5 (2)

AUTHORS: Spitsyn, Vikt. I., Zedelashvili, Ye. N. SOV/78-4-8-14/43

TITLE: The Investigation of the Exchange of Tungsten Isotopes in Some Isopolywolframates (Izucheniye izotopnogo obmena vol'frama v nekotorykh izopolivol'framatakh)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 8, pp 1794 - 1796 (USSR)

ABSTRACT: Previous papers by the authors (Refs 1,2) point to the different linkage of the second sulphur atom in $S_2O_7^{2-}$. The mobility of the S-atoms decreases with increasing diameter of the cation. In this paper a parallel investigation of isopolywolframates is carried out. In this connection it is assumed that due to the longer diameter of the tungsten atom the linkage in the anion is less covalent and more ion-like. Mercury salt was separated from Na_2WO_4 with W^{185}($T_{\frac{1}{2}}$ = 73.2 days), by annealing it was transformed into marked anhydride of tungstic acid and the distribution of radioactive tungsten was investigated after the following reaction carried out at 700°:

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$\dot{W}O_3 + Na_2WO_4 = Na_2\dot{W}_2O_7$; $2\dot{W}O_3 + Na_2W_2O_7 = Na_2\dot{W}_4O_{13}$. In the hydrogen current a reduction of the additional anhydride of tungstic acid takes place at 700°: $Na_2W_2O_7 + 3H_2 = Na_2WO_4 + W + 3H_2O$; $Na_2W_4O_{13} + 9H_2 = Na_2WO_4 + 3W + 9H_2O$. Table 1 shows the isotopic exchange in diwolframate, table 2 in tetrawolframate. The marked tungsten of WO_3 is regularly distributed. The tungsten atoms are therefore equivalent in the polywolframates. By this fact they differ from sodium pyrosulphate. For the complex ion $W_2O_7^{2-}$ the structure $\left[\begin{array}{c} O\ O \\ OWOWO \\ O\ O \end{array}\right]^{2-}$ is assumed, whereas in pyrosulphate the SO_4^{2-}-ion probably maintains a certain individual character: $\left[SO_4 \cdot SO_3\right]$. No isotopic exchange takes place between a solution of Na_2WO_4 and metallic tungsten or WO_3. In the solid phase the exchange takes place only after

The Investigation of the Exchange of Tungsten Isotopes in Some Isopolywolframates SOV/78-4-8-14/43

the formation of the polywolframates. There are 2 tables and 4 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: December 29, 1958

5(4) SOV/62-59-7-38/38

AUTHORS: Spitsyn, Vikt. I., Finikov, V. G.

TITLE: On the Isotope Exchange Between Gaseous Oxygen and Some Silicon Compounds (Ob izotopnom obmene mezhdu gazoobraznym kislorodom i nekotorymi soyedineniyami kremniya)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 7, pp 1351 - 1352 (USSR)

ABSTRACT: An investigation was made of the isotope exchange between gaseous oxygen with a content of 1.3% atomic O^{18}, and the silicon compounds SiO_2, K_2SiO_3 and $K_2Si_2O_5$. The investigation method is described in the paper, reference 1. The stability of the compounds mentioned was to be checked. Stability is influenced by the radius in the various anion central atoms and by the expulsion of oxygen ions in the silicate anion. Data concerning the isotope exchange in the compounds mentioned in the temperature range of from 750-800°, are summarized in a table. The activating energy of ion exchange characterizing the stability of the compounds is lower for the potassium metasilicate as compared to sulphate and silicon oxide. It is interesting to note that it is highest for $K_2Si_2O_5$. Finally,

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On the Isotope Exchange Between Gaseous Oxygen and Some Silicon Compounds SOV/62-59-7-38/38

the authors thank Zykova, G. N. and Yu. A. Goryainov for assistance given in carrying out the works. There are 1 table and 2 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: May 5, 1959

Card 2/2
USCOMM-DC-61,525

SPITSYN, Vikt.I.; GROMOV, V.V.

Adsorption of radiostrontium by certain soil minerals.
Pochvovedenie no.12:45-50 D '59. (MIRA 13:4)

1. Institut fizicheskoy khimii Akademii nauk SSSR.
(Strontium--Isotopes) (Minerals in soil)

0.000

77057
SOV/62-59-12-1/43

AUTHOR: Spitsyn, Vikt. I.

TITLE: The Aims of the Study of Complex Compounds in Connection With the Chemical Problems of the Seven Year Plan

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 12, pp 2067-2072 (USSR)

ABSTRACT: This is a report given at the VIII All-Union Conference on Complex Compounds, held on May 26, 1959, in Kiev. The author stresses the importance of the chemistry of complexes in the coming seven year plan (1959-1965).

ASSOCIATION: Institute of Physical Chemistry of the Academy of Sciences, USSR (Institut fizicheskoy khimii Akademii nauk SSSR)

SUBMITTED: July 28, 1959

Card 1/1

5(4)

SOV/76-33-3-39/41

AUTHORS: Balandin, A. A., Spitsyn, Vikt. I., Barsova, L. I., Duzhenkov, V. I.

TITLE: Radiation Method for the Production of Platinum Catalysts (Radiatsionnyy metod polucheniya platinovogo katalizatora)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 736-737 (USSR)

ABSTRACT:

Though various papers have already been published on the effect exercised by ionizing radiations on catalytic reactions (Refs 1,2), the action of radiations has not yet been employed in the production of the catalyst. In this case the authors investigated the separation of metallic platinum from some of its complex compounds by the action of a flux of fast electrons; further, they studied the structure and catalytic properties of the precipitates obtained. A radiation source was applied as a linear electron accelerator with 1.5 mev (Ref 3). The capacity of each dose was determined by the ferroussulphate method; it amounted to $1.5 \cdot 10^{18}$ ev/cm^3 per second. It was shown by radiation of saturated solutions of $Na_2[Pt(OH)_6]$ in 0.5-3 n NaOH that in doses above

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Radiation Method for the Production of Platinum Catalysts SOV/76-33-3-39/41

$5 \cdot 10^{21}$ ev/cm^3 a yellow precipitate is obtained which assumes a metallic-gray coloration by the action of radiation. N. A. Shishakov made X-ray analyses which indicated that crystalline platinum and the partially unreduced compounds of Pt^{4+} are present in the precipitate. The most interesting results were offered by saturated solutions of $Na_2[Pt(OH)_xCl_{6-x}]$ in 2 n NaOH at doses of $2 \cdot 10^{21}$ ev/cm^3. In this case a black platinum precipitate was obtained, the particle size of which depended on the concentration of the solution and the time of irradiation. The reduction to the metal is perfect in this case. The platinum precipitates obtained were checked with respect to their catalytic activity in the reduction of the low-temperature hydrogenation of cyclohexane and were compared with platinum catalysts produced by Loev's (Lev's) method. During the first days after radiolysis the aforesaid catalysts were more active by fifteen to twenty times, later this activity decreased, yet remained above that of the catalysts according to Loev. The experiments will be continued. There are 4 references, 2 of which are Soviet.

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Radiation Method for the Production of Platinum Catalysts SOV/76-33-3-39/41

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova, Akademiya nauk SSSR, Institut fizicheskoy khimii (Moscow State University imeni M. V. Lomonosov, Academy of Sciences USSR, Institute of Physical Chemistry)

SUBMITTED: December 22, 1958

Card 3/3

5(2)
AUTHORS: Spitsyn, Vikt. I., Academician, SOV/20-124-4-32/67
Kuzina, A. F.

TITLE: Investigation of Measurable Quantities of Technetium
(Issledovaniye vesomykh kolichestv tekhnetsiya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 4, pp 846-848
(USSR)

ABSTRACT: This paper is devoted to the synthesis of chemically pure technetium heptasulfide and ammonium pertechnate. The authors investigated absorption spectra of the pertechnate ion, carried out a gravimetric analysis of heptasulfide and measured the absolute activity of the isolated technetium preparation. Molybdic anhydride was used as an initial product of technetium extraction after a long irradiation with thermal neutrons. Technetium was isolated from the solution of ammonium molybdate by the adsorption method on difficultly soluble crystalline preparations of magnesium ammonium phosphate and magnesium hydrophosphate. Its further extraction was based on its property of being not absorbed in reduced state by phosphate precipitates. After additional treatments technetium was reduced to the tetravalent and partly to the bivalent state and, finally,

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collected in the filtrate in the form of an anion. The authors investigated by the radiation-absorption method in aluminum whether purified technetium sulfide contains radiochemical impurities. As the absorption curve (Fig 1) shows, there are no foreign radioactive impurities and the radiation energy of the preparation agrees with the data to be found in publications (Ref 2). Table 1 gives the results of the analysis of technetium. Its gravimetric analysis was checked by comparing it to the results of the radiometric analysis. Furthermore, the absolute activity of isolated technetium was calculated according to a formula. The measurements were carried out by means of safety glass with front counter (thickness of the mica window: 1.8 mg/cm^2). The absolute total activity amounted to 15.3 μC/ which corresponds to 0.918 mg of metallic technetium if its specific activity is assumed to be 20 μC//mg. The discrepancy of the radiometric and gravimetric analysis amounted to 5.4%. Figure 2 shows the absorption curve of the spectrophotometric investigation of ammonium pertechnate. It is similar to those obtained by other scientists (Refs 3, 4); however, the maximum 2450 Å determined by the authors is closer to the short-wave range

Investigation of Measurable Quantities of Technetium SOV/20-124-4-32/67

by 20 Å. The value of the molar coefficient of extinction amounted to 4407, contrary to that mentioned in publications which is 4000. The slight differences to publications may be due to various types of spectrophotometers with different resolving powers. There are 2 figures, 1 table, and 4 references, 2 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: October 25, 1958

Card 3/3

5(2) SOV/20-124-5-26/62

AUTHORS: Yefremova, K. M., Ippolitova, Ye. A., Simanov, Yu. P., Spitsyn, Vikt. I., Academician

TITLE: An Investigation of the Composition of the Uranates of Alkali Elements Produced by a Dry Procedure (Issledovaniye sostava uranatov shchelochnykh elementov, poluchayemykh sukhim putem)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1057-1060 (USSR)

ABSTRACT: The interaction of uranium oxides or uranium salts with oxides and salts of alkali metals at high temperatures results in the formation of monouranates of alkali metals, moreover, of diuranates of Li, Na, and K; finally, $Na_2U_3O_{10}$ and $K_2U_6O_{19}\cdot 6H_2O$ can be produced from uranyl sulphate with NaCl and KCl (Refs 1-3). There are no exhaustive statements in literature as to what uranates of each alkali metal are formed in this case. The statements made by W. H. Zachariasen (Zakhariasen, Ref 5) on hexagonal and pseudohexagonal layers in the Li-, Na-, and K-monouranates are inconsistent with statements made by other research workers (Ref 7). This divergence may be due to polymorphous modifications. The authors

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An Investigation of the Composition of the Uranates of Alkali Elements Produced by a Dry Procedure SOV/20-124-5-26/62

investigated the conditions for the recovery of said uranates, which are formed when UO_3 and U_3O_8 are heated in air with the carbonates of corresponding elements, and the composition of said uranates (by thermal and X-ray phase analysis). The components were used in amounts corresponding to the formation of uranates with various Me^I_2O- and UO_3 ratios. After discussing the resulting uranates of several alkali metals, the authors state that the indications given in the literature (Ref 1) on the behavior of the uranates at high temperature do not convey a proper impression of their thermal stability. Table 1 shows the results obtained by heating monouranates between 700 and 1,100° in intervals of 100°. It was found that lithium monouranate is thermally stable and does not decompose within 60 hours at 1,300°. On the other hand, Na-, K-, and Rb-uranates decompose at 1,200-1,300°, forming diuranates; Cs_2UO_4 decomposes at 1,200° within 6 hours. Thus, the stability of the monouranates decreases from Li_2UO_4 to Cs_2UO_4. This is consistent with the increase in the cation defor-

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5 (2) SOV/20-127-1-32/65

AUTHORS: Spitsyn, Vikt. I., Academician, Komissarova, L. N., Vladimirova, Z. A.

TITLE: Tungstates of Zirconium and Hafnium (Vol'framaty tsirkoniya i gafniya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 1, pp 120-123 (USSR)

ABSTRACT: The data given in publications on the substances mentioned in the title is very rare and contradicting (Refs 1-4). The present paper deals with the synthesis of hydrated and anhydrous tungstates and with the investigation of some of their properties. The first were obtained by the interaction between zirconyl- or hafnyl nitrate solutions and ammonium tungstate. Their molecular ratio was 1:1. Zr- or Hf hydroxide was precipitated when the pH of the solution amounted to more than 3.2. Colloidal precipitation was produced between pH 1.8 and 3.2 which coagulated in the case of heating in a NH_4NO_3 solution of 5%. Both initial substances reacted fully according to the analysis. Anhydrous tungstates were obtained by sintering (6 hours) oxides or hydroxides of the afore-mentioned elements with equimolar

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quantities of tungstic acid. The formation of the new phase was controlled by radiographic analysis. White fine-crystalline substances with radiographs which are very similar to one another are produced when the sintering products are chilled. The above tungstates are not produced if the chilling is carried out slowly. 1:1-compounds containing an excess of the component concerned were produced by sintering mixtures of ZrO_2 and HfO_2 with WO_3 in other ratios than 1:1, e.g. 1:2, 1:3, and 2:1. The radiographs did not show new lines indicating only 1:1 oxides. The compounds produced were analyzed by alkaline and pyrosulfate exposure. Table 1 shows the results. Accordingly, the substances synthesized are to be ascribed to the following formulas: $ZrOWO_4 \cdot 1.5H_2O$, $ZrOWO_4$, $HfOWO_4 \cdot 2H_2O$ and $HfOWO_r$. Hydrated zirconyl- and hafnyl tungstates are white radioamorphous substances which absorb humidity in air. Either the symmetry of the crystal lattices of anhydrous Zr- and Hf tungstates is low (their radiographs show more than 70 lines), or at least one of the axial parameters has high values. The high values of the angle of glide agree with the low density values: 5.27 for

April 25, 1959

5 (2)

AUTHORS: Men'kov, A. A., Komissarova, L. N., SOV/20-128-1-24/58
Simanov, Yu. P., Spitsyn, Viktor I., Academician

TITLE: On the Selenide and Telluride of Scandium

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 1, pp 92-94 (USSR)

ABSTRACT: The selenide and telluride of scandium were synthesised from elements by the authors. They are non-melting crystalline powders, the former of which is of brown-violet color and the latter black. The compounds obtained were investigated roentgenographically according to the powder method. Results of the analysis are given in tables 1 and 2. With the use of bromoform the density of selenide and telluride of scandium was determined pycnometrically at 22° (Table 3). The values of the density 4.52 g/cm^3 (Ref 1) found for selenide of scandium are in good agreement with those from publications. The crystalline structure of selenide and telluride of scandium belongs to the type of structure $\gamma' = Al_2O_3$ (Ref 9). With respect to scandium ions the structures are defective. The lines Nr 6, 8, 11, 23 (Table 2) present with the telluride of scandium point to a partial transition of the $\gamma' = Al_2O_3$-structure to $\gamma = Al_2O_3$-

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BALADIN, A. A.; SPITSYN, V. I.; DOBROSELSKAYA, N. P.; VERESHCHINSKII, I. V.;
P..Ya.

"Influence Du Rayonnement Radioactif D'un Corps Solids Sur Ses Proprities Catalytiques."

report submitted for Catalysis 2nd Intl. Cong., Paris, 4-9 Jul. 60;

Institute de Chemie Physique, Moscou, U.R.S.S.

SILINA, G.F.; ZAREMBO, Yu.I.; BERTINA, L.E.; SPITSYN, V.I., akad., red.;
ALYAB'YEV, A.F., red.; VLASOVA, N.A., tekhn. red.

[Beryllium; chemical technology and metallurgy] Berillii; khimicheskaia tekhnologiia i metallurgiia. Pod red. V.I.Spitsyna. Moskva, Izd-vo Gos.komiteta Soveta Ministrov SSSR po ispol'zovaniiu atomnoi energii, 1960. 119 p. (MIRA 14:12)
(Beryllium)

68224
S/078/60/005/02/010/045
B004/B016

~~5(2)~~ 5.2620

AUTHORS: Spitsyn, Vikt. I., Rubel, M. P.

TITLE: On the Molybdates of Guanidine

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 2, pp 292-296 (USSR)

ABSTRACT: To investigate the interaction between the guanidine salt of phosphomolybdic acid and guanidine carbonate, the authors produced the various molybdates of guanidine. They describe the preparation of normal guanidine molybdate $(CN_3H_6)_2MoO_4$ (Table 1: analyses, Table 2: lines of the Debye powder pattern). The aqueous solution of this compound has pH = 7 (measured by means of LP-5 type potentiometer). The paramolybdate was obtained from the normal guanidine molybdate by a) addition of 0.1 N HCl, b) exchange reaction between sodium permolybdate and guanidine nitrate: $10CN_3H_5 \cdot 12MoO_3 \cdot 8H_2O$ (Table 3: analysis; Table 4: solubility in the presence of guanidine nitrate, Table 5: lines of the Debye powder pattern). A comparison of the Debye powder patterns of the normal and the paramolybdate (Fig 1) shows that X

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SPITSYN, Vikt. I.; BABAYEV, N.B.

Solubility of some poorly soluble alkali salts of heteropoly acids. (MIRA 14:6)
Zhur. neorg. khim. 5 no.3:580-585 Mr '60.

1. Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova, kafedra neorganicheskoy khimii.
(Phosphomolybdates)
(Phosphotungstates)
(Silicotungstates)
(Silicomolybdates)

~~65931~~ 69531

S/078/60/005/05/04/037
B004/B016

21.3100
5.2200 (A)

AUTHORS: Kuzina, A. F.; Spitsyn, Vikt. I.

TITLE: A Chromatographic Method of Purifying Technetium 27

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 5, pp. 1006-1012

TEXT: The authors describe the purification of technetium preparations by means of the KU-2 cation exchanger in H-form at pH = 2. The Tc was obtained by irradiation of MoO_3 with thermal neutrons for 70 days. According to calculations MoO_3 was expected to contain 3.5.10 [illegible] of Tc^{99} after this period. The analysis of the pure MoO_3 applied, which was carried out in the spektral'naya laboratoriya Instituta metallurgii im. A. A. Baykova Akademii nauk SSSR (Spectral Laboratory of the Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences of the USSR), showed that it contained some impurities in the order of magnitude of the Tc being formed. Further, the authors gathered from the paper by L. S. Fadeyeva, O. N. Pavlov, V. V.

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S/078/60/005/05/04/037
B004/B016

A Chromatographic Method of Purifying Technetium

Bakunin (Ref. 2) that the irradiated MoO_3 contained the following radioisotopes: Zn^{65}, Co^{60}, W^{181}, Sb^{124}, Zr^{95}, and Fe^{59}. Therefore, the containers with the irradiated MoO_3 were stored for 1 - 3 years, until the radioactive impurities disintegrated. The primary concentration of Tc was carried out by means of adsorption onto magnesium ammonium phosphate. This concentrate was purified by means of a KU-2 cation exchanger. The purity of Tc was tested by absorption of its radiation in Al (Fig. 1), by β-spectrum analysis (Fig. 2) made by M. P. Glazunov by means of the β-γ-spectrometer of the ASS-1 type, and by analysis of the emission spectrum (Fig. 4) carried out by A. I. Akimov by means of a KSA-1 spectrograph. The spectrum lines of Tc are given. The β-spectrum is a single-component spectrum with a limiting energy of 285±10 kev. The Curie-Fermi diagram shown in Fig. 3 gives a value of 290 kev. Elution from the cation exchanger by means of HCl (Fig. 5 and Table), and measurement of the maximum radiant energy of the radioactive products by means of absorption in Al and Pb proved that the individual fractions contained Zn^{65} (eluted with 0.2 N HCl, Figs. 6,7), Zr^{95} (0.3 N HCl, Figs. 8,9), W^{181} (0.4 N HCl, Figs. 10,11), Co^{60} (0.6 N HCl, Figs. 12,

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S/078/60/005/007/028/043/XX
B004/B060

AUTHORS: Spitsyn, Vikt. I., Afonskiy, N. S., Tsirel'nikov, V. I.

TITLE: Thermal Decomposition of Isopolychromates of Potassium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 7, pp. 1505 - 1508

TEXT: The authors report on their thermographic investigation of CrO_3, $K_2Cr_2O_7$, $K_2Cr_3O_{10}$, and $K_2Cr_4O_{13}$. They found S^o_{298} = 17.45 e.u. for the standard entropy of CrO_3. The thermograms presented in Figs. 1-4, and the thermogravimetric heating curve shown in Fig.5 for the mentioned compounds resemble each other considerably. When heated to 800°C at a rate of 10°C/min, $K_2Cr_2O_7$ is almost not decomposed at all, while $K_2Cr_3O_{10}$ melts at 243°C, and $K_2Cr_4O_{13}$ at 210°C to form $K_2Cr_2O_7$ and CrO_3. $K_2Cr_2O_7$ lines appear in the roentgenogram in this connection (Fig.6). Only the decomposition of liberated CrO_3 occurs above the melting point. The following crystal

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Thermal Decomposition of Isopolychromates of Potassium

S/078/60/005/007/028/043/XX
B004/B060

lattice parameters were found. $K_2Cr_3O_{10}$: a = 6.14 A, b = 7.29 A, c = 6.07 A, β = 101°, Z = 1, $\rho_{x\text{-ray}}$ = 2.64. $K_2Cr_4O_{13}$: a = 7.50 A, b = 8.55 A, c = 9.47 A, β = 92°, Z = 2, $\rho_{x\text{-ray}}$ = 2.70. The authors mention a paper by T. V. Rode, and thank Yu. P. Simanov and L. M. Kovba for their discussions and assistance in the X-ray analyses. There are 6 figures and 19 references: 6 Soviet, 2 US, 1 Danish, 3 French, and 6 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova, Kafedra neorganicheskoy khimii (Moscow State University imeni M. V. Lomonosov, Chair of Inorganic Chemistry)

SUBMITTED: May 22, 1959

Card 2/2

83123

S/078/60/005/009/002/017
B015/B064

21.3200

AUTHORS: Spitsyn, Vikt. I., Nesmeyanova, G. M., Kanevskiy, Ye. A.

TITLE: Some Problems of the Thermodynamics and Kinetics of the Dissolution of Uranium Oxides in Acid Medium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9, pp. 1938-1942

TEXT: The isobaric potentials of the dissolution processes were determined from publication data for UO_2, UO_3, and U_3O_8 in sulfuric acid solutions of varying concentrations considering complex formation. Besides, experiments were made on the dissolution of UO_2 and U_3O_8 in sulfuric acid solutions (150-1000 g/l) at 90°C; U^{4+} and U^{6+} were determined by the method developed by P. V. Volkov and I. P. Alimarin (Refs. 6,7). The values of the isobaric potentials of the UO_2, UO_3, and U_3O_8 dissolution processes show that especially in dilute sulfuric acid solutions, oxidizing agents should be used for dissolving UO_2 and U_3O_8. A comparison of the

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SPITSYN, Vikt. I.; AFONSKIY, N.S.; TSIREL'NIKOV, V.I.

Reaction of chromic anhydride with potassium chromate. Zhur. neorg.khim. 5 no.9:1970-1972 S '60. (MIRA 13:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova, Kafedra neorganicheskoy khimii.
(Potassium chromate) (Chromium oxide)

S/078/60/005/010/024/030/XX
B017/B067

AUTHORS: Spitsyn, Vikt. I., Komissarova, L. N., Shatskiy, V. M., and Pushkina, G. Ya.

TITLE: Study of the Complex Ammonium Scandium Carbonate

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 10, pp. 2223-2228

TEXT: The authors determined the optimum conditions for producing ammonium scandium carbonates, and described the properties of these compounds. The compound $NH_4Sc(CO_3)_2 \cdot 1.5H_2O$ was produced by dissolving freshly produced scandium hydroxide in a concentrated solution of ammonium carbonate, and subsequent crystallization at room temperature. This compound is stable at room temperature, and decomposes only at 95°C under formation of difficultly soluble basic scandium carbonate whose composition is not constant. The thermal decomposition of ammonium scandium carbonate was thermographically studied by means of a Kurnakov pyrometer. It was observed that the ammonium scandium carbonate decomposes gradually. At 140-190°C,

Card 1/2

Study of the Complex Ammonium Scandium Carbonate

S/078/60/005/010/024/030/XX
B017/B067

partial dehydration occurs, and CO_2 is completely liberated. In the temperature range of 280-305°C, crystalline ScO(OH) is formed which passes into Sc_2O_3 at 480°C. At 400°C, NH_3 and CO_2 are completely liberated. The solubility of scandium hydroxide at 0, 25, and 50°C in solutions of $(NH_4)_2CO_3$ of different concentrations was studied. It was observed that the solubility of scandium hydroxide at higher ammonium carbonate concentrations and lower temperatures is higher. In a 17.8% solution of $(NH_4)_2CO_3 \cdot H_2O$, scandium hydroxide is soluble at 0°C up to a concentration of 1.24% by weight of Sc_2O_3. Amorphous ammonium scandium carbonate $NH_4Sc(CO_3)_2 \cdot 2H_2O$ is formed by dissolution of scandium hydroxide in ammonium carbonate solutions with a concentration higher than 1% by weight in a temperature range of 0-25°C. The amorphous ammonium scandium carbonate passes into the crystalline state above 50°C. The thermogram of amorphous ammonium scandium carbonate shows an endothermic effect at 65-110°C caused by the cleavage of water, which is characteristic only of the amorphous compound. There are 5 figures, 2 tables, and 4 non-Soviet

Moscow State Univ.

Card 2/3

RUBEL, M.P.; SPITSYN, Vikt.I.

Study of the products of the reaction between trisubstituted sodium phosphomolybdate and sodium hydroxide. Zhur. neorg. khim. 5 no. 12:2770-2773 D '60. (MIRA 13:12)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova Kafedra neorganicheskoy khimii.
(Sodium phosphomolybdate) (Sodium hydroxide)

SPITSYN, Vikt.I.; RUBEL, M.P.

Study of trisubstituted guanidine phosphomolybdate and of the products from its reaction with guanidine carbonate. Zhur. neorg. khim. 5 no. 12:2774-2780 D '60. (MIRA 13:12)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova Kafedra neorganicheskoy khimii. (Guanidine)

S/062/60/000/008/013/033/XX
B013/B055

AUTHOR: Spitsyn, Vikt. I.

TITLE: New Data on the Effect of Radioactive Radiation of Solids and External Irradiation on Several Heterogeneous Chemical Processes

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1960, No. 8, pp. 1325-1332

TEXT: The present paper was read at the General Meeting of the Otdeleniye khimicheskikh nauk Akademii nauk SSSR (Department of Chemical Sciences of the Academy of Sciences USSR) in Moscow on April 20, 1960. New data are given on the effect of the radioactive radiation of S^{35} on the rate of isotopic exchange of sulfur at high temperatures in the systems $K_2\overset{*}{S}O_4 - SO_3$ and $Na_2\overset{*}{S}O_4 - SO_3$ and oxygen in the system $Na_2\overset{*}{S}O_4 - O_2^{18}$. The first data on the effect of radioactive radiation on some heterogeneous processes were reported by the author and his collaborators in 1958 (Refs. 1-3). The isotopic exchange of sulfur in the system $K_2\overset{*}{S}O_4 - SO_3$ was

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studied at 840°C at specific activities ranging from 0.02 - 131 mCu per gram potassium sulfate (Ref. 5). The isotopic exchange in this system shows three distinct phases. Similar results were obtained for the system $Na_2SO_4 - SO_3$. Isotopic exchange in these systems is evidently due to interaction between SO_3 and SO_4^{2-} ions on the sulfate surface with intermediate formation of instable $S_2O_7^{2-}$ ions. In 1960 the author and V. G. Finikov studied in detail the isotopic exchange of oxygen in the system $Na_2\overset{*}{S}O_4 - SO_2^{18}$. The exchange was carried out using the dynamic method at temperatures between 620 and 790°C. The degree of exchange was determined on a mass spectrometer. The experimental technique was the same as in Ref. 7. The rules observed were similar to those in the system $K_2\overset{*}{S}O_4 - SO_3$. In 1960, the author and V. V. Gromov extended an investigation into the sorption of organic dyes (Refs. 1, 3) to $BaSO_4$ preparations. The sorptive capacities of irradiated and not irradiated preparations were examined simultaneously (Figs. 4, 5). It was found that irradiation of

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barium sulfate with high-energy electrons and protons decreases its sorptive capacity for organic dyes. β-decay of S^{35} contained in the sorbent has a similar effect. The influence of radioactive radiation of the sorbent on the adsorption processes of gaseous substances was studied in $K_2\overset{*}{S}O_4$ preparations. Potassium sulfate containing S^{35} was found to possess a higher sorptive capacity for methanol vapors, than an inactive K_2SO_4 sample (Fig. 6). Advances were made in the investigation of radioactive catalysts (Figs. 7, 8). It was found (Ref. 10) that the activity of the catalyst, produced by the decay of S^{35} contained in it, decreases according to the rules described in Ref. 4. The assumption made in Ref. 4, that the β-radiation of the catalyst itself causes its increased catalytic activity, was confirmed. It was found that instead of S^{35}, $MgSO_4$ could be admixed with another radioisotope not otherwise contained in the catalyst, thus producing a similar increase in catalytic activity. Also in this case, the radioactive radiation of solids was observed to be more effective than external irradiation. The author studied the influence

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of radioactive radiation on the interaction of a solid phase and its saturated solution in the case of slightly soluble compounds (Figs. 9, 10). Together with Ye. A. Torchenkova and I. N. Glazkova, the author (Ref. 11) studied the water solubility of S^{35}-tagged barium sulfate and, in 1960, together with Moshchanskaya, he studied the solubility of Ce^{144}-tagged cerium oxalate. Radioactive radiation was found to effect the solution process and solubility of slightly soluble substances. When employing tagged atoms, the radiation effect of the tracer on the solubility of slightly soluble compounds must therefore be taken into consideration. I. Ye. Mikhaylenko, N. P. Dobrosel'skaya, and Deryagin are mentioned. There are 10 figures and 11 Soviet references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: May 23, 1960

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77239
SOV/89-8-2-4/30

21.3200

AUTHORS: Spitsyn, V. I., Golutvina, M. M.

TITLE: Separation of Carrier-Free Pa^{233} From Compounds of Thorium Nitrate Irradiated by Slow Neutrons

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 2, pp 117-120 (USSR)

ABSTRACT: The authors developed experimentally the method proposed by Maddock and Miles (see references) for carrier-free separation of radiochemically pure Pa^{233} from irradiated nitrate of thorium. The separation from thorium and zirconium was achieved by absorbing it by means of a precipitate of MnO_2 first described by Grosse and Arguss (J. Amer. Chem. Soc. 57, 438 (1935)). The authors found that the amount of sorption of protoactinium does not depend much on the precipitation process. The authors describe in details their experiments which lead them to establish the following procedure for the extraction. To the solution of freshly exposed $Th(NO_3)_4$ in 7N HNO_3 they add a 10% solution of $MnSO_4$ from computed

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by Slow Neutrons

0.2 ml for each 1 ml of the original solution. They heat it over a water bath up to 80° C and while stiring add a 1% solution of $KMnO_4$ (0.5 ml for 1 ml of the starting solution). The MnO_2 precipitate coagulates for the next 20 min in the water bath; it is next centrifugated from the mother liquor and then dissolved in a hot concentrated HNO_3 with a small addition of sodium nitrite. Equal volume of water is added to this solution and MnO_2 is twice more precipitated in the manner just described. Next, the MnO_2 so obtained is dissolved in hot 6N HCl. To this solution they add equal volume of a solution of cupferrate (7 g of cupferrate and 0.2 g hydroquinone dissolved in 6N HCl to obtain 100 ml, and then filtered through a paper filter). The solution is then carefully stirred and poured into the separating funnel of appropriate size. The previous container is carefully washed by means of two portions of amyl acetate

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the total volume of which is equal to the sum of volumes of the hydrochloric acid solution and the solution of cupferrate and the acetate is carried into the funnel. The extraction goes on for some 5 min until the phases divide. At this point a check of β-activities yielded the results in Table 1. The layers are then separated, and the protoactinium is re-extracted from the amyl acetate phase by means of an equal volume of a 1M citric acid. The solution is then held for 30 min over a boiling water bath and agitated periodically. The solution is finally cooled; the separated water phase contained Pa^{233}. Table 3 summarizes the results. Relative mean square error of the measured activity was ±3%. Protoactinium was positively identified through its β-decay with a half-life $T_{1/2}$ of 27 days. The authors claim that utilizing this method one can separate 70% (of activity) of protoactinium. There are 3 tables, 1 figure, and 8 references, of which 6 are U.S., 2 U.K. The 5 most recent references are: A. Goble, A. Maddock, Trans.

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Table 1. Extraction of the cupferrate of Pa^{233} with amyl acetate from 6N HCl solution.

β-activity of the amyl acetate phase, % of the initial activity	β-activity of the aqueous phase, % of the initial activity
107	2
113	3
111	4
76	1
80	1
116	5
Average 100	3

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SOV/89-8-2-4/30

Faraday Soc., 55, Nr 4, 591 (1959); Neutron Cross Sections, New York, BNL, 1958; D. Strominger, J. Hollender, G. Seaborg, Rev. Mod. Phys. 30, Nr 2, 585 (1958); A. Fudge, L. Woodhead, Chem. Ind., 33, 1122 (1959); A. Fudge, L. Woodhead, Analyst, 81, Nr 964, 417 (1956).

SUBMITTED: September 13, 1959

Card 6/6

78331
SOV/89-8-3-16/32

21.3000

AUTHORS: Spitsyn, Vikt. I., Nesmeyanova, G. M., Alkhazashvili, G. M.

TITLE: Catalytic Action of Iron Compounds in the Oxidation of Uranium (IV) in Acid Media. Letter to the Editor

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 3, pp 261-262 (USSR)

ABSTRACT: The oxidation reaction of uranium (IV) in presence of salts of Fe^{3+} was never investigated quantitatively. Arden (see ref) indicates that uranium oxidation is accelerated in presence of dissolved iron compound; Arthur and Wheeler (see ref) show that concentration of Fe^{3+} must be larger than 2 gm/l; Gandin and Schuhmann (see ref) propose that MnO_2 is the prime oxidizer, while the Fe^{3+} ions act as catalyzer; while Thunaes (see ref) claims that Fe^{3+} is needed to

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produce the necessary oxidizing potential in the medium. The authors investigated the influence of iron compounds on the oxidation of uranium, using pure mixed oxides of uranium and sulfates of Fe^{2+} and Fe^{3+}. As solvents sulfuric and nitric acids of various concentrations were used, and as oxidizer, MnO_2 and $KClO_3$. Tests were performed in an air thermostat at 20 and 90° C. Results are on Figs. 1, 2, and 3. Fe^{2+} ions exert their catalytic influence on the oxidation process of uranium in the moment of their own oxidation. The mechanism can be presented as follows:

$$Fe^{2+} \xrightarrow[\text{OXIDIZER}]{} Fe^{3+} \xrightarrow[U^{4+}]{} Fe^{2+} \xrightarrow[\text{OXIDIZER}]{} Fe^{3+} \xrightarrow[U^{4+}]{} Fe^{2+} \text{ etc.}$$

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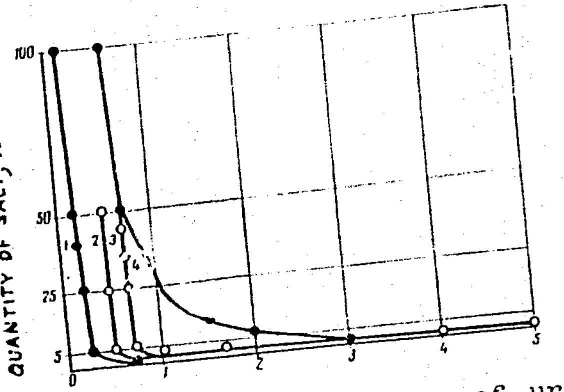

Fig. 1. Duration of dissolution of uranium versus the added Fe^{3+} salt, during a 100% dissolution of mixed uranium oxides at t = 90° C in solutions of nitric and sulfuric acids containing MnO_2. (1, 4) 50 and 5 gm/1 concentrations of nitric acid, respectively; (2, 3) 5 and 150 gm/1 concentrations of sulfuric acid, respectively.

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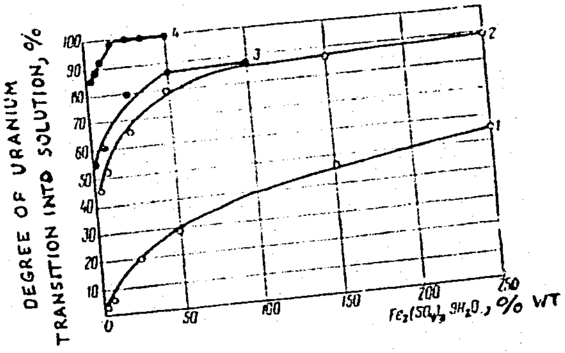

Fig. 2. Influence of Fe^{3+} salt additions on degree of uranium transition into solution of various concentrations of nitric and sulfuric acid with MnO_2. (1, 2) 5 and 50 gm/l concentrations of nitric acid, respectively; (3, 4) 5 and 50 gm/l concentrations of sulfuric acid, respectively. At t = 20° C, τ = 72 hr for the nitric acid and 48 hr for the sulfuric acid with MnO_2.

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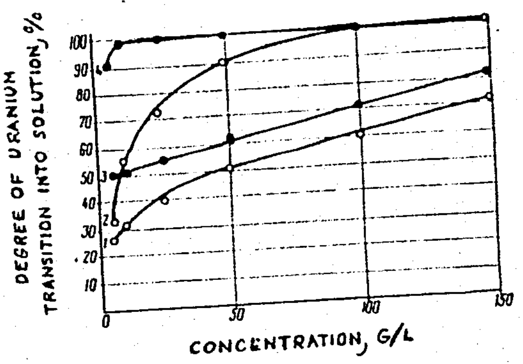

Fig. 3. Influence of microadditions of Fe^{3+} salts on degree of uranium transitions into solution during dissolving of U_3O_8 in sulfuric acid solutions of various concentrations with $KClO_3$ oxidizer (curves 1, 2) or MnO_2 (curves 3, 4). $t = 90^{\circ}$ C, $\tau = 1$ hr.

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78331
SOV/89-8-3-16/32

i.e., iron ions figure as electron carrier between the oxidizers and uranium. There are 3 figures; and 4 references, 2 U.K., 2 U.S. These are: T. Arden, Chemist, 32, 376, 202 (1956); I. Arthur, R. Wheeler, J. South African Institute of Min. and Met., 57, Nr 11, 631 (1957); A. Gandin, R. Schuhmann, J. Metals, 8, Nr 8, 1065 (1956); A. Thunaes, Canad. Mining J., 77, Nr 6, 123 (1956).

SUBMITTED: July 17, 1959

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SPITSYN, Vikt.; KOLYCHEV, B.

Results of the International Conference on the Processing and Disposal Radioactive Waste held in Monaco. Atom. energ. 9 no.1:58-63 Jl '60. (MIRA 13:7)
(Radioactive waste disposal--Congresses)

G/003/60/010/001-4/001/008
B005/B060

AUTHOR: Spitsyn, Viktor I. (Moscow)

TITLE: Present State and Prospects of the Development of Chemistry in the Soviet Union

PERIODICAL: Journal für praktische Chemie, 1960, Vol. 10, No. 1 - 4, pp. 6 - 62

TEXT: This is a reproduction of a speech held by the author on the occasion of the 550th anniversary of Leipzig University. To begin with, the author gives a survey of the development of the Soviet chemical industry in the period from 1918 to 1957. The Seven-year Plan (1959 - 1965) provides for an about trebled annual production of the chemical industry. This will be 300 to 350 times the Russian chemical production in 1913. Investments will amount to 100 - 105 billion rubles. A total of over 140 large chemical plants will be built or completed; over 130 establishments will be reconstructed. Special care is devoted to the production of synthetic substances. The production of synthetic fibers will be increased by four times, and that of the more valuable among them by 12 to 13 times. The production of

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plastics and synthetic fibers will be increased by more than seven times.
The production of mineral fertilizers is to be trebled. To make all this
increase possible, all branches of the chemical industry are required to
mechanize and automatize their operational processes to the utmost. More-
over, it will be necessary to work out new anticorrosive substances for use
in apparatus construction. The most important task confronting Soviet
scientists, however, will be the widest possible extension of theoretical
research to prepare the ground for the development of new techniques and the
production of synthetic materials with properties meeting the demands of
modern technology. The principal part of the author's speech was a report
on Soviet researchers' most important contributions to the present level of
Soviet chemistry. The following Soviet scientists are mentioned in this
report: N. S. Kurnakov, P. I. Preobrazhenskiy, G. G. Urazov, A. G. Bergman,
N. N. Yefremov, N. I. Stepanov, A. Ye. Fersman, S. I. Vol'fkovich, I. A.
Tal'mud, N. I. Vlodavech, F. N. Strokov, I. P. Sidorov, M. I. Temkin, D. N.
Pryanishnikov, Ye. V. Briske, K. M. Malin, I. N. Kuz'minich, L. A. Chugayev,
I. I. Chernyayev, A. A. Grinberg, V. V. Lebedinskiy, N. K. Pshenitsyn, V. I.
Goremykin, O. Ye. Zvyagintsev, A. D. Gel'man, L. N. Essen, F. M. Filinov,

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T. M. Serbin, G. A. Meyerson, I. A. Shlygina, A. V. Lapitskiy, G. F. Silina,
A. V. Novoselova, P. P. Budnikov, I. V. Tananayev, Ya. A. Fialkov, I. S.
Morozov, I. A. Kazarnovskiy, A. F. Kapustinskiy, K. B. Yatsimirskiy, V. I.
Vernadskiy, D. I. Mendeleyev, N. N. Sinin, A. M. Butlerov, V. G. Khlopin,
I. Ye. Starik, B. A. Nikitin, A. Ye. Polesitskiy, A. P. Ratner, Ye. A.
Ippolitova, S. A. Shchukarev, V. M. Vdovenko, B. N. Laskorin, L. D.
Sheydina, G. N. Yakovlev, P. I. Artyukhin, V. V. Fomin, L. Y. Guseva, K. V.
Filippova, G. N. Flerov, S. M. Polikanov, N. Ye. Brezhneva, B. A. Zaytsev,
A. I. Grivkova, Ye. I. Malinina, A. F. Kuzina, A. P. Vinogradov, I. P.
Alimarin, V. I. Baranov, A. K. Lavrukhina, N. D. Zelinskiy, A. Ye. Favor-
skiy, A. Ye. Chichibabin, A. A. Balandin, S. S. Nametkin, N. I. Shuykin,
Yu. K. Yur'yev, S. S. Novikov, O. K. Bogdanova, B. A. Kazanskiy, A. F.
Plate, B. L. Moldavskiy, A. L. Liberman, R. Ya. Levina, M. B. Turova-
-Polyak, A. D. Petrov, A. V. Topchiyev, Yu. G. Mamedaliyev, K. P. Lavrovskiy,
V. N. Ipat'yev, V. G. Shukhov, A. V. Frost, A. I. Dintses, V. V.
Voyevodskiy, Ya. T. Eydus, I. N. Nazarov, M. F. Shostakovskiy, S. V. Lebedev,
I. I. Ostromyslenskiy, Andrey N. Nesmeyanov, V. V. Chelintsev, P. P.
Shorygin, A. Ye. Arbuzov, K. A. Kocheshkov, G. A. Razuvayev, R. Kh.
Freydlina, O. A. Reutov, I. F. Lutsenko, A. Ye. Borisov, N. K. Kochetkov,

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B. A. Arbuzov, M. I. Kabachnik, B. N. Dolgov, K. A. Andrianov, I. L. Knunyants, A. P. Terent'yev, Y. S. Zalkind, O. A. Seyde, A. V. Kirsanov, A. F. Yegorov, N. N. Vorozhtsov, G. V. Chelintsev, O. Y. Magidson, M. N. Shchukina, Ye. V. Benevolenskaya, V. M. Rodionov, M. I. Ribinskaya, Y. L. Gol'dfarb, N. Y. Dem'yanov, A. P. Orekhov, S. Yu. Yunusov, A. S. Sadykov, M. M. Shemyakin, G. F. Gauze, M. G. Brashnikova, B. S. Sadikov, N. I. Gavrilov, N. A. Preobrazhenskiy, D. A. Bochvar, Ye. Ye. Vagner, N. A. Prilezhayev, V. Ye. Tishchenko, N. V. Shorygina, V. V. Korshak, N. N. Beketov, I. A. Kablukov, V. A. Kistyakovskiy, D. P. Konovalov, N. N. Semenov, Y. B. Khariton, S. F. Valta, A. V. Sagulin, A. A. Koval'skiy, A. Trifonov, P. A. Sadovnikov. N. M. Chirkov, D. A. Frank-Kamenetskiy, Ya. B. Zel'dovich, A. B. Nalbandyan, N. M. Emanuel', S. S. Medvedev, M. B. Neyman, V. N. Kondrat'yev, V. L. Tal'roze, Ye. L. Frankevich, A. Ya. Berlin, L. A. Blyumenfel'd, A. N. Frumkin, B. N. Kabanov, O. A. Yesin, M. A. Loshkarev, L. I. Antropov, S. V. Karpachev, Y. M. Kolotyrkin, V. I. Veselovskiy, Y. V. Durdin, A. T. Vagramyan, K. M. Gorbunova, Y. S. Tsareva, A. I. Krasovskiy, Y. S. Petrova, S. A. Solov'yeva, D. N. Usachev, V. G. Levich, G. V. Akimov, N. D. Tomashev, I. L. Rozenfel'd, A. V. Dumanskiy, S. M. Lipatov, V. A. Kargin, N. P. Peskov, P. A. Rebinder, B. V. Deryagin, I. V. Petryanov,

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B005/B060

P. S. Prokhorov, A. B. Taubman, A. A. Trapeznikov, V. I. Likhtman, V. N.
Rozhanskiy, Ye. Ye. Segalova, N. N. Serb-Serbina, L. V. Ivanova, N. V.
Mikhaylov, V. L. Karpov, S. P. Papkov, A. A. Tager, N. A. Fuks, N. A.
Shilov, M. M. Dubinin, K. V. Chmutov, A. V. Kiselev, L. V. Radushkevich,
V. M. Luk'yanovich, A. Y. Korolev, V. K. Semenchenko, B. V. Il'in, L. V.
Pisarshevskiy, S. S. Roginskiy, F. F. Vol'kenshteyn, O. M. Todes, L. Y.
Margolis, N. P. Keyer, V. A. Royter, G. K. Boreskov, A. N. Vol'skiy, Ya. I.
Gerasimov, M. M. Popov, S. M. Skuratov, I. N. Godnev, P. G. Maslov, V. M.
Tatevskiy, I. R. Krichevskiy, A. N. Terenin, P. I. Dolin, V. Ershler, M. A.
Proskurnin, L. S. Polak, N. A. Bakh, B. M. Mikhaylov, D. Abkin, Y. S.
Lazurkin, N. N. Tunitskiy, P. Y. Glazunov, A. K. Pikayev, Y. A. Nazarenko,
A. I. Brodskiy, A. A. Brodskiy, Ye. I. Dontsova, V. G. Finikov, I. Ye.
Mikhaylenko, A. I. Shatenshteyn, G. P. Miklukhin, Y. M. Varshavskiy, S. Ye.
Weysberg, Ye. N. Gur'yanova, A. K. Babko, N. P. Komarov, Ya. P. Gokhshteyn,
M. S. Zakhar'yevskiy, V. I. Kuznetsov, L. M. Kul'berg, A. S. Komarovskiy.
New physicochemical techniques including radiochemical methods will be
introduced in the course of the next seven years for the initiation of
chemical processes. The catalytic theory will be further developed with a
view to improving continuous processes for valuable chemical products.

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Finally, the author gives a brief survey of plans made for various branches of the chemical industry in the forthcoming years. The following Soviet institutes are mentioned in this connection: Institute of Physicochemical Analysis of the Academy of Sciences USSR, Institute for Research of Platinum and Other Noble Metals of the Academy of Sciences USSR, Physicochemical Institute imeni Karpov, Scientific Research Institute of Fertilizers, State Institute of Applied Chemistry, Institute of Chemically Pure Reagents, Scientific Chemicopharmaceutical Institute, Radium Institute, Scientific Institute of Intermediates and Dyes, All-Union Scientific Research Institute of Synthetic Fibers, All-Union Scientific Research Institute of Synthetic Rubber. The scientific research institutes concerned with chemistry in the Soviet Union total about 800, not counting factory laboratories also doing research in this field. There are 2 figures and 26 references: 24 Soviet and 1 German.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR, Moskva, Leninskiy prospekt 31 (Institute of Physical Chemistry of the Academy of Sciences USSR, Moscow, Leninskiy prospekt 31)

SUBMITTED: October 16, 1959

Card 6/6

SPITSYN, V.I.

S/089/61/010/004/025/027
B102/B205

AUTHOR: G. Z.

TITLE: IV All-Union Conference on Physico-chemical Analysis

PERIODICAL: Atomnaya energiya, v. 10, no. 4, 1961, 406-407

TEXT: The IV Vsesoyuznoye soveshchaniye po fiziko-khimicheskomu analizu (IV All-Union Conference on Physico-chemical Analysis), convened by the Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova AN SSSR (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, AS USSR) and the Institut metallurgii im. A. A. Baykova AN SSSR (Institute of Metallurgy imeni A. A. Baykov, AS USSR), was held from December 6 to 10, 1960 on the occasion of the 100th anniversary of the birthday of N. S. Kurnakov. Part of the 142 reports made at the Conference dealt with problems of the atomic industry, including reports on the physico-chemical analysis of thorium, uranium, plutonium, and their alloys, as well as of zirconium and beryllium (O. S. Ivanov); "radiation phenomena and new problems of physico-chemical analysis" (V. I. Spitsyn); structure and constitution diagrams of the ternary systems thorium - zirconium - uranium

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S/089/61/010/004/025/027
B102/B205

IV All-Union Conference...

(G. K. Alekseyenko and T. A. Badayeva), uranium - molybdenum - zirconium (G. N. Bagrov), uranium - zirconium - niobium (L. I. Gomozov), uranium - niobium - molybdenum (G. I. Terekhov); and physico-chemical analysis of metallic system with rare metals (Ye. M. Savitskiy). V. F. Terekhova reported experimental and theoretical data on rare-earth alloys and presented new constitution diagrams of alloys of yttrium, neodymium, and gadolinium with magnesium, of yttrium and neodymium with aluminum, and of gadolinium with iron and nickel; furthermore, she described the properties of the latter. M. A. Tylkina held a report on tests of alloys of rhenium, tantalum, and tungsten, and also on reactions between these alloys and elements of the 4th, 5th, 6th, 7th, and 8th group.

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SPITSYN, Viktor

The problem of basicity of heteropolyacids and the nature of their multisubstituted salts. Rocz chemii 34 no.2:375-384 '60.
(EEAI 10:1)

1. Institut fizicheskoy khimii Akademii nauk SSSR, Moskva i Kafedra neorganicheskoy khimii Moskovskogo Gos. Universiteta im. M.V.Lomonosova, Moskva.
(Salts) (Acids)

5.2200(A)
~~5(2), 5(3)~~

67913
S/020/60/130/03/018/065
B011/B016

AUTHORS: Zelentsov, V. V., Savich, I. A., Spitsyn, Vikt. I., Academician

TITLE: Inner Complex Compounds of Hexavalent Uranium With Azomethine Derivatives

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 3, pp 549-551 (USSR)

ABSTRACT: The present report deals with the stereochemistry of uranyl compounds with Schiff's bases. The compounds mentioned in this paper may be divided into three groups according to the type of the ligand. The authors used three types of Schiff's bases which had been obtained from ethylene diamine (A), aromatic amine (B) as well as from 2-amino-pyridine (V) (see scheme). The analysis revealed that the uranyls of type 1 never contain more than 1 molecule of the solvent (Table 1). The molecule can be removed only by prolonged heating at 160-180°. The nature of the complex and the difficult elimination of the solvent molecule suggest that a donor-acceptor-bond may be formed. Accordingly, the coordination number of uranium in such compounds

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67913

Inner Complex Compounds of Hexavalent Uranium With Azomethine Derivatives

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B011/B016

is 7 and will be 6 after elimination of the solvent-molecule. In the second type of the uranyl complexes the case is quite a different one: they contain 2 pyridine molecules which cannot be removed even by prolonged heating at 160-180°. At 200-220° the complexes are destroyed. Also in this case a donor-acceptor-bond is probably formed. The coordination number of the hexavalent uranium in such complexes apparently equals 8. 2-Salicylal-aminopyridine (contrary to salicylal-aniline) readily forms a complex with uranyl even in a neutral medium. As the former differs from the latter only by the occurrence of heterocyclic nitrogen, such a considerable increase in the capability of complex formation may be attributed to heterocyclic nitrogen. It was, however, not possible to produce a complex of uranium with 3-salicylal-aminopyridine. Accordingly, the stability of the complex depends mainly on the position of the heterocyclic nitrogen with respect to the azomethine-group. It was confirmed by analysis that complexes of this type contain no molecules of the solvent. Herefrom the authors conclude that in the complex compounds of uranyl with azomethine-derivatives of the 2-aminopyridine series, a coordination-saturation of

4

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Inner Complex Compounds of Hexavalent Uranium With Azomethine Derivatives

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hexavalent uranium takes place. This is possible only if the heterocyclic nitrogen is coordinated with the central atom. The coordination number of uranium in these compounds is, most likely, equal to 8. Thus, uranium, according to the properties of the Schiff's base, shows a variable coordination number. Taking into account that the uranyl ion has a linear structure, it follows that, from among all possible structural models of the hexavalent uranium complexes with the coordination numbers 6, 7 and 8, such would have to be given preference, in which the ligand atoms combined with uranium are placed in a plane vertical to the direction O — U — O. Since the high stability of UO_2^{2+} is due to the participation of the 5 f-orbits of uranium in the bindings with oxygen (Ref 8), the structure of the complexes for the coordination numbers 5, 7 and 8 will correspond to a tetragonal bi-pyramid ($5f^3 6d^2 7s$) I, a pentagonal bi-pyramid ($5f^3 6d^3 7s$) II and a hexagonal bi-pyramid ($5f^3 6d^3 7s7p$) III (a,b) (Scheme). There are 1 table and 8 references,

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AUTHORS: Mikhaylenko, I. Ye., Spitsyn, Vikt. I., S/020/60/131/01/036/060
Academician B004/B011

TITLE: New Data Concerning the Influence of Radioactivity of the Solid Phase on Heterogeneous Processes of Isotopic Exchange

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 1, pp 129 - 132 (USSR)

ABSTRACT: The authors investigated rate and yield of isotopic exchange of sulfur at 840° in the system $K_2\overset{\circ}{S}O_4 - SO_3$. The specific activity of the $K_2\overset{\circ}{S}O_4$ preparations ranged between 0.02 and 131 millicuries/g. Results are shown in table 1 and figure 1. The yield of the exchange is practically constant in the case of a specific radioactivity of $K_2\overset{\circ}{S}O_4$ in the range 0.02 - 0.03 millicurie/g. It begins rising at 0.05 millicurie/g, attains a maximum at 2 - 2.5 millicuries/g (66% in 10 min) and drops to 25% with a further increase in activity to 35 millicuries/g. A new rise begins at 61 millicuries/g and attains 85% in 10 min at 131 millicuries/g. The authors conclude from these data that

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New Data Concerning the Influence of Radioactivity of the Solid Phase on Heterogeneous Processes of Isotopic Exchange S/020/60/131/01/036/060 B004/B011

two reaction mechanisms alternate each other. In the range of activities from hundredths of millicurie/g to 3 millicuries/g, the isotopic exchange is increased by the appearance of positive charges on the surface of the solid phase in consequence of continuous irradiation of β-particles. The drop of exchange between 3 - 35 millicuries/g might be explained by partial neutralization of the positive changes by copiously emitted electrons. Pure radiation phenomena appear above 35 millicuries/g: stronger activation of the SO_4^{2-}-ions and individual atoms of the crystal lattice under the action of β-particles. The action of accelerated electrons becomes noticeable in this range (Ref 2). Experiments with KCl addition showed that the presence of chlorine ions has no influence on the isotopic exchange. The authors further studied the change in activation energy with rising radioactive isotope content of the sulfate. As the kinetics of this process was investigated at 1000°, Na_2SO_4 had to be used in the place of K_2SO_4 which undergoes

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New Data Concerning the Influence of Radioactivity S/020/60/131/01/036/060
of the Solid Phase on Heterogeneous Processes of B004/B011
Isotopic Exchange

thermal dissociation at this temperature. Table 2 and figure 2 show the results obtained. The activation energy was calculated according to Arrhenius, the reaction rate constant by the equation ln 100/(100-W) = kt, where W denotes the yield of exchange, and t is the duration of experiment. As is shown by figure 3, the left side of the equation is linearly dependent on t. The exchange rate in the system $Na_2\dot{S}O_4 - SO_3$ showed the same dependences on the specific activity as the system $K_2SO_4 - SO_3$. The process of isotopic exchange may be subdivided into two stages with respect to its rate (Fig 4): an initial quick stage which drops to a lower constant value after 5 min. The exchange between tagged $\dot{S}O_3$ and stable K_2SO_4 (Table 3) yielded constant radioactivity of K_2SO_4 after 5 min. Here, the rate is inhibited by the complicated diffusion of $\dot{S}O_3$ in the solid phase. Table 4 shows the results of isotopic exchange in

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New Data Concerning the Influence of Radioactivity of the Solid Phase on Heterogeneous Processes of Isotopic Exchange

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the system $K_2SO_4 - SO_2$. Isotopic exchange begins above 700°, and the course of reaction at 840° does not differ from the one in the system with SO_3. There are 4 figures, 4 tables, and 2 Soviet references.

4

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

SUBMITTED: December 10, 1959

Card 4/4

5:2500
5.4500(B)

68997

AUTHORS: **Spitsyn, Vikt. I.**, Academician, **Mikhaylenko, I. Ye.**, **Vereshchinskiy, I. V.**, **Glazunov, P. Ya.**

S/020/60/131/02/043/071
B004/B007

TITLE: Investigation of the Influence of External Radiation Upon the Rate of the Isotopic Exchange of Sulfur in the System $K_2SO_4 - SO_3$ at High Temperature

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 2, pp 360 - 363 (USSR)

ABSTRACT: It was the aim of this paper to investigate the action of the radiation of a betatron upon the isotopic exchange of a weakly traced K_2SO_4-preparation with SO_3-vapors. Figure 1 shows the scheme of the remote-controlled experimental apparatus, which is described. Temperature was kept at 840° with an accuracy of ±3°. The electron beam had an energy of 5 Mev. The course taken by the experiment was followed by means of television. The $K_2S^*O_4$-preparation had a specific activity of $4.6 \cdot 10^{-2}$ millicurie/g. The radiation dose was determined by means of Fe(II) sulfate (spectrophotometric determination of the Fe^{3+} formed). In an experimental

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68997

Investigation of the Influence of External Radiation Upon the Rate of the Isotopic Exchange of Sulfur in the System $K_2\dot{S}O_4$ - SO_3 at High Temperature

S/020/60/131/02/043/071
B004/B007

series K_2SO_4 + SO_3, and in a second series only SO_3 was irradiated by means of a betatron. In the determination of the total dose, the specific weight, volume, and ratio between the electron density of the substance concerned and the electron density of water were considered (Table 1). No radiochemical decomposition of K_2SO_4 was observed in any of the experiments. Table 2 gives examples for the change in the activity of K_2SO_4 resulting from irradiation. In table 3, the mean values of all experiments are given. The authors obtained the following results: The external irradiation of the solid phase of the K_2SO_4 - SO_3-system by means of electrons exerts no influence upon the rate of isotopic exchange in the case of a dose of the order of 10^{15} ev/10 min. With an increase of the dose to 10^{16} - 10^{17} ev/10 min, an increase in the exchange yield occurs, which is directly proportional to the logarithm of the dose (Fig 2). The β-radiation of the radioactive $K_2\dot{S}O_4$ exerts a much more considerable influence

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69510
S/020/60/131/04/039/073
B011/B017

5.2200

AUTHORS: Spitsyn, Vikt. I., Academician, Vladimirova, Z. A., Komissarova, L. N., Simanov, Yu. P., Tyutyuyeva, N. N.

TITLE: Niobate and Tantalate of Zirconium

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 4, pp 857-860 (USSR)

TEXT: The authors describe the conditions of formation of zirconium tantalate and -niobate. Mixtures of zirconium- and niobium hydroxide ($ZrO_2:Nb_2O_5$ = 2:1, 1:1 and 1:2) served for their production. Besides these mixtures, also the individual hydroxides were sintered and/or roasted in silite furnaces at 1300°. Figure 1 shows the X-ray photographs which were taken on an iron anode with a camera of type RKD-57. They were measured by means of a comparator. The results are in good agreement with data from publications. The lines characteristic of ZrO_2 and Nb_2O_5 do not appear on the X-ray photograph with an oxide ratio of 2:1. Hence, a new phase was formed (Fig 1). No lines with a different oxide ratio than that mentioned were observed. Zirconium tantalate was produced by a similar method from the corresponding hydroxides ($ZrO_2:Ta_2O_5$ = 2:1) by sintering. The X-ray photograph showed no lines of ZrO_2, only some lines which might be ascribed to

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At 500°, zirconyl
shows that both zirconyl salts

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Niobate and Tantalate of Zirconium

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are highly resistant to HCl (36%), H_2F_2 (25%), H_2SO_4 (94%), and NaOH (40%). They were best dissolved in H_2F_2 where tantalate is more resistant. It is practically insoluble in hot-concentrated HCl- and H_2SO_4 solutions, in H_2SO_4 and ammonium sulfate mixtures. Also together with sodium pyrosulfate, K_2CO_3, and sodium peroxide it cannot be melted. The undissolved portion of the two zirconyl salts remains unchanged which indicates a high chemical resistance of these compounds. There are 2 figures, 2 tables, and 5 references.

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

SUBMITTED: December 22, 1959

Card 3/3

5.3630
5.4500(B)

80004
S/020/60/131/05/034/069
B011/B117

AUTHORS: Spitsyn, Vikt. I., Academician, Afanas'yeva, N. A., Pikayev, A. K., Kolli, I. D., Glazunov, P. Ya.

TITLE: Radiation Method of Synthesis for Some Derivatives of Phosphonitryl Chloride 7

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 5, pp 1106-1108 (USSR)

TEXT: The authors investigated the possibility to synthetize the butyl phosphonitryl ether by radiation of a mixture consisting of tetrameric phosphonitryl chloride and n-butyl alcohol with a high-energy electron flux at room temperature. An electron accelerator giving up to 1.0-1.2 Mev (Ref 14) was used as the radiation source. The solutions were irradiated in glass cells equipped with a thin glass membrane. n-Butyl alcohol was cooled and stirred with air saturated with n-butanol vapor. The course of the reaction was checked with an Ostwal'd viscosimeter and by checking the chlorine content in the resulting compounds. It was found that, for both chlorine atoms in tetrameric phosphonitryl chloride, butoxy radicals are substituted. Then, the authors described a typical experiment in order to obtain butyl phosphonitryl ether. With radiation using 0.6 Mev electrons and a current of 3 µa in the solution for six hours and with an integral dose of $1.5 \cdot 10^{22}$ ev/ml at a maximum temperature of 30°, a

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80004

Radiation Method of Synthesis for Some Derivatives of Phosphonitryl Chloride

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B011/B117

viscous brown liquid with a disagreeable smell remained, when n-butanol had been distilled off. Its analytical data corresponded to phosphonitryl ether of n-butyl alcohol. The yield was nearly twice as much as compared to the yields, obtained with methods according to reference 9, i.e. 45%. Table 1 shows the results of viscosity measurements of the irradiated 5% solutions of the tetramer in n-butyl alcohol as well as of chlorine determinations in the products obtained. Figure 1 shows the characteristic changes of viscosity of a 5% solution of the tetramer in butanol as a function of the integral radiation dose. The authors come to the conclusion that the character of the radiolytic reaction mentioned is complicated. The rapid decrease of the chlorine content and the reduction of viscosity at the very beginning of radiation are probably due to a substitutional chain reaction. The substance dissolved is probably exposed chiefly to the action of hydrogen atoms forming when n-butyl alcohol is being radiolyzed. By reaction with atomic hydrogen, the ring of the tetramer is split. Mono- and dimeric radicals are formed, and chlorine atoms are split off as HCl (see schemes (1) - (5)). Hydrogen atoms resulting from the reactions (4) and (5) react again with the tetramer, and so on. If radiation is further prolonged, an inverse reaction between HCl and the butoxy derivatives due to a high HCl concentration is possible, besides ring formation (Table 1). For this reason, a maximum

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80004

Radiation Method of Synthesis for Some Derivatives of Phosphonitryl Chloride

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B011/B117

appears on the curve (Fig 1); the second minimum is apparently due to the suppression of the inverse reaction. The method mentioned in the title has several advantages as compared to current-type procedures. When a 2% solution of phosphonitryl chloride trimer in absolute dioxane was irradiated, $(PNClC_4H_8O_2)_x$ - a substitution product of one dioxane molecule for one chlorine atom of phosphonitryl chloride - was obtained (Table 2). This compound is highly resistant to hydrolysis. Its structure is being further studied. There are 1 figure, 2 tables, and 14 references, 3 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR). Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 16, 1960

Card 3/3

S/020/60/132/02/45/067
B004/B007

AUTHORS: Spitsyn, Vikt. I., Academician, Pirogova, G. N., Pikayev, A. K., Glazunov, P. Ya.

TITLE: The Action of High-energy Electrons on Complex Compounds of Platinum

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 2, pp. 406-408

TEXT: The authors investigated the action of a beam of accelerated electrons on the solid platinum compounds $K_2[PtCl_6]$, $(NH_4)_2[PtCl_6]$, $K_2[PtCl_4]$, $(NH_4)_2[PtCl_4]$, $[Pt(NH_3)_4]Cl_2 \cdot H_2O$, cis- and trans-$[Pt(NH_3)_2 \cdot Cl_2]$. The synthesis of these compounds and their analyses are given in Table 1. A 1-Mev accelerating tube served as radiation source. The irradiation cell is shown in Fig. 1. The experiments were carried out in dry argon at constant temperature (90-95°C for the chloroplatinites, 145-150°C for the other compounds), at which no decomposition as yet occurs without irradiation. The metallic platinum separated as a result of irradiation was gravimetrically determined. Table 2 gives the initial metallic platinum yield in atoms/100 ev for the individual compounds.

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41233

S/020/60/132/03/43/066
B004/B007

5.2500
5.4500 (B)

AUTHORS: Spitsyn, Vikt. I., Academician, Torchenkova, Ye. A., Glazkova, I. N.

TITLE: The Influence of the Radioactive Radiation 19 of a Solid on the Processes of Its Dissolution

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 3, pp. 643-645

TEXT: The authors investigated the solubility of $BaSO_4$ which was traced with S^{35}. They describe the production of $BaSO_4$, the specific surface of which was determined by means of a microscope and an electron microscope. The particles had a size of 2.7-8.1 μ. Furthermore, the activity of precipitate and solution was measured in intervals of time. Fig. 1 shows the kinetics of $BaSO_4$ dissolution of different activities at 20°C. $BaSO_4$ was obtained by mixing equivalent quantities of 0.1 N solutions of $BaCl_2$ and Na_2SO_4. With a specific radioactivity of the preparation of 0.7-1.0 milli-

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81239

The Influence of the Radioactive Radiation of a Solid on the Processes of Its Dissolution

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B004/B007

curie/g considerable oversaturation was observed, which decreased after 25 h. In the case of preparations with 9-20 millicuries/g the concentration of the dissolved $BaSO_4$ increased proportionally with time. The solubility of $BaSO_4$ is increased by an excess of Na_2SO_4, but especially by an excess of $BaCl_2$ (Fig. 2). If instead of Na_2SO_4 a 0.1 N H_2SO_4 is used for the production of $BaSO_4$, solubility decreases (Figs. 3,4), but the kinetics of solubility shows the same phenomena as represented in Fig. 1. The authors explain this phenomena as being due to β-radiation, by which the electric double layer at the interface is influenced. This influence acts in a similar way on the dissolution as the ion strength of the solution. The occurrence of a maximum is ascribed to a change in the interaction between β-particles and the substance with an increased number of β-particles. There are 4 figures and 14 references: 9 Soviet, 1 Austrian, 1 French, 1 German, and 1 Dutch.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

Card 2/3

SPITSYN, Vikt. I., akademik; KABANOV, V.Ya.

Mechanism of formation of high molecular weight compounds of tungsten, as studied by the dilatometric and spectrophotometric methods. Dokl. AN SSSR 132 no.5:1114-1117 Je '60. (MIRA 13:6)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Tungsten compounds)

Spitsyn, Vikt. I.

S/020/60/133/03/09/013
B016/B068

AUTHORS: Spitsyn, Vikt. I., Academician, Voytekh, O.

TITLE: Study of the Formation of Complex Compounds of Some α-Hydroxy Acids With Yttrium and Cerium

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 3, pp. 613 - 616

TEXT: The compounds mentioned in the title are used in the chromatographic separation of mixtures of rare-earth elements (Refs. 1-3). Data required to find the optimum structure and composition of the hydroxy acid used are not given in publications, however. The authors studied the subject mentioned in the title using microamounts of yttrium and cerium without carriers. They used aliphatic α-hydroxy acids containing various numbers of carbon atoms, such as glycolic, lactic, α-hydroxy isobutyric, α-hydroxy isovaleric, and α-hydroxy isocaproic acid. A КУ-2 (KU-2) type cationite was used as the solid phase. The specific activity of the working solutions containing Y^{91} or Ce^{144} was about 6000 counts per minute/ml. In order to establish the distribution coefficient φ of Y^{3+}

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Study of the Formation of Complex Compounds
of Some α-Hydroxy Acids With Yttrium and
Cerium

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and Ce^{3+} between the resin and the solution under static conditions, the radioactivity in the original solution and in the same solution was measured after equilibrium with the resin had been attained. The ionite was used in the Na form. The coefficient φ was calculated from the equation $\varphi = xv/cm$ with x being the residual activity in the resin, c the residual activity in the solution, v the volume of the solution in ml, and m the weighed portion of the air-dry sample. The experiments were carried out at 20 ± 1°C. Fig. 1 shows the ($\log \varphi - \log [A^-]$) curves which were obtained by plotting the results achieved in the diagram $\varphi - [A^-]$ (concentration of the added ion). The values of φ^0 (i.e. φ for a zero concentration of the added ion) are: 18 160 ± 1200 for yttrium, and 26 170 ± 2000 for cerium. The stability constants of the complex compounds were calculated according to S. Fronaeus (Ref. 7). φ for the three types of complex compounds assumed to exist is calculated from equation (1). The total stability constants of these complex compounds MA^{2+}, MA_2^+, and Ma_3, viz. β_1, β_2, and β_3, may be calculated from equation (2). Fig. 2 shows an example of such calculations for sodium α-hydroxy isobutyrate. Based on values found in this manner, the authors

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Study of the Formation of Complex Compounds of Some α-Hydroxy Acids With Yttrium and Cerium

S/020/60/133/03/09/013
B016/B068

calculated the content of various forms of complex compounds as a function of the concentration of the substance to be added (Fig. 3). Similarly, data on the stability constants of the complex compounds of Y and Ce with the acids listed above were found (Table 1). Data obtained are similar to those which are given in publications (V. I. Paramonova, Ref. 9). From their results, the authors conclude that the strength of the bond of the hydrogen ion to the acid radical in the series of monobasic α-hydroxy acids, is proportional to the strength of the ionic bond of rare-earth elements in complex compounds which are formed by these acids. Fig. 4 gives additional data on α-hydroxy isocaproic acid. From these, the importance of the volume factor of the added substance can be seen. The authors found that α-hydroxy isobutyric acid is the best eluting agent. A somewhat improved separation can be expected, by using α-hydroxy isovaleric acid. There are 4 figures, 1 table, and 11 references: 4 Soviet, 2 German, 3 American, 1 Swedish, and 1 Czechoslovakian.

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

SUBMITTED: April 18, 1960

Card 3/3

S/020/60/133/004/039/040XX
B004/B067

AUTHORS: Spitsyn, Vikt. I., Academician, and Moshchanskaya, N. G.

TITLE: Study of the Effect of Specific Radioactivity of Cerium Oxalate on Its Solubility

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 4, pp. 859-861

TEXT: The authors refer to a paper by V. I. Spitsyn, Ye. A. Torchenkova, and I. N. Glazkova in which a relationship was found between the solubility of barium sulfate tagged with S^{35} and its specific radioactivity. Therefore, they studied the effect of radioactivity on the solubility of cerium oxalate tagged with Ce^{144}. The half-life of this isotope is 282 d; the short-lived Pr^{144} ($T_{1/2}$ = 17.5 min) is formed with a 2.97-Mev beta radiation energy. Preparations were produced with 0.0075; 0.046; 0.495; and 4.3 millicuries/g by precipitating spectroscopically pure $CeCl_3$ tagged with Ce^{144} from a hydrochloric solution by means of oxalic acid. Empirical

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2

Study of the Effect of Specific Radioactivity of Cerium Oxalate on Its Solubility

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formula of the preparations: $Ce_2(C_2O_4)_3 \cdot 10H_2O$. Solubility was determined in a thermostat at 25°C. Equilibrium between solution and precipitate was established after about 80-100 hours. The sample of the centrifuged solution was applied to aluminum targets and boiled down, and its activity was determined by a comparison with a standard solution. Solubility was calculated from the equation: $L = 1000 I_{sol} Q_{std} / L_{std} \cdot v_{sol}$ (1); (I_{sol}, I_{std} = intensity of the solution and the standard, respectively, Q_{std} = cerium oxalate content of the standard solution; v_{sol} = volume of the solution studied). The following relationship was found between the specific activity N and the solubility L: $\log N = aL + b$ (2), which is graphically represented in Fig. 1. The following values were obtained for the constants: a = -4.93, b = 2.235. This effect of radioactivity on solubility must be taken into account especially for difficultly soluble compounds. There are 1 figure, 1 table, and 11 references: 9 Soviet, 1 US, 1 Austrian, and 3 German.

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2

SPITSYN, Vikt.I., akademik; FINIKOV, V.G.

Effect of β-radiation from S^{35} on the isotopic exchange of oxygen in the system $Na_2SO_4^{16}$ - O_2^{18}. Dokl.AN SSSR 133 no.6:1381-1383 Ag '60. (MIRA 13:8)

1. Institut fizicheskoy khimii Akademii nauk SSSR.
(Oxygen--Isotopes) (Sulfur--Isotopes) (Beta rays)

TRAILINA, Ye.P.; ZELENTSOV, V.V.; SAVICH, I.A.; SPITSYN, Vikt.I., akademik

Spectrophotometric determination of the molecular weithts of some inner-complex compounds. Dokl.AN SSSR 134 no.4:848-849 O '60. (MIRA 13:9)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Molecular weights) (Complex compounds)

S/020/60/134/005/017/023
B016/B054

AUTHORS: Spitsyn, Vikt. I., Academician and D'yachkova, R. A.

TITLE: Isolation of Weighable Quantities of Pure Protactinium 231 19

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 5, pp. 1111-1114

TEXT: The authors present a review of the production method by A.V.Grosse, M. S. Agruss (Ref. 7), which is based on the sorption on manganese dioxide from nitric acid solutions. They worked out a purification method for milligram amounts of Pa from impurities of niobium, titanium, and zirconium which exceed the Pa content (1-2 mg) by the ten- and hundredfold. The separation of these elements on anionites of USSR production АВ-16 (AV-16), АВ-17 (AV-17), and АН-2Ф (AN-2F) under the conditions described in publications for Dowex-1, did not yield satisfactory results. The use of manganese dioxide proved to be more efficient. The chromatographic sorption of Pa from a 10 N HNO_3 solution permits its separation from large titanium and niobium quantities. These two elements can be fully removed from the column by rinsing with 10 N HNO_3. As the behavior of

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Isolation of Weighable Quantities of Pure Protactinium 231

S/020/60/134/005/017/023
B016/B054

protactinium and niobium is similar under the given conditions, the authors discussed the problem of their separation more thoroughly (Table 1). The use of acid NH_4F solutions for the elution of Pa and Nb permitted a complete separation of these elements when they were absorbed in a column with manganese dioxide. Fig. 1 shows the elution curve of Pa-233 and Nb-95 with 0.5 N HNO_3 + 0.2 N NH_4F. The authors used the above method for the concentration of Pa-231 in the precipitate of Zr-, Ti-, and Nb phosphate. The phosphates were boiled with 10% NaOH solution, and the resulting hydroxides treated with HNO_3. The nitric acid solution was passed through a column with manganese dioxide, and Ti and Zr were removed with 10 N HNO_3. Protactinium was separated from niobium as stated above. As the eluate contained some μg/ml of manganese, it was led through a column with the resin КУ-2 (KU-2) where Mn was adsorbed. Thus, milligram quantities of Pa were obtained from some kilograms of initial concentrate. Its chemical purity was confirmed spectroscopically. Pa was additionally identified by the method of isotope dilution and by the energy of α-radiation. Б-2 (B-2) instruments, a Т-25-БФЛ (T-25-BFL) end-window counter, and a "ФЛОКС" (Floks) apparatus were used. The results are given in Table 2. There are 2 figures, 2 tables, and 19 references.

Card 2/2 Inst. Phys Chem. AS USSR

SPITSYN, Vikt.I., akademik, red.; GOL'DENBERG, G.S., red.; LAZAREVA, L.V., tekhn. red.

[Studies in the field of uranium chemistry] Issledovaniia v oblasti khimii urana. Moskva, Izd-vo Mosk.univ., 1961. 302 p.
(MIRA 14:12)

(Uranium)

SPITSYN, V.I., akad., red.; KOLLI, I.D., kand. khim. nauk, red.; ZHELIGOVSKAYA, N., kand. khim. nauk [translator]; MEL'KOVA, [illegible]., [translator]; PATSUKOVA, N., kand.khim. nauk [translator]; PASHINKIN, A., kand. khim. nauk [translator]; PIKAYEV, A., kand. khim. nauk [translator]; SEMENENKO, K., kand. khim. nauk [translator]; TUROVA, N. [translator]; MANUYLOVA. G.M., red.; RYBKINA, V.P., tekhn. red.

[Inorganic polymers] Neorganicheskie polimery. Moskva, Izd-vo inostr. lit-ry, 1961. 470 p. Translations from foreign journals. (MIRA 14:13)

(Polymers)

S/081/62/000/010/018/085
B138/B101

AUTHORS: Vidavskiy, L. M., Kovba, L. M., Ippolitova, Ye. A., Spitsyn, Vikt. I.

TITLE: Reaction of uranoso-uranic oxide with sodium and potassium nitrates

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 10, 1962, 93, abstract 10V16 (Sb. "Issled. v obl. khimii urana". M., Mosk. un-t, 1961, 65 - 66)

TEXT: Using the methods of X-ray phase and thermal analysis it has been found that reaction between U_3O_8 and $NaNO_3$ begins at 410°C. As a result of this reaction the Na di-uranate is formed which reacts at a higher temperature (530°C) with the nitrate, to form the Na mono-uranate. As a result of interaction between the U_3O_8 and KNO_3 (beginning at 390°C) the potassium di-uranate is formed. [Abstracter's note: Complete translation.]

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33732

S/656/61/000/000/002/007
D244/D304

21.2100

AUTHORS: Khomyakov, K.G., Spitsyn, V.I., and Zhvanko, S.A.

TITLE: True heat capacity of U_3O_8

SOURCE: Spitsyn, V.I., ed. Issledovaniya v oblasti khimii urana; sbornik statey (Moscow) 1961, 141 - 144

TEXT: The authors measured true heat capacities of U_3O_8 up to 1000°C. A method depending on the constant heat flow at a given temperature was used. Accuracy of the determinations was 1 - 2 % up to 600°C and 2 - 3 % up to 1000°C. U_3O_8 was prepared by heating chemically pure ammonium uranate at ~ 800°C. Before a sample was placed in the calorimeter it was heated slowly to 600°C and then slowly cooled to eliminate strains. It was found that U_3O_8 undergoes two phase changes, one at 770°C and the other at 940°C. Thus U_3O_8 can exist in the form of 3 phases: α, stable up to 770°C, β (770° - 940°C) and γ (above 940°C). The heat capacities are given in the table. The heats of the phase changes observed were calculated from the measured heat capacities by comparing areas (I) enclo-

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True heat capacity of U_3O_8

sed by the experimental curve of true heat capacity, temperature axis and two crdinates at the beginning and the end of a transformation and (II) another area calculated from area I bounded by the same ordinates, temperature axis and a heat capacity curve that would exist in the absence of the phase change. The heats were 265 ± 5 cal/mole for the α → β transformation and 1105 ± 15 cal/mole for the β → γ transformation. Secondary heat effects were also observed to take place before the first and the second phase changes (25 and 65 cal/mole respectively) which were due to transformations of the supercooled phases. There are 1 figure, 1 table and 7 references: 1 Soviet-bloc and 6 non-Soviet-bloc. The 4 references to the English-language publications read as follows: J. Dewar, Proc. Roy. Soc., 89A, 158, 1913; G.E. Moore and K.K. Kelly, J. Amer. Chem. Soc. 69, 2105, 1947; A. Southard, ibid., 63, 5142, 1942; C.S. Smith Met. techn., 6, 6, 1939.

X

Card 2/2

S/081/62/000/010/020/065
B138/B101

AUTHORS: Spitsyn, Vikt. I., Murav'yeva, I. A., Nemkova, O. G., Gulia, V. G.

TITLE: Uranyl phosphates

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 10, 1962, 93, abstract 10V18 (Sb. "Issled. v obl. khimii urana". M., Mosk. un-t, 1961, 233 - 239)

TEXT: In the interaction between 0.001 M and less concentrated acid solutions (pH=2.4) of $UO_2(NO_3)_2$ and a solution of Na phosphate, $(UO_2)_3(PO_4)_2 \cdot 3H_2O$ was obtained. [Abstracter's note: Complete translation.]

Card 1/1

32327
S/081/61/000/024/C12/086
B138/B102

51196

AUTHORS: Balandin, A. A., Spitsyn, V. I., Duzhenkov, V. I., Bersova, L. I.

TIT : Radiochemical method of producing metallic catalysts

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 24, 1961, 82, abstract 24B596 (Tr. Tashkentsk. konferentsii po mirn. ispol'zovaniyu atomn. energii, v. I, 1959. Tashkent, AN UzSSR, 1961, 289-295)

TEXT: The radiochemical stability of solutions of chloro-, hydroxy-, and chlorohydroxy-substituted complex compounds of platinum was investigated. The least stable compounds were found to be those having the trans-coordinate OH-Pt-Cl. Under radiolysis these compounds were completely reduced to the metal. Radiolysis of aqueous solutions of $PdCl_2$ and K_2PdCl_4 tends toward the complete reduction of Pd^{2+} to the metal. Metallic Pd has an inhibiting effect on the reduction process. Investigation of the catalytic activity of platinum blacks in the low-temperature hydrogenation of cyclohexane showed that a black produced by the radiation method has 4 to 5 times higher activity than those produced by the Zelinskiy method of reduction. This is not the case with Pd.

SPITSYN, Vikt.I.; ZABORENKO, K.B.; RADICHEVA, M.A.; BABESHKIN, A.M.

Use of the emanation method in the study of conversions of heteropolycompounds. Izv. AN SSSR. Otd. khim. nauk no. 1:5-11 Ja '61. (MIRA 14:2)

1. Moskovskiy gosudarstvennyy universitet im.M.V. Lomonosova.
(Barium phosphotungstate) (Radium--Isotopes)

BALANDIN, A.A.; SPITSYN, V.I.; RUDENKO, A.P.; DOBROSEL'SKAYA, N.P.;
MIKHAYLENKO, I.Ye.; PIROGOVA, G.I.; GLAZUNOV, P.Ya.

Apparatus for studying heterogeneous catalysis at high temperature using radioactive catalysts and ionizing radiations. Kin.i kat. 2 no.4:626-632 Jl-Ag '61. (MIRA 14:10)

1. Institut fizicheskoy khimii AN SSSR i Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Catalysis)

22514

S/062/61/000/004/003/008
B118/B208

5 1190 2209, 1274, 1297

AUTHORS: Balandin, A. A., Spitsyn, Vikt. I., Dobrosel'skaya, N. P., Mikhaylenko, I. Ye., Vereshchinskiy, I. V., and Glazunov, P. Ya.

TITLE: Effect of radioactive radiation of a solid body on its catalytic properties

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, no. 4, 1961, 565-571

TEXT: There are no data available on the effect of the proper radioactive radiation of solids on their catalytic properties. The authors of the present paper investigated the change of catalytic activity as a result of decay of the radioactive isotope, furthermore whether also the β-radiation of a foreign element affects the reaction to be studied, and the effect of irradiating the catalyst by a fast electron beam. The effect of the radioactive catalysts $CaCl_2$, $MgSO_4$, and Na_2SO_4, containing the β-emitters S^{35} and Ca^{45}, on the dehydration of cyclohexanol was studied. The increased catalytic activity of radioactive catalysts, contrary to

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Effect of radioactive...

non-labeled catalysts, which had been previously observed by the authors, was confirmed in many cases. The catalytic activity decreases with decreasing radioactivity of the catalyst owing to decay of the isotopes S^{35} and Ca^{45}. Bombardment of the surface of the non-labeled catalyst with 800-kev electrons has no pronounced effect, contrary to the effect of β-particles of labeled S^{35} and Ca^{45} which are constituents of the catalyst. Thus not only the labeled S^{35}, but also the labeled Ca^{45} increases the catalytic activity of magnesium sulfate in the dehydration of cyclohexanol. The radioactive isotope need not be a component of the acting catalyst. It must be concluded that the increased activity of the radioactive catalysts studied is due to a continuous bombardment of the active centers of the catalyst with β-particles. The latter transfer their energy to the adsorbed cyclohexanol molecules and reduce the activation energy of the chemical reaction. It may be concluded from the decrease of the catalytic activity due to the decay of the isotope in the catalyst that the new elements resulting in the radioactive conversion do not increase the activity. Apparently, the activation of the catalyst surface takes place

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22514

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B118/B208

Effect of radioactive...

at the expense of the proper radioactive radiation. There are 8 figures, 2 tables, and 4 Soviet-bloc references.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences USSR). Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 16, 1960

Card 3/3

28185

S/190/61/003/010/014/019
B124/B110

15 8150 2209, 1555,

AUTHORS: Zelentsov, V. V., Pai Wen-ming, Savich, I. A., Spitsyn, V. I.

TITLE: Chelate polymers of uranyl

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 10, 1961, 1535-1543

TEXT: The present paper describes the synthesis and some properties of polychelate- (or coordination-) compounds of uranyl with poly-Schiff's bases which had been synthesized from 3,3'-methylene-bis-5-bromo salicyl aldehyde (BSA) and some diamines. The chelate polymers synthesized can be illustrated by the general formula

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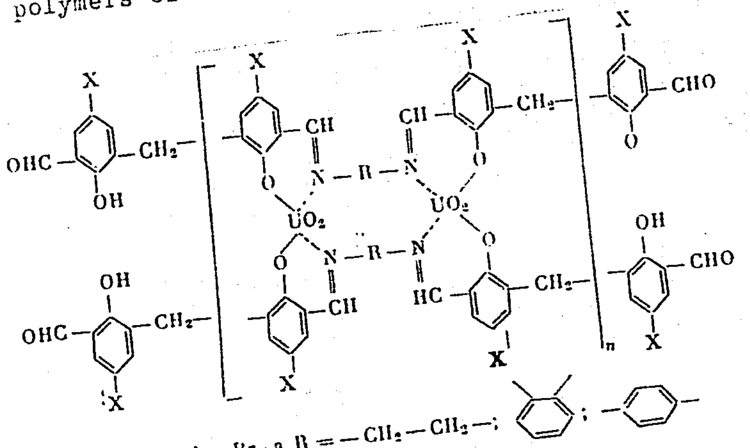
S/190/61/003/010/014/019
B124/B110

Chelate polymers of uranyl



(I)

(I).

where X=Cl и Br, a R = $-CH_2-CH_2-$;

As compared to 5,5'-methylene-bis-salicyl aldehyde (MSA), the 3,3'-methylene-bis-5-chloro salicyl aldehyde (CSA) and the 3,3'-methylene-bis-5-

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28185

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B124/B110

Chelate polymers of uranyl

bromo salicyl aldehyde (BSA) react much faster, with considerably higher yields, and without resin formation. The synthesis of CSA and BSA proceeds under heating of a solution of the respective aldehyde in a mixture of concentrated H_2SO_4 and glacial acetic acid with paraformaldehyde. The preparations were purified by recrystallizing from glacial acetic acid. The poly-Schiff's bases were synthesized by reacting of equimolecular quantities of the respective bis-aldehydes with diamines in their methanolic-benzene solution heated to boiling temperature. They are microcrystalline, yellow to light-brown powders unsoluble in usual solvents; some properties of these substances are given in Table 1. For synthesizing the chelate polymers of uranyl, the reaction of uranyl acetate with the corresponding dialdehydes and diamines (molar ratio 1 : 1 : 1) in benzene-alcoholic solution heated to boiling temperature is most advantageous. In this way, six chelate polymers of uranyl were synthesized; the composition and some properties of which are given in Table 2. The formulas assumed on the basis of results of ultimate analysis are confirmed by the infrared absorption spectra. All chelate polymers of uranyl are almost insoluble in usual solvents; in pyridine and tetrahydrofuran, they are poorly soluble. Up to 270-300°C, they are stable, and with heating (10 hr) to 200°C no

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28185
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Chelate polymers of uranyl

considerable loss in weight occurs The derivatives of CSA are somewhat more resistant to heat than those of BSA; the heat resistance of poly- chelates of uranyl decreases in the sequence o-phenylene diamine > p- phenylene diamine > ethylene diamine. The density of compounds synthesized from BSA is lower than that of compounds synthesized from CSA With equal dialdehyde it decreases in the sequence ethylene diamine > o-phenylene diamine > p-phenylene diamine. All synthesized polychelates of hexavalent uranium are paramagnetic. The synthesis of 5-chloro salicyl aldehyde, 5-bromo salicyl aldehyde, BSA, CSA, poly-Schiff's bases, and uranyl polychelates is described. There are 2 tables and 12 references: 2 Soviet and 10 non-Soviet. The two most recent references to English- language publications read as follows: C S Marvel, N. Tarkoy, J Amer Chem Soc., 80, 832, 1958; C S Marvel, P V Bonsigusry, J Amer Chem Soc, 81, 2668, 1959, C S Marvel, N Tarkoy, J Amer Chem Soc, 79, 6000, 1957

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

SUBMITTED: November 21, 1960

Card 4/4

ZELENTSOV, V.V.; TRAILINA, Ye.P.; GLUSHKO, Yu.V.; SAVICH, I.A.; SPITSYN, VIKT.I.

Inner-complex uranyl compounds with derivatives of 8-hydroxyquinoline of the type of Mannich bases. Zhur.neorg.khim. 6 no.5:1063-1065 My '61. (MIRA 14:4)

(Uranyl compounds)