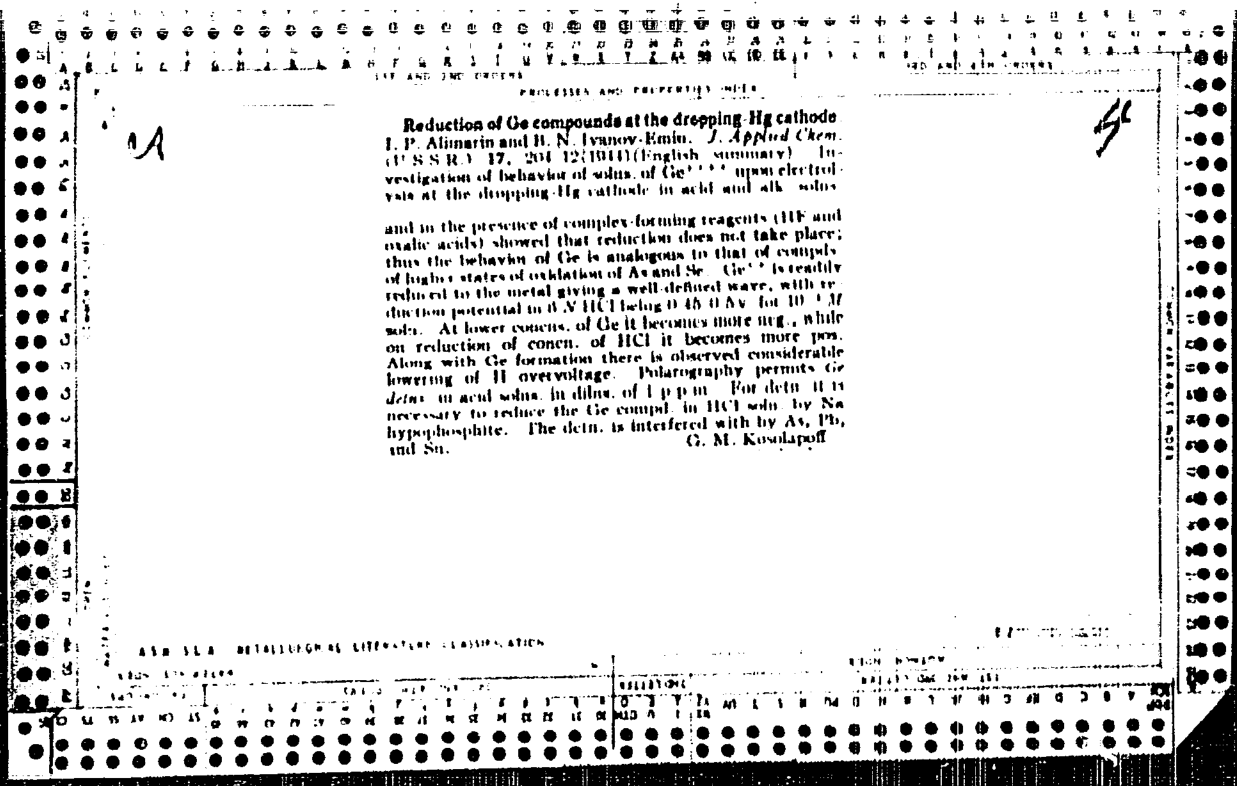


1ST AND 2ND ORDERS

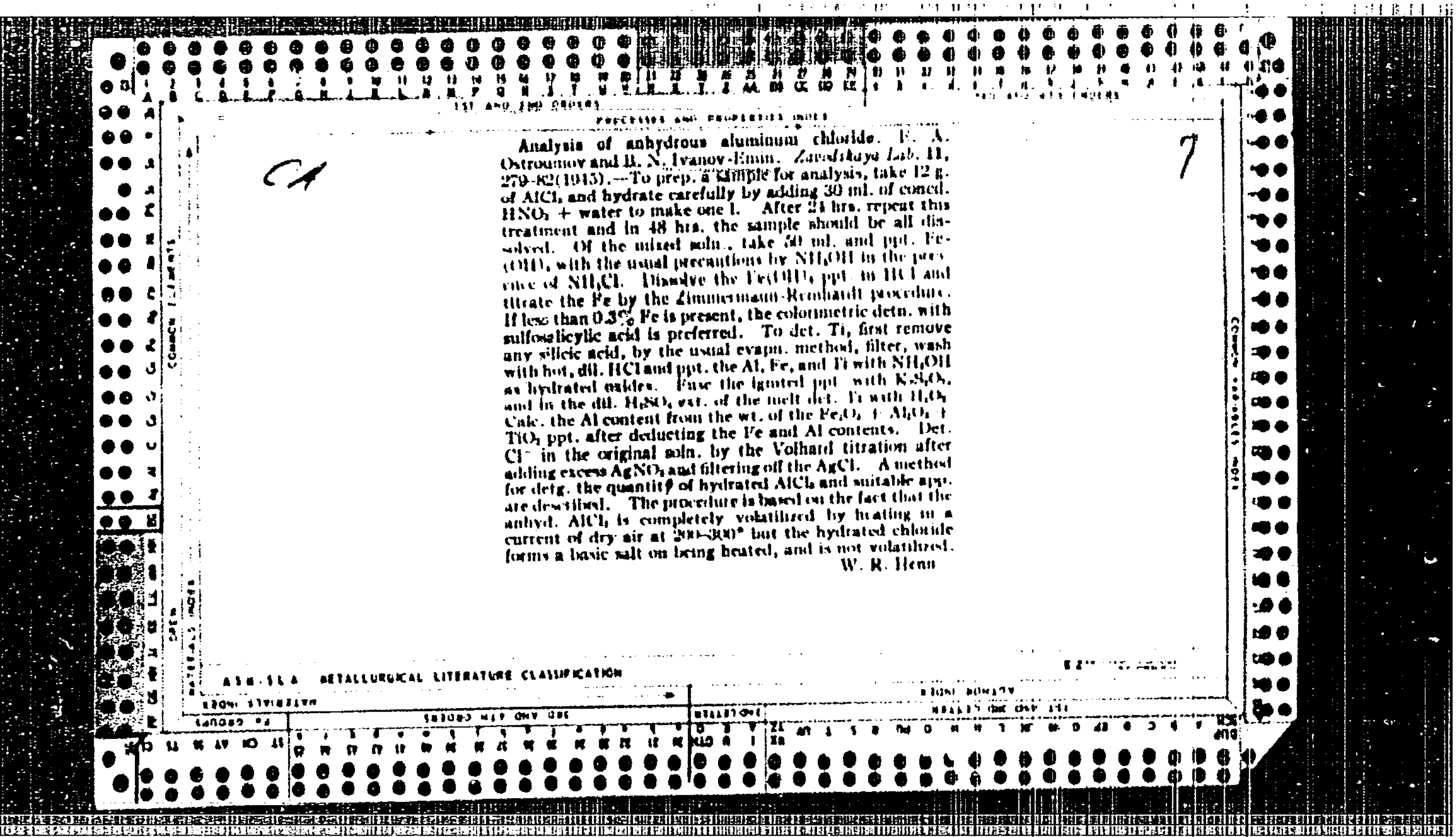
PROCESSES AND PROPERTIES INDEX

A

5c

Reduction of Ge compounds at the dropping-Hg cathode. I. P. Alimarin and B. N. Ivanov-Emin. *J. Applied Chem.* (U.S.S.R.) 17, 204-12(1944)(English summary).—Investigation of behavior of solns. of Ge^{++++} upon electrolysis at the dropping-Hg cathode in acid and alk. solns. and in the presence of complex-forming reagents (HF and oxalic acids) showed that reduction does not take place; thus the behavior of Ge is analogous to that of compds. of higher states of oxidation of As and Se. Ge^{++} is readily reduced to the metal giving a well-defined wave, with reduction potential in 6 N HCl being 0.45-0.5v. for 10^{-3} M soln. At lower concns. of Ge it becomes more neg., while on reduction of concn. of HCl it becomes more pos. Along with Ge formation there is observed considerable lowering of H overvoltage. Polarography permits Ge detn. in acid solns. in dilns. of 1 p.p.m. For detn. it is necessary to reduce the Ge compd. in HCl soln. by Na hypophosphite. The detn. is interfered with by As, Pb, and Sn. G. M. Kosolapoff

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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CA

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Analysis of anhydrous aluminum chloride. F. A. Ostroumov and B. N. Ivanov-Emin. *Zavodskaya Lab.* 11, 279-82(1945).—To prep. a sample for analysis, take 12 g. of $AlCl_3$ and hydrate carefully by adding 30 ml. of concd. HNO_3 + water to make one l. After 24 hrs. repeat this treatment and in 48 hrs. the sample should be all dissolved. Of the mixed soln., take 50 ml. and ppt. $Fe(OH)_3$ with the usual precautions by NH_4OH in the presence of NH_4Cl. Dissolve the $Fe(OH)_3$ ppt. in HCl and titrate the Fe by the Zimmermann-Reinhardt procedure. If less than 0.3% Fe is present, the colorimetric detn. with sulfosalicylic acid is preferred. To det. Ti, first remove any silicic acid, by the usual evapn. method, filter, wash with hot, dil. HCl and ppt. the Al, Fe, and Ti with NH_4OH as hydrated oxides. Fuse the ignited ppt. with $K_2S_2O_7$ and in the dil. H_2SO_4 ext. of the melt det. Ti with H_2O_2. Calc. the Al content from the wt. of the Fe_2O_3 + Al_2O_3 + TiO_2 ppt. after deducting the Fe and Al contents. Det. Cl^- in the original soln. by the Volhard titration after adding excess $AgNO_3$ and filtering off the AgCl. A method for detg. the quantity of hydrated $AlCl_3$ and suitable app. are described. The procedure is based on the fact that the anhyd. $AlCl_3$ is completely volatilized by heating in a current of dry air at 200-300° but the hydrated chloride forms a basic salt on being heated, and is not volatilized.

W. R. Henn

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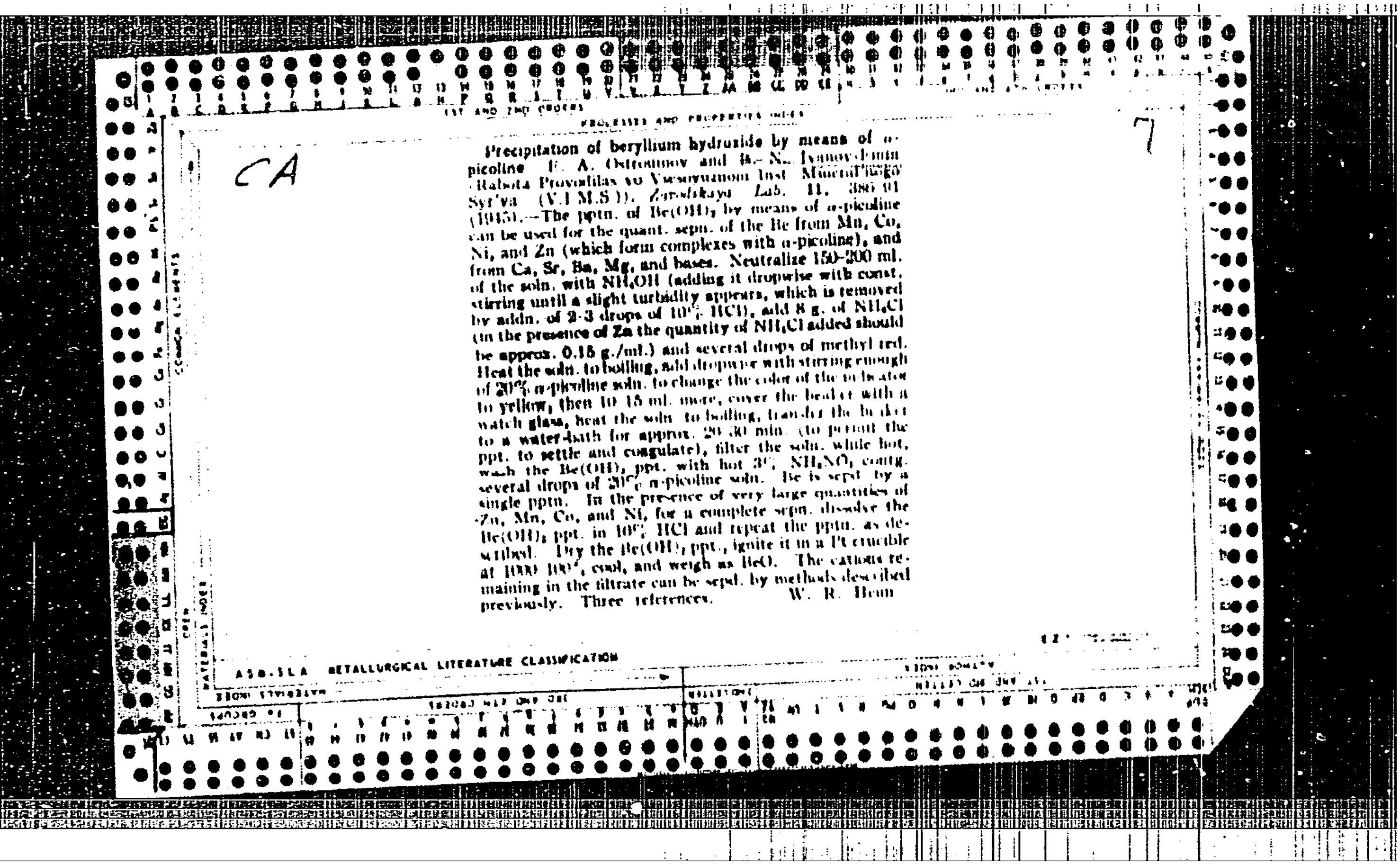

CA

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

Precipitation of beryllium hydroxide by means of α-picoline E. A. Ostroumov and B. N. Ivanov-Emin (Rabota Provodilas vo Vsesoyuznom Inst. Mineral'nogo Syr'ya (V.I.M.S.)). *Zavodskaya Lab.* 11, 386-91 (1945).—The pptn. of $Be(OH)_2$ by means of α-picoline can be used for the quant. sepn. of the Be from Mn, Co, Ni, and Zn (which form complexes with α-picoline), and from Ca, Sr, Ba, Mg, and bases. Neutralize 150-200 ml. of the soln. with NH_4OH (adding it dropwise with const. stirring until a slight turbidity appears, which is removed by addn. of 2-3 drops of 10% HCl), add 8 g. of NH_4Cl (in the presence of Zn the quantity of NH_4Cl added should be approx. 0.15 g./ml.) and several drops of methyl red. Heat the soln. to boiling, add dropwise with stirring enough of 20% α-picoline soln. to change the color of the indicator to yellow, then 10-15 ml. more, cover the beaker with a watch glass, heat the soln. to boiling, transfer the beaker to a water-bath for approx. 20-30 min. (to permit the ppt. to settle and coagulate), filter the soln. while hot, wash the $Be(OH)_2$ ppt. with hot 3% NH_4NO_3 contg. several drops of 20% α-picoline soln. Be is sepd. by a single pptn. In the presence of very large quantities of Zn, Mn, Co, and Ni, for a complete sepn. dissolve the $Be(OH)_2$ ppt. in 10% HCl and repeat the pptn. as described. Dry the $Be(OH)_2$ ppt., ignite it in a Pt crucible at 1000-1100°, cool, and weigh as BeO. The cations remaining in the filtrate can be sepd. by methods described previously. Three references. W. R. Henn

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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CA

Separation of indium hydroxide by means of pyridine. Zavodskaya
E. A. Ostroumov and B. N. Ivanov-Emin. Pyridine can be used to sep.
Lab. 11, 1034-42(1945). Pyridine can be used to sep. In(OH)$_3$, which loses
In quantitatively from its salts as In(OH)$_3$, which loses into a
a part of its water on heating and is transformed into a pyri-
form poorer in water. Pptn. of In(OH)$_3$ by means of pyri- Cu
dine in the presence of Mn, Co, Ni, Zn, Cd, and Cu consisting of
salts results in the formation of mixed ppts. consisting of explained
indates of these metals and of In(OH)$_3$. This is explained metal and
by the equil. between the i e of the bivalent metal and from the
its pyridine complex It ible to sep. In from the
metals mentioned in the form of In(OH)$_3$ by displacing the
equil. in the direction of the formation of the pyridine com-
plex by the addn. of NH$_4$Cl. The method proposed can
be used to sep. In from Ca, Sr, Ba, Mg, e ses. Neu-
tralize the soln. of chlorides by adding dild. NH$_4$OH drop-
wise with const. mixing until a slight turbidity appears,
dil. the turbidity with 2-3 drops of dild. HCl, add water
to approx. 150 ml., 15 g. of NH$_4$Cl (10 g. of NH$_4$Cl per
each 100 ml. of soln.), and some macerated paper, heat
the soln. to boiling, add 20% pyridine in the presence of
methyl red, mixing constantly until the color changes to
yellow, add an addnl. 10-15 ml. of pyridine, cover the
beaker with a watch glass, heat the soln. to boiling, keep
it on a water bath for 1.0-1.5 hrs. to coagulate the ppt.
(avoid boiling the soln), filter while hot, and wash the
In(OH)$_3$ ppt. with hot 3% NH$_4$Cl contg. several drops of
20% pyridine soln. Reppt. the residue for a more com-
plete sepn. of In(OH)$_3$. Dissolve the residue on the filter
with hot dild. HCl, wash with hot water, cool, neutralize
with NH$_4$OH until a turbidity appears, dissolve it with
2-3 drops of dil. HCl, and repeat the sepn. as previously.
Filter, wash with 3% NH$_4$NO$_3$ contg. several drops of
20% pyridine soln., dry and ignite in a porcelain crucible,
and weigh as In$_2$O$_3$. The method proposed can be used in
analytical chemistry, in inorg. chemistry, and in the
prepn. of pure In compds. Four references. W. R. H.

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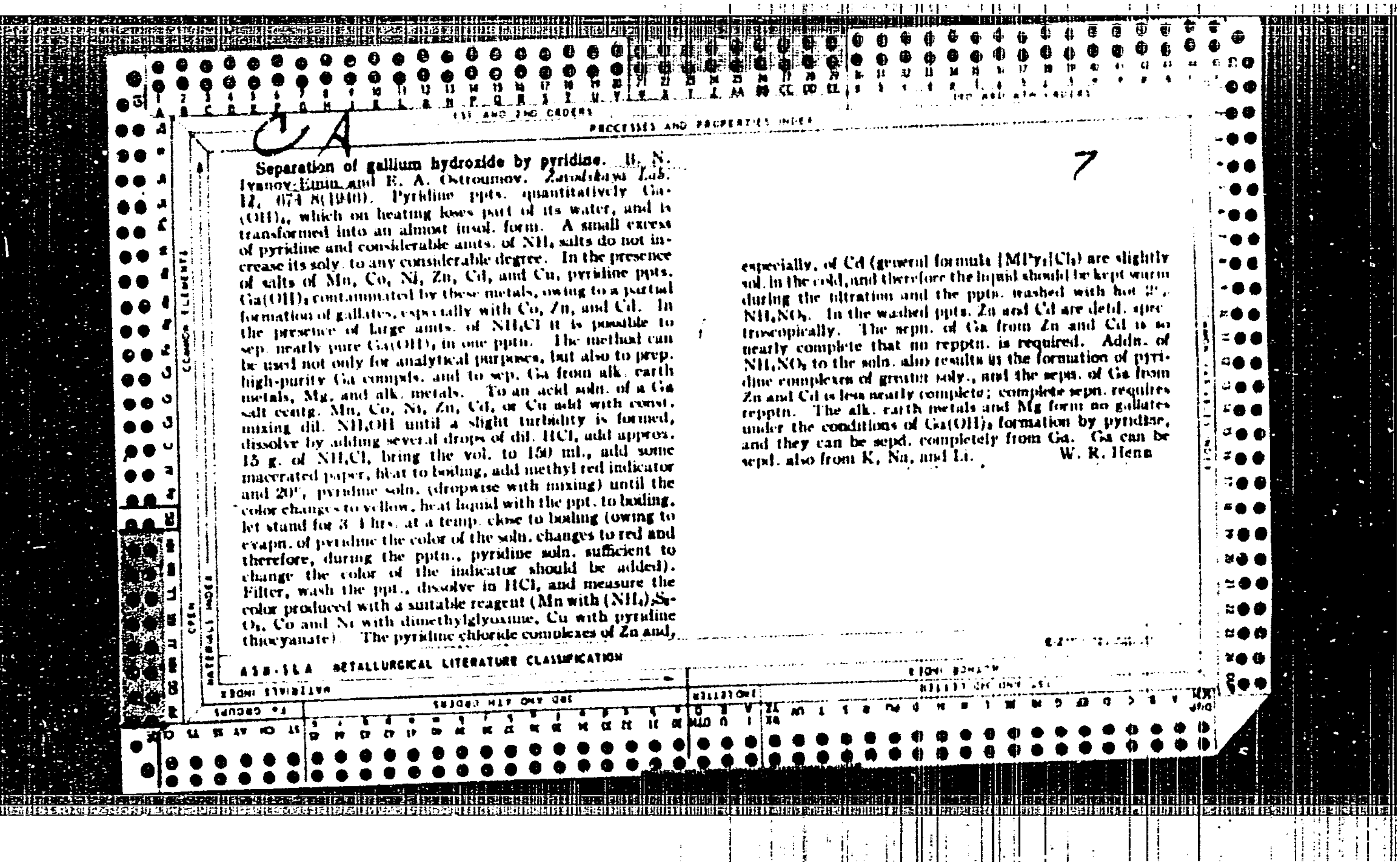
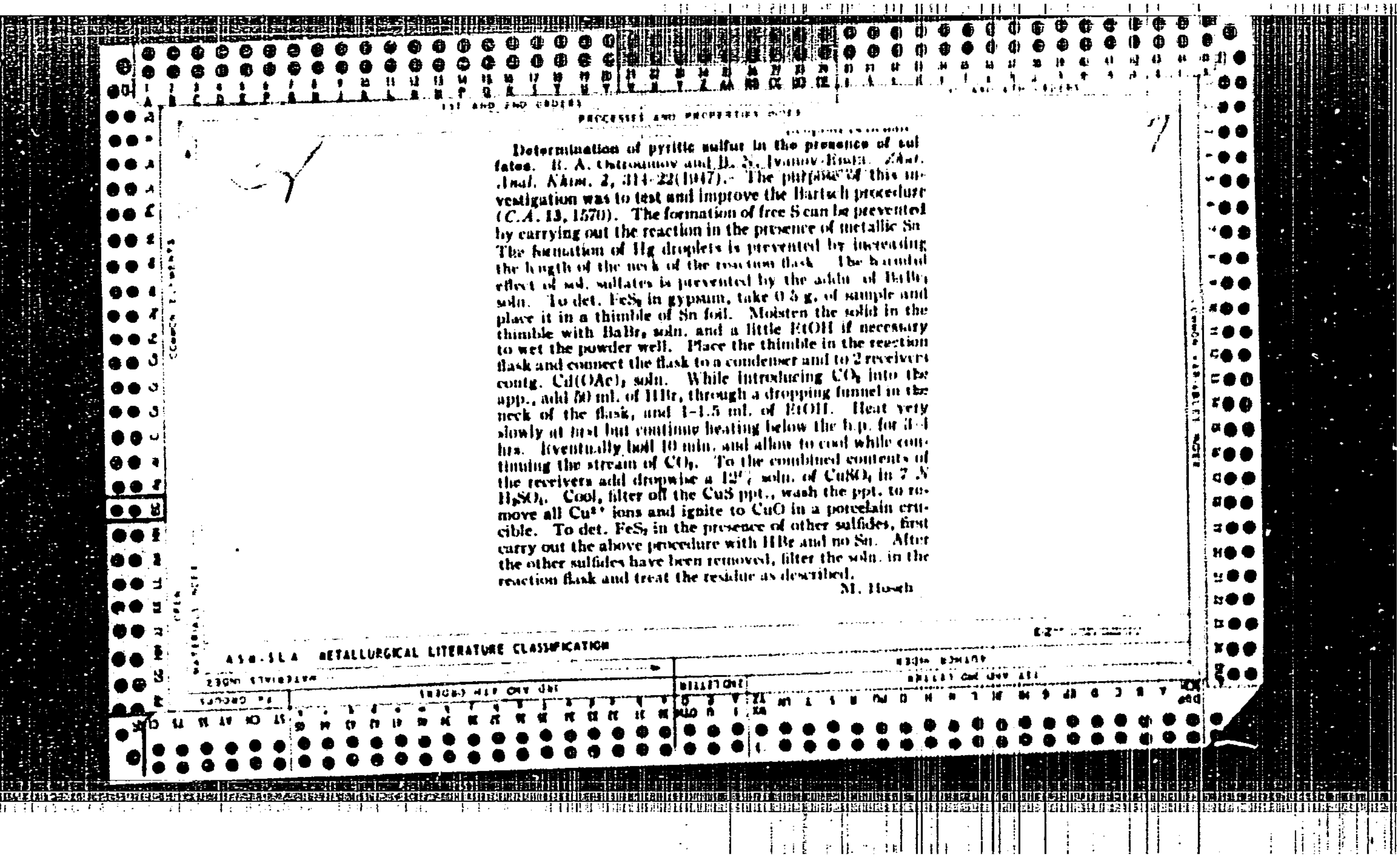
COMMON ELEMENTS

MATERIALS INDEX



Separation of gallium hydroxide by pyridine. B. N. Ivanov-Emin and E. A. Ostroumov. *Zavodskaya Lab.* 12, 674-8(1940). Pyridine ppts. quantitatively Ga(OH)$_3$, which on heating loses part of its water, and is transformed into an almost insol. form. A small excess of pyridine and considerable amts. of NH$_4$ salts do not increase its soly. to any considerable degree. In the presence of salts of Mn, Co, Ni, Zn, Cd, and Cu, pyridine ppts. Ga(OH)$_3$ contaminated by these metals, owing to a partial formation of gallates, especially with Co, Zn, and Cd. In the presence of large amts. of NH$_4$Cl it is possible to sep. nearly pure Ga(OH)$_3$ in one pptn. The method can be used not only for analytical purposes, but also to prep. high-purity Ga compds. and to sep. Ga from alk. earth metals, Mg, and alk. metals. To an acid soln. of a Ga salt contg. Mn, Co, Ni, Zn, Cd, or Cu add with const. mixing dil. NH$_4$OH until a slight turbidity is formed, dissolve by adding several drops of dil. HCl, add approx. 15 g. of NH$_4$Cl, bring the vol. to 150 ml., add some macerated paper, heat to boiling, add methyl red indicator and 20% pyridine soln. (dropwise with mixing) until the color changes to yellow, heat liquid with the ppt. to boiling, let stand for 3-4 hrs. at a temp. close to boiling (owing to evapn. of pyridine the color of the soln. changes to red and therefore, during the pptn., pyridine soln. sufficient to change the color of the indicator should be added). Filter, wash the ppt., dissolve in HCl, and measure the color produced with a suitable reagent (Mn with (NH$_4$)$_2$S$_2$O$_8$, Co and Ni with dimethylglyoxime, Cu with pyridine thiocyanate). The pyridine chloride complexes of Zn and, especially, of Cd (general formula [MPy$_2$]Cl$_2$) are slightly sol. in the cold, and therefore the liquid should be kept warm during the filtration and the pptn. washed with hot 2% NH$_4$NO$_3$. In the washed ppts. Zn and Cd are detd. spectroscopically. The sepn. of Ga from Zn and Cd is so nearly complete that no repptn. is required. Addn. of NH$_4$NO$_3$ to the soln. also results in the formation of pyridine complexes of greater soly., and the sepn. of Ga from Zn and Cd is less nearly complete; complete sepn. requires repptn. The alk. earth metals and Mg form no gallates under the conditions of Ga(OH)$_3$ formation by pyridine, and they can be sepd. completely from Ga. Ga can be sepd. also from K, Na, and Li. W. R. Henn



PROCESSES AND PROPERTIES INDEX

Determination of pyritic sulfur in the presence of sulfates. B. A. Ostroumov and B. S. Ivanov-Emin. *Zhur. Anal. Khim.* **2**, 314-22(1947).—The purpose of this investigation was to test and improve the Bartsch procedure (*C.A.* **13**, 1570). The formation of free S can be prevented by carrying out the reaction in the presence of metallic Sn. The formation of Hg droplets is prevented by increasing the length of the neck of the reaction flask. The harmful effect of sol. sulfates is prevented by the addn. of $BaBr_2$ soln. To det. FeS_2 in gypsum, take 0.5 g. of sample and place it in a thimble of Sn foil. Moisten the solid in the thimble with $BaBr_2$ soln. and a little EtOH if necessary to wet the powder well. Place the thimble in the reaction flask and connect the flask to a condenser and to 2 receivers contg. $Cd(OAc)_2$ soln. While introducing CO_2 into the app., add 50 ml. of HBr, through a dropping funnel in the neck of the flask, and 1-1.5 ml. of EtOH. Heat very slowly at first but continue heating below the b.p. for 3-4 hrs. Eventually boil 10 min. and allow to cool while continuing the stream of CO_2. To the combined contents of the receivers add dropwise a 12% soln. of $CuSO_4$ in 7 N H_2SO_4. Cool, filter off the CuS ppt., wash the ppt. to remove all Cu^{++} ions and ignite to CuO in a porcelain crucible. To det. FeS_2 in the presence of other sulfides, first carry out the above procedure with HBr and no Sn. After the other sulfides have been removed, filter the soln. in the reaction flask and treat the residue as described.

M. Hosch

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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M

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***New Method for the Iodometric Determination of Germanium and Its Separation from Arsenic with Sodium Hypophosphite.** B. N. Ivanov-Emin (*Zavod. Lab.*, 1947, 13, (2), 161-163).—[In Russian]. Ge may be determined with adequate accuracy by the iodometric method after preliminary reduction to the divalent condition by Na hypophosphite. It is possible to determine Ge and As after their separation by means of Na hypophosphite. D. A.

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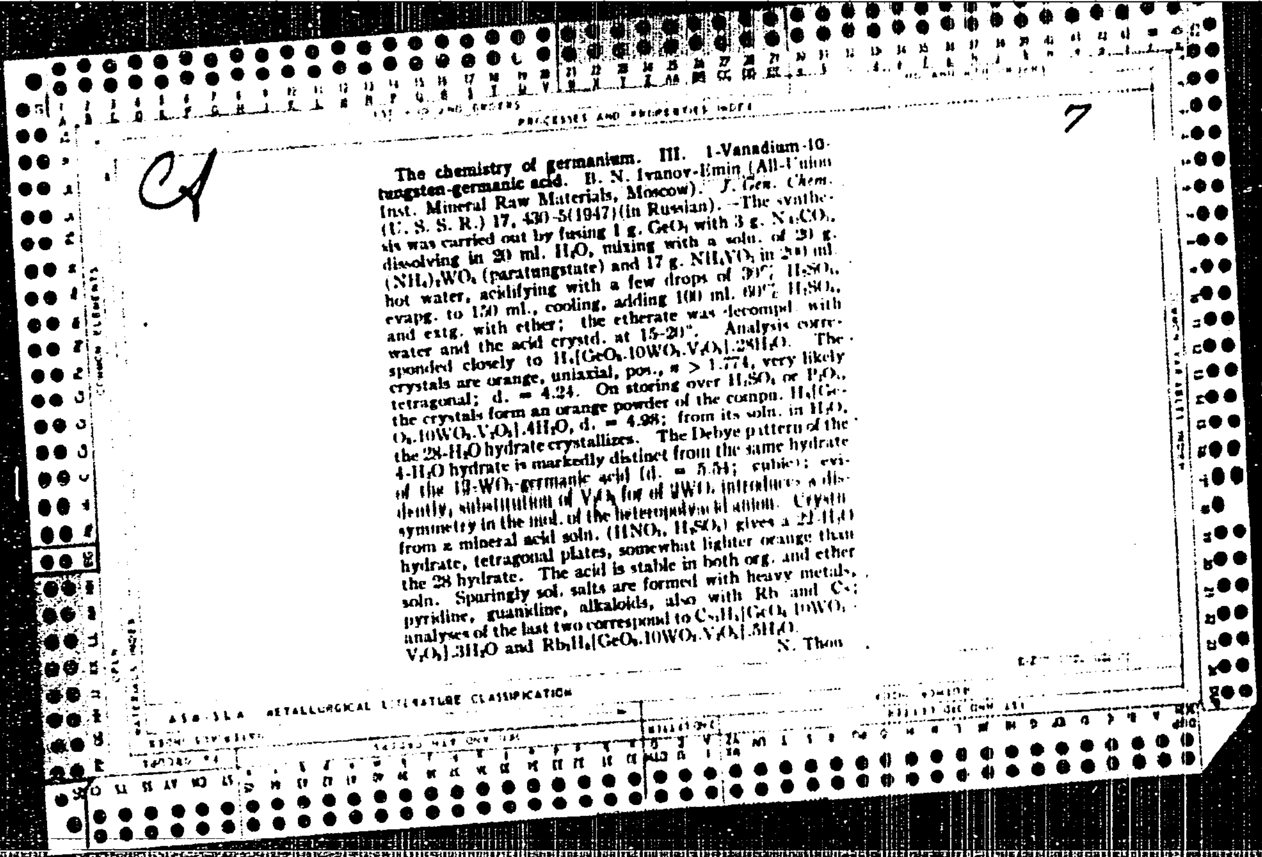

PROCESSES AND PROPERTIES INDEX

CA

7

The chemistry of germanium. III. 1-Vanadium-10-tungsten-germanic acid. B. N. Ivanov-Emin (All-Union Inst. Mineral Raw Materials, Moscow). *J. Gen. Chem.* (U. S. S. R.) 17, 430-5(1947)(in Russian).—The synthesis was carried out by fusing 1 g. GeO_2 with 3 g. Na_2CO_3, dissolving in 20 ml. H_2O, mixing with a soln. of 20 g. $(NH_4)_6WO_4$ (paratungstate) and 17 g. NH_4VO_3 in 250 ml. hot water, acidifying with a few drops of 30% H_2SO_4, evapg. to 150 ml., cooling, adding 100 ml. 60% H_2SO_4, and extg. with ether; the etherate was decompd. with water and the acid crystd. at 15-20°. Analysis corresponded closely to $H_4[GeO_2.10WO_3.V_2O_5].28H_2O$. The crystals are orange, uniaxial, pos., *n* > 1.774, very likely tetragonal; d. = 4.24. On storing over H_2SO_4 or P_2O_5, the crystals form an orange powder of the compn. $H_4[GeO_2.10WO_3.V_2O_5].4H_2O$, d. = 4.98; from its soln. in H_2O, the 28-H_2O hydrate crystallizes. The Debye pattern of the 4-H_2O hydrate is markedly distinct from the same hydrate of the 12-WO_3-germanic acid (d. = 5.54; cubic); evidently, substitution of V_2O_5 for of $2WO_3$ introduces a dissymmetry in the mol. of the heteropolyacid anion. Crystn. from a mineral acid soln. (HNO_3, H_2SO_4) gives a 22-H_2O hydrate, tetragonal plates, somewhat lighter orange than the 28 hydrate. The acid is stable in both org. and ether soln. Sparingly sol. salts are formed with heavy metals, pyridine, guanidine, alkaloids, also with Rb and Cs; analyses of the last two correspond to $Cs_4H_4[GeO_2.10WO_3.V_2O_5].5H_2O$ and $Rb_4H_4[GeO_2.10WO_3.V_2O_5].3H_2O$.

N. Thon

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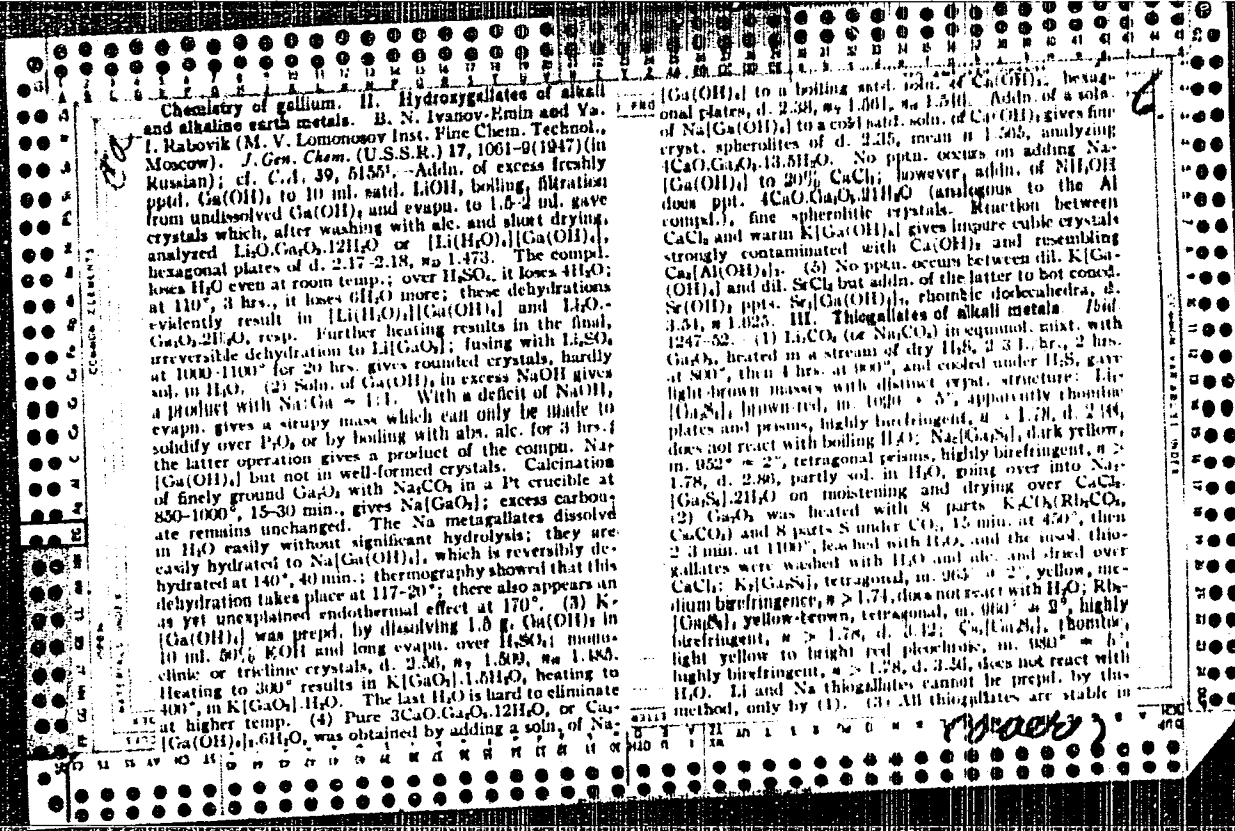
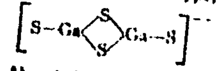


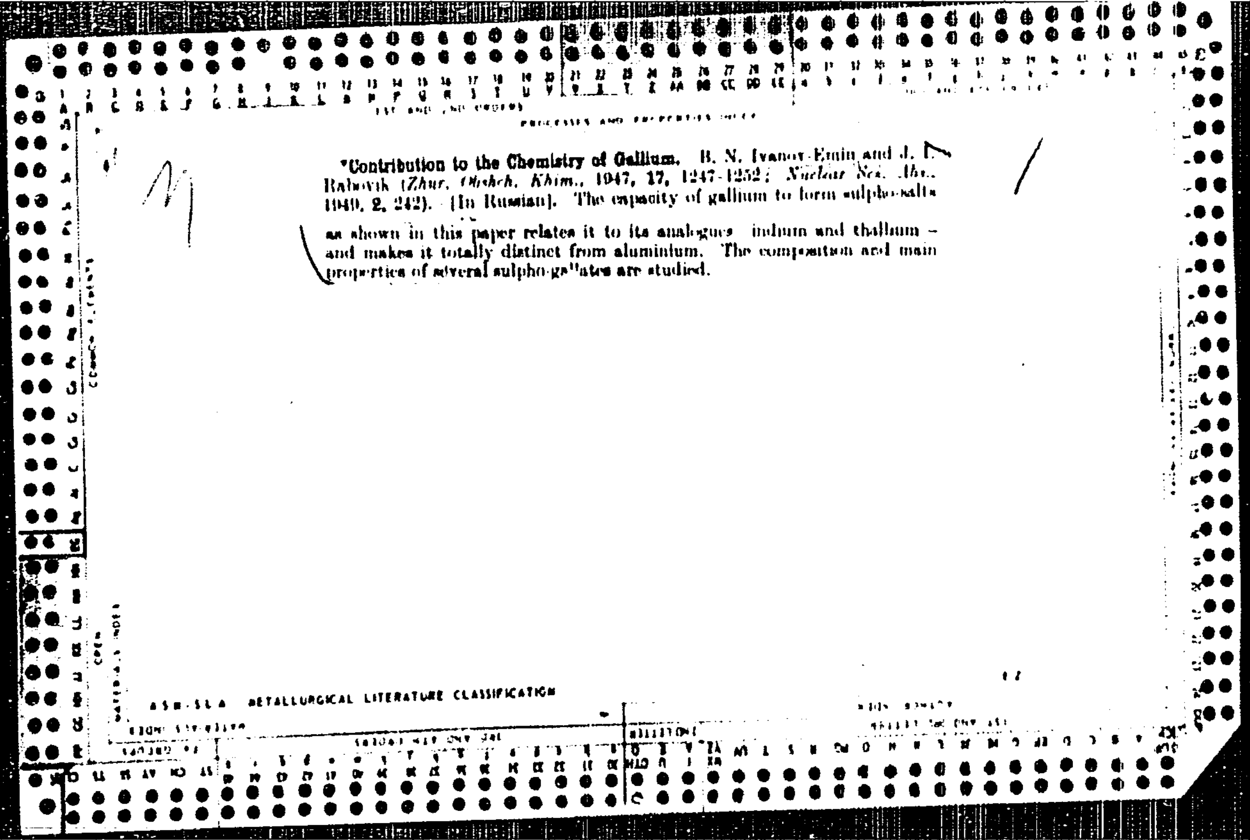
Chemistry of gallium. II. Hydroxygallates of alkali and alkaline earth metals. B. N. Ivanov-Emin and Ya. I. Rabovik (M. V. Lomonosov Inst. Fine Chem. Technol., Moscow). *J. Gen. Chem.* (U.S.S.R.) 17, 1061-9(1947)(in Russian); cf. C.A. 39, 5155¹.—Addn. of excess freshly pptd. $Ga(OH)_3$ to 10 ml. satd. LiOH, boiling, filtration from undissolved $Ga(OH)_3$ and evapn. to 1.5-2 ml. gave crystals which, after washing with alc. and short drying, analyzed $Li_2O.Ga_2O_3.12H_2O$ or $[Li(H_2O)_4][Ga(OH)_4]$, hexagonal plates of d. 2.17-2.18, n_D 1.473. The compd. loses H_2O even at room temp.; over H_2SO_4 it loses $4H_2O$; at 110°, 3 hrs., it loses $6H_2O$ more; these dehydrations evidently result in $[Li(H_2O)_2][Ga(OH)_4]$ and $Li_2O.Ga_2O_3.2H_2O$, resp. Further heating results in the final, irreversible dehydration to $Li[GaO_2]$; fusing with Li_2SO_4 at 1000-1100° for 20 hrs. gives rounded crystals, hardly sol. in H_2O. (2) Soln. of $Ga(OH)_3$ in excess NaOH gives a product with Na:Ga = 1:1. With a deficit of NaOH, evapn. gives a sirupy mass which can only be made to solidify over P_2O_5 or by boiling with abs. alc. for 3 hrs.; the latter operation gives a product of the compn. $Na[Ga(OH)_4]$ but not in well-formed crystals. Calcination of finely ground Ga_2O_3 with Na_2CO_3 in a Pt crucible at 850-1000°, 15-30 min., gives $Na[GaO_2]$; excess carbonate remains unchanged. The Na metagallates dissolve in H_2O easily without significant hydrolysis; they are easily hydrated to $Na[Ga(OH)_4]$, which is reversibly dehydrated at 140°, 40 min.; thermography showed that this dehydration takes place at 117-20°; there also appears an as yet unexplained endothermal effect at 170°. (3) $K[Ga(OH)_4]$ was prepd. by dissolving 1.5 g. $Ga(OH)_3$ in 10 ml. 50% KOH and long evapn. over H_2SO_4; monoclinic or triclinic crystals, d. 2.36, n_γ 1.509, n_α 1.485. Heating to 300° results in $K[GaO_2].1.5H_2O$, heating to 400°, in $K[GaO_2].H_2O$. The last H_2O is hard to eliminate at higher temp. (4) Pure $3CaO.Ga_2O_3.12H_2O$, or $Ca_3[Ga(OH)_6]_2$, was obtained by adding a soln. of $Na[Ga(OH)_4]$ to a boiling satd. soln. of $Ca(OH)_2$, hexagonal plates, d. 2.38, n_γ 1.561, n_α 1.540. Addn. of a soln. of $Na[Ga(OH)_4]$ to a cold satd. soln. of $Ca(OH)_2$ gives fine cryst. spherulites of d. 2.15, mean n 1.505, analyzing $4CaO.Ga_2O_3.13.5H_2O$. No pptn. occurs on adding $Na[Ga(OH)_4]$ to 20% $CaCl_2$; however, addn. of NH_4OH does ppt. $4CaO.Ga_2O_3.21H_2O$ (analogous to the Al compd.), fine spherulitic crystals. Reaction between $CaCl_2$ and warm $K[Ga(OH)_4]$ gives impure cubic crystals strongly contaminated with $Ca(OH)_2$ and resembling $Ca_3[Al(OH)_6]_2$. (5) No pptn. occurs between dil. $K[Ga(OH)_4]$ and dil. $SrCl_2$ but addn. of the latter to hot concd. $Sr(OH)_2$ ppts. $Sr_3[Ga(OH)_6]_2$, rhombic dodecahedra, d. 3.51, n 1.625.

III. Thiogallates of alkali metals. *Ibid.* 1247-52.—(1) Li_2CO_3 (or Na_2CO_3) in equimol. mixt. with Ga_2O_3, heated in a stream of dry H_2S, 2-3 l./hr., 2 hrs. at 800°, then 4 hrs. at 900°, and cooled under H_2S, gave light-brown masses with distinct cryst. structure: $Li[GaS_2]$, brown-red, m. 1050 ± 5°, apparently rhombic plates and prisms, highly birefringent, n > 1.78, d. 2.88, does not react with boiling H_2O; $Na_2[Ga_2S_4]$, dark yellow, m. 952° ± 2°, tetragonal prisms, highly birefringent, n > 1.78, d. 2.86, partly sol. in H_2O, going over into $Na_2[Ga_2S_4].2H_2O$ on moistening and drying over $CaCl_2$. (2) Ga_2O_3 was heated with 8 parts K_2CO_3 (Rb_2CO_3, Cs_2CO_3) and 8 parts S under CO_2, 15 min. at 450°, then 2-3 min. at 1100°, leached with H_2O, and the insol. thiogallates were washed with H_2O and alc. and dried over $CaCl_2$: $K_2[Ga_2S_4]$, tetragonal, m. 965° ± 2°, yellow, medium birefringence, n > 1.74, does not react with H_2O; $Rb_2[Ga_2S_4]$, yellow-brown, tetragonal, m. 990° ± 2°, highly birefringent, n > 1.78, d. 3.42; $Cs_2[Ga_2S_4]$, rhombic, light yellow to bright red pleochroic, m. 980° ± 5°, highly birefringent, n > 1.78, d. 3.34, does not react with H_2O. Li and Na thiogallates cannot be prepd. by this method, only by (1). (3) All thiogallates are stable in air; they are decompd. by strong acids with evolution of H_2S. (4) By the thiogallate anion type,



Ga differs from Al and shows an analogy with In and Tl, evidently owing to the 18-electron shell of the ion, in contrast to the 8 outer electrons of Al^{+++}.

N. Thon



PROCESSES AND PROPERTIES INDEX

*Contribution to the Chemistry of Gallium. B. N. Ivanov-Emin and J. I. Rabovik (*Zhur. Obshch. Khim.*, 1947, 17, 1247-1252; *Nuclear Sci. Abs.*, 1949, 2, 242). (In Russian). The capacity of gallium to form sulpho-salts as shown in this paper relates it to its analogues indium and thallium – and makes it totally distinct from aluminium. The composition and main properties of several sulpho-gallates are studied.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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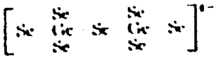
Chemistry of germanium. IV. Selenogermanates of alkali metals. B. N. Ivanov-Emin and V. M. Kostrikin (M. V. Lomonosov Inst. Fine Chem. Technol., Moscow). *J. Gen. Chem.* (U.S.S.R.) 17, 1253-60(1947)(in Russian); cf. *C.A.* 42, 4751. $Na_6[Ge_2Se_7]·9H_2O$ was prepd. by satg. a soln. of GeO_2 in NaOH (mole ratio 1:4) with H_2Se and pouring the product into Me_2CO; the oily mass crystallizes rapidly; washed with Me_2CO, the crystals are light-yellow but turn red when either washed with H_2O or exposed to air. $K_6[Ge_2Se_7]·9H_2O$ is obtained in the same way. The two compds. are optically isotropic, probably rhombic; readily sol. in H_2O with a yellowish color; acids ppt. orange $GeSe_2$; CO_2 has no effect. The anion is formulated



$$\left[\begin{array}{ccccc} & Se & & Se & \\ Se & Ge & Se & Ge & Se \\ & Se & & Se & \end{array}\right]^{6-}$$

N. Thon

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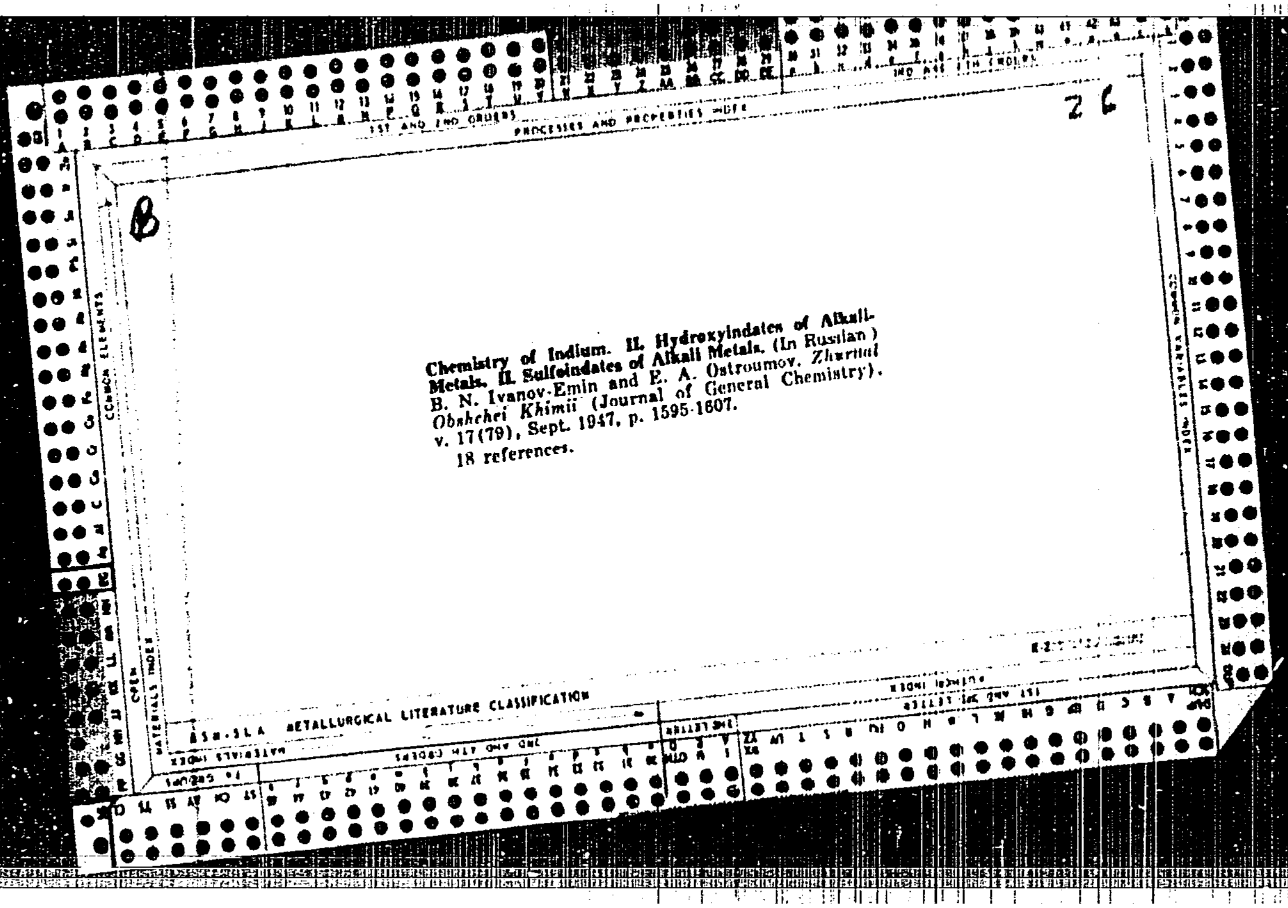

B

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Chemistry of Indium. II. Hydroxyindates of Alkali-Metals. II. Sulfoindates of Alkali Metals. (In Russian) B. N. Ivanov-Emin and E. A. Ostroumov. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 17(79), Sept. 1947, p. 1595-1607.

18 references.

IVANOV-EMIN, B. N.

Alimarin, I. P. and Ivanov-Emin, B. N. - "On the Distillation of Lead in the Form of haloid compounds", Trudy Mosk. in-ta tonkoy khim. tekhnologii im. Lomonosova, Issue 2, 1948, p. 89-96, - Bibliog: 7 items.

SO: U-3042, 11 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 8, 1949).

USSR/Inorganic Chemistry. Complex Compounds.

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26494.

Author : Nisel'son, L.A., Ivanov-Emin, B.N.

Inst :

Title : To The Question of Interaction Products of Zirconium and Hafnium Tetrachlorides with Phosphorus Oxychloride.

Orig Pub : Zh. neorgan. khimii, 1956, 1, No. 8, 1766 - 1770

Abstract : It was established by chemical analysis that the composition of the sublimating product of the interaction between $ZrCl_2$ and $POCl_3$ is close to $3ZrCl_4 \cdot 2POCl_3$ (I). The molecular weight of I vapor at 370 to 400° is equal to about 450. I starts to melt at 98 to 100°, the main mass melts at 170° to

Card 1/2

1. Moskovskiy Institut Tsvetnykh metallov i Zolota imeni M.I. Kalinina.

USSR/Inorganic Chemistry. Complex Compounds. C

Abs Jour : Ref Zhur - Khimiya, No. 8, 1957, 26494.

175°, melting is complete at 225 to 230°. The authors surmise that I and $3HfCl_4 \cdot 2POCl_3$ are not individual compounds, but azeotropic mixtures.

Card 2/2

SOV/137-58-10-20463

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 17 (USSR)

AUTHOR: Ivanov-Emin, B. N.

TITLE: An Investigation in the Field of the Chemistry of the Nearest Analogs of Aluminum (Issledovaniya v oblasti khimii blizhayshikh analogov alyuminiya)

PERIODICAL: Sb. nauchn. tr. Mosk. in-t tsvetn. met. i zolota, 1957, Nr 27, pp 7-22

ABSTRACT: A study is made of the properties of the most important types of Sc, Ga, and In compounds, namely, hydroxides, hydroxy and thio compounds, halide complexes, heteropoly compounds, and complexes with amines.

N. P.

1. Aluminum--Synthesis 2. Chemical compounds 3. Scientific research

Card 1/1

AUTHORS: Ivanov-Emin, B. N., Rabovik, Ya. I. SOV/78-3-10-35/35

TITLE: Hexamolybdenum Gallates of Alkali Metals(Geksamolibdatogallaty shchelochnykh metallov)

PERIODICAL: Zhurnal neorganicheskoy khimii 1958, Vol 3, Nr.10, pp 2429-2432 (USSR)

ABSTRACT: The production of potassium and ammoniumhexamolybdenum gallate was carried out in the weakly acid medium when solutions formed by potassium molybdate (ammonium molybdate) and gallium sulfate were heated. The compounds have the following composition:

$$3\ K_2O.Ga_2O_3.12MoO_3.20\ H_2O$$

$$3(NH_4)_2O.Ga_2O_3.12MoO_3.20\ H_2O$$

It follows from the analyses of the molecular conductivity that alkalihexamolybdenum gallates consist of four ions. The following coordination structure was suggested for potassium and ammoniumhexamolybdenum gallates:

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$$K_3[Ga(HMoO_4)_6].\ 7\ H_2O$$

Hexamolybdenum Gallates of Alkali Metals

SOV/78-3-10-35/35

$$(NH_4)_3[Ga(HMoO_4)_6] \cdot 7\ H_2O$$

When dried, hexamolybdenum gallates of potassium and ammonium lose seven mol water at 110-120° C. The water of constitution is removed not before a temperature of 250°C has been reached. These investigations show that hexamolybdenum gallates of potassium and ammonium are analogous to the corresponding aluminum compounds. There are 1 figure, 3 tables, and 9 references, 3 of which are Soviet.

SUBMITTED: January 20, 1958

Card 2/2

USCOMM-DC-60758

5(2) SOV/78-4-1-14/48

AUTHORS: Ivanov-Emin, B. N., Ostroumov, E. A.

TITLE: On the Question of the Formation of Hydroxy-scandiates of the Alkali Metals (K voprosu ob obrazovanii gidroksoskandiatov shchelochnykh metallov)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 1, pp 71-73 (USSR)

ABSTRACT: The separation of hexahydroxo-sodium scandiate, having the composition $Na_3[Sc(OH)_6]\cdot 2H_2O$, is described. For the synthesis of this compound scandium hydroxide produced by the method of N. A. Tananayev was disolved by heating in 18 n sodium hydrate. The compound separated out was analyzed and the formula mentioned above was confirmed. The coordination number of scandium in this compound is 6. The crystalline compound has a rhombic lattice. The crystals frequently form druses. At a temperature of 25 the crystal density is 2.01-2.05 as measured by the micropyknometer by V. V. Syromyatnikov (Ref 10). The compound sodium hexahydroxo-scandiate decomposes on the effect of

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SOV/78-4-1-14/48

On the Question of the Formation of Hydroxy-scandiated of the Alkali Metals

water, at the same time scandium hydroxide is formed. The production of lithium hexahydroxo-scandiate by dissolving scandium hydroxide in a lithium hydroxide solution did not prove successful. There are 1 figure and 12 references, 6 of which are Soviet.

SUBMITTED: October 26, 1957

Card 2/2

SOV/78-4-4-42/44

5(2)

AUTHORS: Nisel'son, L. A., Edel'shteyn, L. B., Ivanov-Emin, B. N.

TITLE: Investigation of the System Benzene - Silicon Tetraiodide (Izucheniye sistemy benzol-tetrayodid kremniya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 4, pp 954-956 (USSR)

ABSTRACT: The authors investigated the system SiJ_4-C_6H_6. Silicon tetraiodide in pure state was obtained by distillation. C_6H_6 and SiJ_4 form a system of a simple eutectic type without chemical interaction of the components. The solubility of SiJ_4 in benzene was determined by a visual synthetic method. The data on the solubility virtually form a straight line in the coordinate system 1/T-lgN, where T denotes the absolute temperature, and N the mole number of SiJ_4. The solution heat of SiJ_4 in benzene amounts to 6.2 kcal/mole. The solubility of the iodides PJ_3, Al_2J_6, SbJ_3, HgJ_2 and AsJ_3 in benzene was investigated; the results are contained in table 2. These compounds frequently

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SOV/78-4-4-42/44

Investigation of the System Benzene - Silicon Tetraiodide

act as impurities in silicon tetraiodide. Single crystallization does not yield purest silicon tetraiodide. The phase equilibrium crystals - liquid in the system $SiJ_4-C_6H_6$ is characterized in a table. There are 1 figure, 2 tables, and 2 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota im. M. I. Kalinina (Moscow Institute of Nonferrous Metals and Gold imeni M. I. Kalinin)

SUBMITTED: November 22, 1958

Card 2/2

5(4) SOV/78-4-6-29/44

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A.

TITLE: On the Transformation of the Hydroxo-compounds of Gallium, Indium, and Scandium During Heating (O prevrashcheniyakh gidroksosoyedineniy galliya, indiya i skandiya pri nagrevanii)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 6, pp 1386 - 1392 (USSR)

ABSTRACT: The thermal stability of lithium-, sodium-, and potassium hydroxogallate, of potassium- and sodium hydroxoindiate, and of sodium hydroxoscandiate was investigated. The compounds were investigated by the thermal analysis, dehydration, and X-ray analyses. The thermograms of the hydroxogallates of lithium $[Li(OH)_4][Ga(OH)_4]$, potassium $Na[Ga(OH)_4]$, and sodium $K[Ga(OH)_4]$ are given in the figures 1-3. The dehydration of the hydroxoindiates of sodium and potassium were investigated and the thermograms of $Na_3[In(OH)_6] \cdot 2H_2O$ and $K_3[In(OH)_6] \cdot 2H_2O$ are given in the figures 5 and 6. A thermo-

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On the Transformation of the Hydroxo-compounds of Gallium, Indium, and Scandium During Heating

SOV/78-4-6-29/44

gram of $Na_3[Sc(OH)_6].2H_2O$ was taken and is given in figure 8. The dehydration temperature of sodium tetrahydroxoscandiate is higher than the corresponding temperature of the tetrahydroxoindiate, since the polarization effect of the indium ion is greater than that of the scandium ion. The thermal transformation of the hydrate of the sodium hexahydroxoscandiate is given by the following reaction:

$$Na_3[Sc(OH)_6].2H_2O \rightarrow Na_3[Sc(OH)_6] + 2H_2O,$$

$$Na_3[Sc(OH)_6] \rightarrow Na[Sc(OH)_4] + 2NaOH,$$

$$Na[Sc(OH)_4] \rightarrow NaScO_2 + 2H_2O.$$

The corresponding radiographs of $Na[Ga(OH)_4]$, $Na_3[In(OH)_6].2H_2O$, their heating products, and the radiographs of sodium metaindiate $NaInO_2$ and $Na_3[Sc(OH)_6].2H_2O$ and their heating products as well as the thermal dissociation of the sodium metascandiate $NaScO_2$ are given in figures 4,7,and 9. There are 9 figures, 1 table, and 8 references, 5 of which are Soviet.

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On the Transformation of the Hydroxo-compounds of Gallium, Indium, and Scandium During Heating SOV/78-4-6-29/44

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota im. M. I. Kalinina (Moscow Institute of Nonferrous Metals and Gold imeni M. I. Kalinin)

SUBMITTED: March 4, 1958

Card 3/3

5 (2)

AUTHORS: Lebedinskiy, V. V. (Deceased), Ivanov-Emin, B. N. SOV/78-4-8-10/43

TITLE: On Complex Compounds of Pentavalent Rhenium With Pyridine (O kompleksnykh soyedineniyakh pyativalentnogo reniya s piridinom)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 8, pp 1762 - 1767 (USSR)

ABSTRACT: In 1943 the authors were able to prove that rhenium forms typical amino complexes in which rhenium has the function of the central atom of a complex cation (Ref 1). In this case ethylene diamine served as substituent. The effect of pyridine differs from that of ethylene diamine by the fact that in aqueous solution of potassium chlororhenite (or -rhenate) hydrolysis takes place after the addition of pyridine. Only by the action of a 50% solution of pyridine on solid potassium-oxochlororhenate it was possible to obtain the relatively stable compound $[ReO_2.4C_5H_5N]Cl$ which the authors denoted as tetrapyridine-dioxo-rhenium chloride (I). Under the action of hydrochloric acid a two-stage reaction takes place:

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On Complex Compounds of Pentavalent Rhenium With Pyridine SOV/78-4-8-10/43

$$[\mathrm{ReO_2 4Py}]\mathrm{Cl} \xrightarrow{\mathrm{HCl}} [\mathrm{ReO(OH)4Py}]\mathrm{Cl_2} \xrightarrow[\mathrm{heat}]{\mathrm{HCl}} [\mathrm{ReO_2 4Py}]_2[\mathrm{ReOCl_5}].$$

(I) orange (II) red (III) green

The compounds (II) and (III) were also separated and investigated. The following names are suggested: (II) = tetrapyridinoxohydrorhenium chloride, (III) = tetrapyridine-dioxorheniumoxo-chlororhenate. This effect of acids on the pyridine compound is similar to that of the corresponding ethylene diamine compounds. In the first stage of the reaction one proton enters the inner sphere of the complex under formation of a hydroxyl group. Compound II is unstable. It decomposes in water according to the reaction II $\rightleftarrows$ I + HCl. This reaction is, however, reversible and at an increase of the acid concentration compound II is formed again. The experimental data prove the opinions expressed by the authors already earlier on the reaction mechanism (Ref 1). Since pyridine is a tertiary amine, an amido reaction which is characteristic of the amino complexes of platinum, cannot take place. In these complexes rhenium is pentavalent, as was proved by ti-

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tration. The pyridine complexes of rhenium are less stable than ethylene diamine complexes because pyridine is displaced from the complex by ethylene diamine. The experimental chapter of the paper gives a detailed description of the reactions and analyses carried out. Figure 1 shows the crystals of compound (I). There are 1 figure and 4 references, 1 of which is Soviet.

SUBMITTED: May 20, 1958

5(2) SOV/78-4-10-9/40

AUTHORS: Ivanov-Emin, B. N., Rabovik, Ya. I.

TITLE: Complex Compounds of Halides of Gallium and Indium With Pyridine

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 10, pp 2228-2236 (USSR)

ABSTRACT: In the introduction the authors mention the complex compounds of the halides of Ga, In and Th with ammonia, ethylene diamine and urea hitherto known. The ethylene diamine and ammonia-ethylene diamine compounds were described by A. P. Kochetkova and V. G. Tronev (Ref 2) who have also synthesized compound $InCl_3 \cdot 4NH_3$ (Ref 4). Preliminary experiments showed that the formation of pyridine complex compounds of gallium from aqueous solutions is not possible. The synthesis was therefore carried out in alcoholic or ethereal solution. The following compounds were obtained for the first time: $GaCl_3 \cdot C_5H_5N$, $GaCl_3 \cdot 2C_5H_5N$, $GaBr_3 \cdot 3C_5H_5N$, $GaJ_3 \cdot 3C_5H_5N$, $InBr_3 \cdot 3C_5H_5N$ and the α-picoline complex compounds $InHal_3 \cdot 3C_5H_4CH_3N$. The analyses of the preparations, the variation of pH on dilution and titration

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SOV/78-4-10-9/40

Complex Compounds of Halides of Gallium and Indium With Pyridine

with KOH, the melting points and the molecular electrical conductivities are given and the crystals shown in a picture. The absence of the tripyridine compounds of $GaCl_3$ and InJ_3 and the low stability of the $GaCl_3$-dipyridine complex is explained by the trans-effect according to I. I. Chernyayev, on suggestion of B. V. Nekrasov. The indium complexes are completely hydrolyzed by water, whereas the gallium complexes form acido complexes without noticeable hydrolysis. The aqueous solutions are of acid reaction, their electrical conductivity ranks in the decreasing order of Cl → Br → J. By determination of the molecular weight of the gallium-halogen complexes they were proved to be monomer when dissolved in benzene. There are 3 figures, 8 tables, and 9 references, 3 of which are Soviet.

SUBMITTED: July 2, 1958

Card 2/2

S/078/60/005/009/018/040/XX
B017/B056

AUTHORS: Ivanov - Emin, B. N. and Nisel'son, L. A.

TITLE: Amphoteric Properties of Ytterbium and Lutecium Hydroxides

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No 9, pp. 1921 - 1923

TEXT: The alkali salts of the hexahydroxo compounds of ytterbium and lutecium were synthetized. Ytterbium and lutecium oxides with a purity of 99.95% were used as starting materials. The amphoteric hydroxides were treated with a concentrated sodium hydroxide solution for 48 hours in an autoclave at 180 - 200°C. The isolated compounds have the following composition:

$$Na_3\left[Yb(OH)_6\right] \quad \text{and} \quad Na_3\left[Lu(OH)_6\right]$$

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U2277

S/078/60/005/009/028/040/XX
B017/B058

11.4100

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Larionova, L. Ye

TITLE: Study of the Behavior of Some Fluoro Gallates of Alkali Metals in Aqueous Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1993-1995

TEXT: The fluoro gallates of potassium, rubidium and cesium were studied in aqueous phase by means of electrical conductivity measurements. The molecular electrical conductivities found for the compounds $[GaF_3 \cdot 3H_2O]$, $K_2[GaF_5 \cdot H_2O]$, $Rb[GaF_4 \cdot 2H_2O]$ and $Cs[GaF_4 \cdot 2H_2O]$ are given in Fig. 1 and Table 1. The determination was made at 20°C. It follows from the studies of the conductivity of fluoro gallates of potassium rubidium and cesium that the complex anion decomposes in aqueous solution according to the reaction scheme: $K_2[GaF_5 \cdot H_2O] \rightarrow 2\,KF + GaF_3 + H_2O$ and $Cs[GaF_4 \cdot 2H_2O] \rightarrow CsF + GaF_3 + H_2O$,

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Study of the Behaviour of Some Fluoro Gallates of Alkali Metals in Aqueous Solutions S/078/60/005/009/028/040/XX B017/B058

respectively. When diluting the gallium fluoride solutions, hydration and dissociation of the hydrated gallium fluoride molecule sets in according to the reaction scheme: $[GaF_3 \cdot 3H_2O] + H_2O \rightarrow [GaF_2 \cdot 4H_2O]^+ + F^-$. The dissociation rises slowly with increasing dilution and the molecular conductivity attains the valence of a two-ion electrolyte only at a dilution of $V \approx 700$ - 10001/mole. The authors mention I. V. Tananayev and N. V. Bausova. There are 1 figure, 2 tables, and 5 references: 4 Soviet and 1 British.

SUBMITTED: June 6, 1959

Card 2/2

S/078/60/005/009/029/040/XX
B017/B058

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Greksa, Ya.

TITLE: Study of the Solubility of Indium Hydroxide in Sodium Hydroxide Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1996-1998

TEXT: The solubility of indium hydroxide in sodium hydroxide solutions with concentrations of from 1 to 17 mol/l was studied at 25°C. Indium hydroxide was prepared according to the method by N. A. Tananayev (Ref.6) and subsequently converted into the crystalline state according to the method by Fricke and Seitz (Ref. 7). The analysis results of crystalline indium hydroxide, dried at 120°C, corresponded to formula $In(OH)_3$. The solubility of indium hydroxide in solutions of sodium hydroxide at 25°C is given in Table 1, and Fig. 1 shows graphically the dependence of the solubility of indium hydroxide at 25°C on the concentration of sodium

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Study of the Solubility of Indium Hydroxide in Sodium Hydroxide Solutions

S/078/60/005/009/029/040/XX
B017/B058

hydroxide. The maximum solubility of $In(OH)_3$ in sodium hydroxide solutions (11.33 mol NaOH/l) amounts to 11.0 g/l. The solid phase consists of indium hydroxide at a soda lye concentration of up to 11.0 g/l. and of a hydrate of sodium hexahydroxo indate at a soda lye concentration above 11.0 g/l. The solubility of amorphous and crystalline indium hydroxide is the same. The authors mention E. A. Ostroumov, N. V. Aksel'rud, V. B. Spivakovskiy, E. N. Deychman, V. P. Chalyy and S. P. Rozhenko. D. Okhodnitski and Ya. Chizhniar participated in the study. There are 1 figure, 1 table, and 8 references; 6 Soviet, 1 French, and 1 German.

SUBMITTED: June 6, 1959

S/078/60/005/012/015/016
B017/B064

AUTHORS: Ivanov-Emin, B. N., Nisel'son, L. A., Ivolgina, A. T.

TITLE: Study of the Solubility of Scandium Hydroxide in Sodium Hydroxide Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 12, pp. 2841-2842

TEXT: The solubility of scandium hydroxide in sodium hydroxide solutions containing 1 - 19 moles of NaOH/l was studied at 25°C. Maximum solubility of $Sc(OH)_3$ in an 11.7-mole solution of sodium hydroxide is 5.0 g/l. The existence of peaks on the solubility curve indicates the formation of sodium hydroxo scandiate. The solid phase up to the peak is crystalline scandium hydroxide, and the solid phase behind the peak is a hydrate of sodium hexahydroxo scandiate $Na_3[Sc(OH)_6] \cdot 2H_2O$. N. A. Tananayev is mentioned. There are 1 figure, 1 table, and 9 references: 4 Soviet, 2 British, 2 German, and 1 Czechoslovakian.

SUBMITTED: December 30, 1959

Card 1/1

NISEL'SON, L.A.; IVANOV-EMIN, B.N.; LARIONOVA, L.Ye.

Crystals-liquid phase equilibria in binary systems formed by $ZrCl_4$, $HfCl_4$, $SnCl_2$, and $BiCl_3$. Zhur. neorg. khim. 6 no.1:186-191 '61. (MIRA 14:2)

(Zirconium chloride) (Hafnium chloride)
(Phase rule and equilibrium)

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; RABCVIK, Ya, I.; LARICNOVA, L.Ye.

Complex compounds of gallium halides with o-phenanthroline. Zhur. neorg.khim. 6 no.5:1142-1146 My '61. (MIRA 14:4)

(Gallium compounds) (Phenanthroline)

IVANOV-EMIYE, B.N.; NISEL'SON, L.A.; IVOLGINA, A.T.

Solubility of yttrium hydroxide in sodium hydroxide solutions. Zhur.neorg.khim. 6 no.6:1483-1484 Je '61. (MIRA 14:11)
(Yttrium oxide) (Sodium hydroxide)

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; LARIONOVA, L.Ye.

Properties of solutions of alkali metal gallates. Zhur.neorg.khim. 7 no.3:522-526 Mr '62. (MIRA 15:3)
(Gallic hydroxide)

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; GVOZDEVA, N.I.

Solubility of gallium hydroxide in sodium hydroxide and potassium hydroxide solutions at 25°C. Zhur.neorg.khim. 7 no.5:1150-1153 My '62. (MIRA 15:7)

(Gallium hydroxide) (Alkalies) (Solubility)

IVANOV-EMIN, B.N.; NISEL'SON, L.A.; SOKOLOVA, T.D.

Reactions of scandium chloride with ethylenediamine. Zhur. neorg. khim. 8 no.6:1381-1383 Je '63. (MIRA 16:6)

(Scandium chloride)
(Ethylenediamine)

IVANOV-EMIN, B.N.; RYBINA, V.I.; KORNEV, V.I.

Solubility of thallium hydroxide in caustic soda solutions.
Zhur.energ.khim. 10 no.4:1005-1008 Ap '65.

(MIRA 18:6)

L 41730-66 EWT(m)/EWP(j)/EWP(t)/ETI IJP(c) JD/JG/RM

ACC NR: AP6020367 (A) SOURCE CODE: UR/0078/66/011/003/0475/0477

AUTHOR: Ivanov-Emin, B. N.; Siforova, Ye. N.; Fisher, Marianna Mskes; Kampos, Virkhiniya Mel'yado 35 34 B

ORG: Peoples' Friendship University im. Patrice Lumumba (Universitet druzhby narodov)

TITLE: Study of the solubility of hydroxides of certain lanthanides in sodium 27 hydroxide solutions

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SOURCE: Zhurnal neorganicheskoy khimii, v. 11, no. 3, 1966, 475-477

TOPIC TAGS: hydroxide, solubility, sodium hydroxide, lanthanum compound, ytterbium compound, gadolinium compound

ABSTRACT: The solubility isotherm of lanthanum, 27 gadolinium, 27 and ytterbium 27 hydroxides in sodium hydroxide solutions of various concentrations was studied at 25°C. The solubility of lanthanum hydroxide does not increase with rising NaOH concentration. The solubility isotherm of gadolinium hydroxide rises only slightly with NaOH concentration; the solubility curve has no maximum. In the case of ytterbium hydroxide, the solubility isotherm has a distinct maximum at an NaOH concentration of approximately 14.1 N; the solubility at this maximum amounts to 4 g of hydroxide per liter of solution, i.e., 2×10^{-2} mole/l. The solid phase up to the maximum is $Yb(OH)_3$, and at higher NaOH concentrations the solid phase is sodium hydroxoytterbate

Card 1/2 UDC: 546.65-36

L 41730-66

ACC NR: AP6020367

$Na_3[Yb(OH)_6]$. A determination of the lanthanide hydroxide concentrations in NaOH solutions, carried out gravimetrically and colorimetrically, showed that the acidic properties of the hydroxides increase with the atomic number of the lanthanide; this is attributed to the lanthanide contraction. Orig. art. has: 1 figure and 2 tables.

SUB CODE: 07/ SUBM DATE: 06Jul64/ ORIG REF: 003/ OTH REF: 008

Card 2/2 af

ACC NR: AM6013720 Monograph UR/

Baydakov, Vadim Borisovich; Ivanov-Emin, Lev Nikolayevich

Aircraft aeromechanics (Aeromekhanika letatel'nykh apparatov) Moscow, Izd-vo "Mashinostroyeniye," 1965. 409 p. illus., biblio. Errata slip inserted. 7500 copies printed. A textbook for aviation technical schools.

TOPIC TAGS: aerodynamics, aeronautic engineering, aerodynamic design, rocket flight, missile technology

PURPOSE AND COVERAGE: This book outlines fundamentals of aeromechanics, the structure and physical properties of the atmosphere, aerodynamic characteristics of wings, and modern methods of aerodynamic investigations. Special chapters deal with the stability and controllability of flying vehicles (airplanes and rockets), and with methods of their aerodynamic and ballistic design. The book is intended as a textbook for students in technical aviation schools. It may be useful to medium-level technical personnel of aviation industry.

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ACC NR: AM6013720

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SUB CODE: 01, 02/ SUBM DATE: 27Nov65/ ORIG REF: 041/ OTH REF: 005

Card 3/3

AKIVIS, D.R., inzh.; IVANOV-EMIN, Ye.B., inzh.; MOSKVIN, P.P., inzh.

Checking the pressing speed. Mekh. i avtom. proizv 18 no.4:37-39 Ap'64. (MIRA 17:5)

GORSKIY, A.I., kand.tekhn.nauk; IVANOV-EMIN, Ye.B., inzh.

Using pneumatic drives in automatic control systems. Mekh. i avtom. proizv. 19 no.1:36-39 Ja '65. (MIRA 18:3)

GORSKIY, A.I.; AKIVIS, D.R.; IVANOV-EMIN, Ye.B.

Effect of the pressing rate on the quality of castings. Lit.proizv. no.10:12-15 O '64. (MIRA 18:4)

IVANOV-FRANTSKEVICH, G. N.

"Vertical Stability of Water Layers as an Important Oceanographic Characteristic," Trudy Instituta Okeanologii (Transactions of the Oceanography Institute), Vol 3, pp 91-110, Moscow, 1953

A-38772, 9 Mar 55 - Summary

SOV/124-58-8-8845

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 8, p 74 (USSR)

AUTHOR: Ivanov-Frantskevich, G.N.

TITLE: On the Vertical Stability of Water Layers (K voprosu o vertikal'noy ustoychivosti vodnykh sloyev)

PERIODICAL: Tr. In-ta okeanol. AN SSSR, 1956, Vol 19, pp 3-45

ABSTRACT: Analysis is made of the methods used to estimate the vertical stability of layers of water in the seas. The physical significance of the static-stability criteria now in use is explained, and the author indicates the most rational method for a numerical calculation of these criteria. In the author's opinion, the most rational turbulence criterion in the case of a stratified flow of sea water is the Richardson number. He analyzes the existing methods of arriving at the critical value of the Richardson number.

D.L. Laykhtman

Card 1/1

S/020/61/141/006/012/021
B104/B112

AUTHOR: Ivanov-Frantskevich, ~~G. N.~~

TITLE: Averaging of the balance equation in oceanology

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 6, 1961, 1350-1352

TEXT: The author understands equation of motion, equation of continuity, equation of turbulent heat exchange, and others to be balance equations for different quantities (momentum, mass, heat, and similar factors). For the general form of the equation of motion, $\frac{\partial}{\partial t}(e\varrho) + \frac{\partial}{\partial x_k} C_k[E] = \sigma[E]$ is given, with C_k being the components of flow $\vec{C}$ of E. $\sigma[E]$ the intensity of sources and sinks of E. By $c_k = C_k/e\varrho$, the balance equation can be represented in the form $\frac{\partial}{\partial t}(\varrho e) + \frac{\partial}{\partial x_k}(\varrho e c_k) = \sigma$ (4). The various averaging methods of (4) lead to different equations for the turbulent heat exchange. The velocity field

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$\vec{v}_k$ plays an essential role in averaging. Its proper choice is very important for the convenience of calculation. The two averagings are used: (1) that according to Reynolds: $\bar{e} = \frac{1}{t}\int_{-\pi/2}^{\pi/2} e\,dt$, and (2) that according to the mean weight $\hat{e} = \overline{\varrho e}/\bar{e}$. From the equation of continuity

$$\frac{\partial\bar{\rho}}{\partial t} + \frac{\partial}{\partial x_k}(\bar{\rho}\bar{v}_k) + \frac{\partial}{\partial x_k}(\overline{\rho' v'_k}) = 0, \qquad (6)$$

$(\varrho' = \varrho - \bar{\varrho})$, which was obtained by averaging according to Reynolds, the two forms of the equation of turbulent diffusion

$$\frac{\partial\bar{\rho}}{\partial t} + \frac{\partial}{\partial x_k}(\bar{\rho}\bar{v}_k) - \frac{\partial}{\partial x_k}\left(B_k\frac{\partial\bar{\rho}}{\partial x_k}\right) = 0 \qquad (9) \text{ or}$$

$$\frac{\partial\bar{\rho}}{\partial t} + \frac{\partial}{\partial x_k}(\overline{\rho v_k}) - \frac{\partial}{\partial x_k}\left(B_{kl}\frac{\partial\bar{\rho}}{\partial x_l}\right) = 0. \qquad (9')$$

Averaging of the balance ...

S/020/61/141/006/012/021
B104/B112

ences: 1 Soviet and 4 non-Soviet.

ASSOCIATION: Institut okeanologii Akademii nauk SSSR (Institute of Oceanology of the Academy of Sciences USSR)

PRESENTED: February 16, 1961, by V. V. Shuleykin, Academician

SUBMITTED: February 16, 1961

Card 4/4

IVANOV-FRANTSKEVICH, G.N.

Conference of the joint group on the study of the equation of the state of sea water held in Paris, May 23-25, 1962. Okeanologiia 3 no.6:1116-1119 '63. (MIRA 17:4)

IVANOV-GORODOV, A. N. Cand Tech Sci -- "Study of the effect of the grain composition of Portland cement upon its construction-engineering properties." Mos, 1960 (Min of Higher and Secondary Specialized Education RSFSR. Mos Order of Lenin Chemicotechnological Inst im D. I. Mendeleyev). (KL, 4-61, 196)

PHASE I BOOK EXPLOITATION SOV/5670

Konovalov, P. F., N. P. Shteyyert, A. N. Ivanov-Gorodov, and B. V. Volkonskiy

Fiziko-mekhanicheskiye i fiziko-khimicheskiye issledovaniya tsementa; metody i apparatura (Physicomechanical and Physicochemical Analysis of Cement; Methods and Apparatus) Leningrad, Gosstroyizdat, 1960. 318 p. Errata slip inserted. 5,000 copies printed.

Scientific Ed.: V. F. Krylov, Candidate of Technical Sciences; Ed. of Publishing House: A. S. Rotenberg; Tech. Ed.: Ye. A. Pul'kina.

PURPOSE: This book is intended for technical personnel and scientists in factory and research laboratories who are engaged in testing and investigating cements and other binding materials.

COVERAGE: The book discusses chemical, petrographic, ionization-radiographic and other methods used in physicochemical and -mechanical investigations of cements and describes the necessary equipment. Materials from both Soviet and non-Soviet sources are reviewed. No personalities are mentioned. There are 49 references: 38 Soviet, 8 English, and 3 German.

Card 1/10

IVANOV-GORODOV, A.N., inzh.

Investigating the relationship between the heat emission during hydration of Portland cement and the degree of its dispersability. Trudy NIITSement no.14:101-117 '60. (MIRA 13:11)
(Heat--Transmission) (Portland cement)

IVANOV-KALUPCHIEV, K.

A device for gas preparation. Tekhnika Bulg 12 no.5:37 '63.

IVANOV-KHOLODNYY, G.S.

Structure and chemical composition of red dwarfs. Soob.GAISH no.60:24-36 '51. (MLRA 7:5)

(Stars--Constitution)

IVANOV-KHOLODNYY, G. S.

Sun - Prominences

Photographing protuberances in the infra-red line of helium 10830. Izv. Krym. astrofiz. obs. No. 8, 1952.

Monthly List of Russian Accessions, Library of Congress June 1953. UNCL.

IVANOV-KHOLODNYI, G. S.

Sun

Observations on the spectrohelioscope in 1950. Izv. Krym. astrofiz. obs. No. 8, '52.

Monthly List of Russian Accessions, Library of Congress
June 1953. UNCL.

IVANOV-KHOLODNYY, G. S.

Dissertation: "Spectrophotometric Investigation of the Physical State of Hydrogen and Helium in Prominences." Cand Phys-Math Sci, Main Astronomical Observatory, Acad Sci USSR, Moscow, 1953. Referativnyy Zhurnal — Astronomiya, Moscow, May 54.

SO: SUM 284, 26 Nov 1954

IVANOV-KHOLODNYY, G.S.

Spectrophotometric investigation of hydrogen and helium in prominences. Part 1. (Experimental part). Izv.Krym.astrofiz. obser. 13:112-154 '55. (MIRA 13:4)
(Sun--Prominences)

IVANOV-KHOLODNYY, G.S.

Spectrophotometric investigation of hydrogen and helium in prominences. Part 2. Izv.Krym.astrofis.obser. 15:69-94 '55. (MIRA 13:4)

(Sun--Prominences--Spectra)

IVANOV-KHOLODNYY, [redacted]

Active areas of the solar corona [with summary in French]. Vop. kosm. 5:203-241 '57. (MLRA 10:8)

(Sun--Corona)

SOV/49-58-9-5/14

AUTHOR: Ivanov-Kholodnyy, G.S.

TITLE: Spectrophotometric Measurement of the Radiation Lines of Mg II in the Solar Spectrum (Spektrofotometricheskoye izmereniye liniy izlucheniya Mg II v spektre solntsa)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 9, pp 1105 - 1110 (USSR)

ABSTRACT: In photographs of the ultra-violet spectrum of the sun taken from rockets, an emission reversal can be seen in the centre of the strong Mg II absorption lines at λ 2795.5 and 2802.7 Å. This is the only noticeable radiation line in the solar spectrum except for the weak emission in the centre of the Ca II H and K lines.

The most accurate photometric survey of the region round 2800 Å has been made by Wilson et al (Ref 1); other measurements have been made by Clearman (Ref 2), Durand (Ref 3) and Yakovleva (previous article).

The results of the latter measurements are given in Figure 1 (dashed line) and compared with the American results (dotted line). The differences can be explained by the lower resolving power of the Russian apparatus.

The determination of intensity and contours of the Mg II

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SOV/49-58-9-5/14

Spectrophotometric Measurement of the Radiation Lines of Mg II in the Solar Spectrum

lines is made more difficult by the lack of knowledge of the continuous background, of the profile of the absorption lines under the emission and of the amount of scattered light. The last factor was shown to be negligible by taking as a standard of intensity the straight line parts of the wings $a\delta$ and $b\zeta$.
The table on p 1106 gives the absolute amount of radiative energy, S, in the lines as found a) by the author, b) by Wilson, c) by Clearman and d) by Durand.
The line profiles were investigated with the aid of a graph of the distance from the centre of the profile squared ($\delta\lambda^2$) against the logarithm of the intensity at that point (lg I). This graph was compared with a Gaussian distribution and the half width $\Delta\lambda$ and maximum intensity I_m determined (Ref 4). The approximation of straight line wings does not affect the result.
The table gives $\Delta\lambda$ together with R, the Wolf number and Σ, the effective area of flocculi ($\times 10^{-4}$) at the time of measurement. As Tousey (Ref 7) has pointed out, the

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SOV/49-58-9-5/14

Spectrophotometric Measurement of the Radiation Lines of Mg II in the Solar Spectrum

intensity of the Mg II lines hardly varies at all with solar activity. Hence, the main source of the radiation must be in either the photosphere or the chromosphere. The author remarks that he has found self-absorption in the centre of the 2795.5 Å line. After correction for instrumental broadening, Wilson et al. found a half-width of 0.53 - 0.59 Å, whilst the author has obtained a value 0.59 A. This is too large a value for either the photosphere or chromosphere. To explain it, a turbulence effect of 30-35 km/sec is necessary. Hence, some new mechanism must be looked for, such as non-uniform circulation of the chromosphere.

The author next calculated the number of Mg II atoms in the ground state (3S) and the first excited state (3P) and determines the excitation temperature T_B. He first writes the equation for the line profile of a line with self absorption (1) - where $\tau_0(\lambda)$ is the optical depth at the centre of the line and depends on the number of absorbing atoms N(3S), the Döppler half-width $\Delta\lambda_D$ and

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the oscillator strength f . The ratio of the energy, E_1 , of the line $\lambda_1 = 2795.5$ Å to the energy E_2 of the line $\lambda_2 = 2802.7$ Å is given by Eq.(2), from which is obtained $\lg \tau_0(\lambda_2) = 0.145$. Another approximate method is applied (Eqs.(3) and (4)) and leads to $\lg \tau_0(\lambda_2) = 1.0 - 1.25$. The difference is probably due to the assumption of a homogeneous emitting layer. $\Delta\lambda_0$ is calculated from Eq.(3) and then a value $N(3S) = 9.1 \times 10^{13}$ cm^{-2} is obtained.

Next, the number of atoms in the first excited state is calculated N(3P) . Eqs. (4) and (5) are used to obtain a value for:

$$\frac{N(3P)}{g(3P)} = 2.6 \times 10^{9} \text{ cm}^{-2}$$

(where g is the statistical weight). Using the

SOV/49-58-9-5/14

Spectrophotometric Measurement of the Radiation Lines of Mg II in the Solar Spectrum

Boltzmann relation between:

$$\frac{N(3P)}{g(3P)} \quad \text{and} \quad \frac{N(3S)}{g(3S)}$$

the excitation temperature $T_B = 5300^0$. At this temperature, Saha's formula indicates that neutral Mg atoms are 2.5 times rarer than Mg II. Assuming (Ref 6) that $N(H)/N(Mg) = 3.5 \times 10^4$, N(H) in the chromosphere $= 3.2 \times 10^{18}$ cm^{-2}.
The author points out the different results obtained by using MgII, which is widely distributed on the solar surface, from the results obtained by Cillie and Menzel using Ca II.
A.B. Severny pointed out that the effect of chromospheric absorption of photospheric radiation had not been taken into account in the above work. It is obvious that, if it were, the density of Mg atoms would be increased.

Card5/6

SOV/49-58-9-5/14

Spectrophotometric Measurement of the Radiation Lines of Mg II in the Solar Spectrum

There are 1 figure and 9 references, 5 of which are English and 4 Soviet (1 translated from English).

ASSOCIATION: Akademiya nauk SSSR, Institut prikladnoy geofiziki (Ac.Sc.USSR, Institute of Applied Geophysics)

SUBMITTED: November 12, 1957

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SOV/58-59-7-16535

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 7, p 268 (USSR)

AUTHOR: Ivanov-Kholodnyy, G.S.

TITLE: On Prominence Spectral Emission-Line Contour Deviation From the Doppler Contour

PERIODICAL: Izv. Krymsk. astrofiz. observ., 1958, Vol 18, pp 109 - 135 (English résumé)

ABSTRACT: The article has not been reviewed.

Card 1/1

AUTHOR: Ivanov-Kholodnyy, G. S. SOV/49-59-1-13/23

TITLE: On Rocket Investigations of the Shortwave Radiation of the Sun (O raketnykh issledovaniyakh korotkovolnovoy radiatsii solntsa)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1959, Nr 1, pp 108-121 (USSR)

ABSTRACT: Following the detailed review paper of S. L. Mandel'shtam (Ref 1) on shortwave radiations of the sun, several papers were published (Refs 2-5) which reflect the further successes in this field up to 1954. As a result of rapid development of the techniques of rocket investigations and publication of data on a large number of new experiments, these reviews are now obsolete. Other papers (Refs 6,7) reviewing the results obtained during the IGY, 1957 and 1958, also no longer represent the most recent achievements. In this paper, an attempt is made to fill this gap. Most of the information contained in this paper is based on American results, relatively few of the results given in the paper are Russian. The subject matter is dealt with under the following paragraph headings:

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SOV/49-59-1-13/23

On Rocket Investigations of the Shortwave Radiation of the Sun

1) Solar constant and energy distribution in the spectral range 2000-70000 Å, giving mainly the results published by F. S. Johnson, according to which the effective temperature of the Sun is $T_{eo} = 5808^{\circ}C$.

2) Spectral range 2000-3000 Å and radiation line MgII. The information given in this paragraph is based on results published by Wilson et al., Malitson et al. Information is also mentioned which was obtained by the Russian authors V. P. Kachalov, N. A. Pavlenko and A. V. Yakovleva (Ref 13) relating to the spectral range 2471-2635 Å and information published by the author of this paper on spectral photometric results of measurements of the radiation lines MgII in the spectrum of the Sun.

3) Photographing in the spectral range 1000 to 2000 Å. This paragraph contains almost exclusively American information.

4) Distribution of the energy in the spectral range $\lambda < 1500$ Å. Information given in this paragraph is based exclusively on American results.

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On Rocket Investigations of the Shortwave Radiation of the Sun

5) Energy of the X-ray radiation of the Sun. This paragraph is based entirely on American results up to and including results obtained by the Aerobee-43 rocket launched in November, 1957.

6) Shortwave radiation of the chromosphere flares. The information given is based exclusively on published American results.

7. Contour of the L_α line and distribution of the intensity of the L_α line along the disc of the Sun. The information given in this paragraph is based predominantly on American results, the only Russian information mentioned is that published by G. M. Nikolskiy (Ref 68) on the possibilities of absorption of the L_α radiation of the Sun by the inter-planetary medium.

8) Detection of ultra-violet radiation of non-solar origin. The information given in this paragraph is based predominantly on the results published by J. E. Kupperian and his team (Refs 43,72,75-79).

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SOV/49-59-1-13/23

On Rocket Investigations of the Shortwave Radiation of the Sun

There are 4 tables, 1 figure and 79 references, 15 of which are Soviet, 64 Western.

ASSOCIATION: Akademiya nauk SSSR, Institut prikladnoy geofiziki (Ac. Sc. USSR, Institute of Applied Geophysics)

SUBMITTED: November 5, 1958

Card 4/4

6

3(1)

AUTHORS: Pikel'ner, S.B., Shklovskiy, I.S. SOV/33-36-2-8/27
. . Ivanov-Kholodnyy, G. S.

TITLE: On Possible Mechanisms of Emission of Discrete Galactic Objects in the Spectral Region 1225 - 1350 Å

PERIODICAL: Astronomicheskiy zhurnal, 1959, Vol 36, Nr 2, pp 264-268 (USSR)

ABSTRACT: The authors examine the possibility of explaining the emission of discrete galactic sources, observed in the spectral region 1225 - 1350 Å , by usual mechanics. However, this explanation requires the assumption that the absolute value of brightness of galactic sources in this spectral region were considerably overestimated. The measurings of the H_α line necessary for the investigation were carried out by N.N. Shefov and V.S. Prokudina in the Zvenigorod station of the Institute for Atmospheric Physics of the Academy of Sciences USSR.
There are 9 references, 3 of which are Soviet, 3 American, and 3 English.

SUBMITTED: October 27, 1958

Card 1/1

84928

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17 4110 also 2107

S/033/60/037/005/003/024
E032/E514

AUTHORS: Ivanov-Kholodnyy, G.S., Nikol'skiy, G.M. and Gulyayev, R.A.

TITLE: Ionization and Excitation of Hydrogen
I. Elementary Processes for the Upper Levels

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol.37, No.5, pp. 799-811

TEXT: Elementary processes associated with quantum transitions, such as recombination, ionization, collisions of the first and second kind, emission etc, are frequently discussed in connection with astrophysical problems. The present paper is concerned with such elementary processes in hydrogen plasma in the light of modern data for the corresponding effective cross-sections. Particular attention is paid to the upper quantum levels. The first section of the paper is concerned with the phenomenon of pre-ionization. Thus, a hydrogen atom cannot exist in a state with a large quantum number m when placed in an electric field since the latter reduces the height of the potential barrier and an electron at a certain level m_o will thus become effectively free. The pre-ionization effect can also be associated with the

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E032/E514

Ionization and Excitation of Hydrogen I. Elementary Processes for the Upper Levels

perturbation of hydrogen atoms by free ions. If the disturbing proton and the nucleus of the atom are at a distance r_0 then the total potential energy of an electron in the field of these two nuclei is of the form

$$U(r) = -e^2\left(\frac{1}{r} + \frac{1}{r_0 - r} - \frac{1}{r_0}\right) \qquad (1)$$

This is illustrated in Fig.1 in which the dashed curves represent the undisturbed fields. If the total energy of the electron in the m-th level E_m is not smaller than the maximum height of the potential barrier $U(r_0/2) = -3e^2/r_0$ then charge transfer will take place and the electron will enter the potential well of the neighbouring proton. In a plasma characterized by an ion density n_i and consequently mean inter-ionic distance $r_0 \sim n_i^{-1/3}$ the above charge transfer mechanism will occur continuously throughout the plasma. The electron will be found in a band similar to the conduction band in solids i.e. pre-ionization will take place.

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E032/E514

Ionization and Excitation of Hydrogen. I. Elementary Processes for the Upper Levels

The ionization continuum will be lowered to the level with the principal quantum number m_o determined from the condition

$$E_{m_o} = U\,(r_o/2)$$

or

$$\frac{\chi_o}{m^2} = \frac{3e^2}{r_o} \qquad \left(\frac{\chi_o}{e^2} = 0.946 \cdot 10^8 \text{ cm}^{-1} \right) . \qquad (2)$$

When $E_m < U\,(r_o/2)$ charge transfer can also take place as a result of the tunnel effect. All these phenomena are estimated quantitatively and an expression is derived for the total number of charge transfers per unit volume per second. The appropriate expression for this number is given by Eq.(7). This expression gives the total charge transfer cross-section for an excited hydrogen atom and a proton. In the second section of the paper

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Ionization and Excitation of Hydrogen. I. Elementary Processes for the Upper Levels

A calculation is made of the total effective cross-section for the various elementary processes in hydrogen plasma. Expressions are derived for the excitation (Eq.15) and de-excitation by electron collision (Eq.18) cross-sections. Contributions due to ionization by electron collision (Eq.26), photo-ionization (Eq.44), photo-recombination to all levels (Eq.33) and recombination by three-body collisions are estimated. The relative role of these effects is discussed for the ground and upper levels. There are 3 figures, 1 table and 21 references: 11 Soviet, 2 German and 8 English.

ASSOCIATIONS: Institut prikladnoy geofiziki AN SSSR
(Institute of Applied Geophysics AS USSR)
Institut zemnogo magnetizma, ionosfery i
rasprostraneniya radiovoln AN SSSR
(Institute of Terrestrial Magnetism, Ionosphere and
the Propagation of Radio Waves AS USSR)

SUBMITTED: April 1, 1960

Card 4/4

IVANOV-KHOLODNY, G. S., and ANTONOVA, L. A.

"Ionization in the Night Ionosphere (Corpuscular Hypothesis.)"

Report presented at the Commission on Space Research, 2nd Intl. Symposium and Plenary Meeting, 7-18 April 1961, Florence Italy.

IVANOV-KHOLODNYY, G. S. and NIKOLSKIY, G. M.

"On the ionization and excitation in the region between chromosphere a - corona."

report to be submitted for the IAU Symposium on the Corona, Cloudcroft, New Mexico, 28-30 Aug 1961.

TANTSOVA, N.N. [translator]; IVANOV-KHOLODNYY, G.S., red.; SAMSONENKO, L.V., red.; KHOMYAKOV, A.D., tekhn. red.

[Investigation of the upper atmosphere by the use of rockets and satellites; solar short-wave and corpuscular radiations and their effect on the upper atmosphere of the earth] Issledovaniia verkhnei atmosfery s pomoshch'iu raket i sputnikov; korotkovolnovoe i korpuskuliarnoe izlucheniia solntsa i ikh vozdeistvie na verkhniuiu atmosferu Zemli; sbornik statei. Moskva, Izd-vo inostr. lit-ry, 1961. 471 p. (MIRA 15:2)

(Solar radiation) (Atmosphere, Upper--Rocket observations)

ANTONOVA, L.A.; IVANOV-KHOLODNYY, G.S.

Corpuscular hypothesis of the ionization of the night ionosphere.
Geomag. i aer. 1 no.2:164-173 Mr-Ap '61. (MIRA 14:7)

1. Institut prikladnoy geofiziki AN SSSR.
(Ionosphere) (Electrons)

89321

S/033/61/038/001/004/019
E032/E314

3.1540 (1062, 1128, 1184)

AUTHORS: Ivanov-Kholodnyy, G.S. and Nikol'skiy, G.M.

TITLE: Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

PERIODICAL: Astronomicheskiy zhurnal, 1961, Vol. 38, No. 1, pp. 45 - 65

TEXT: Preliminary results of the work now reported were described by the author in Vestnik AN SSSR, 1960, No. 10, p. 104. The physical properties of the solar chromosphere and corona are now relatively well known. It has been reported (Petri - Ref. 1) that the emission maximum in the inner corona occurs at a height of only $1.03 R_0 = 2 \times 10^{-9}$ cm . Thus the intermediate layer between the corona and the lower chromosphere, in which the temperature changes from about 6 000 deg to about 10^6 deg, the concentration of atoms from 10^{16} to 3×10^8 cm^{-3} and the degree of ionisation from 10^{-4} to 10^7 is a relatively

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Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

narrow region and physical parameters change very rapidly within it. The present paper is concerned with the upper part of the intermediate region, which is also called the "upper chromosphere" or the "sub-corona". This part of the solar atmosphere emits a strong line spectrum in the ultra-violet region which is largely responsible for the state of ionisation in the upper layers of the Earth's atmosphere. It is shown that the line intensities calculated by Woolley and Allen (Ref. 8) are always lower than the observed intensities, particularly for low ionisation potentials. It is said that the Woolley--Allen model is not satisfactory because it does not reproduce even the relative intensity of the lines. Emission lines originating in the solar corona are also found in the region under investigation (100 to 2 000 Å). The wavelength and the intensities of some of the coronal ultraviolet lines were predicted by Shklovskiy (Refs. 10, 11) as far back as 1945. Shklovskiy

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Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

has predicted the intensity of the resonance doublets of Ne VIII (768 and 776 Å) and Mg X (610 and 625 Å). His results are said to be in conflict both with the data of Allen and Woolley (Ref. 12) and with observations. Other theoretical work in this field (Elwert, Refs. 13, 14) has also led to results which are said to be in disagreement with observations. The present authors have therefore attempted to set up a new model of the intermediate region using recently published data on the shortwave emission spectrum (Johnson et al - Refs. 2, 3, Jursa et al - Ref. 4, Behring et al - Ref. 5, Aboud et al - Ref. 6 and Violett and Rense - Ref. 7). Analysis of experimental data carried out by the present authors has led them to the following two basic formulae:

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Ultraviolot Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

$$\Delta\varphi_i \equiv \{\bar{n}_e^2 T^{-3/2} (h_2 - h_1)\}_i = \frac{2.3\cdot 10^{13}/\lambda}{\varkappa f_{12} \left[\frac{n^{(i)}}{\Sigma n^{(i)}} W \right]_{T=T_0}} \text{см}^{-5}\,\text{град}^{-3/2}. \qquad (18)$$

(18)

(19)

$$\Delta T = 0.5T_o$$

In these formulae $\varkappa$ gives the ratio of the abundance of the given element i to that of hydrogen, $n^{(i)}/\Sigma n^{(i)}$ is its proportion in the given stage of ionisation, I is the intensity in erg/cm^2 at the Earth surface, λ is in Å, f_{12} is the oscillator strength for absorption,

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Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

$W' = WT^{3/2}/f_{12}$ and T_o corresponds to the maximum of the expression $\left[n^{(i)}/\Sigma\, n^{(i)}\right]W$. T_o is close to the average temperature of the given radiating region and ΔT represents the difference between the boundary temperatures. Fig. 5 shows the relation between ΔT determined for a number of ions as a function of T_o. The points are experimental and the straight lines corresponds to

$$\Delta T = 0.5T_o .$$

Fig. 6 shows the relation between the "partial emission" $\Delta\varphi_i$ and the temperature T_o for different ions in the transition region. As can be seen, there is a satisfactory correlation between the points, except for N IV and N V.

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Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

It is shown that although the optical thickness in a number of these lines is greater than unity, self-absorption is absent. Estimates carried out by the present authors show that the nitrogen concentration on the Sun is $[N]/[H] \sim 10^{-5}$, which is lower by a factor of 1.5 than the usually accepted figure. The continuous emission of the Sun in the region 30 - 1500 Å is computed. It is concluded that the X-rays recorded in rocket experiments form a line spectrum (Kazachevskaya and Ivanov-Kholodnyy, Ref. 27). 90% of the ultraviolet emission during 1958-1959 was emitted by active regions occupying 1/10 of the surface of the Sun. The surface brightness of the undisturbed regions is lower by two orders of magnitude than the brightness of the active regions. It is claimed that the model of the transition layer set up in the present paper for active and undisturbed

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Ultraviolet Solar Radiation and the Transition Layer Between the Chromosphere and the Corona

regions is in agreement with optical, radio and rocket observations. The model leads to a steeper temperature variation with altitude as compared with existing models. Acknowledgments are made to I.S. Shklovskiy for valuable advice.
There are 9 figures, 6 tables and 42 references: 11 Soviet and 31 non-Soviet.

ASSOCIATIONS: Institut zemnogo magnetizma, ionosfery i rasprostraneniya radiovoln AN SSSR (Institute of Terrestrial Magnetism, Ionosphere and Propagation of Radio Waves of the AS USSR)
Institut prikladnoy geofiziki AN SSSR (Institute of Applied Geophysics of the AS USSR)

SUBMITTED: September 23, 1960

Card 7/8

IVANOV-KHOLODNYY, G.S.; NIKOL'SKIY, G.M.

Ionization and excitation of hydrogen. Part 2: The number of
observed lines in a series. Astron.zhur. 38 no.3:455-462 My-Je
'61. (MIRA 14:6)

1. Institut prikladnoy geofiziki AN SSSR i Institut zemnogo
magnetizma, ionosfery i rasprostraneniya radiovoln AN SSSR.
(Hydrogen—Spectra) (Hydrogen-ion concentration)

IVANOV-KHOLODNYY, G.S.; NIKOL'SKIY, G.M.

Prediction of solar line emission in the extreme ultraviolet.
Astron.zhur. 38 no.5:828-843 S-O '61. (MIRA 14:9)

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3.1800 (1041, 1062, 1178)

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TEXT: The author starts with referring to the mass spectrometric investigations of the upper layers by V. G. Istomin, where large quantities of molecular ions have been established in altitudes up to 500 km. A. D. Danilov explained the unusual distribution of NO^+ and O_2^+ ions with following reactions:

$$\left.\begin{array}{l} O^+ + N_2 \rightarrow NO^+ + N, \\ NO^+ + e \rightarrow N + O; \end{array}\right\} \quad \left.\begin{array}{l} O^+ + O \rightarrow O_2^+ + h\nu \\ O_2^+ + e \rightarrow O' + O' \end{array}\right\} \qquad (1).$$

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