S/207/63/000/001/027/028
E202/E420

AUTHORS: Zhinkina, V.B., Malenkov, I.G., Moskvicheva, V.N.
(Novosibirsk, Leningrad)

TITLE: The effect of geometrical characteristics of perforated plate on the entrainment of heavy component during bubbling

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no.1, 1963, 155-157

TEXT: An investigation of the effect of velocity and conditions of entry of the light component on the removal of the heavy component, particularly in the supercritical region. Experiments were carried out using a rectangular transparent column 2000 mm high and 200 x 200 mm^2 cross section. The light component was introduced into the layer through interchangeable perforated plates with different geometrical parameters. The diameters of the openings d, were 2,3,5 and 8 mm and the open cross section area of the plate φ were 2,3,4.5,5,8 and 12.5%. All the experiments were carried out on the water-mercury system with a given height of the layer h' = 72 mm. Mercury concentration in

water was determined chemically since the mechanical separation of mercury was thought not sufficiently accurate. The samples were taken during a steady reduced velocity of the lighter component reached in a steady supercritical condition of bubbling. It was found that the geometric characteristics of the perforated plate has a very complex effect on the entrainment of the heavy component. The curve relating the relative entrainment w to the relative open cross section of the perforated plate φ had at w = 0.06 m/sec a well defined minimum at $\varphi_{min} \approx 5\%$. The main difference of the two component streams in the subcritical and supercritical regions lies in the difference of structure of the bubbled layer. In the subcritical flow this layer comprises a stable turbulent mass of the heavier component with separate droplets of the light component. In the supercritical region of flow the roverse is true. The change of structure takes place when the critical value of the light component velocity is reached. Three types of entrainment were observed: 1) foam entrainment characteristics for low velocities and small separating volumes; 2) "dust" entrainment and entrainment of very fine droplets for

which the velocity of fall of the droplets does not exceed the velocity of the entering streams and 3) splash entrainment which takes place as a result of mechanical breaking of droplets of a large size which is observed in separators the height of which is smaller than the height of splash of the droplets. The second mode of entrainment was most effective. It was also found that at low values of φ the light component enters the layer with relatively high velocity, the number of centers of entry being distributed along the surface of the perforated plate. The flow of such streams takes place without noticeable interaction and displaced droplets of mercury fall freely in the space between these streams. Strong water streams penetrated the layer, forming in it separate channels through which passed a continuous flow of water. There are 4 figures.

SUBMITTED: September 15, 1962

L 2[illegible] EWT(1)/EWP(m) IJP(c) WW/RM/GW/GD

ACC NR: AT6021839 (A) SOURCE CODE: UR/0000/65/000/000/0118/0124

AUTHOR: Kutateladze, S. S.; Leont'yev, A. I.; Mamontova, N. N.; Moskvicheva, V. N.; Shtokolov, L. S.

ORG: Institute of Thermophysics, Siberian Branch AN SSSR (Institut teplofiziki SO AN SSSR)

TITLE: Hydrodynamic theory of the heat transfer crisis in forced flow of a boiling liquid. The crisis at high flow rates and a zero vapor content in the flow

SOURCE: Teplo- i massoperenos. t. III: Teplo- i massoperenos pri fazovykh prevrashcheniyakh (Heat and mass transfer. v. 3: Heat and mass transfer in phase transformations). Minsk, Nauka i tekhnika, 1965, 118-124

TOPIC TAGS: boiling, heat transfer, hydrodynamic theory

ABSTRACT: From the theory of the limiting friction laws in the turbulent boundary layer it follows that when the Reynolds number approaches infinity, the critical injection in a homogeneous flow is equal to

$$j_{kp} = 2c_{f0}\gamma W_0. \quad (1)$$

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We assume that the amount of liquid ejected from the boundary layer region in the moment of crisis is

$$j_* = 2c_{f0}\gamma' W_0(1-\varphi_*), \qquad (2)$$

where φ_* is the volumetric vapor content of the boundary layer region, and the energy required for this ejection comes from the loss of kinetic energy from the vapor stream, that is

$$\frac{j_*^2}{\gamma'} = \left(\frac{q_{кр\,cr}}{\varphi_* r\gamma''}\right)^2 \gamma'. \qquad (3)$$

Then

$$q_{кр\,cr} = 2c_{f0}\varphi_*(1-\varphi_*) r\sqrt{\gamma'\gamma''}\, W_0. \qquad (4)$$

On the above basis, the article considers mathematically the effect of underheating of the core of the flow up to the saturation temperature, and the effect of the vapor content of the flow. Orig. art. has: 19 formulas and 3 figures.

SUB CODE: 20/ SUBM DATE: 09Dec65/ ORIG REF: 016/ OTH REF: 009

Card 2/2 MLP

KUTATELADZE, S.S.; LEONT'YEV, A.I.; RUBTSOV, N.A.; GOL'DSHTIK, M.A.; VOICHKOV, E.P.; DAVYDOVA, I.V.; DRUZHININ, S.A.; KIRILLOVA, N.N.; KALENKOV, I.G.; MOSKVICHEVA, V.N.; MIRONOV, B.P.; MUKHIN, V.A.; MUKHINA, N.V.; REBROV, A.K.; FEDOROV, V.K.; KHABAKHPASHEVA, Ye.M.; SHTOKOLOV, L.S.; SHPAKOVSKAYA, L.I., red.

[Heat and mass transfer and friction in a turbulent boundary layer] Teplomassoobmen i trenie v turbulentnom pogranichnom sloe. Novosibirsk, Rod.-izd. otdel Sibirskogo otd-niia AN SSSR, 1964. 206 p. (MIRA 18:1)

PA 19T38

MOSKVICHEVA, V. V.

USSR/Telephone Terminals Jan 1946
Telephones - Performance

"Organization of Exploitation at International Telephone Stations," V. V. Moskvicheva, 1½ pp

"Vestnik Svyazi - Elektro Svyaz'" No 1 (70)

Telephone stations at Krasnodar, Ufa, Baku and several others were given monetary prizes for their excellent work. The article discusses some of the methods used at such stations as Kiev, Stalin, Krasnodar, and emphasizes the effect of close personal supervision by the head of the stations.

19T38

MOSKVICHEVA, V.V.; SAMORUKOV, D.A.; AFANAS'YEV, P.V., otvetstvennyy redaktor; BELIKOV, B.S., redaktor; VEYNTRAUB, L.B., tekhnicheskiy redkator

[The long-distance telephone operator] Telefonistka mezhdugorodnoi telefonnoi stantsii. Moskva, Gos. izd-vo lit-ry po voprosam sviazi i radio, 1951. 171 p. [Microfilm]
(Telephone--Operators' manuals) (MLRA 7:10)

AID P - 5586

Subject : USSR/Aeronautics - computers

Card 1/1 Pub. 135 - 25/27

Author : Moskvin, A. I., Eng.-Col., Dr. of tech. sci.

Title : Computers in aviation

Periodical : Vest. vozd. flota, 6, 92-94, Je 1956

Abstract : The author, on the basis of foreign literature, describes the use of various, mostly electronic, computers in aviation.

Institution : None

Submitted : No date

AUTHORS Gel'man A.D., Matorina N.N., Moskvin A.I. 89-10-4/36

TITLE Determination of the Composition and Instability Constants of Pu^{+3} Oxalate Complexes.
(Opredeleniye sostava i konstant nestoykosti oksalatnykh kompleksnykh ionov Pu^{+3}) - Russian).

PERIODICAL Atomnaya Energiya , 1957, Vol 3, Nr 1o, pp 3o8 - 313 (U.S.S.R.)

ABSTRACT The solubility of $Pu_2(C_2O_4)_3.9H_2O$ in aqueous $K_2C_2O_4$-solution of the most various concentrations /0,o1 - 2,4 Mol/l/ was measured at constant ionization of the solution and at a temperature of 2o°C. Forming of Pu^{+3} complexes was proved and the following ion complexes were formed: $[Pu(C_2O_4)_2]^-$, $[Pu(C_2O_4)_3]^{-3}$ and $[Pu(C_2O_4)_4]^{-5}$ with the instability constants:
4,9.1o^{-1o}; 4,1o . 1o^{-1o} and 11,9.1o^{-11} respectively.
The solubility of $Pu_2(C_2O_4)_3.9H_2O$ in an aqueous $(NH_4)_2C_2O_4$-solution at an ammonium concentration of 0,o7 -0,7 mol/l at a temperature of 7o° C was also measured.The following ion complexes with the instability constants were found:

$[Pu(C_2O_4)_2]^-$	11,6.1o^{-9}
$[Pu(C_2O_4)_3]^{-3}$	5,6.1o^{-9}
$[Pu(C_2O_4)_4]^{-5}$	2,5.1o^{-9}

There are 4 figures, 3 tables and 7 Slavic references.

SUBMITTED January,19,1957
AVAILABLE Library of Congress.
Card 1/1

GEL'MAN, A.D.; MOSKVIN, A.I.

Spectroscopic studies of Pu ^{3} complex formation and stability.
Atom.energ. 3 no.10:314-316 O '57. (MIRA 10:10)
(Plutonium compounds)

AUTHORS: Gel'man, A. D., Matorina, N. N. and Moskvin, A. I. 20-1-23/42

TITLE: An Investigation of the Formation Conditions and of the Stability of Complex Oxalate Compounds of Pu (III) in Aqueous Solutions(Issledovaniye usloviy obrazovaniya i prochnosti oksalatnykh kompleksnykh soyedineniy Pu (III) v vodnykh rastvorakh).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 1, pp. 88-91 (USSR)

ABSTRACT: From other publications it is well known, that Pu (III) shows much less preference for the formation of complexes. The authors studied the stability of solutions of oxalate, carbonate, citrate and ethylene-diamine-tetra-acetate complex compounds of Pu (III) against oxydation by the oxygen of the air by spectral photometric methods. It appears, that Khindmen was correct with his assumption, that complex formation cannot cause a noticeable modification of the absorption spectrum of Pu (III). After the authors having established the conditions of the above-mentioned stability, they approached the problem of the determination of the composition and of the instability

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An Investigation of the Formation Conditions and of the Stability of Complex Oxalate Compounds of Pu (III) in Aqueous Solutions

constant of the complex ions of PU (III) with various complex constituents. Two methods were employed: a) the method of solubility (at pH$\sim$8) and b) the method of ion-exchange (at pH $\sim$ 1'4 - 3'0). a) At first the solubility of $Pu_2(C_2O_4)_3 \cdot 9H_2O$ in aqueous solutions of $K_2C_2O_4$ at 20°C and at a constant ion density of the solution was determined. Pu (III) was protected against oxydation by a nitrogen jet. The plutonium contents of the solution were determined by radiometric measurements. The results are given in table 1, from which the composition and the general instability constants (reference 6) of the oxalate complex ions of Pu (III) were determined or computed, respectively. In the range of concentration of $K_2C_2O_4$ under investigation complex ions are formed (more exactly a relation between Pu (III) and the C_2O_4''-ion): $/Pu(C_2O_4)_2/^-$, $/Pu(C_2O_4)_3/^{3-}$ and $/Pu(C_2O_4)_4/^{5-}$, the total concentration instability constants

of which ("obshchiye kontsentratsionnyye konstanty nestoykosti"), corresponding to $4,9.\ 10^{-10}$; $4,1.\ 10^{-10}$ and $1,2.\ 10^{-10}$, are equal. The dependence of the concentration of the ions in question on the concentration of the complex constituent is illustrated in figure 1.
In an analoguous way the solubility of $Pu_2(C_2O_4)_3 \cdot 9H_2O$ in aqueous solutions of $(NH_4)_2C_2O_4$ in the range of concentration of the ammonium oxalate from 0'07 to 0'7 Mol/l at 70°C was determined (table 1). In this process complex ions of the same composition are formed, the total instability constants of which for $Pu_2(C_2O_4)_2^{-1}$ $1,6.10^{-9}$, for $/Pu(C_2O_4)_3/^{3-}$ $5,6.\ 10^{-9}$, and for $Pu+(C_2O_4)_4/^{5-}$ $2,5.\ 10^{-9}$ are equal. The heat of formation of the complex ions in the case of the reaction

$$Pu^{3+} + nC_2O_4'' \rightleftarrows /Pu(C_2O_4)_n/^{3-2n} \quad (1)$$

Card 3/4 was also computed. It was found, that ΔQ equals 1300 Kcals

An Investigation of the Formation Conditions and of the Stability of Complex Oxalate Compounds of Pu (III) in Aqueous Solutions

for the $/Pu(C_2O_4)_2^{\cdot\cdot}$ ion. The data on the complex formation of Pu (III), obtained with $C_2O_4^{\cdot\cdot}$-ions by means of the method of solubility, were confirmed by the method of ion exchange. Finally, the distribution of Pu (III) between the 1 molar solution of NH_4Cl and of "cationite" KU-2 (reference 15) was determined with respect to the pH-value of the solution (table 2). There are 2 figures, 2 tables, and 15 references, 8 of which are Slavic.

ASSOCIATION: Institute for Physical Chemistry AN USSR (Institut fizicheskoy khimii Akademii nauk SSSR)

PRESENTED: June 24, 1957, by I. I. Chernyayev, Academician

SUBMITTED; June 13, 1957

AVAILABLE: Library of Congress

Card 4/4

MOSKVIN, A.I., Cand Chem Sci -- (diss) "Study of the complex formation of tri and tetravalent plutonium with the anions of certain acids in aqueous solutions." Mos, [illegible] Publ House of Acad Sci USSR, 1958, 14 pp (Acad Sci USSR. Inst of Physical Chemistry) 110 copies (KL, 23-58, 132)

CHEMISTRY AND PHYSICAL CHEMISTRY OF REACTOR MATERIALS AND PROCESSES

"Determination of the Composition and Dissociation Constant for Oxalate Complexes for Pu 3 by the Ion-Exchange Method, " by A. D. Gel'man, N. N. Matorina and A. I. Moskvin. Atomnaya Energiya, No 1, January 1958, pp 52-56.

The method of ion exchange is used to study the oxalate complexes of Pu^{3} in th pH interval 1.4 to 3.0. It is established that in this pH region, there are formed the complex ions $[Pu(C_2O_4)_2]$ and $[Pu(HC_2O_4)_4]$, whose instability constants are $K_1 = 7.1 \times 10^{-10}$ and $K''_1 = 1.1 \times 10^{-11}$. The value of the instability constant of the complex ion $[Pu(C_2O_4)_2]$ is in satisfactory agreement with the value of the instability constant of the corresponding complexion, obtained by the solubility method.

Bibliography of 15 titles.

SOV/137-59-12-27231

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 12, p 212 (USSR)

AUTHORS: Likhachev, V.A., Moskvin, A.I.

TITLE: Changes in the Dimensions of Aluminum Specimens Subjected to Cyclic Temperature Action

PERIODICAL: Nauchno-tekhn. inform. buyl. Leningr. politekhn. in-t, 1958, Nr 12, pp 56 - 69

ABSTRACT: The authors investigated basic regularities of irreversible changes in the dimension and shape of Al (99.7% Al) subjected to a periodic temperature action. The authors investigated the dependence of these changes on the number of thermal cycles, the heating and cooling rate, the temperature range, preliminary plastic deformation, grain size, dimensions and shape of the original specimen. The cyclic temperature action was brought about by transferring the specimen from one temperature zone into another one. The time of transfer was two seconds. It was established that an increased number of cycles caused usually increased deformation of the specimen and that this augmentation was proportional to the number of cycles. A higher cooling rate furthered the increase in the coefficient

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Changes in the Dimensions of Aluminum Specimens Subjected to Cyclic Temperature Action

of growth, equal to one cycle; however, higher heating rate raised the proneness to contraction of the specimen. Raised temperature ranges caused a noticeable increase in the coefficient of growth. For annealed and rolled specimens the temperature dependence of the coefficient of growth was different; this was particularly noticeable within the range of temperature drop of 300°C. In preliminary deformation to 50% the coefficient of growth increased 4 times, compared to the initial value (non-deformed specimen). Annealing of the specimen after preliminary cyclic thermal action entailed a considerable rise of the coefficient of growth. Different grain size caused a difference in the coefficient of growth only under conditions of speeded-up heating and slow cooling-off. Generally, deformation of large-diameter specimens was higher if the initial diameter changed during a given number of cycles, although such dependence was rather complicated in a number of cases. During the tests the authors observed intensive dislocation, migration of grain boundaries and sometimes crack formation. The conclusion is drawn that irreversible changes in the shape are due to relaxation of stresses arising during the heating and cooling process. These stresses may develop on account of the temperature gradient along the cross section of the specimen, whose

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Changes in the Dimensions of Aluminum Specimens Subjected to Cyclic Temperature Action

surface is at first rapidly heated up (in speeded-up heating) and then tends to expand. Stresses may cause plastic deformations, and since the periphery is heated up more than the center, the specimen may turn out to be plastically compressed. In the case of speeded-up cooling of the heated specimen, the effect of stresses is reversed and the specimen may deform plastically in the direction of the expansion.

Yu.L.

Card 3/3

78-3-4-24/36

AUTHORS: Moskvin, A. I., Gel'man, A. D.

TITLE: Investigation of the Physico-Chemical Properties of Aqueous Solutions of Plutonium Oxalate (IV) and the Determination of Their Solubility Products (Issledovaniye fiziko-khimicheskikh svoystv vodnykh rastvorov oksalata plutoniya (IV) i opredeleniye yego proizvedeniya rastvorimosti)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 4, pp. 956-961 (USSR)

ABSTRACT: The solubility of plutonium-IV-oxalate in water and in the acids H_2SO_4, HNO_3 and $HClO_4$ was determined.

Based on the solubility of plutonium-IV-oxalate, the determination of the pH-value and the electric conductivity of the saturated aqueous solutions of $Pu(C_2O_4)_2 \cdot 6\,H_2O$ it was found that the aqueous solutions of plutonium-IV-oxalate have acidous properties. In the saturated aqueous solution of $Pu(C_2O_4)_2 \cdot 6\,H_2O$ the hydrogen-ion concentration $[H^+] = 3{,}98 \cdot 10^{-8}$

The dissociation constant of plutonium-IV-oxalate $= 2{,}7 \cdot 10^{-5}$.

The solubility of $Pu(C_2O_4)_2 \cdot 6\,H_2O$ decreases with the decrease of the pH-value of the solution. With an increase of the acid

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Investigation of the Physico-Chemical Properties of Aqueous Solutions of Plutonium Oxalate(IV) and the Determination of Their Solubility Products

concentration the solubility increases under the formation of complexes of Pu-IV with the anion of the corresponding acid. For the determination of the solubility product of $Pu(C_2O_4)_2 \cdot 6\,H_2O$ a mixture of HNO_3-$(NH_4)_2C_2O_4$ was used. The solubility product amounts to $4 \cdot 10^{-22}$. This new method for the determination of the solubility products of difficultly soluble precipitates in acids is also used successfully in other systems, as for instance with $U(C_2O_4)_2 \cdot 6\,H_2O$, $UO_2(C_2O_4) \cdot 3\,H_2O$, and others. There are 2 figures, 5 tables, and 12 references, all of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR
(Institute for Physical Chemistry, AS USSR)

SUBMITTED: July 27, 1957

AUTHORS: Moskvin, A. I., Gel'man, A. D. 78-3-4-25/38

TITLE: Determination of the Composition and Instability Constants of Oxalate- and Carbonate Complexes of Plutonium-IV (Opredeleniye sostava i konstant nestoykosti oksalatnykh i karbonatnykh kompleksov plutoniya (IV))

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol.3, Nr 4, pp.962-974 (USSR)

ABSTRACT: The solubility of $Pu(C_2O_4)_2 \cdot 6\,H_2O$ in solutions of ammonium oxalate of concentrations of from 0,001 - 0,35 mol/l in the presence of 1 mol HNO_3 were determined. Based on the achieved results the composition of the complexes as well as the stability of the oxalate complexes of Pu-IV were determined. For $\left[Pu(C_2O_4)\right]^{2+}$ $K_H = 1{,}8 \cdot 10^{-9}$; for $\left[Pu(C_2O_4)_2\right]^{0} = 1{,}2 \cdot 10^{-17}$, for $\left[Pu(C_2O_4)_3\right]^{2-} = 4{,}0 \cdot 10^{-24}$ for $\left[Pu(C_2O_4)_4\right]^{4-} = 3{,}2 \cdot 10^{-28}$.

The solubility of plutonium-IV-hydroxide at constant ion-density in aqueous solutions of K_2CO_3 0,36-3,62 mol/l and at

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Determination of the Composition and Instability Constants of Oxalate- and Carbonate Complexes of Plutonium-IV

a temperature of 20°C was determined. Also the solubility of plutonium-IV-hydroxide in aqueous solutions of K_2CO_3 of various concentrations without constant ion-density was determined. It was found that with an increase of the concentration of K_2CO_3 the solubility of plutonium-IV-hydroxide increases under the formation of complexes of Pu-IV-carbonate. The carbonate complex of plutonium-IV has the following composition: $[Pu(CO_3)]^{2+}$ with an instability constant of $1,1.10^{-47}$.

With carbonate complex solutions of plutonium-IV also the adsorption spectrum was determined and the existence of the carbonate complex was proved by that. The formation of plutonium-IV-carbonate complexes proceeds stepwise. In solutions there exist several plutonium-IV-carbonate solutions of various compositions. The tendency of plutonium of other valence to form complexes with oxalation was also investigated. The tendency to complex formation of plutonium has the following order: $Pu^{4+} > Pu^{3+} > Pu^{3+} > PuO_2^{2+} > PuO_2^{+}$.

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Determination of the Composition and Instability Constants of Oxalate- and Carbonate Complexes of Plutonium-IV

78-3-4-25/38

The tendency of plutonium to form complexes with different anions CO_3^{2-}, $C_6H_4O_7^{3-}$, $C_4H_4O_6^{2-}$ has probably the same order as with oxalates.
Based on the instability constant of plutonium-IV with some complex partners the tendency to form complexes of Pu-IV-ions can be classified as follows:

$$CO_3^{2-} > \gamma^{4-} > C_2O_4^{2-} .$$

γ^{4-} = anion of ethylene-diamine tetraacetic acid.
There are 5 figures, 7 tables, and 14 references, 11 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR
(Institute for Physical Chemistry, AS USSR)

SUBMITTED: July 27, 1957

Card 3 /3

AUTHORS: Gel'man, A.D., Drabkina, L.Ye., Moskvin, A.I. SOV/78-3-7-14/44

TITLE: The Determination of the Composition and of the Instability Constants of the Oxalate Complex Ions of Plutonium (VI) (Opredeleniye sostava i konstant nestoykosti oksalatnykh kompleksnykh ionov plutoniya (VI))

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 7, pp 1546-1550 (USSR)

ABSTRACT: In the present paper the results obtained in connection with the determination of the composition and the instability constants of oxalate complexes of PuO_2^{2+} by the solubility of plutonium (VI) oxalate in $n\text{-}HNO_3$ in the presence of ammonium oxalate are given. The determination of the solubility of plutonyl oxalate in nitric acid in the presence of ammonium oxalate was carried out at 20° C, and a value of $(3.\,)\cdot 10^{-3}$ mol/l plutonyl oxalate was obtained. Solubility increases with an increase of the ammonium oxalate concentration because complexes are formed. The solubility product of $PuO_2 \cdot C_2O_4 \cdot 3\,H_2O$ is $\sim (5.9)\cdot 10^{-10}$.

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The Determination of the Composition and of the Instability SOV/78-3-7-14/44
Constants of the Oxalate Complex Ions of Plutonium (VI)

In oxalate solutions of plutonium (VI) the following complexes exist: $[PuO_2C_2O_4]^0$ and $[PuO_2(C_2O_4)_2]^{2-}$. Their instability constants are: (2.0) 10^{-7} and (3.4 - 4.3) 10^{-12} respectively. There are 1 figure, 1 table, and 5 references: 4 of which are Soviet.

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

SUBMITTED: October 31, 1957

1. Complex ions--Stability 2. Complex ions--Solubility
3. Ammonium oxalate--Applications

Card 2/2

AUTHORS: Drabkina, L Ye., [illegible], A. I., [illegible], M. L. SOV/78-3-8-33/42

TITLE: Determination of the Solubility Product of Plutonyl Oxalate (Opredeleniye proizvedeniya rastvorimosti plutoniloksalata)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol. 3, Nr 8, pp 1934-1936 (USSR)

ABSTRACT: The solubility product was determined of plutonyl oxalate in 1,1, 2,0, 3,00 mol. HNO_3 and in mixtures of HNO_3-$H_2C_2O_4$. The solubility product of plutonyl oxalate has an average value of $6,0.10^{-10}$. With an increase of the oxalic acid concentration the solubility of plutonyl oxalate decreases. Approximate values of the solubility product of plutonyl oxalate were also determined by means of the graphical method from data on the solubility of plutonyl oxalate in mixed solutions of HNO_3-$(NH_4)_2C_2O_4$. The solubility product, determined by the graphical method, amounts to $1,4.10^{-10}$. This value corresponds quite well to the value found in the experimental way. There are 1 figure, 2 tables, and 10 references, 9 of which are

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SOV/78-3-[illegible]-34/46

Determination of the Solubility Product of Plutonyl Oxalate

Soviet.

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

SUBMITTED: October 31, 1957

Card 2/2

AUTHORS: Gel'man, A. D., Matorina, N. N., Moskvin, A. I. 89-1-6/29

TITLE: The Determination of the Composition and the Instability Constant of Oxalate Complexes of Pu^{+3} Compounds by the Method of Ion Exchange (Opredeleniye sostava i konstant nestoykosti oksalatnykh kompleksnykh soyedinneniy Pu^{+3} metodom ionnogo obmena).

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 1, pp. 52 - 56 (USSR).

ABSTRACT: By the method of ion exchange the formation of ion complexes of Pu^{+3} in oxalate solutions was determined, and the pH value of the solutions was found to fluctuate between 1,4 and 2,8. Measuring results:
1.) The instability constant of the complex ion $[Pu(C_2O_4)_2]^-$ is practically constant with in the range of the pH values from 1,47 to 2,65 (11 values).
2.) In a solution with pH $>$ 1,7 s mixture of complex ions $[Pu(C_4O_2)_2]^-$ and $[Pu(HC_2O_4)_4]^-$ is developed, and the average instability constants for these two types of ions were measured to be $K'_H = 7,1.10^{-10}$ and $K''_H = 1,1.10^{-11}$.
3.) The constants K'_H and K''_H correspond to a total decay of the

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The Determination of the Composition and the Instability Constant of Oxalate Complexes of Pu^{+3} Compounds by the Method of Ion Exchange. 89-1-6/29

ions in accordance with the form:

$$[Pu(C_2O_4)_2]^- \rightleftarrows Pu^{+3} + 2C_2O_4^{-2}$$

$$[Pu(HC_2O_4)_4]^- \rightleftarrows Pu^{+3} + 4HC_2O_4^-$$

4.) Determination of K_H for the complex ion $[Pu(C_2O_4)_2]^-$ by the method of ion exchange supplies values which agree satisfactorily with those obtained by the solubility method.
There are 4 figures, 2 tables, and 15 references, 12 of which are Slavic.

SUBMITTED: August 15, 1957.

AVAILABLE: Library of Congress.

Card 2/2

AUTHORS: Gel'man, A. D., Moskvin, A. I. 20-3-21/59

TITLE: An Investigation of the Complex Oxalates and Carbonates of Plutonium /IV/ in Water Solutions by Means of the Solubility Method (Issledovaniye oksalatnykh i karbonatnykh kompleksov plutoniya (IV) v vodnykh rastvorakh metodom rastvorimosti).

PERIODICAL: Doklady AN SSSR, 1958, Vol. 118, Nr 3, pp. 493-496 (USSR)

ABSTRACT: No date can be found in publications concerning the composition and stability of the carbonates complex of plutonium (IV). In this work the authors give the determination of the composition as well as of the instability constants of Pu (IV) as mentioned in the title. 4-6 hours are sufficient to reach the equilibrium between the ammonium-oxalate solution and the solid phase of Pu (IV) oxalate at 20 ± 0,02°. The experimental results are mentioned in table 1. The solubility of Pu (IV) oxalate decreases with the increase of the concentration of ammonium-oxalate from 0,001 to 0,005 Mol/liter, it reaches a minimum of $3,55.10^{-5}$ mol. Pu(IV) per liter and then increases because of the complex formation of Pu(IV) with oxalations. The solubility is expressed by means of an equation (1). Complex ions with general instability constants (= I. C. in brackets) are formed:

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An Investigation of the Complex Oxalates and Carbonates of Plutonium /IV/ in Water Solutions by Means of the Solubility Method. 20-3-21/59

$\left[Pu(C_2O_4)\right]^{2+}$ (I. C. = $1,8.10^{-9}$), $\left[Pu(C_2O_4)_2\right]^{o}$ (I. C. = $1,2.10^{-17}$) $\left[Pu(C_2O_4)_3\right]^{2-}$ (I. C. = $4,0.10^{-24}$) and $\left[Pu(C_2O_4)_4\right]^{4-}$ (I.C. = $3,3.10^{-28}$). These constants correspond to a complete decomposition of the ions of Pu(IV). From these general instability constants the stepwise constants were determined. Both kinds of constants correspond to different decomposition schemes (2) and (3). Table 2 gives the solubility of Pu(IV)-oxalate in water and in H_2SO_4, HNO_3 and $HClO_4$. From this follows that the solubility, but that then, starting from 0,1 N , it increases again. Because of their interaction with the oxalate in aqueous solutions the acids form a series: $H_2SO_4 > HNO_3 > HClO_4$. The pH of a saturated Pu(IV) oxalate solution was equal to 4,4, the molecular electric conductivity $47o\,\Omega^{-1}$. The dissociation process of Pu(IV) oxalate is explained by means of a scheme for its analogy with U^{4+}. The estimated constant of the acid dissoziation of Pu(IV) gave $\simeq 3.10^{-5}$. Furtheron the solubility of Pu(IV) oxalate in a mixed solution HNO_3-$(NH_4)_2C_2O_4$ (table 1), as well as of Pu(IV) hydroxide in K_2CO_3. with a constant ionic density with an addition of KCl and $KClO_4$ (table 3) are measured. From table 3 it

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can be seen that the solubility of the hydroxide increases with the increasing K_2CO_3 concentration because of the complex formation of Pu(IV) with Carbonate ions. The complex ion $[Pu(CO_3)]^{2+}$ has an instability coefficient of the concentration $1,1.10^{-47}$. Absorption spectra of the solutions of the latter complex were investigated. Table 4 gives the calculated values of the ion potential. From this is seen the tendency for complex formation of single plutonium ions: $Pu^{4+} < Pu^{3+} \simeq PuO_2^{2+} < PuO_2^{+}$, which decreases with the decreases of the ion potential. By means of the data in table 5 the anions can be arranged in a series according to their tendency for complex formation with Pu(IV): $CO_3^{2-} > C_4H_4O_6^{2-} > C_6H_5O_7^{3-} \simeq C_2O_4^{2-}$. There are 5 tables, 5 ——— references, 4 of which are Slavic.

ASSOCIATION: Institute for Physical Chemistry AN USSR (Institut fizicheskoy khimii Akademii nauk SSSR).

PRESENTED: August 15, 1957, by I. I. Chernyayev, Academician

SUBMITTED: August 1, 1957

AVAILABLE: Library of Congress

Card 3/3

MAYOROV, Fedor Vasil'yevich, prof., doktor tekhn.nauk; KOSKVIN, A.I., doktor tekhn.nauk, inzh.-polkovnik, red.; KADER, Ya.M., red. izd-va; STREL'NIKOVA, M.A., tekhn.red.

[Electronic calculating machines and their use] Elektronnye vychislitel'nye mashiny i ikh primenenie. Moskva, Voen. izd-vo M-va obor. SSSR, 1959. 234 p. (MIRA 12:6)
(Electronic calculating machines)

MOSKVIN, A.I.; KHALTURIN, G.V.; GEL'MAN, A.D.

Investigation of the complex formation of trivalent americium in oxalate and ethylenediaminetetraacetic acid solutions by means of ion exchange. Radiokhimiia 1 no.2:141-146 '59.
(MIRA 12:8)

(Americium compounds)

MOSKVIN, A.I.; AMPELOGOVA, N.I.

State of microquantities of radioelements in solutions. Part 13: Study of the state of polonium in aqueous solutions by means of ultrafiltration and adsorption on glass. Radiokhimiia 1 no.4: 425-429 '59. (MIRA 13:1)

(Polonium)

MOSKVIN, A.I.

Complex formation by plutonium and americium (III) in aqueous solutions, studied by means of solubility and ion-exchange methods. Radiokhimiia 1 no.4:430-434 '59. (MIRA 13:1)
(Plutonium compounds) (Americium compounds)

5(4)

AUTHORS: Moskvin, A. I., Artyukhin, P. I. SOV/78-4-3-17/34

TITLE: Determination of the Composition of the Stability Constant of the Ethylene Diamino-tetraacetate Complex of Pu(III) by the Ion Exchange Method (Opredeleniye sostava i konstant nestoykosti etilendiamintetraatsetatnykh kompleksov Pu(III) metodom ionnogo obmena)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 3, pp 591-595 (USSR)

ABSTRACT: The complex formation of plutonium (III) in ethylene diamino-tetraacetic acid (EDTA) by ion exchange was investigated at constant concentration of Trilon-B and at various p_H values. Distribution coefficients were determined of Pu^{3+} in series of 1-molar solution of NH_4Cl on KU-2 at p_H 1.6-1.3. The experimental data are given by tables 1 and 2 and figure 1. From the results it may be concluded that with an increase in the p_H value the concentration of Pu^{3+} in the solution increases under formation of the ethylene diamino-tetraacetic acid complex. In the case of p_H = 2.5 and above Pu^{3+} appears

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Determination of the Composition of the Stability Constant of the Ethylene Diamino-tetraacetate Complex of Pu(III) by the Ion Exchange Method SOV/78-1-3-17/34

in anionic complex form and is not adsorbed by cationite. In the case of p_H = 1.25 no complex is formed. In the p_H range of 1.5-2 the complex ions PuY^- and $PuHY^0$ are formed with the following stability constants: $4.4.10^{-18}$ and $6.2.10^{-10}$. For the thermodynamic stability constant of the complex PuY^- a value of pK = 21 was found. For $PuHY^0$ pK = 11.9 was found.

The process of complex formation of Pu^{3+} with ethylene diamino-tetraacetic acid proceeds according to the following reactions: $Pu^{3+} + HY^{3-} \rightleftharpoons PuHY^0$, $Pu^{3+} + Y^{4-} \rightleftharpoons PuY^-$. For the complexes PuY^- and $PuHY^0$ the following structural formulae were suggested:

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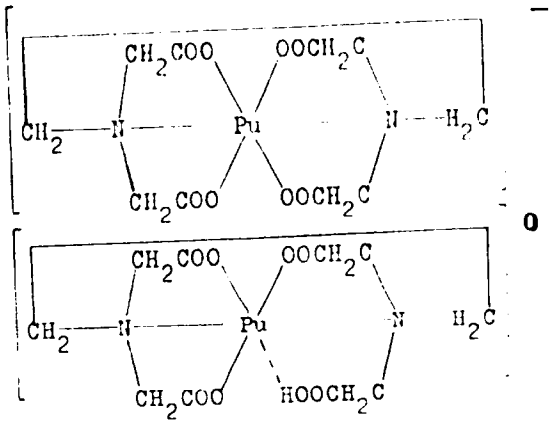
Determination of the Composition of the Stability Constant of the Ethylene Diamino-tetraacetate Complex of Pu(III) by the Ion Exchange Method SOV/78-4-3-17/34



The coordination number of plutonium (III) in the complexes was not determined. There are 1 figure, 2 tables, and 6 references, 4 of which are Soviet.

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Determination of the Composition of the Stability Constant of the Ethylene Diamino-tetraacetate Complex of Pu(III) by the Ion Exchange Method

SOV/78-4-3-17/34

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

SUBMITTED: December 24, 1957

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SOV/78-4-6-19/44

5(4), 21(1)
AUTHORS: Gel'man, A. D., Artyukhin, P. [illegible], Moskvin, A. I.

TITLE: Investigation of the Complex Formation of Pentavalent Plutonium in Ethylene-diamine-tetraacetic Acid by the Ion Exchange Method (Issledovaniye kompleksoobrazovaniya pyativalentnogo plutoniya v etilendiamintetraatsetatnykh rastvorakh metodom ionnogo obmena)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 6, pp 1332-1335 (USSR)

ABSTRACT: The complex formation process of [illegible](V) in ethylene-diamine-tetraacetic acid was investigated by the ion exchange method. The results of the distribution of the pentavalent plutonium between 0.05 mol-solution NH_4Cl and the cation exchanger with different pH-value are given in table 1. They show that the complex ion PuO_2Y^{3-} is produced in the pH-range 4 - 5 with the instability constant $\approx 2 \cdot 10^{-11}$. The influence of the pH-value on the distribution of Pu(V) between 0.05 mol solution NH_4Cl and the ion exchanger in the case of presence and absence of Komplexon is given in figure 1. The instability

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SOV/78-4-6-19/44

Investigation of the Complex Formation of [illegible]valent Plutonium in Ethylene-diamine-tetraacetic Acid by the Ion Exchange Method

constants of the ADTA-complex ions of Pu(III), Pu(VI) and Pu(V) were compared and given in Table 3. The inclination of different plutonium ions to complex formation has the following series:

$$Pu^{4+} > Pu^{3+} > PuO_2^{2+} > PuO_2^{+} .$$

The Pu(IV) ion and the small [illegible](V)-ion are most inclined to complex formation with the ion Y^{4+}. There are 2 figures, 3 tables, and 7 references, 4 of which are Soviet.

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

SUBMITTED: April 16, 1958

Card 2/2

5(2)

AUTHORS: Moskvin, A. I., Zakharova, F. A. SOV/78-4-9-36/44

TITLE: The Investigation of the Complex Formation of Uranyl in Oxalate Solutions by Means of the Solubility Method

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 9, pp 2151-2160 (USSR)

ABSTRACT: A. A. Grinberg, B. V. Ptitsyn and Ye. N. Tekster (Ref 2) determined the instability constant of the following reactions:

$$UO_2(C_2O_4)_2^{2-} \rightleftarrows C_2O_4^{2-} + UO_2C_2O_4 \quad \text{and}$$

$$\left[(UO_2)_2(C_2O_4)_5\right]^{6-} \rightleftarrows C_2O_4^{2-} + 2\left[UO_2(C_2O_4)_2\right]^{2-} .$$

In the present paper the solubility product (SP) of the compound $UO_2C_2O_4 \cdot 3H_2O$ and the complex formation of uranyl with oxalate ions were investigated. The solubility of uranyloxalate in $HClO_4$ and HNO_3 solutions of different concentrations as well as with additions of oxalic acid or ammonium oxalate was determined by

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the usual solubility method. As the data contained in table 1 show, the solubility decreases as the oxalate ion concentration increases, so that no complexes form in the range of concentration investigated. Table 2 lists the values of the equilibrium constants, table 3 those of the SP. As the graphic representation of the relationship between the logarithm of the concentration of the oxalate ion and the logarithm of the mineral acid concentration shows, the SP equals $2.2.10^{-9}$ in the presence of chloric acid, and $3.0.10^{-9}$ in the presence of nitric acid. The determination of the solubility of uranyl oxalate in oxalic acid and ammonium oxalate solutions, respectively, with additions of chloric acid or nitric acid (Tables 4, 5) point to complex formations according to the general equation

$$(2-2x)H^{+} + UO_2C_2O_4 \cdot 3H_2O \rightleftarrows \left[UO_2(C_2O_4)_x^{2-2x}\right] + (1-x)H_2C_2O_4 + 3H_2O .$$

The graphical evaluation of the data (Figs 2, 3) showed that predominantly a complex with a component ratio of uranyl ion: oxalate ion = 1 : 2 forms. This complex formation, however, takes place in the case of hydrogen ion concentrations below 2 mol/l only.

The Investigation of the Complex Formation of Uranyl in Oxalate Solutions by Means of the Solubility Method

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The equilibrium constants of the complex formation are listed in table 6. The investigation of the solubility of uranyl oxalate trihydrate in ammonium oxalate solutions without any additions of mineral acid (Table 7) showed that here complexes of the same composition are formed. The following equation was established for the dependence of the solubility of uranyloxalate on the concentration of H^+ ions: $[H^+]^2 = 7.35\ H_2C_2O_4$.

By means of this equation the most favorable condition for the precipitation of uranyloxalate from solutions in the presence of mineral acids can be determined. The respective instability constants of the oxalate complexes $[UO_2C_2O_4]$ and $[UO_2(C_2O_4)_2]^{2-}$ are given as $(1.7\pm0.3).10^{-7}$ and $(1.0\pm0.3).10^{-12}$ for the oxalate ion concentration range under investigation. The acidolysis constants are $2.5.10^{-2}$ and $2.1.10^{-2}$, respectively.

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A comparison of the results with the data obtained in the case of plutonium oxalate complexes shows that there are but slight differences. The uranyl ion complexes are even more stable than those of the plutonyl ion. The authors thank Professor A. D. Gel'man for his valuable advice. There are 3 figures, 8 tables, and 10 references, 5 of which are Soviet.

SUBMITTED: June 4, 1958

SOV/89-7-2-11/24

5(2) 21(1)

AUTHORS: Gel'man, A. D., Moskvin, A. I., Artyukhin, P. I.

TITLE: The Compositions and Dissociation Constants of Pu(V) and Pu(III) Complexes with Ethylenediaminetetraacetic Acid (Sostav i konstanty dissotsiatsii kompleksov Pu(V) i Pu(III) s etilendiamintetrauksusnoy kislotoy)

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr 2, pp 162 - 163 (USSR)

ABSTRACT: The complex formation of Pu(V) with and without complex-forming ethylene diamine tetra acetic acid (EDTA) was measured with the ion exchange method under the following conditions: KU-2; pH range 3.3 to 5.1; ionic force μ = 0.05 (0.05 M NH_4Cl solution); temperature 20 $\pm$ 1°C. In the examined pH range a complex ion of the type PuO_2Y^{3-} (Y^{4-} = anion of the EDTA) is formed with a dissociation constant K $6.8.10^{-11}$. Similarly the complex formation was determined for Pu(III) in the pH range 1.2 to 3.4, in a nitrogen atmosphere μ = 1 (1 M NH_4Cl). The following complex ions are formed: PuY^- and PuHY; their dissociation constants are $4.4.10^{-18}$ and $6.2.10^{-10}$. By this and earlier data the dissociation constants of the EDTA complexes of the

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The Compositions and Dissociation Constants of Pu(V) and Pu(III) Complexes with Ethylenediaminetetraacetic Acid

SOV/89-7-2-11/24

trivalent transuranic elements (Pu-Cf) can be compared and one may see that with increase of the Z the strength of the complexes of the type MY^- increases, which is easy to understand because of the increase of the ion potential. When the dissociation constants of the complex plutonium ions are being compared it can be established that the tendency of complex formation decreases in the following sequence:

$Pu^{4+} > Pu^{3+} > PuO_2^{2+} > PuO_2^+$, i. e. with decrease of the ion potential

There are 1 table and 6 references, 4 of which are Soviet.

SUBMITTED: January 6, 1959

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Moskvin, A. I.

Ginzburg, F.L.

21 (0), 5 (0) SOV/89-7-2-17/24

AUTHOR: Shchebetkovskiy, V. N.

TITLE: All-Union Symposium on Radiochemistry (Vsesoyuznyy simpozium po radiokhimii)

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr 2, pp 175-176 (USSR)

ABSTRACT: A symposium was held in Leningrad from 3 to 5 March 1959. More than 200 participants from different institutes in Moscow, Leningrad, Kiyev, Novosibirsk, Tbilisi and Gor'kiy attended it. Twentyeight papers were read. The following are mentioned: I. Ye. Starik: On the problem of the molecular state of micromasses of radioactive elements in solutions; I. Ye. Starik, N. I. Ampelogova, I. A. Skul'skiy, L. D. Sheydina, F. L. Ginzburg, L. I. Il'menkova, I. A. Skul'skiy: Condition of radioactive elements occurring in microconcentrations of solutions (Zr, Am, Pa, Po). N. N. Yakovleva, M. A. Shurshalina: Application of the dialysis method for examination of uranium carriers in natural bodies of water. V. I. Paramonova, Ye. F. Latyshev: Complex formation of the multivalent ruthenium with chlorine ions. K. B. Zaborenko, A. V. Zaval'skaya, V. V. Fomin: Determination of the composition and the instability constants by ion exchange of the cerium oxalate complexes. A. I. Moskvin: Complex formation of plutonium and americium with the anions of

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ethylene diamine tetra acetic acid (EDTA) and oxalic and phosphoric acid. A. P. Trofimov, L. N. Shiganova: A new method for the determination of ion charges of radioactive elements in solutions by application of ion exchanging resins of different swelling capacities. N. B. Vysokoostrovskaya, A. L. Trofimov, B. N. Nikol'skiy: Confirmation of the non-existence of complex formation between potassium and EDTA by application of the ion exchange and the potentiometric methods. V. M. Vdovenko, Ya. A. Smirnova: Determination of the conditions of compounds to be extracted in the organic phase (hydration of uranyl nitrate with ester). V. M. Vdovenko, N. F. Lazarev: Degree of hydration of nitric acid in dibutyl ether of the diethylene glycol. V. M. Vdovenko, A. S. Krivokhatskiy: Degree of solvation of the nitric acid in the dibutyl ether of the diethylene glycol. A. I. Lavrukhina: Determination of the dependency of the distribution coefficients between the organic and the watery phases in order to determine the condition of the substance in the solution and to fixate the concentration range at which complex formation starts. V. I. Kuznetsov, P. S. Ivanov lectured on extraction of hexavalent tungsten with aniline from hydrochloric media. An. N. Nesmeyanov on substitution of hydrogen in benzol by the recoil

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atoms P^{32}, As^{76} and Sb^{124}. B. G. Dzantiyev lectured on the recoil atoms from the reactions of $Li^{6}(n,\alpha)T$, $N^{14}(n,p)C^{14}$ in a medium of cyclic hydrocarbons. Ye. I. Artyukhin lectured on the influence of the NO_3 and H^+ ions on the reduction velocity of hexavalent plutonium under the influence of its own α-radiation. In the course of thorough discussions it was established that the comprehension of the condition of radioactive elements in solution are of eminent importance for the whole range of radio chemistry. More studies have to be made in this field as were made before. A better coordination of all the institutes which are occupied with this problem will yield good results in the future.

69013

S/078/60/005/04/008/040
B004/B007

5.2200(A)

AUTHORS: Denotkina, R. G., Moskvin, A. I., Shevchenko, V. B.

TITLE: The Solubility Product of Bisubstituted Plutonium(IV)Phosphate and Its Solubility in Some Acids

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol 5, Nr 4, pp 805 - 810 (USSR)

ABSTRACT: The authors investigated the solubility of $Pu(HPO_4)_2 \cdot xH_2O$ in $HClO_4$ and HNO_3, and determined the solubility product of this compound. Solubility was determined at a constant ion strength = 2, which was maintained by addition of $NaClO_4$ or $LiNO_3$. The precipitation of $Pu(HPO_4)_2 \cdot xH_2O$ (x fluctuates according to the authors' data between 1 and 4) was effected from a solution of 1 - 2 M Pu(IV)-nitrate by a solution of 0.4 M H_3PO_4. The experimental data are given as follows: Figure 1 - influence of hydrogen ion concentration upon the solubility of $Pu(HPO_4)_2 \cdot xH_2O$ in HNO_3, figure 2 - the same in $HClO_4$. Hydrogen ion concentration was measured by means of an LP-5 potentiometer. The solubility of

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The Solubility Product of Bisubstituted Plutonium(IV)Phosphate and Its Solubility in Some Acids

plutonium diphosphate increases with increasing hydrogen ion concentration, and is greater in HNO_3 as a result of the formation of the complex $Pu(NO_3)^{3+}$. Further, the solubility of $Pu(HPO_4)_2 \cdot xH_2O$ in distilled water and in $HClO_4$ and HNO_3 with concentrations between 0.1 - 2 M was determined. Table 1 gives the data. From the low pH (3.55 - 3.60) of the saturated aqueous solution of $Pu(HPO_4)_2 \cdot xH_2O$, conclusions are drawn as to hydrolysis accompanied by formation of the aquo-hydroxo complex $\left[Pu(HPO_4)(H_2O)_{n-1}OH\right]^+$, where n = 1....i. From the dissociation constants of HPO_4 and the equilibrium constant for the dissociation of $Pu(HPO_4)_2 \cdot xH_2O$ the solubility product was calculated. Table 2 gives the solubility product in $HClO_4$, table 3 gives the solubility product in HNO_3 with an ion strength = 2. Further, the solubility product was calculated immediately from the equation $L^P_{Pu(HPO_4).xH_2O} = \left[Pu^{4+}\right]\left[HPO_4^{2-}\right]^2$ (Table 4), and finally

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B004/B007

The Solubility Product of Bisubstituted Plutonium(IV)Phosphate and Its Solubility in Some Acids

the solubility of the Pu(IV)phosphate was determined graphically from experimental data for the solubility of Pu(IV)phosphate in mixtures of HNO_3 and H_3PO_4 (Fig 3). The mean value of the solubility product determined according to the three methods is 2.10^{-28}. A comparison between the solubility product of Pu(IV)phosphate and the corresponding Th- and U-compounds shows that the Pu-compound has the lowest solubility because of its lower ionic radius. There are 3 figures, 4 tables, and 6 references, 5 of which are Soviet.

SUBMITTED: December 18, 1958

Card 3/3

S/078/60/005/06/00[illegible]
B004/B0[illegible]

AUTHORS: Zakharova, E. A., Nesmeyan, A. I.

TITLE: The Solubility Produc[illegible] of Uranium(IV) Oxalate. Compl[illegible] and Dissociation Constants [illegible] Complex U(IV) Ions in Aqueous Solutions

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 6, pp. 1228 - 1233

TEXT: The authors examined the formation of complex compounds of tetravalent uranium in oxalate solutions by using the solubility method. The solubility product of $U(C_2O_4)_2 \cdot 6H_2O$, its composition and the instab[illegible] constants of the oxalate complex compounds were determined in analogy to investigations on tetravalent plutonium described in Ref. 2. The dependence of the solubility product of $U(C_2O_4)_2 \cdot 6H_2O$ on the acidity of the hydrochloric acid solution was determined by means of tracing with the radioactive isotope U^{233}. The α activity was measured by means of

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The Solubility Product of Uranium(IV) Oxalate. Composition and Dissociation Constants of Complex U(IV) Ions in Aqueous Solutions

S/078/60/005/06/06/030
B004/B014

radiometric apparatus of the type T- 10,000 (PS-10,000). Table 5 lists experimental data. The solubility product was equal to $(4.3\pm0.4)\cdot10^{-22}$. The complex ions $[U(C_2O_4)]^{2+}$, $[U(C_2O_4)_2]$, $[U(C_2O_4)_3]^{2-}$ and $[U(C_2O_4)_4]^{4-}$ with the instability constants $2.5\cdot10^{-9}$, $1.4\cdot10^{-17}$, $1.7\cdot10^{-23}$ and $5.7\cdot10^{-28}$ were detected by examining the complex compounds formation U(IV) in oxalate solutions in the presence of 0.5 N HCl (Table 3). The dependence of the reciprocal logarithm of the instability constants on the ratio between metal and addend is shown in a figure. The instability constants of the oxalate complex ions of the tetravalent actinides Th, Np, and Pu are compiled in Table 4. The authors refer to papers by A. A. Grinberg and G. I. Petrzhak and thank Professor A. D. Gel'man for his valuable advice. There are 1 figure, 4 tables, and 10 references: 6 Soviet, 1 American, 1 British and 2 Indian.

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The Solubility Product of Uranium(IV) Oxalate. Composition and Dissociation Constants of Complex U(IV) Ions in Aqueous Solutions

S/078/60/005/06/06/0?? B004/B014

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

SUBMITTED: March 10, 1959

Card 3/3

Moskvin, A. I.

81940
S/078/60/005/07/05/014
B004/B056

21.3500

AUTHORS: Denotkina, R. G., Moskvin, A. I., Shevchenko, V. B.

TITLE: Determination of the Composition and the Dissociation Constants of the Phosphate Complexes of Plutonium (IV) by Means of the Solubility Method

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 7, pp. 1509-1515

TEXT: In order to obtain stable solutions of nitric acid when dissolving the fuel elements consisting of an uranium-molybdenum alloy of the first atomic power plant of the USSR, 20-40 g/l phosphoric acid is added. This caused the authors to investigate the complex-formation of plutonium (IV) in solutions of phosphoric acid and to determine the ratio between metal and addend and the dissociation constants of the complexes. They investigated the solubility of the gelatinous $Pu(HPO_4)_2 \cdot xH_2O$ in 0.012 to 2 mole/l phosphoric acid in the presence of 2 M HNO_3 at 25°C. The experimental data are shown in Table 1 and Fig. 1. The solubility of

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plutonium (IV)-phosphate at first decreases, attains a minimum at 1.06×10^{-4} mole/l, after which it increases as a result of complex formation. From the curve in Fig. 1 it may be seen that the number of phosphate groups in the complex ion increases steplike from 1,2,3,4 to 5. The following instability constants are calculated for $[Pu(HPO_4)]^{2+}$ $K_{n_1} = 1.2 \cdot 10^{-13}$; for $[Pu(HPO_4)_2]^{\circ}$ $K_{n_2} = 1.8 \cdot 10^{-24}$; for $[Pu(HPO_4)_3]^{2-}$ $K_{n_3} = 3.7 \cdot 10^{-34}$; for $[Pu(HPO_4)_4]^{4-}$ $K_{n_4} = 6 \cdot 10^{-44}$; and for $[Pu(HPO_4)_5]^{6-}$ $K_{n_5} = 9 \cdot 10^{-53}$. Fig. 2 shows the dependence of the exponent of the instability constants on the ratio between metal and addend. When increasing the hydrogen-ion concentration, acidolysis of the phosphate complexes occurs, also for which the constants are calculated. Further, the solubility of the dry plutonium diphosphates in aqueous phosphoric acid solution (0.03-3.9 mole/l) was investigated. The results are given in

Determination of the Composition and the Dissociation Constants of the Phosphate Complexes of Plutonium (IV) by Means of the Solubility Method

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B004/B056

Table 2 and in Fig. 3. Complex ions with the ratio metal : addend = 1 : 3, 1 : 4, and 1 : 5 were found. Formation of these complexes could be proved by means of electromigration (Table 3). In Table 4 the instability constants of the phosphate complexes of Pu(IV) were compared with those of the complexes with other acid-anions, and the following order was found: $CO_3^{2-} > HPO_4^{2-} > C_2O_4^{2-}$. There are 3 figures, 4 tables, and 5 references: 4 Soviet and 1 American.

SUBMITTED: March 10, 1959

Card 3/3

MOSKVIN, A I

PHASE I BOOK EXPLOITATION SOV/5501

Gel'man, Anna Dmitriyevna, Doctor of Chemical Sciences; Apollinariy Ivanovich Moskvin, Candidate of Chemical Sciences; Lev Mikhaylovich Zaytsev, Candidate of Chemical Sciences; and Meyya Pavlovna Mefod'yeva, Candidate of Chemical Sciences

Kompleksnyye soyedineniya transuranovykh elementov (Complex Compounds of Transuranium Elements) Moscow, Izd-vo AN SSSR, 1961. Errata slip inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut fizicheskoy khimii.
Ed. of Publishing House: E.S. Dragunov, Tech. Ed.: P.S. Kashina.

PURPOSE: This book is intended for chemists interested in the complex compounds of transuranium elements, and specifically for young scientific workers and aspirants doing research in this field.

COVERAGE: The book deals with the complex compounds of transuranium elements. It describes the formation of complex compounds of neptunium (including oxalates, carbonates, acetates, and fluorides), and plutonium in aqueous solutions. Types of such solutions are described along with the hydrolysis

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of hydrated plutonium ions of various oxidation states. Physicochemical properties of plutonium compounds in aqueous solutions are examined along with the plutonium oxalates, phosphates of Pu (IV) and Pu (VI), and acetates of Pu (VI). The synthesis and properties of complex compounds of tri-, tetra-, and hexavalent plutonium are described along with the insoluble plutonium compounds such as the plutonium oxalates, hydroxides, peroxides, and dioxides. The formation of americium, curium, berkelium, californium, einsteinium, fermium, and mendelevium complexes are also covered. The use of complex compounds for the separation of transuranium elements is discussed along with prevailing methods such as coprecipitation, extraction, ion exchange, and fractional distillation. The authors thank Candidates of Chemical Sciences P.I. Artyukhin and L. Ye. Drabkin. There are 108 references: 54 English, 46 Soviet, 4 Swedish, 2 German, and 2 French.

TABLE OF CONTENTS:

27559
S/170/61/004/010/014/019
B108/B102

18.8100

AUTHORS: Likhachev, V. A., Moskvin, A. I.

TITLE: Change in density of aluminum due to heat variations

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 10, 1961, 111-114

TEXT: The authors studied the thermal fatigue of cylinders of 99.97%-pure copper which were subjected to a cyclic thermal treatment. The specimens were put into a furnace, kept there for about 5.7 min, and then chilled in 10°C water for 2 min. This process was repeated cyclically. After about 1000 cycles over a temperature interval of some 500°C, the thermal stresses led not only to a crinkling of the surface but also to a relative deformation (elongation) of the specimens by 5 - 7%. The relative change in the apparent density of the specimens rised with the number N of cycles according to a parabolic law. The anomalous course of the curve corresponding to cycles over an interval of 400°C could not be explained. The relative change in density was due to thermal fatigue which causes

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Change in density of aluminum due to ...

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microscopic cracks in the material. The greatest change in density was observed in the regions of the highest thermal stresses. Measurements showed a relative change in density of 2.75% on the surface and of 2% in the center of the specimens. In between, the decrease in density was lesser. The relative decrease in density reached more than 4% after 2000 cycles over a temperature interval of 600°C. There are 2 figures and 3 Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut, g. Leningrad (Physicotechnical Institute Leningrad)

SUBMITTED: June 12, 1961

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S/078/61/006/005/003/015
B121/B208

AUTHORS: Zolotov, Yu. A., Marov, I. N., and Moskvin, A. I.

TITLE: Complex compounds of pentavalent neptunium in solutions of oxalic acid and ethylene diamine tetraacetic acid

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 5, 1961, 1055 - 1062

TEXT: The authors studied the complex formation of the NpO_2^+ ion with oxalic acid and ethylene diamine tetraacetic acid by ion exchange. The study was carried out statically by observing the distribution of Np^V used as indicator between a 0,05 M solution of NH_4ClO_4 and the KY-2 (KU-2) cation exchanger in its ammonium form in the presence and in the absence of complexing agents. The experiments were performed at 20 ± 2°C. The grain size of the cation exchanger was 50 - 70 mesh. The pH of the solution was measured with a glass electrode and the ЛП-5 (LP-5) pH-meter. In a pH-range of 2 - 5 Np^V was found to form complex ions of the following

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composition with oxalic acid $NpO_2HC_2O_4$, $NpO_2C_2O_4^-$ and $NpO_2(C_2O_4)_2^{3-}$. The corresponding stability constants were: $5,0 \cdot 10^2$, $1,1 \cdot 10^4$, and $2,3 \cdot 10^7$. At a pH below 1,6 no neptunium oxalate complexes were obtained. In the pH-range 2,0 - 3,2 $NpO_2HC_2O_4$ and $NpO_2C_2O_4^-$ are formed, and at a pH above 4 $NpO_2(C_2O_4)_2^{3-}$. The complex formation is expressed by the following equations:

$$NpO_2^+ + HC_2O_4^- \rightleftharpoons NpO_2HC_2O_4 \quad (11),$$

$$NpO_2^+ + C_2O_4^{2-} \rightleftharpoons NpO_2C_2O_4^- \quad (12),$$

$$NpO_2^+ + 2\ C_2O_4^{2-} \rightleftharpoons NpO_2(C_2O_4)_2^{3-} \quad (13).$$

The thermodynamic stability constants of the NpO_2^+ oxalate complexes were compared with published data (Ref. 5: D. M. Gruen, J. J. Katz, J. Amer. Chem. Soc., 75, 3772 (1953)); the results are summarized in Table 3. In the pH-range 4,9 - 6,2 neptunium forms with ethylene diamine tetraacetic acid only one complex of the composition NpO_2Y^{3-} and a stability constant

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Complex compounds of ...

$(4,9 \pm 1,1),10^9$. There are 1 figure, 4 tables, and 21 references: 12 Soviet-bloc and 9 non-Soviet-bloc. The four most recent references to English language publications read as follows: 4. G. Gibson, D. M. Gruen, J. J. Katz, J. Amer. Chem. Soc., 74, 2103 (1952); 8. J. C. Hindman, L. B. Magnusson, T. J. La Chapelle, The Transuranium Elements. Nat. Nucl. En. Sev., Div. IV, 14B, paper 15.2, New York 1949; 9. R. Sjoblom, J. C. Hindman, J. Amer. Chem. Soc., 73, 1744 (1951); 10. R. M. Diamond, K. Street, G. T. Seaborg, J. Amer. Chem. Soc., 76, 146 (1954).

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk SSSR
(Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR)

SUBMITTED: April 8, 1960

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25506 S/078/61/006/008/005/018
B121/B203

5 3700

AUTHORS: Moskvin, A. I., Marov, I. N., and Zolotov, Yu. A.

TITLE: Complex compounds of pentavalent neptunium with citric and tartaric acid

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 8, 1961, 1813-1820

TEXT: The complex compounds of neptunium with oxy-acids have been little studied. Only Yu. A. Zolotov and Yu. P. Novikov (Ref. 1: Zh. neorgan. khimii 6, 1055, 1961) detected a change in the absorption spectra of neptunium solutions in the presence of complex-forming substances. The complex formation at different pH values was studied by cation exchange between pentavalent neptunium in 0.05 molar NH_4ClO_4 solution and the cation exchanger КУ-2 (KU-2) in ammonium form in the presence of citric and tartaric acid. The pH value was measured with an ЛП-5 (LP-5) pH meter with glass electrodes. In the pH range 4.3 - 5.2, neptunium (V) was found to form the following complexes with citric acid: NpO_2Cit^{2-} and NpO_2HCit^- with the stability constants $(4.7 \pm 1.0)\cdot 10^3$ (pK = 3.67) and

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$(4.9 \pm 1.4) \cdot 10^2$ (pK = 2.69). The absorption spectra of neptunium (V) solutions in the presence of citric acid at pH = 0.9, 3.5, 5.1, 5.7, and 6.1 were recorded. The absorption maximum at 983 mμ was found to shift due to complex formation to the side of increased complex formation. The complex formation in the system neptunium (V) - tartaric acid was determined by a change in absorption spectra of neptunium (V) solutions in the presence of tartaric acid at different pH values of the solutions. In the pH range 3.2 - 6.2, neptunium - tartaric acid complexes of the following compositions were determined by cation exchange: NpO_2HTar, NpO_2Tar^-, $NpO_2Tar_2^{3-}$, and $NpO_2Tar_3^{5-}$. These complexes have the following stability constants: $2.3 \cdot 10^2$ (pK = 2.36), $2.1 \cdot 10^2$ (pK = 2.32), $2.0 \cdot 10^4$ (pK = 4.30), and $1.5 \cdot 10^6$ (pK = 6.18). There are 7 figures, 3 tables, and 4 Soviet-bloc references.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo AN SSSR (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy AS USSR)

SUBMITTED: July 8, 1960

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34 26
S/186/62/004/001/005/008
E075/E436

21.4300

AUTHORS: Moskvin, A.I., Zaytseva, V.P.

TITLE: Hydrolytic behaviour of plutonyl in aqueous solutions

PERIODICAL: Radiokhimiya, v.4, no.1, 1962, 73-81

TEXT: The object of the authors' work was to obtain a more complete elucidation of the nature of the processes of hydrolysis of PuO^{2+} in aqueous solutions with pH changing from 3.0 to 9.0 Concentration of OH^- was regulated by additions of $HClO_4$ or NH_4OH. It was shown that with the increasing equilibrium value of pH from 3.0 to about 8.2, the solubility of $(NH_4)_2Pu_2O_7$ decreases to a minimum value (4.2×10^{-4} mole Pu/litre) and then increases for the higher values of pH (pH > 8.3). In concentrated ammonia solution (pH > 13) the solubility is lowered again. The value of the solubility at pH = 3.25 was used for the calculation of solubility product for $PuO_2(OH)_2$ which was found to be 1.8×10^{-23}. Absorption spectra for the saturated aqueous solutions of $(NH_4)_2P_2O_7$ were obtained at pH values of 7.0, 7.4 and 8.7. Their comparison with the spectrum for $Pu^{(VI)}$ in 1M $HClO_4$ showed that the spectra all differed due to formation of

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hydrolysis products of PuO_2^{2+} in the aqueous solution at pH > 3. Equilibrium constants were obtained for a series of hydrolytic processes which led to the derivation of summarized reactions giving the hydrolysis products:

$$2PuO_2^{2+} + 3H_2O \rightleftharpoons \left[(PuO_2)_2(OH)_3\right]^+ + 3H^+ \quad (12)$$

and

$$2PuO_2^{2+} + 5H_2O \rightleftharpoons \left[(PuO_2)_2(OH)_5\right]^- + 5H^+ \quad (13)$$

Equilibrium constants for these reactions are 5.2×10^{-7} and 8.0×10^{-23} respectively. Composition of and relationships between the different forms of plutonyl depend on pH of the solutions. The predominant products were $\left[(PuO_2)_2(OH)_3\right]^+$ at pH < 7.5 and $\left[(PuO_2)_2(OH)_5\right]^-$ at pH > 8.4. Between pH values of 7.5 and 8.9 solubility of the plutonyl hydroxides was at a minimum and depended on the formation of $\left[PO_2(OH)_2\right]^0$. Concentrations of $\left[PuO_2(OH)\right]^+$, $\left[PuO_2(OH)_2\right]^0$ and $\left[PuO_2(OH)_3\right]^-$ in the solutions are very small due to their mutual interaction which leads to formation of more complex ions. At pH < 1.0

Hydrolytic behaviour ... S/186/62/004/001/005/008
E075/E436

ammonium diplutonate $(NH_4)_2Pu_2O_7$. There are 2 figures and 4 tables.

SUBMITTED: January 28, 1961

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S/186/62/004/002/004/010
E075/E136

AUTHORS: Gel'man, A.D., Moskvin, A.I., and Zaytseva, V.P.

TITLE: On the carbonate compounds of plutonium

PERIODICAL: Radiokhimiya, v.4, no.2, 1962, 154-162

TEXT: The object of the work was to determine the composition and stability of Pu(VI) complexes forming in carbonate solutions by determining the relationship between Mo_2^{2+} and the addend. To confirm the reactions taking place in the solutions some of the carbonate complexes of Pu were separated in the solid state. The equilibrium concentration of Pu in the solutions was determined by a radiometric method and pH values were measured by a potentiometer type ЛП-5 (LP-5) with a glass electrode. Solubility of ammonium diplutonate in $(NH_4)_2CO_3$ solutions was determined and found to increase with the carbonate concentration. Dissociation constants were calculated for the first time for the following complexes:
$[PuO_2(CO_3)(OH)_2 \cdot 2H_2O]^{2-}$, $[PuO_2(CO_3)(OH) \cdot 3H_2O]^{-}$, and

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On the carbonate compounds of ...

$[PuO_2(CO_3)_2 \cdot 2H_2O]^{2-}$. Dissociation constants and solubility products of PuO_2CO_3 were also determined. The authors isolated for the first time a compound $NH_4[PuO_2(CO_3)(OH) \cdot 3H_2O]$ from dark red carbonate solutions. Carbonate complexes with a ratio of MO_2^{2+} to addend equal to 1:2 and 1:3 were also isolated. The solubility of plutonyltricarbonate in $(NH_4)_2CO_3$ solutions of various concentrations was determined and the absorption spectra of the green solutions thus obtained were measured. It was calculated that under these conditions a carbonate complex with a ratio of MO_2^{2+} to addend equal to 1:2 forms predominantly.
There are 2 figures and 4 tables.

SUBMITTED: March 1, 1961

Card 2/2

S/020/63/149/003/023/028
B117/B186

AUTHORS: Moskvin, A. I., Geletseanu, I., Lapitskiy, A. V.

TITLE: Some regularities of complexing of pentavalent actinides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 149, no. 3, 1963, 611-614

TEXT: On the basis of compositions and instability constants of complexes of pentavalent Pa, Np and Pu with anions of some acids (determined by means of the ion exchange method), the tendency of these elements to form complexes was shown to be much stronger than is generally supposed. This tendency is much the same for the elements mentioned, as they form complexes of identical composition and approximately identical stability with anions of suitable acids. The tendency of the addends to form complexes decreases according to the following sequence:
$\gamma^{4-} > Cit^{3-} > HPO_4^{2-} > tart^{2-} > Ac^- \simeq Lact^-$. The stability of the complexes of Pa(V) with hydroxy acids permits generalization of this sequence as follows: EDTA > citric acid > oxalic- > phosphoric- > trioxyglutaric > α-hydroxyisobutyric > tartaric > malic > mandelic > acetic > lactic acid.

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Some regularities of ...

Although no complete data exist for Np(V) and Pu(V), this sequence can also be applied for these elements owing to conformance of instability constants. Instability constants of complexes formed by Pu of different valence with the same addend show that Pu in the pentavalent state has the weakest tendency to form complexes. On the basis of the similarity of complexing properties of pentavalent Pa, Np and Pu, and of the quantitative data available, conclusions may also be drawn as to the composition and stability of complexes of pentavalent uranium with the acids mentioned. One of the properties of actinides which serves to prove their position in the periodic system of elements is their behavior during ion exchange. Pa, Np and Pu in pentavalent state were found to behave similarly during ion exchange. There are 1 figure and 1 table.

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

PRESENTED: October 29, 1962, by I. I. Chernyayev, Academician

SUBMITTED: October 24, 1962

Card 2/2

MOSKVIN, A.I.; PERETRUKHIN, V.F.

Study of the complex formation of pentavalent neptunium in phosphate solutions by means of ion exchange. Radiokhimiia 6 no.2:206-214 '64. (MIRA 17:6)

MOSKVIN, A.I.; ZAYTSEVA, V.P.; GEL'MAN, A.D.

Study of the complex formation of trivalent plutonium with anions of acetic, citric, and tartaric acids by means of ion exchange. Radiokhimiia 6 no.2:214-230 '64. (MIRA 17:6)

L 00035-66 EWT(m)/EPF(n)-2/EWP(j)/T/EWP(t)/EWP(b) IJP(c) JD/WW/JG/RM
ACCESSION NR: AP5020303 UR/0186/65/007/004/0410/0419
541.49:546.799.3.5:661.733

AUTHOR: Moskvin, A. I.; Mefod'yeva, M. P.

TITLE: Formation of pentavalent neptunium complexes in lactate and glycolate solutions

SOURCE: Radiokhimiya, v. 7, no. 4, 1965, 410-419

TOPIC TAGS: neptunium compound, complex compound

ABSTRACT: The recent determination of the composition and stability constants for complexes formed by NpO_2^+ ion with oxalic, citric and tartaric acids led the authors to obtain data on the complex formation of NpO_2^+ ion with lactic and glycolic acids. They used the experimental procedure described in *Zhur. neorg. Khim. 6*, 1813 (1961) and *Radiokhimiya 6*, 214 (1964) to study the distribution of Np (V) between the cationite KU-2 and lactic acid solutions of different concentrations. The equilibrium concentration of different forms of Np (V) as a function of the concentration of Lact is shown in Fig. 5 (Enclosure 01). The concentration of lactic acid was varied within 0.005-0.2 M range and pH 6.5. The ionic strength values were μ=0/05 and μ=0.2. Two lactate complexes were discovered: $[NpO_2Lact]^0$ and $[NpO_2(Lact)_2]$.

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ACCESSION NR: AP5020303

The concentration stability constants for these two complexes are:
$\beta_1=51\pm1$, $\beta_2=(3.0\pm1.0)\cdot10^2$ ($\mu=0.05$)
$\beta_1=36\pm1$, $\beta_2=(1.6\pm0.1)\cdot10^2$ ($\mu=0.2$)
respectively. Electrophoresis produced distribution curves which show that in lactate solutions neutral complex is predominant. In glycolate solutions of complexes only an electrically neutral complex of Np (V) is formed. The stability constant of this complex is 40 ± 7. The thermodynamic equilibrium constants were calculated and listed with those of other neptunyl complexes. Acid anions arranged in decreasing order of complex formation are as follows:
$Y^{4-} > cit^{3-} > C_2O_4^{2-} > HPO_4^{2-} > tart^{2-} > HCO_3^- > SO_3^{2-} > Ac^- \approx Glyc > Lact^-$
Orig. art. has: 4 tables and 8 figures.

ASSOCIATION: none

SUBMITTED: 14Dec64 ENCL: 01 SUB CODE: IC, GC

NO REF SOV: 015 OTHER: 003

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L 00035-66
ACCESSION NR: AP5020303

ENCLOSURE: 01

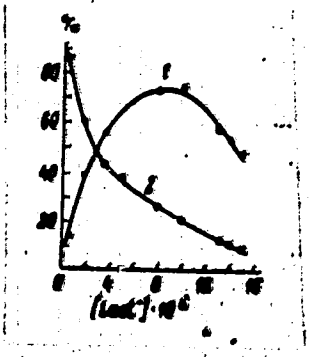

Fig. 1. Equilibrium concentration of different forms of Np (V) as a function of concentraction of Lact in solutions (the total content of neptunium in the solution is taken as 100%)
1- $[NpO_2Lact]^o$; 2- $[NpO_2^+]$

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L 8143-66 EWT(m)/EPF(c)/EWP(t)/EWP(b) LJP(c) JD

ACC NR: AP5027204 SOURCE CODE: UR/0078/65/010/011/2449/2452

AUTHOR: Denotkina, R. G.; Shevchenko, V. B.; Moskvin, A. I. 21 B

ORG: None

TITLE: The solubility product of ammonium plutonyl phosphate in aqueous solutions

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 11, 1965, 2449-2452

TOPIC TAGS: ammonium phosphate, plutonium compound, solubility

ABSTRACT: Ammonium plutonyl phosphate was precipitated by the reaction of a 0.1 molar nitric acid plutonyl solution with an 8.26×10^{-3} molar concentration of the metal and a 1.0 molar solution of $(NH_4)_2HPO_4$. The finely crystalline precipitate obtained, which was of a light green color and had the composition $NH_4PuO_2PO_4 \cdot 3H_2O$, was the starting material for the investigations. The solubility of ammonium plutonyl phosphate was determined in aqueous solutions over the pH range from 1.0 to 6.4. In one series of experiments the pH of the solutions was adjusted by addition of $HClO_4$, and in another series of experiments by addition of HNO_3. The ionic strength in the solution was not constant, since addition of $NaClO_4$ or $LiNO_3$ to maintain mu constant brought about partial replacement of the NH_4 group by sodium or lithium ions, as a

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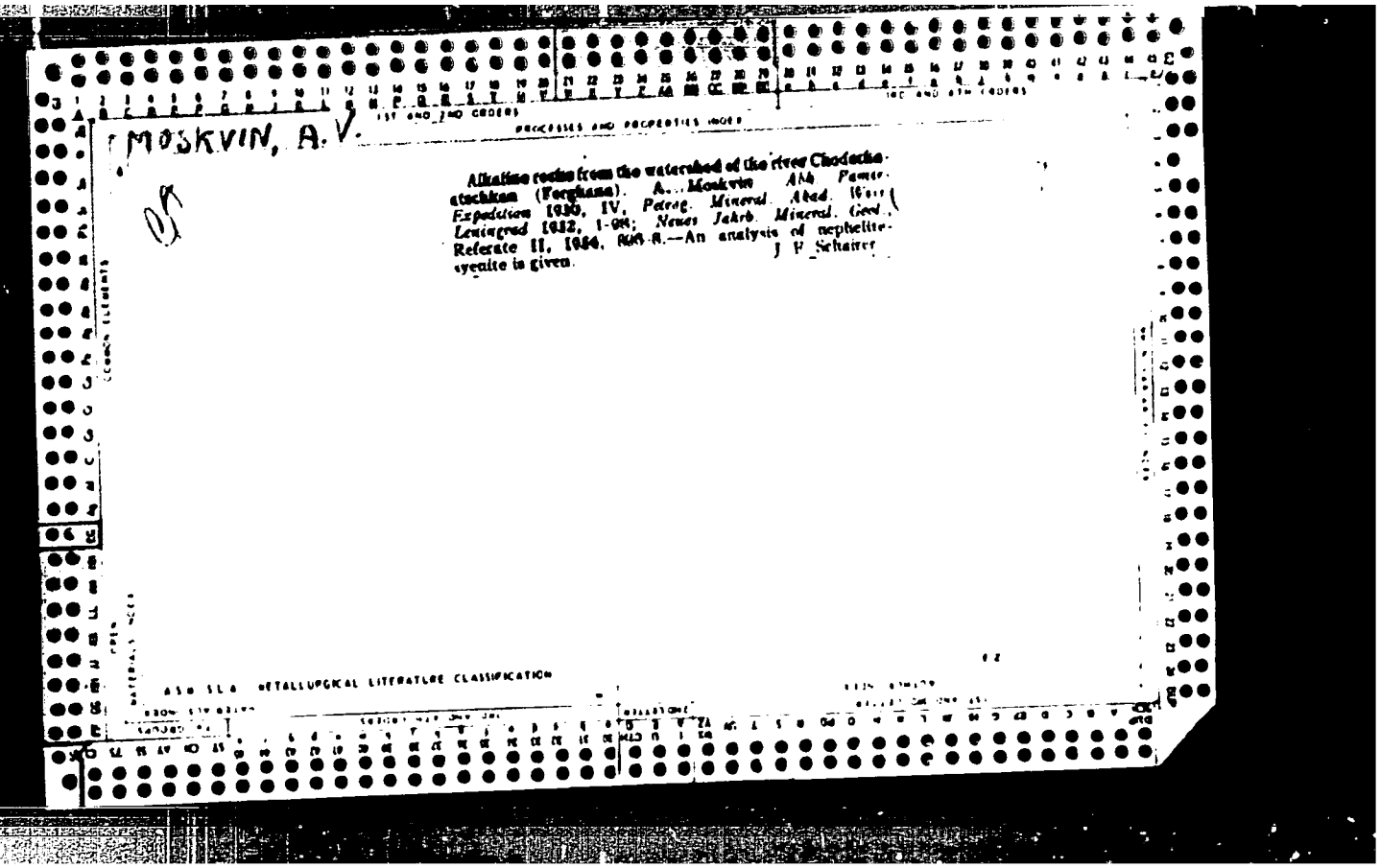
L 8143-66

ACC NR: AP5027204

result of which the solubility could be determined only for the mixed compound $(NH_4, Na)PuO_2PO_4$ or $(NH_4, Li)PuO_2PO_4$, but not for ammonium plutonyl phosphate. The experimental solubility data is exhibited in tabular form. On the basis of the experimental data, calculations were made of the solubility product of ammonium plutonyl phosphate and of a double substituted plutonyl phosphate; these were found to be equal to $(2.3 \pm 1.2) \times 10^{-27}$ and $(2.8 \pm 1.3) \times 10^{-13}$. The concentration instability constants for $NH_4PuO_2PO_4$ and PuO_2HPO_4 were calculated to be equal to 3.7×10^{-22} and 6.8×10^{-9}. It is concluded from the calculated solubility products for $NH_4PuO_2PO_4 \cdot 3H_2O$ and PuO_2HPO_4 that ammonium plutonyl phosphate belongs to the groups of slightly soluble compounds formed by the reaction of the PuO_2^{2+} ion with phosphoric acid. Orig. art. has: 10 formulas and 1 table.

SUB CODE: GC, IC/ SUBM DATE: 27Feb65/ ORIG REF: 004/ OTH REF: 008

Card 2/2 pw

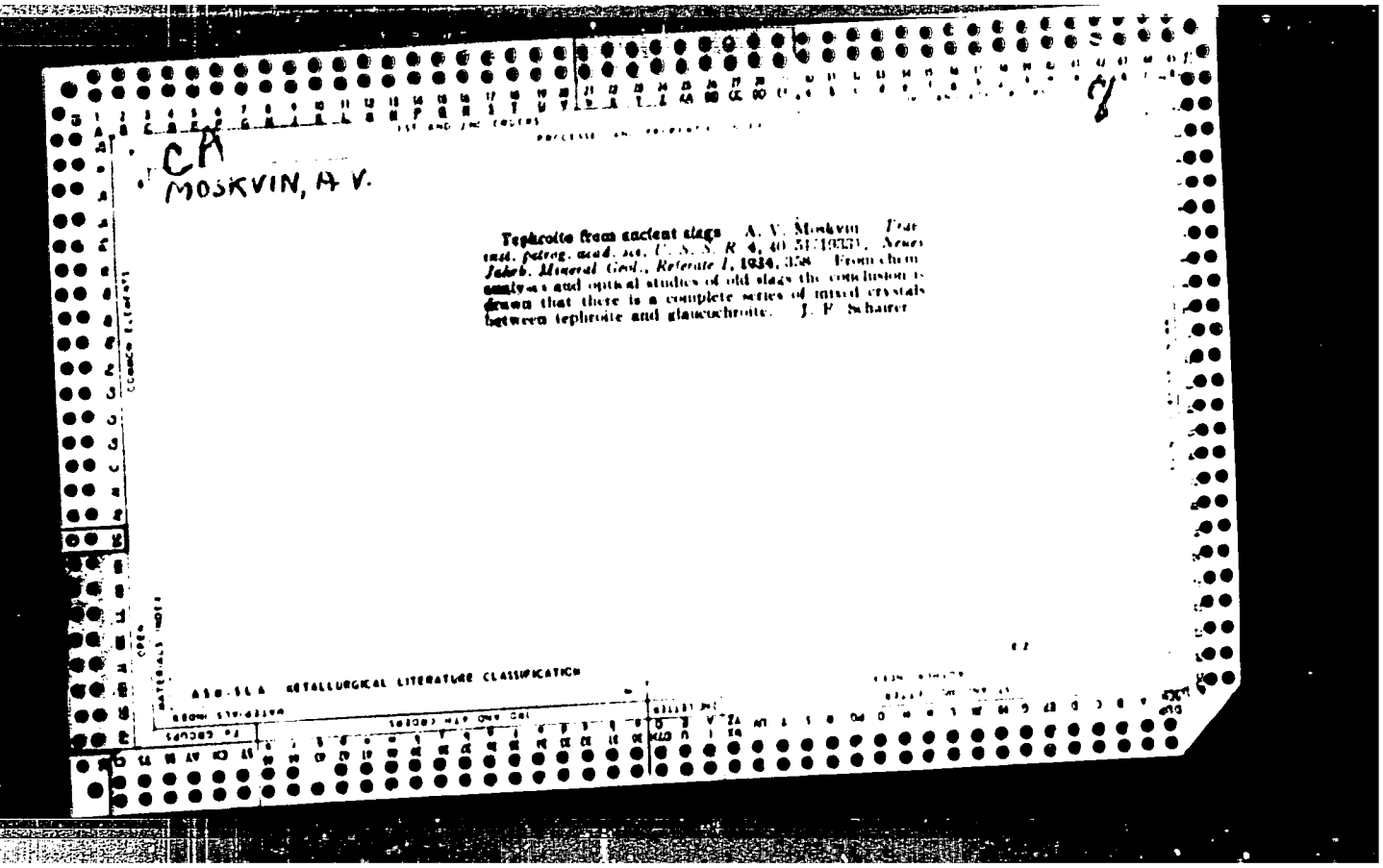


MOSKVIN, A.V.

Alkaline rocks from the watershed of the river Chodzcha-atachkan (Ferghana). A. ... Moskvin *Ann. Pamer. Expedition 1930, IV, Petrog. Mineral. Abad.* (Acad. Sci.) *Leningrad 1932, 1-98; Neues Jahrb. Mineral. Geol., Referate II, 1934, 406-8.*—An analysis of nepheline-syenite is given.

J. F. Schairer

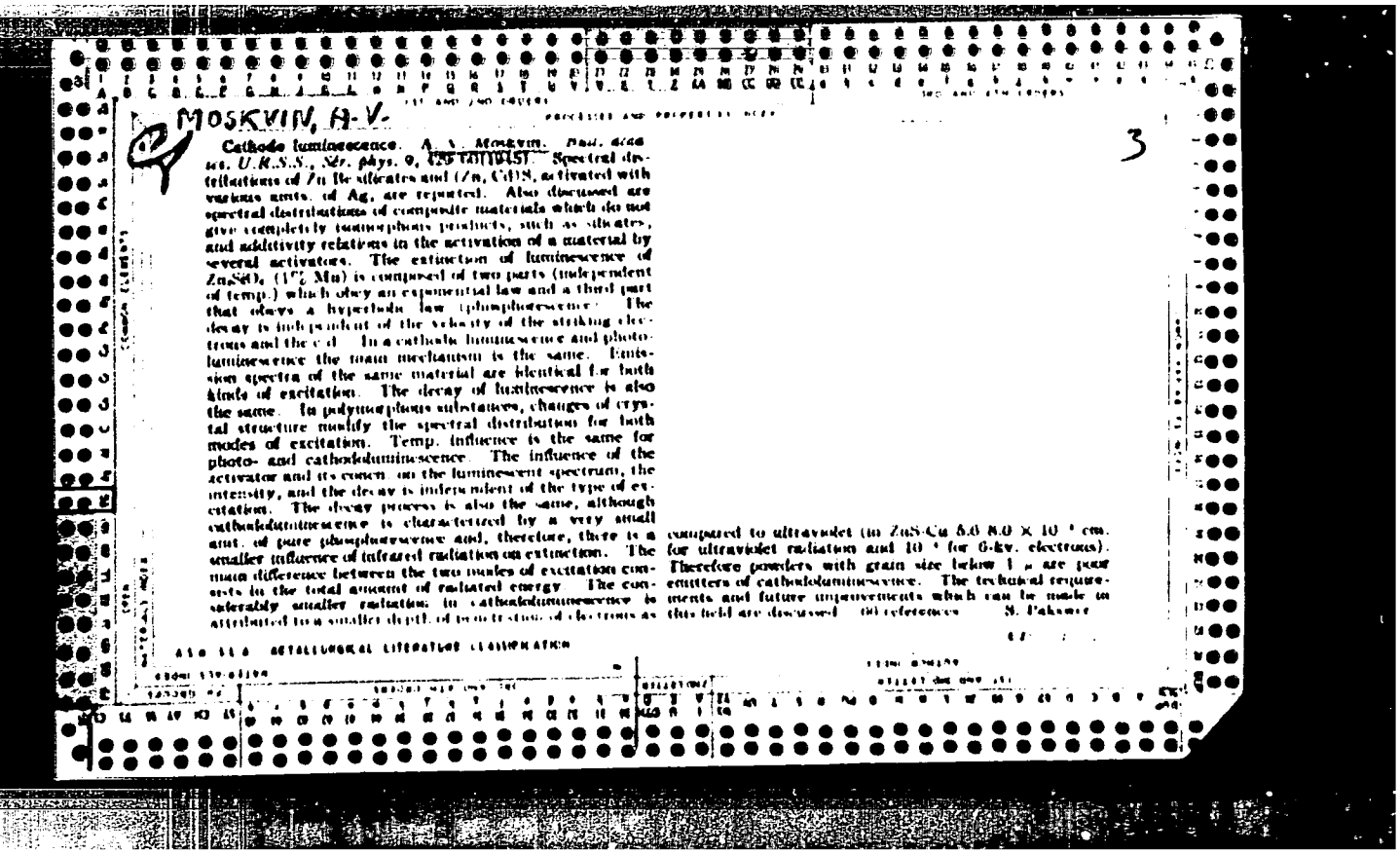
A 5 0 51 0 METALLURGICAL LITERATURE CLASSIFICATION



CA
MOSKVIN, A V.

Tephrolite from ancient slags. A. V. Moskvin. *Trav. inst. petrog. acad. sc. U. S. S. R.* 4, 40-51 (1935). *Neues Jahrb. Mineral Geol., Referate I*, 1936, 358. From chem. analyses and optical studies of old slags the conclusion is drawn that there is a complete series of mixed crystals between tephrolite and glaucochroite. J. F. Schairer

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



MOSKVIN, A.V.

3

Cathode luminescence. A. V. Moskvin. *Izvest. Akad. nauk. U.R.S.S., Ser. phys.* 9, [illegible] Spectral distributions of Zn silicates and (Zn, Cd)S, activated with various amts. of Ag, are reported. Also discussed are spectral distributions of composite materials which do not give completely isomorphous products, such as silicates, and additivity relations in the activation of a material by several activators. The extinction of luminescence of Zn_2SiO_4 (1% Mn) is composed of two parts (independent of temp.) which obey an exponential law and a third part that obeys a hyperbolic law (phosphorescence). The decay is independent of the velocity of the striking electrons and the cd. In cathode luminescence and photoluminescence the main mechanism is the same. Emission spectra of the same material are identical for both kinds of excitation. The decay of luminescence is also the same. In polymorphous substances, changes of crystal structure modify the spectral distribution for both modes of excitation. Temp. influence is the same for photo- and cathodoluminescence. The influence of the activator and its concn. on the luminescent spectrum, the intensity, and the decay is independent of the type of excitation. The decay process is also the same, although cathodoluminescence is characterized by a very small amt. of pure phosphorescence and, therefore, there is a smaller influence of infrared radiation on extinction. The main difference between the two modes of excitation consists in the total amount of radiated energy. The considerably smaller radiation in cathodoluminescence is attributed to a smaller depth of penetration of electrons as compared to ultraviolet (in ZnS:Cu $5.0\ 8.0 \times 10^{-4}$ cm. for ultraviolet radiation and 10^{-4} for 6-kv. electrons). Therefore powders with grain size below 1 μ are poor emitters of cathodoluminescence. The technical requirements and future improvements which can be made in this field are discussed. 60 references. S. Pakswer

A. V. MOSKVIN

"Cathode-luminescence", published by State Publishers of Energetic Literature, Moscow, 1963

MOSKVIN, A. V.

PA47T30

USSR/Electricity
Luminescence
Cathode

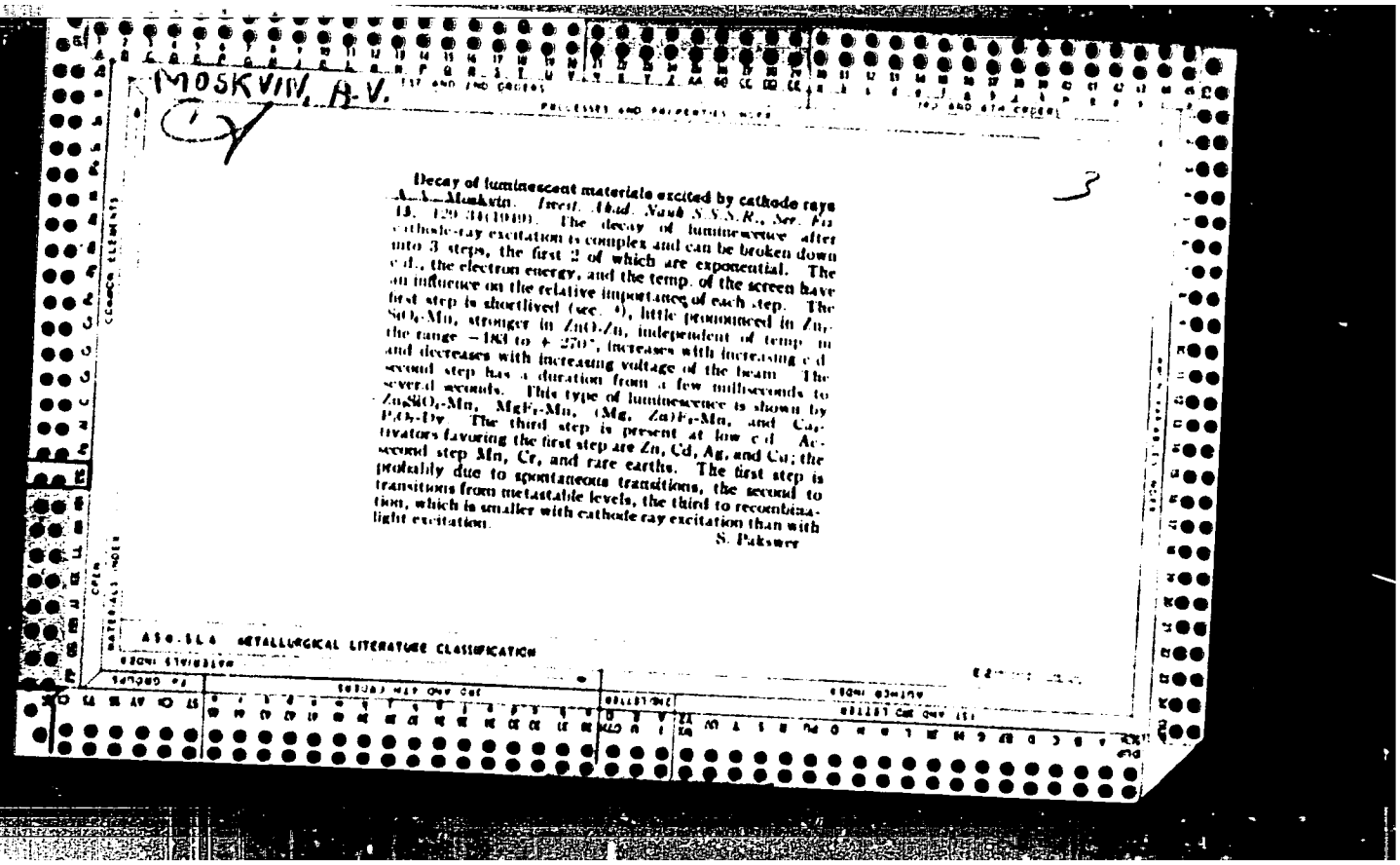
Mar 1948

"Problems of Cathode Luminescence," Candidate Tech Sci A. V. Moskvin, 6 pp

"Elektrichestvo" No 3

Luminescence brought about by electron bombardments very widely used in television, radar and oscillographic instrument as means of transforming electrical impulses into light. Diagrams the operation of cathode luminescence in systems requiring high quality luminophors. Also presents some purely theoretical aspects necessary for proper operation of such systems.

47T30



MOSKVIN, A.V.

Decay of luminescent materials excited by cathode rays
A. A. Mankin. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 13, 129-30(1949). The decay of luminescence after cathode-ray excitation is complex and can be broken down into 3 steps, the first 2 of which are exponential. The c.d., the electron energy, and the temp. of the screen have an influence on the relative importance of each step. The first step is shortlived (sec. 4), little pronounced in Zn_2SiO_4-Mn, stronger in ZnO-Zn, independent of temp. in the range −183 to +270°, increases with increasing c.d. and decreases with increasing voltage of the beam. The second step has a duration from a few milliseconds to several seconds. This type of luminescence is shown by Zn_2SiO_4-Mn, MgF_2-Mn, (Mg, Zn)F_2-Mn, and $Ca_3(PO_4)_2$-Dy. The third step is present at low c.d. Activators favoring the first step are Zn, Cd, Ag, and Cu; the second step Mn, Cr, and rare earths. The first step is probably due to spontaneous transitions, the second to transitions from metastable levels, the third to recombination, which is smaller with cathode ray excitation than with light excitation.
S. Paksver

A50-5L4 METALLURGICAL LITERATURE CLASSIFICATION

OSKIN, A. V.

Cathodoluminescence, Part II. Cathodoluminophors and Screens. Glavpoligrafizdat, Main Polygraphic Publishing House, 700 pp, 1952,

SOV/51-6-1-28/30

AUTHORS: Lushchik, Ch.B. and Moskvin, A.V.

TITLE: VII Conference on Luminescence (Crystal Phosphors). (VII Soveshchaniye po lyuminestsentsii (kristallofosfory))

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 1, pp 122-124 (USSR)

ABSTRACT: The VII Conference on Luminescence was held in Moscow between June 26 and July 3, 1958. It was organized by the Physics Institute imeni P.N. Lebedev of the Academy of Sciences of the U.S.S.R. and by the Scientific Council on Luminescence. The conference was devoted to the physics, chemistry and applications of crystal phosphors. Over 350 delegates from 24 cities and towns in the Soviet Union attended the conference. Hungarian, Polish and East German scientists were also present. Over 100 papers were read at 4 plenary and 14 sectional sessions. The conference was split into two parallel sections on the physics and on the chemistry of crystal phosphors. Papers on the physics of crystal phosphors could be divided into the following groups: (1) nature of the luminescence centres, (2) processes of transfer of energy in crystals, (3) kinetics of recombination luminescence and the nature of capture centres, (4) physical processes occurring on excitation with electric fields, electron beams and hard radiations.

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VII Conference on Luminescence (Crystal Phosphors).

The authors review first the papers on the nature of luminescence centres. These papers included work on quantum-mechanical calculation of a luminescence centre in KCl-Tl (N.N. Kristofel'), a discussion of alkali-halide phosphors activated with mercury-like ions (N.Ya.Lushchik, work on halide phosphors in which the activator ions were said to be distributed along crystal lattice sites (F.D. Klement), a discussion of surface effects in luminescence (P. Shvist and N.I. Ivanova), a paper on crystals in which luminescence centres are in the form of complexes situated on the surface (I.M. Shanovskiy and A.A. Dunina). Z.A. Trapeznikova, M.L. Kats and N.Ya.Lushchik showed that in phosphors with one activator several types of luminescence centres are possible. The effects of uniform pressure of 7000 atm on luminescent properties of Zn_2SiO_4-Mn and of halide phosphors were reported by Ya.Ya. Kirs. Z.L. Morgenshtern reported work on luminescence of non-activated alkali-halide crystals. The temperature quenching of luminescence of alkali-halide phosphors and the relationship between optical and thermal properties of impurity centres were reported in a paper by K.K. Shvarts. I.A. Plyavin' showed that the short-duration emission of alkali-halide phosphors is of metastable nature. A number of papers

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dealt with capture centres in alkali-halide phosphors (I.A. Parfianovich, F.K. Zaitov, L.Ya. Uybo, P.A. Khellemmme, A.Kh. Khalilov, A.M. Polerskiy and others). Ch.B. Lushchik and G.G. Liyd'ya reported investigations of the interaction of excitons with various defects of the crystal lattice. Mechanisms of electron and hole processes producing recombination luminescence in alkali-halide phosphors were discussed in papers by M.L. Katz, I.A. Parfianovich, L.M. Shamovskiy, Ch.B. Lushchik, Kh.F. Kyaembra and I.V. Yaek. A group of papers dealt with kinetics of recombination luminescence and interpretation of relaxation relationships in terms of the band theory of phosphors (N.A. Tolstoy, A.A. Ryskin, M.V. Fok, F.I. Vergunas, K.A. Rebane, Yu.M. Popov). Flash emission by ZnS phosphors was reported by N.A. Tolstoy and his co-workers. The effect of infrared radiation on recombination luminescence was discussed in papers by P.P. [illegible] (Poland) and K.S.K. Rebane. V.L. Levshin and B.M. Orlov studied thermo-optical maximum of electron liberation from capture levels. In papers and discussions at the Conference it was stressed that studies of recombination luminescence kinetics should include not only electron and electron-hole processes, but also exciton, sensitizing, ionic, dislocation and electron-vibrational processes. Only a small number of papers dealt with luminescent and electrical properties of phosphors (O.V. Agashkin, I.K. Vitol, Va.A. Okuma, [illegible],

P.Ye. Ramazanov). Professor Nad' (Nagy) of Hungary, V.V. Antonov-Romanovskiy, M.V. Fok and others discussed the mechanism and kinetics of electroluminescence. V.Ye. Oranovskiy and B.T. Fedyushin reported their investigations of anisotropy of electroluminescence in synthetic ZnS crystals. V.Ye. Oranovskiy and Z A. Trapeznikova read a paper on sulphides activated with rare earths in which they established the identity of emission centres responsible for photoluminescence and electroluminescence. Practical applications of electroluminescence were dealt with in the papers of N.N. Orlov and I.Ya. Lyamichev. Papers on cathodoluminescence of crystals included one by M.D. Galanin and A.V. Rayevskiy on temperature quenching of luminescence of ZnS-Ag excited with α-particles. The papers on the chemistry of crystal phosphors dealt with a great variety of subjects. Many of them described preparation of new photo-phosphors (Yu.M. Lecnov and F.M. Pokerman), cathodo-phosphors (M.[illegible] Kh.S. [illegible] N.A. Gorlacheva, B.M. Gugel', L.Ya. Markovskiy and V.P. Nazarova) and electro-phosphors (T.K. Voznesenskaya, O.M. Kazankin and Z.I. Klabukova). Luminescence of oxides (M.A. Konstantinova-Shlezinger), observations on behaviour of europium in silicates and phosphates (Yu.S. Blank and V.P. Nazarova), relationship between temperature quenching and stability

of crystal lattice of tungstates (Yu.M. Leonov) and ageing in cathodoluminescence (B.M. Gugel') were also reported. Interaction of "blue" and "samarium" centres in sulphide phosphors activated with rare-earth ions was reported in a paper by Z.A. Trapeznikova. Excess zinc and silver as activators of sulphides were discussed by A.A. Bundel' and A.A. Cherepnev. The effect of oxygen in formation of luminescence centres was dealt with by A.A. Bundel', A.M. Gurevich and Yu.M. Leonov. Existence of a new crystal phase in the wurtzite-sphalerite system was discovered by S.A. Fridman who also reported work on rare-earth activators. Preparation of sulphide mono-crystals was described by Ye.I. Panasyuk. Phase analysis of willemite was reported by V.V. Osiko. Many papers dealt with phosphors prepared by sublimation and with luminescent screens. Extension of the range of activators and bases used to prepare screens by sublimation was also reported. Practical applications of such screens were dealt with by E.Ya. Arapova, Ye.I. Blazhnova, N.A. Vlasenko and V.V. Golubets. There were only a few papers on the

industrial processes of preparation of phosphors and on purification methods. Application of luminescence to the study of phase equilibria (V.V. Osiko) and to the study of reactions in the silicate phase (A.K. Trofimov and Yu.M. Leonov) were also reported. The authors of the report point out that the Conference showed lack of coordination of studies of phosphors and semiconductors and some examples of lag of theory behind experiments and vice versa.

MOSKVIN, A.V.

Intakes in rivers of the north. Sbor.nauch.rab.AKKH no.12:82-92 '62. (MIRA 16:4)
(Russia, Northern--Intakes (Hydraulic engineering))

AUTHOR: Moskvin, B.M., Dr. of Technical Science, Prof., and Alekseev, S.N., Candidate of Technical Science.

TITLE: Method of Improving Corrosion Resistance in the Reinforcement of Concrete Construction. (Sposoby povysheniya korrozionnoy stoikosti armatury zhelezobetonnykh konstruktsiy.)

PERIODICAL: Beton i zhelezobeton, 1957, No. 1, pp. 28-29, (U.S.S.R.)

ABSTRACT: The corrosion resistance of steel is affected by the quality of the concrete used, and decreases with decreasing alkalinity, i.e. when the hydrogen ion concentration falls below 9.5 which can occur due to the carbonization of the cement matrix which is in direct contact with the reinforcement. The degree of carbonization depends on the permeability of the protective layer, the permeability being a function of the density and of the thickness of the layer. Considerable reduction of the permeability can occur during autoclave curing, especially when cement containing silica additives is used. In all these cases the degree of corrosion is influenced by the thickness of the protective layer both during the initial stages of the hardening

TITLE: Method of Improving Corrosion Resistance in the Reinforcement of Concrete Construction. (Sposoby povysheniya korrozionnoi stoikosti armatury zhelezobetonnykh konstruksiy.)

and during the final stages when corrosion is retarded by the formation of metal recommended to ensure a substantially thick protective layer. Various methods devised to achieve this protective coating were submitted to the authorities, e.g. the coating of the reinforcement with a cement slurry containing various additives, coating with a layer of bitumen, etc. The first method did not prove to be successful, the second method, although more advantageous, has the following disadvantages: the adhesive properties of the concrete and the steel are not utilised, it is difficult to ensure the coating of all steel surfaces, and there is the undesirable effect of heat on the bitumen during autoclave treatment. The best method of protecting steel surfaces appears to be the "neutralisation" of the surfaces of the reinforcement. Ordinary concrete, due to its high degree of permeability, acts as a "neutraliser". Experiments were carried out to bring about this "neutralisation" artificially. Various inorganic salts are known to act as oxidising agents and thus act as "neutralisers", e.g. chlorides, nitrates, phosphates and some alkaline metal salts.

97-1-8/10

TITLE: Method of Improving Corrosion Resistance in the Reinforcement of Concrete Constructions. (Sposoby Povysheniya Korrozionnoy Stoikosti Armatury Zhelezobetonnykh Konstruktsiy.)

Investigation showed that the best additive is Na nitrate which is added to the cement mix (2-3% by weight of cement.) Coating with this chemical substance proved unsuccessful during autoclave treatment. $NaNO_2$ did not have an adverse effect on the physical or the mechanical properties of the concrete in the above proportion.

There are 1 table, 2 Slavic references.

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