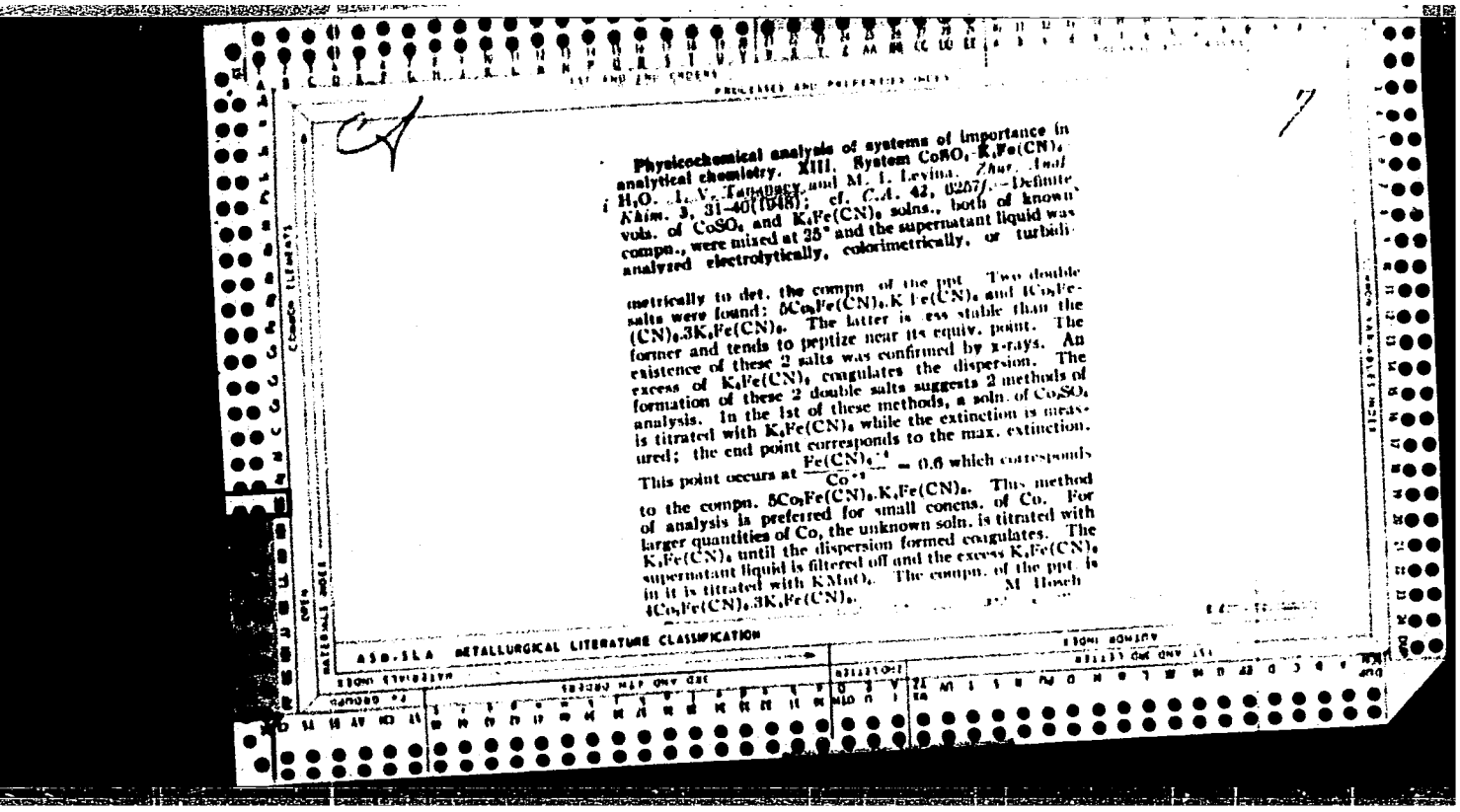

Physicochemical analysis of systems of importance in analytical chemistry. XIII. System $CoSO_4$-$K_4Fe(CN)_6$-H_2O. I. V. Tananaev and M. I. Levina. *Zhur. Anal. Khim.* 3, 31-40(1948); cf. *C.A.* 42, 6257f.—Definite vols. of $CoSO_4$ and $K_4Fe(CN)_6$ solns., both of known compn., were mixed at 25° and the supernatant liquid was analyzed electrolytically, colorimetrically, or turbidimetrically to det. the compn. of the ppt. Two double salts were found: $5Co_2Fe(CN)_6.K_4Fe(CN)_6$ and $4Co_2Fe(CN)_6.3K_4Fe(CN)_6$. The latter is less stable than the former and tends to peptize near its equiv. point. The existence of these 2 salts was confirmed by x-rays. An excess of $K_4Fe(CN)_6$ coagulates the dispersion. The formation of these 2 double salts suggests 2 methods of analysis. In the 1st of these methods, a soln. of $CoSO_4$ is titrated with $K_4Fe(CN)_6$ while the extinction is measured; the end point corresponds to the max. extinction. This point occurs at $\frac{Fe(CN)_6^{-4}}{Co^{+2}} = 0.6$ which corresponds to the compn. $5Co_2Fe(CN)_6.K_4Fe(CN)_6$. This method of analysis is preferred for small concns. of Co. For larger quantities of Co, the unknown soln. is titrated with $K_4Fe(CN)_6$ until the dispersion formed coagulates. The supernatant liquid is filtered off and the excess $K_4Fe(CN)_6$ in it is titrated with $KMnO_4$. The compn. of the ppt. is $4Co_2Fe(CN)_6.3K_4Fe(CN)_6$. M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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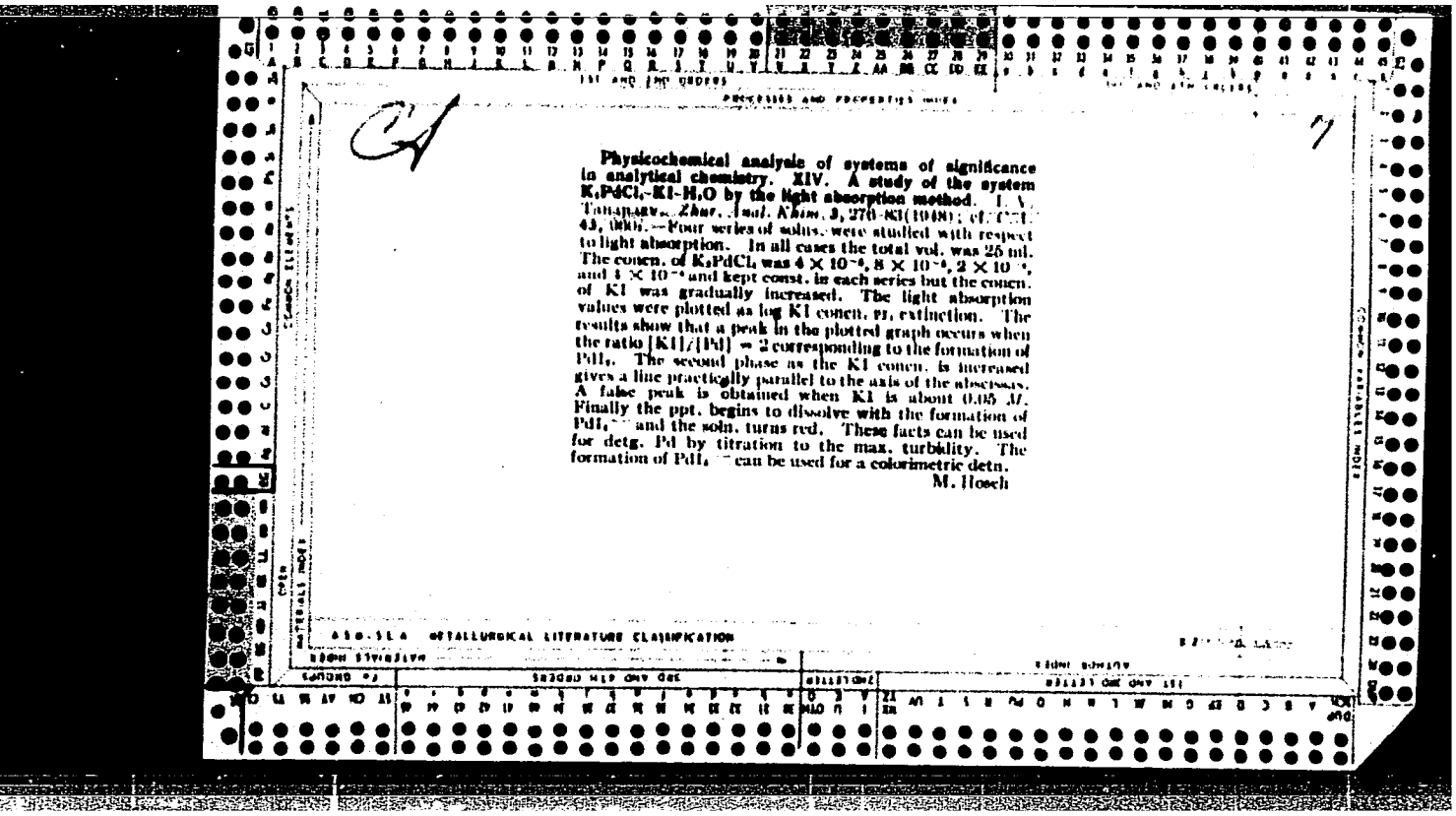

Physicochemical analysis of systems of significance in analytical chemistry. XIV. A study of the system K_2PdCl_4-KI-H_2O by the light absorption method. I. V. Tananaev. *Zhur. Anal. Khim.* 3, 270-83(1948); cf. *C.A.* 43, 1006.—Four series of solns. were studied with respect to light absorption. In all cases the total vol. was 25 ml. The concn. of K_2PdCl_4 was 4×10^{-4}, 8×10^{-4}, 2×10^{-3}, and 4×10^{-3} and kept const. in each series but the concn. of KI was gradually increased. The light absorption values were plotted as log KI concn. vs. extinction. The results show that a peak in the plotted graph occurs when the ratio [KI]/[Pd] = 2 corresponding to the formation of PdI_4^{--}. The second phase as the KI concn. is increased gives a line practically parallel to the axis of the abscissas. A false peak is obtained when KI is about 0.05 *M*. Finally the ppt. begins to dissolve with the formation of PdI_4^{--} and the soln. turns red. These facts can be used for detg. Pd by titration to the max. turbidity. The formation of PdI_4^{--} can be used for a colorimetric detn.

M. Hosch

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TANANAEV, I. V.

I. V. Tananaev and I. B. Migetskaya, A Physicochemical Analysis of Systems of Importance in Analytical Chemistry. Article VII. The System $PbSO_4$-H_2SO_4-H_2O and $PbSO_4$-$Pb(NO_3)_2$-H_2O. P. 391.

SO: Bulletin of the U.S.S.R. Academy of Sciences (Chemistry Series) Izvestia Akad. Nauk, S.S.S.R., No. 4, 1948.

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Physicochemical analysis of systems significant in analytical chemistry. IV. The interaction of $PtCl_4^{--}$ and I ions in aqueous solutions. I. V. Tananaev. *Izvest. Sektora Platiny i Drugikh Blagorod. Metal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* No. 21, 203-18 (1948).—Solns. of KI and $(NH_4)_2PtCl_6$ were combined in a manner such that the KI:Pt ratio was varied, and the color intensity of the resulting soln. was detd. in a photoelec. colorimeter. There were 2 series of solns.: in one of these the Pt content was const., in the other both the Pt and the KI were varied. The exptl. results were used for constructing a space diagram of state. Solns. having a color concn. too dense to be measured accurately were dild. Readings thus obtained were reproducible. Time required to attain equil. varied for different sections of the system. Where homogeneity was preserved, equil. was reached within 24 hrs.; where a ppt. formed, it required 7 or more days. In the series of solns. with a const. content of Pt, light absorption increased with the quantity of KI and reached a max. at KI:Pt = 4. Beyond this KI:Pt ratio, the absorption dropped until a ratio 6, after which there was a slight rise in absorption and a limiting value was reached. The curve KI:Pt ratio *vs.* difference in absorption between consecutively increasing KI:Pt ratios revealed 2 steps at ratio values of 2 and 4. This indicated the formation of $[PtI_2Cl_2]^{--}$ (or a soln. of PtI_2Cl_2) and PtI_4. On a Gibbs triangle were investigated 5 sections in which the reactants were at equal concns., their sum ranging from 0.0002 to 0.001 mol./l. and 15 sections with variable KI:Pt ratio varying from 0.09 to 23; thus 75 points were fixed on the diagram. A space diagram constructed from these results comprised 2 folds. Of these the larger one occupied almost the entire area of the triangle, it had a fairly sharp peak with a max. along a line corresponding to KI:Pt = 2. The 2nd fold was low and obtuse, and its geometry was characteristic of incongruent compns. Between these 2 folds was a trough the lowest line of which represented the geometric location of the isoelec. points of PtI_4. Along this line PtI_4 pptd. completely; on either side of this line the soly. of PtI_4 increased. The phase diagram indicated that at concns. up to 0.001 mol./l. were formed 2 chem. compns., $[PtI_2Cl_2]^{--}$ and PtI_4. The presence of an excess of Cl^- added as NaCl did not affect the tendency of I^- to replace Cl^-, although large concns. of NaCl did change the shape of the diagram. Next was studied the soly. of PtI_4 in the system PtI_4-KI-H_2O. Attempts at synthesizing PtI_4 by methods described in the literature were unsuccessful. In the presence of I^- quadrivalent Pt was reduced to bivalent and the formed I volatilized. To obtain pure PtI_4, a soln. of KI was added to a soln. of $(NH_4)_2PtCl_6$; 4 mols. of KI were used for each Pt. The mixt. was kept in a tightly closed container leaving no more than 1 cc. of air above the soln. The reaction lasted several days after which the supernatant liquid became clear. PtI_4 was filtered off, thoroughly washed, and dried at 100°. The soly. curve comprised 2 branches. The 1st of these corresponding to PtI_4 in the solid phase rose sharply with increasing concn. of KI in soln. until the latter was 0.6 mol./l. At this point PtI_4 transforms into K_2PtI_6 represented by the 2nd branch of the curve. The soly. of the complex salt decreases with the increasing KI concn. until it reaches practically zero when the soln. is satd. with KI. Based on the foregoing, the following procedure is recommended for detg. Pt. Have the analyzed soln. neutral, add 5 ml. of 10% KI soln., and allow to stand for 1 hr. Dil. to desired vol. and take a photocolorimeter reading. Det. concn. from a calibration curve prepd. from 0.001 *M* $(NH_4)_2PtCl_6$ using 0.2-10 ml. of Pt for individual points on the curve. Cf. *C.A.* 40, 7038[8]; 44, 2402*i*, 2883*f*.

M. Hoseh

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New method for separating noble metals from base metals with the aid of liquid amalgams and simultaneously utilizing them for determining iron, copper, and nickel. I. V. Tananaev and M. I. Levina. *Izvest. Sektora Platiny i Drugikh Blagorod. Metal., Inst. Obshchei i Neorg. Khim., Akad. Nauk S.S.S.R.* No. 22, 114-20(1948). This method is based on reducing the noble metals to the metallic state, Cu either to metal or to the univalent state, and Fe to the bivalent state. Fe, Cu, and Ni are then detd. titrimetrically. The reduction is effected by Zn, Pb, or Bi amalgams. Zn and Pb amalgams reduce the noble metals and Cu to metals, and Fe^{+++} to Fe^{++}. The reduction is carried out in dil. H_2SO_4 and Fe^{++} is then titrated with $K_2Cr_2O_7$ without filtering the soln. Another sample after soln. is reduced with Bi amalgam in dil. HCl. This reduces the noble metals to metal, and Cu and Fe to a lower valency. The sum of the 2 is titrated with $K_2Cr_2O_7$ and Cu is found by difference. Ni is detd. by titration with an alc. soln. of dimethylglyoxime. This titration is carried out in an aliquot of the H_2SO_4-reduced soln. after blocking the Fe with NaF or KF, and buffering the soln. with Na acetate. M. Hoseh

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TANANAYEV, I. V.

USSR/Chemistry - Beryllium Fluoride Mar/Apr 49
Chemistry - Solubility

"Some Properties of Beryllium Fluoride in Solutions Part II," I. V. Tananayev, E. N. Deychman, Inst of Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR, 7½ pp

"Iz Ak Nauk SSSR, Otdel Khim Nauk" No 2

Finds by a study of the solubility of CaF_2, PbFCl, and LiF in solutions of $Be(NO_3)_2$, with concentrations from 0.001 -- 1 mol/l, that quantity dissolving is large enough to be explained by formation of slightly dissociated products of the

43/49T12

USSR/Chemistry - Beryllium Fluoride Mar/Apr 49
(Contd)

combination of beryllium and fluorine ions. Shows by calculations that stable slightly dissociated products are: ion BeF^+ ($k_{BeF^+} = 5.1 \cdot 10^{-5}$) and BeF_2 ($k_{BeF_2} = 0.01$). Concludes that complex ions BeF_3^- and BeF_4^{--} are very unstable. Submitted 28 Jun 48.

43/49T12

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C A

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Physicochemical analysis of systems significant in analytical chemistry. XV. Phototurbidimetric determination of palladium. I. V. Tananaev, *Zavod. Lab. Khim.* 4, 67-74(1940); cf. C.A. 49, 8913f. Physicochemical studies show that a soln. of K_2PdCl_4 which is 0.05-0.00 *N* HCl can be titrated with standard KI soln. and the end point corresponding to the complete formation of PdI_2 detd. by measuring the light absorption in a photometer. Solns. contg. 0.001 mol. per l. of K_2PdCl_4 gave good results when 25 ml. portions were titrated with dil. KI soln. M. Hosch

Inst. Gen. + Inorg. Chem. im. Kurnakov,
AN SSSR.

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Physicochemical analysis of systems significant in analytical chemistry. XVI. Study of the kinetics of palladium iodide coagulation by means of light absorption. I. V. Tananaev (Acad. Sci. U.S.S.R.). *Zhur. Anal. Khim.* 4, 138-48(1949); cf. *C.A.* 44, 479a.—Since the light absorption of a system contg. a ppt. is greatly affected by the degree of dispersion of the ppt., this study dealt with the light absorption of a system contg. a sol, a coagulant, and a dispersant. The systems studied were PdI_2–LiCl–H_2O and PdI_2–KI (excess)–LiCl–H_2O. In the former, at small concns. of LiCl (or 0.05 mol./l.), the light absorption was not affected by time, remaining const. for 24 hrs. Above 0.05 mol./l., the system underwent various changes during 1 hr. until the ppt. settled out leaving the soln. clear. At still higher concns. of LiCl the rate of coagulation increased, reaching a max. of 2 min. As the rate of coagulation increased, the max. extinction value rose to a max. and then dropped sharply. Projected in space, the system is delineated by 2 planes formed by LiCl concns. of 0-0.5 and 2 mol./l. and more. Within these planes the system is static whereas in the space between them the system is highly dynamic. In the system contg. KI (excess), the max. extinction value for any one system was higher than for a comparative system contg. no KI. Also, the drop of extinction max. was slower in systems contg. KI. In a system contg. a ppt. its precipitant, and an outside electrolyte, the interaction between them is quite obvious but the quant. relation is as yet unknown. When coagulation is studied with the aid of light

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absorption, stirring is of importance. Stirring does not affect the max. of light absorption, but when this point is reached the stirring becomes paramount. This is primarily due to the mutual attractive forces of individual particle of the ppt, and the distance between these particles. M. Busch

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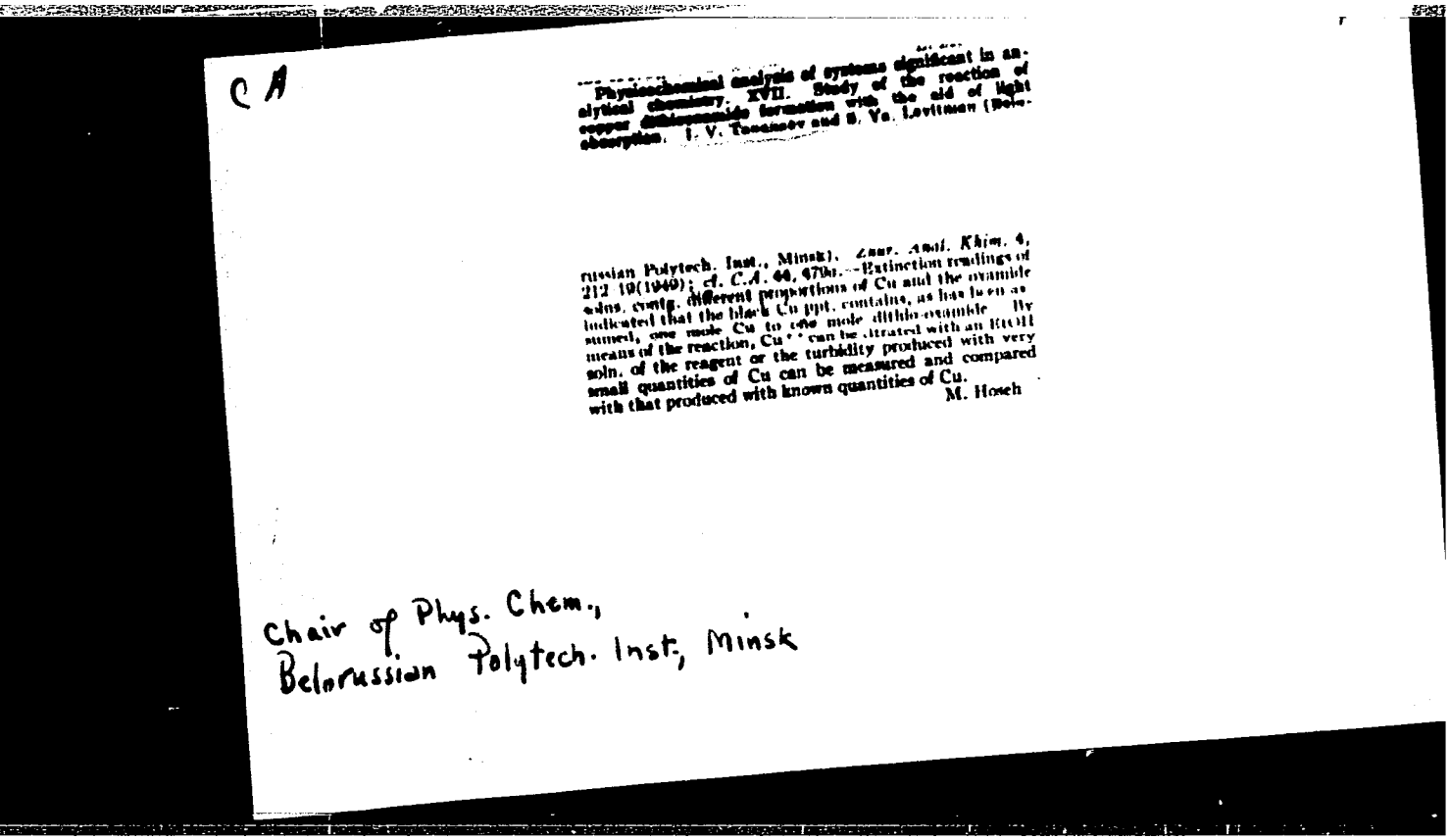

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Physicochemical analysis of systems significant in analytical chemistry. XVII. Study of the reaction of copper dithiooxamide formation with the aid of light absorption. I. V. Tananaev and S. Ya. Levitman (Belo-

russian Polytech. Inst., Minsk). *Zhur. Anal. Khim.* 4, 212-19(1949); cf. *C.A.* 44, 479a.—Extinction readings of solns. contg. different proportions of Cu and the oxamide indicated that the black Cu ppt. contains, as has been assumed, one mole Cu to one mole dithio-oxamide. By means of the reaction, Cu^{++} can be titrated with an EtOH soln. of the reagent or the turbidity produced with very small quantities of Cu can be measured and compared with that produced with known quantities of Cu.

M. Hosch

Chair of Phys. Chem.,
Belorussian Polytech. Inst., Minsk

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TANANAEV, I. V. Y LEVINA, M. I.

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Fiziko-Khi-Micheskiy Analiz Sistem Co So4 - Li4 Fe (CN)6 (Na4 Fe CN6 Cs4 Fe Cn6) H20 Y Ikh Analiticheskoe Znachenie. Zavodskaya Laboratoriya, 1949 No. 8, S. 887-95. - Bibliogr. 5 Nazv.

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Solubility of silver bromate in electrolyte solutions. I. The system silver bromate-alkaline earth metal nitrate-water. I. V. Tananaev, Yu. L. Lel'chuk, and B. Kh. Petrovitskaya (White-Russ. Polytech. Inst., Minsk). *Zhur. Obshchei Khim.* (J. Gen. Chem.) 19, 1207-15 (1949); cf. *C.A.* 41, 2839a.—Data for $M(NO_3)_2$ solns. (M = Mg, Ca, Sr, Ba) of $AgBrO_3$ at 25° at nitrate concns. up to 1 *M* are tabulated, giving the concn. of $M(NO_3)_2$, the molarity of $AgBrO_3$ in satd. soln., ionic strength μ, activity coeff. γ, soly. product Lp, activity product La, and activity a. The calcns. are based on the following relations: $[Ag^+] \times [BrO_3^-]\gamma^2 = Lp_{AgBrO_3}\gamma^2 = La_{AgBrO_3}$; $\gamma = \sqrt{La/Lp}$; $-\log \gamma = 0.505\sqrt{\mu}/(1 + 0.33a\sqrt{\mu})$. The soly. of $AgBrO_3$ increases with increasing nitrate concn., the increase being most pronounced at high nitrate concns. The cations enhance the soly. in the order Mg < Ca < Sr < Ba, but a decreases in this same order, e.g. in 0.3 *M* soln. from 3.37 to 1.90, in 1 *M* soln. from 2.41 to 1.89. La is not entirely const., it has a min. for $M(NO_3)_2$ concns. in the region from 0.1 to 0.3 *M*. A plot of a against the ionic radii r of the cations gave an almost straight line. The soly. S_{AgBrO_3} was calcd. from $\sqrt{La/\gamma^2}$, where La (assumed to be const., as a simplification), is 5.5×10^{-4}; γ may be calcd. from $-\log \gamma = 0.505\sqrt{\mu}/(1 + 0.33a\sqrt{\mu})$, where a is the av. (= 2.1) of values obtained for the 4 cations in 1 *M* solns. $S_{AgBrO_3} \times 10^3$ for 0.3 *M* Mg, Ca, Sr, and Ba nitrates is 1.27, 1.33, 1.43, 1.49; for 1 *M* solns. 1.73, 1.81, 1.84, —. The soly. in H_2O at 25° is 0.1948 g./100 ml.; values by 10 other authors are given.

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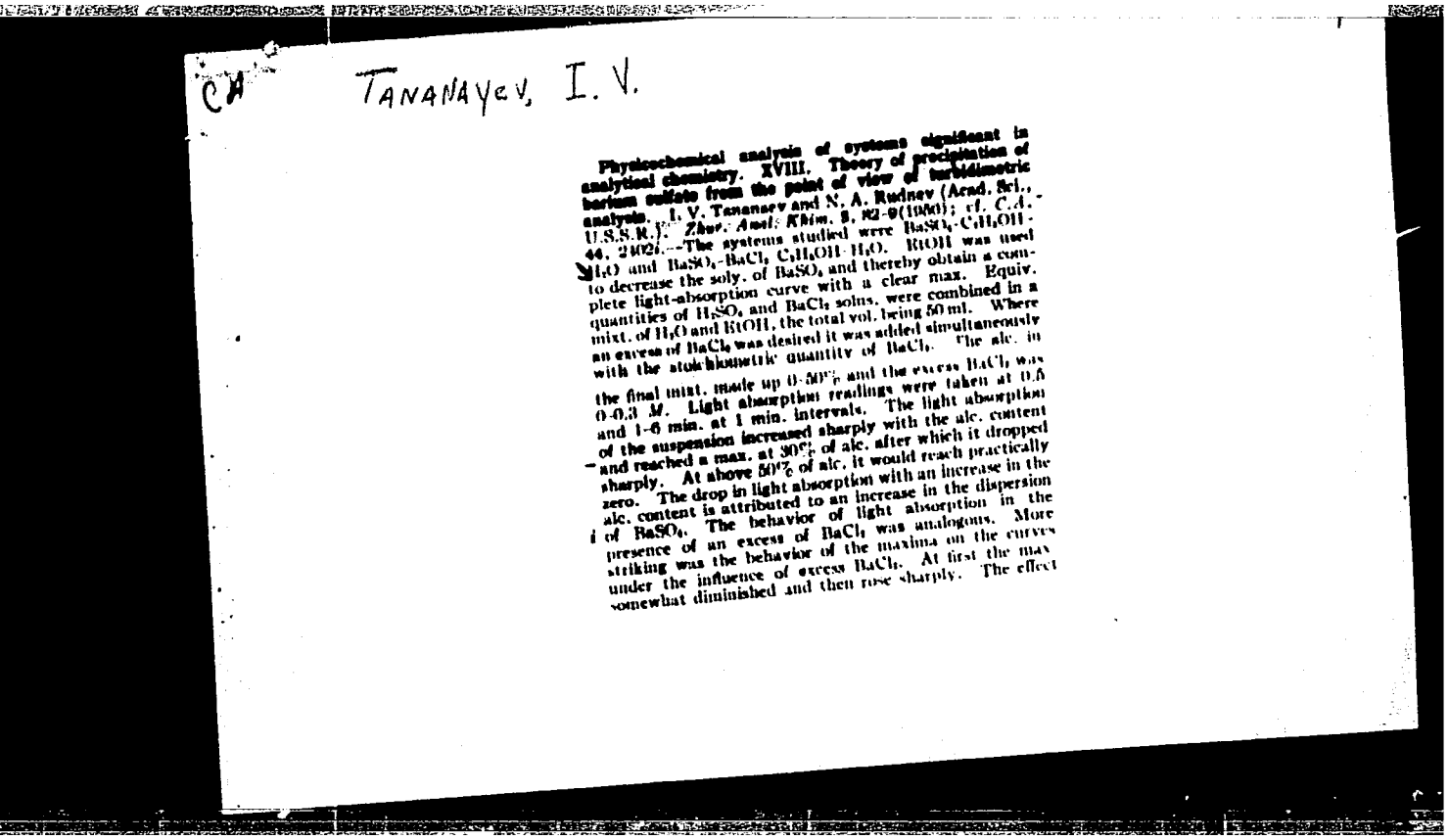

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TANANAYEV, I. V.

Physicochemical analysis of systems significant in analytical chemistry. XVIII. Theory of precipitation of barium sulfate from the point of view of turbidimetric analysis. I. V. Tananaev and N. A. Rudnev (Acad. Sci., U.S.S.R.). *Zhur. Anal. Khim.* 5, 82-9(1950); cf. *C.A.* 44, 2402i.—The systems studied were $BaSO_4$-C_2H_5OH-H_2O and $BaSO_4$-$BaCl_2$-C_2H_5OH-H_2O. EtOH was used to decrease the soly. of $BaSO_4$ and thereby obtain a complete light-absorption curve with a clear max. Equiv. quantities of H_2SO_4 and $BaCl_2$ solns. were combined in a mixt. of H_2O and EtOH, the total vol. being 50 ml. Where an excess of $BaCl_2$ was desired it was added simultaneously with the stoichiometric quantity of $BaCl_2$. The alc. in the final mixt. made up 0-80% and the excess $BaCl_2$ was 0-0.3 *M*. Light absorption readings were taken at 0.5 and 1-6 min. at 1 min. intervals. The light absorption of the suspension increased sharply with the alc. content and reached a max. at 30% of alc. after which it dropped sharply. At above 50% of alc. it would reach practically zero. The drop in light absorption with an increase in the alc. content is attributed to an increase in the dispersion of $BaSO_4$. The behavior of light absorption in the presence of an excess of $BaCl_2$ was analogous. More striking was the behavior of the maxima on the curves under the influence of excess $BaCl_2$. At first the max somewhat diminished and then rose sharply. The effect

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of $BaCl_2$ is explicable by its action on $BaSO_4$ in which case it augments the effect of KOH. This does not explain the fluctuation of the max. Excess $BaCl_2$ affects not only the dispersion of $BaSO_4$ but apparently also its cryst. form as well as the bulk of the ppt. due to copptn. Both of these affect the light absorption. Thus, the light absorption of a $BaSO_4$ suspension is complex and depends greatly on circumstances of pptn., primarily on the alc. content and the excess $BaCl_2$. Therefore, care must be exercised when using this method for the detn. of SO_4^{--} either with the aid of calibration curves or by turbidimetric titration. M. Hosch

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C.A.

Physicochemical analysis of systems significant in analytical chemistry. XIX. Investigation of the system $BaSO_4$-NaCl-C_2H_5OH-H_2O from the point of view of turbidimetry. I. V. Tananaev and N. A. Rudnev (N. S. Kurnakov Inst. of Gen. and Inorg. Chem., Acad. Sci. U.S.S.R.). *Zhur. Anal. Khim.* 5, 281-5(1950); cf. *C.A.* 44, 4815k.—The solns. studied were prepd. by adding to 12.50 ml. of 0.004 *M* H_2SO_4 a NaCl soln., alc., H_2O, and finally $BaCl_2$ soln. to make the total vol. 50 ml. The quantity of $BaCl_2$ in all solns. was equiv. to the H_2SO_4. The concn. of NaCl was 0-1 *M* and the alc. content was 0-50% by vol. From the time $BaCl_2$ was added, extinction readings were taken at definite intervals after 0.25-5 min. Time was an important factor in the behavior of this system. This time factor varied with the compn. of the system. By plotting time *vs.* extinction 4 types of curves were obtained depending on the alc. and NaCl content. In the absence of NaCl turbidity did not change with time. With 0.1-1.0 *M* NaCl there was a decrease in extinction with time. At small alc. content the extinction increased with time, the increase being greater as the concn. of NaCl rose. At a NaCl content of 1 *M*, the curves had a distinct max. Thus, NaCl retarded pptn. even at fairly high alc. content. In the absence of alc., pptn. was arrested completely for several min. At a high concn. of NaCl the coagulating effect of the salt is more pronounced. NaCl increases somewhat the soly. of $BaSO_4$ while alc. has the opposite effect. The molar extinction coeff. corresponding to max. absorption was 142. This value coincided with the analogous value in the system $BaSO_4$-$BaCl_2$-EtOH-H_2O. Since the effect of NaCl and $BaCl_2$ on $BaSO_4$ is opposite, it is evident that the degree of dispersion coincidental with max. absorption in the system $BaSO_4$-EtOH-H_2O can be attained either by retarding crystn., *i.e.*, by adding an agent which enhances the soly. of $BaSO_4$, or by accelerating the formation of primary particles as compared to the secondary process of their aggregation. In the former case the max. shifts to the right until it reaches its limiting value, in the 2nd case the max. shifts to the left until it attains its greatest value. It was observed that the form of the ppt. differs depending on the presence of $BaCl_2$ and NaCl. In the absence of these salts, the ppt. is loose and flaky, while in the presence of $BaCl_2$ or NaCl the cryst. structure is pronounced.

M. Hosch

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Journal of the Iron and Steel Institute
Vol. 176
Apr. 1954
Analysis

(2) 4

Cryolite Method for the Determination of Aluminium in Complex Alloy Steels and Other Alloys. I. V. Tananaev and P. Ya. Yakovlev. (*Zavodskaya Laboratoriya*, 1950, 16, (10), 1155-1161). [In Russian]. An account is given of a gravimetric method for the determination of aluminium in steels as well as in iron and nickel-base alloys containing chromium, molybdenum, tungsten, vanadium, zirconium, niobium, and titanium. The aluminium is precipitated as cryolite and test data are presented showing the effect of each of the above elements on the precipitation. Results of aluminium determinations in steels and alloys by the cryolite method agree well with those obtained by the slower mercury-cupferron method.—H. K.

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TANANAYEV, I.V.

The activity of solution components in liquid hydrogen fluoride. I. N. S. Nikolaev and I. V. Tananaev. *Izvest. Sektora Fiz.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 184-95(1950).—The activity (a) was calcd. from the basic equations of Lewis and Randall. Metzing and Klatt (*C.A.* 31, 8259') found in detns. of vapor pressure depression that HF mols. in the liquid state associated into $[HF]_{1.6}$. Dahmlos and Jung (*C.A.* 27, 4148) found in m.p. detns. that HF mols. existed as $[HF]_{1.7}$. Thus, ΔH (latent heat of vaporization) was taken to be 6150 cal. and the latent heat of fusion 4048 cal. The freezing point depression was calcd. to be 1.3° and the b.p. rise 1.9°. a was detd. cryoscopically and ebullioscopically with KF, NaF, and LiF solns. in HF. Ebullioscopic detns. could be made for KF up to 10M, for NaF up to 5M, and for LiF up to 2.8M. Above these concns. boiling stopped. On curves of the activity coeff. (f) of HF *vs.* concn. of solute the curves of KF and NaF had a max. beyond which they dropped sharply and approached asymptotically concns. corresponding to KF.5HF and NaF.10HF, resp. The LiF curve had no max. nor did it have an asymptotic branch but ended at a point corresponding to LiF.20HF. The sharp drop of f and the interruption of boiling point is a peculiar condition apparently brought about by the formation of the acid salts. The ascending part of the curve (before reaching the max.) points to a break-up of the aggregated mols. as suggested by Getman and Daniels. From a math. analysis of the curves were found the following relationships between the f and the concn. of the solute $-68.03N_{KF}^3 + 44.705N_{KF}^2 - 5.149N_{KF} + 1.164N_{KF} + 1 = f_{HF}$, $- 934.745N_{NaF}^3 + 490.860N_{NaF}^2 - 78.73N_{NaF}^2 + 2.769N_{NaF} + 1 = f_{HF}$, and $- 1824.254N_{LiF}^3 + 550.523N_{LiF}^2 - 48.890N_{LiF} + 0.331N_{LiF} + 1 = f_{HF}$. A comparison between calcd. and expti. values showed a relative difference for f_{HF} in KF solns. ±0.85, in NaF ±0.62, and in LiF solns. ±0.66%. H.

Activity of alkali fluorides in liquid hydrogen fluoride. N. S. Nikolaev. *Ibid.* 196-203.—In this investigation was calcd. the relationship between the activity coeff. of HF and the activity coeff. of KF, NaF, and LiF. The results are tabulated and presented graphically. The results indicate the multimol. nature of HF. The dissolved fluoride reacts first with HF monomers until they are used up. During this stage the activity coeff. of the solvent decreases. Further increase in the concn. of the solute causes breakup of HF polymers. At this stage the activity coeff. of the solvent increases and of the solute decreases. This proceeds until all of the HF polymers disappear. At this point sets in a satd. compn. which for KF is KF.5HF, and some excess solvent is also present. A rise in temp. drives off this excess and the acid salt begins to dissociate. The effect of alkalies on the disaggregation of HF polymers is K > Na > Li. III. Activity of hydrogen fluoride in ammonium base solutions. N. S. Nikolaev and I. V. Tananaev. *Ibid.* 204-11.—Activity and activity coeffs. were studied in the systems NH_3–HF, $C_6H_5NH_2$–HF, CH_3NH_2–HF, and $(C_6H_5)_2NH$–HF. Expti. (ebullioscopic) and calcd. values of f for these systems are tabulated. The calcns. were made on the basis of $[HF]_{1.6}$, mol. wt. 69. The accumulated data show a striking correspondence between $\rho_{mls.}$ and $f_{max.}$. ρ is the ratio of mol. rise in boiling temp. to the ebullioscopic const. of HF which is taken to be 1.9 (cf. Fredenhagen and Cadenbach, *C.A.* 27, 3381). Thus e.g., for NH_3–HF $\rho_{mls.} = 0.345$, and this corresponds to $f_{max.} = 1.29$. The facts that $\rho < 1$ and $f > 1$ is taken to indicate that there is an increase in the active mass of the solvent. f_1 was plotted vs. N_2, the mole fraction of solute, and from these curves were calcd. the coeffs. A, B, C, and D in the equation for f_1. Generally, the values of f_1 calcd. from the empirical equation were close to those obtained by expt., but in some parts of the studied systems the differences were considerable. The limiting compds. for the studied systems were $NH_4F.5HF$, $C_6H_5NH_2F.7HF$, $CH_3NH_2F.10HF$, and $(C_6H_5)_2NH_2F.16HF$. M. Hosch

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TANANAIEV, I. V.

Physicochemical analysis of systems significant in analytical chemistry. XXII. Investigation of solubility in the system AlF_3-KF-H_2O at 25°. I. V. Tananaev and M. A. Nekhamkina. *Izvest. Sektora Fiz.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 227-37(1950); cf. *C.A.* 46, 3384g.—Solns. of AlF_3 and KF were mixed in such a manner that at a const. vol. of 200 ml, the ratio of KF:AlF_3 increased from 1:1 to 1:80. The mixts. placed in a thermostat were stirred for 8 hrs. and then allowed to settle. The supernatant clear liquid and the ppt. were analyzed for K and Al. In the mixed soln. a ppt. formed throughout the entire range of KF:AlF_3 ratios starting with 1. As the KF:AlF_3 ratio reached 8, no Al could be detected in the liquid phase. At KF:AlF_3 ratios from 1 to 15 the solid phase formed was $2KF{\cdot}AlF_3{\cdot}H_2O$. At ratios from 15 to 40 solid solns. formed having a gradually increasing KF content. At ratios 40–80 $3KF{\cdot}AlF_3$ formed. $2KF{\cdot}AlF_3{\cdot}H_2O$ was stable on contact with H_2O and dissolved congruently. $3KF{\cdot}AlF_3$ dissolved incongruently and was decompd. by H_2O into $2KF{\cdot}AlF_3{\cdot}H_2O$, forming a ppt. and KF which dissolved. The thermogram of $2KF{\cdot}AlF_3{\cdot}H_2O$ showed 4 steps: at 145–165° an endothermal effect connected with the loss of H_2O of crystn., and exothermal at 230–260° apparently occasioned by recrystn. of the anhyd. double salt, at 570–610° apparently occasioned by partial decompn. of the salt, and an endothermal at 855°, the m.p. of the salt. The thermogram of $3KF{\cdot}AlF_3$ had 5 stops. Of these 160–185°, 285–315°, 575–585°, and 1030° are analogous to the stops on the $2KF{\cdot}AlF_3{\cdot}H_2O$ thermogram. The stop at 505–520° is as yet unexplained. The soly. of $2KF{\cdot}AlF_3{\cdot}H_2O$ in HF was studied. At HF concns. above 43% the reaction proceeds according to $2KF{\cdot}AlF_3{\cdot}H_2O + HF \rightarrow KF{\cdot}AlF_3 + KHF_2 + H_2O$. At HF concns. below 40%, the reaction is reversed.

M. Hoseh

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TANANAYEV, I. V.

Physicochemical analysis in analytical chemistry. I. V. Tananaev. *Izvest. Sektora Fiz.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 277-93(1950).—The importance of phys.-chem. analysis in explaining analytical methods is discussed. In pptn. procedures the soly. of the ppt. in the presence of similar and dissimilar ions can be studied only by methods of phys.-chem. analysis. The ionic strength of a soln. calcd. on the assumption of complete dissocn. of an electrolyte is justified at best for uni- and bivalent electrolytes. For tri- and quadrivalent electrolytes hydrolysis enters into play, resulting in the formation of free acid and of practically undissocd. ions of the type $M(OH)^{+++}$, $M(OH)_2^{++}$, etc. Under such conditions the calcns. are no longer reliable. Also in the presence of extraneous salts, the compn. of the ppt. is variable as solid solns. and double salts are likely to be formed. The study of the behavior of a given salt as part of a ternary, quaternary, or multicomponent system is valuable in the understanding of its analytical behavior. Light adsorption, electrocond., e.m.f., thermal analysis, and measuring the vol. of a ppt. of systems are invaluable in developing analytical methods. M. Hoseh

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TANANAYEV, I. V.

PA 174T6

USSR/Chemistry - Beryllium-Fluorine Compounds

Jan/Feb 51

"Certain Properties of Solutions of Beryllium Fluoride, Report 3," I. V. Tananayev, E. N. Deychman, Inst Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR

"Iz Ak Nauk SSSR, Otdel Khim Nauk" No 1, pp 26-31

Study of system BeF_2--$Be(NO_3)_2$--H_2O by methods of measuring viscosity, sp gr, and cryoscopy proved existence in soln of monofluoroberyllium ion of greater stability than all remaining fluoroberyllates in soln.

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E4

New titrimetric procedure for determining potassium. I. V. Tananaev and A. S. Kozlov. *Zhur. Anal. Khim.* 6, 110-5(1951).—This method is based on the interaction of $CdSO_4$, $Li_4Fe(CN)_6$, and $K_4Fe(CN)_6$. The first two react to form $Cd_2Fe(CN)_6$ regardless of the excess $Li_4Fe(CN)_6$. The system $CdSO_4$-$K_4Fe(CN)_6H_2O$ behaved quite differently. Up to a $K_4Fe(CN)_6$:$CdSO_4$ ratio of 0.3 $Cd_2Fe(CN)_6$ is formed. At a ratio of 0.3-0.7 a variable solid phase is formed contg. 0-0.9 mol. of $K_4Fe(CN)_6$ per mol. of $Cd_2Fe(CN)_6$. The complex reaction product is $5Cd_2Fe(CN)_6$·$4K_4Fe(CN)_6$. In the 3rd stage as the $K_4Fe(CN)_6$ increases further, the double salt $Cd_2Fe(CN)_6.K_4Fe(CN)_6$ is formed. Thus, after ppte. Cd with $Li_4Fe(CN)_6$, the excess of the latter can be detd. by titration with $KMnO_4$. Addn. of a K salt, e.g., KCl or KNO_3, will cause $K_4Fe(CN)_6$ to be absorbed on the Cd ppt. and form $5Cd_2Fe(CN)_6.4K_4Fe(CN)_6$. The amt. of $Fe(CN)_6^{4-}$ in soln. will thereby be reduced. A 2nd titration with $KMnO_4$ will indicate the amt. of $Fe(CN)_6^{4-}$ removed from soln. and can be recalcd. in terms of K.

M. Hosch

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USSR/Chemistry - Quaternary Systems Nov/Dec 51
Lithium Compounds

"Physicochemical Analysis of Systems Which Are Important in Analytical Chemistry. XXI. Investigation of Solubility (25°) in Quaternary Systems $PbSO_4$-Li_2SO_4-$NaNO_3$($Mg(NO_3)_2$, $Al(NO_3)_3$)-H_2O," I. V. Tananayev, I. B. Mizetskaya, Inst of Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR

"Zhur Analit Khim" Vol VI, No 6, pp 337-343

Investigated soly of $PbSO_4$ in quaternary systems $PbSO_4$-Li_2SO_4-$MeNO_3$-H_2O (Me = Na, 1/2 Mg, 1/3Al). Soly of $PbSO_4$ in these quaternary systems under conditions eliminating chem reaction was sum of opposing effects: capacity of nitrates to dissolve greater amts of $PbSO_4$ and of Li_2SO_4 to salt out $PbSO_4$. Soly product in system increased 10,000 times. Pptn behavior, ill-defined by any formula of Debye and Hueckel, is fully explained by triadal soly diagram, which can be used successfully in practical analytical chemistry.

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TANANAYEV, I. V.

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DDC.51

TANANAYEV I. V.

USSR/Chemistry - Fluorine and Aluminum Compounds

"Forms of Complex Fluoroaluminates in Aqueous Solutions," G. S. Savchenko, I. V. Tananayev, Inst of Gen and Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR

"Zhur Obshch Khim" Vol XXI, No 12, pp 2235-2245

Studied systems $Al(NO_3)_3$-HF-H_2O, $AlCl_3$-HF-H_2O, $Al_2(SO_4)_3$-HF-H_2O using methods in H ion concn and thermometric measurements. Found that in all 3 systems very stable AlF_2^+ ions, not noticeably dissocd in soln, are formed. Their existence is explained by ability of salts of Al and many other polyvalent metals to dissolve difficulty sol fluorides (cryolite, CaF_2). Existence of AlF_3 or complex fluoroaluminates of type AlF_6^{3-} could not be confirmed due to their high deg of dissocn. These data compel a change in views on state and behavior of polyvalent metallic fluorides in soln.

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TANANAYEV, I.V.

Chemical Abst.
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Inorganic Chemistry

—The reaction between bivalent manganese ions and $K_4Fe(CN)_6$. I. V. Tananaev and E. S. Dzhanokmen, *J. Gen. Chem. U.S.S.R.* 21, 1097–1100(1951)(Engl. translation); *Zhur. Obshchel Khim.* 21, 1000–10(1951).—The soly. and cond. of mixts. of $MnSO_4$ and $K_4Fe(CN)_6$ in water were studied. $MnK_2Fe(CN)_6$ (I) is less sol. than $Mn_2Fe(CN)_6$, and under most conditions I is the solid phase at 25°. One of the principal factors affecting the compn. of the solid is the concn. of K^+, which depends on the amount of $K_4Fe(CN)_6$ added. When the total concn. of $MnSO_4$ and $K_4Fe(CN)_6$ is less than 0.03*M*, and the ratio $K_4Fe(CN)_6$:$MnSO_4$ in the mixt. is small, the solid phase is $Mn_2Fe(CN)_6$ contaminated with I. No $Mn_2Fe(CN)_6$ is pptd. at higher concns., regardless of the ratio of reactants, or at concns. as low as $6 \times 10^{-4}M$ at ratios of 1.25 or greater. The cond. curve at all concns. passes through a min. at unity ratio, which corresponds to the compn. of I. Analyses of 0.0156*M* $MnSO_4$ solns. show that the solid is I at $K_4Fe(CN)_6$:$MnSO_4$ ratios between 0.128 and 0.170. Soly. and cond. data indicate no solid solns. are formed. Addn. of $K_4Fe(CN)_6$ to $MnSO_4$ produces a sol very sharply at unity ratio. Several methods for the analysis of Mn^{++} are suggested by gravimetric, volumetric, potentiometric, turbidometric, and conductometric methods based on the formation of I.

Bernard M. Zeffert

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