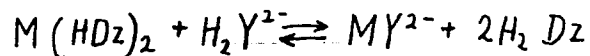Separation of Zinc and Cadmium by Dithizone and Trilon

certained that the new method of zinc and cadmium separation can be based on the mentioned peculiarities of the process. The equilibrium between the dithizonates of the metal $M(HDz)_2$ deluted in CCl_4, and EDTA (ion H_2Y^{2-}) can be expressed by the equation

$$M(HDz)_2 + H_2Y^{2-} \rightleftharpoons MY^{2-} + 2H_2Dz$$

The constant of this equilibrium is

$$K_{piBH} = \frac{[MY^{2-}][H_2Dz]^2}{[H_2Y^{2-}][M(HDz)_2]} = \frac{K_M(HDz)_2 \cdot K_3 \cdot K_4}{K_{MY^{2-}}(K^I_{H_2Dz})^2}$$

Card 2/4

Separation of Zinc and Cadmium by Dithizone and Trilon

whereby $K_{M(HDz)_2}$ and K_{MY}^{2-} stand for constants of proper complexes; K_3 and K_4 - proper constants of the acidic dissociation of EDTA, and $K_{H_2Dz}^I$ - first constant of the dithizone dissociation. The calculation of the equilibrium constant of zinc dithizonates and cadmium with EDTA showed that the equilibrium of the reaction may be shifted to the right, in the presence of a definite excess of EDTA, more readily for cadmium than for zinc. When investigating the conditions of cadmium and zinc separation, the authors also studied the effect of the pH, temperature, and of the trilon B concentration on the reaction rate of the interaction of zinc and cadmium dithizonates with the trilon B. A method for separation of small and approximately equal quantities of zinc and cadmium, based on these experiments, has been elaborated. There are 3

Card 3/4

Separation of Zinc and Cadmium by Dithozone and Trilon   SOV/21-59-9-14/25

  graphs and 3 references, 2 of which are Soviet and
  1 English.

ASSOCIATION: Instytut zahal'noyi ta neorhanichnoyi khimiyi AN URSR
  (Institute of General and Inorganic Chemistry of the
  AS of UkrSSR)

SUBMITTED: April 25, 1959

Card 4/4

BABKO, A.K.;MARKOVA, L.V.

Photometric determination of microquantities of sulfides and
sulfur in metals from the catalytic effect on the iodine-azide
reaction. Zav.lab. no.11:1283-1287 '59.   (MIRA 13:4)

1.Institut obshchey i neorganicheskoy khimii Akademii nauk USSR.
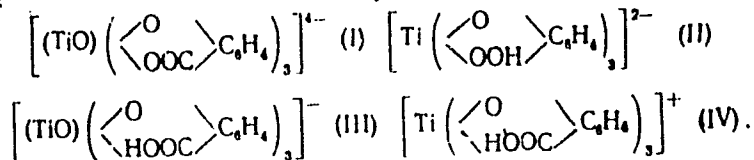   (Metals-- Analysis) (Sulfur-- Analysis) (Sulfides)
      (Azides)

SOV/21-59-12-9/20

AUTHORS: Babko, A. K., Member of the Academy of Sciences Ukrainian SSR,
           Volkova, O. I.

TITLE: Photometric Determination of Titanium as a Pyridine Salicylate
           Complex

PERIODICAL: Dopovidi Akademii nauk Ukrains'koy RSR, 1959, Nr 12,
             pp 1316-1339 (USSR)

ABSTRACT: A new method of photometric determination of titanium (IV) in
           steel is proposed. The method is based on the formation of a
           colored (yellow) complex by the reaction of titanium with sali-
           cylic acid and pyridine or other organic bases (quinoline, pyramidon).
           The complex was separated and analyzed. It was shown that it
           contains the components in the following ratio: Pyridine:titanium:
           :salicylic acid = 1:1:3. The complex Ti:salicylic acid = 1:3 can
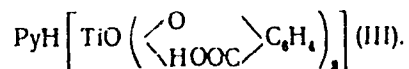   be expressed:

$$\left[(TiO) \left(\underset{OOC}{\overset{O}{\diagup}} \diagup C_6H_4 \right)_3 \right]^{4-} \text{(I)} \quad \left[Ti \left(\underset{OOH}{\overset{O}{\diagup}} \diagup C_6H_4 \right)_3 \right]^{2-} \text{(II)}$$

$$\left[(TiO) \left(\underset{HOOC}{\overset{O}{\diagup}} \diagup C_6H_4 \right)_3 \right]^{-} \text{(III)} \quad \left[Ti \left(\underset{HOOC}{\overset{O}{\diagup}} \diagup C_6H_4 \right)_3 \right]^{+} \text{(IV)}.$$

Card 1/4

Photometric Determination of Titanium as a   SOV/21-59-12-9/20
Pyridine Salicylate Complex

It was assumed that the titanium:salicylic acid complex forms with
pyridine the following compound:

$$PyH \left[TiO \left(\underset{HOOC}{\overset{O}{<}} > C_6H_4 \right)_3 \right] (III).$$

The ternary complex is only slightly soluble in water, but readily
soluble in chloroform. The optical density of the chloroform extract
of the tertiary complex is measured using SF-4 spectrophotometer.
Visually, $1 \cdot 10^{-5}$ g Ti/25 mls of the extract can be determined.
The sensitivity of the proposed method is seven to eight times
greater than that of the hydrogen peroxide method. Interference
of other elements is eliminated by complexing them with
thiosulfate. The following procedure is given. Dissolve the steel
sample in a mixture of sulfuric and nitric acids. Take an
aliquot of the solution and neutralize with ammonia to pH 1-2.
Add 1-2 drops of ammonium thiocyanate, then add 10% thiosulfate
solution dropwise until the iron-thiocyanate color disappears.
Add 1-2 mls of a 10% sodium salicylate solution and few drops

Card 2/4   of pyridine. Bring the pH of the solution to 3-3.5. Transfer

Photometric Determination of Titanium as a   SOV/21-59-12-9/20
Pyridine Salicylate Complex

the solution into a separatory funnel and extract the complex
with 3-4 portions of chloroform; collect the extract in a 25 mls
volumetric flask and make up to volume. The optical density
of the extract is measured at 400-430 m μ using the SF-4
spectrophotometer. Some standard steels were analyzed. The
results are shown in the table below.

a	b					c	
	Cr	Ni	Cu	V	Ti	d	e
Co-83-Д	0,11	0,09	0,22	—	0,12*	0,12	0,12
Co-123*	24,57	0,22	0,11	—	0,26	0,26	0,27
Co-123*	24,57	0,22	0,11	5*	0,26	0,27	0,27
Co-52*	10,75	18,11	0,22	—	0,41	0,41	0,42
Co-52*	10,75	18,11	0,22	10*	0,41	0,40	—
Co-167*	21,1	—	0,06	—	2,44	2,40	2,42
Co-167*	21,1	—	0,06	50*	2,44	2,48	—
Co-87	12,55	0,55	—	2,26	0,12*	—	0,12

Card 3/4   (Key to table on Card 4/4)

Photometric Determination of Titanium as a   SOV/21-59-12-9/20
Pyridine Salicylate Complex

Determination of Ti in steel.

Key: (a) Steel specimens; (b) interfering elements, % (according to specification); (c) Ti found in %, by using (d) pyridine, (e) pyramidon; (*) added.

There are 2 figures; 1 table; and 2 Soviet references.

ASSOCIATION: Institute of General and Inorganic Chemistry, Academy of Sciences Ukrainian SSR (Institut azhal'noi ta neorganichnoi khimii AN USSR)

SUBMITTED: July 3, 1959

Card 4/4

5(0), 24(7)   SOV/63-4-2-5/39

AUTHOR: Babko, A.K., Academician of the AS UkrSSR

TITLE: Spectrophotometric Analysis

ABSTRACT: Spectrophotometry has been developed on the base of colorimetry and
               the absorption spectra of solutions. Colorimetry can be used only for
               the visible part of the spectrum, spectrophotometric analysis includes
               also the infrared and ultraviolet part. The ultraviolet spectrum is
               especially useful in the analysis of fats, oils, vitamins, hormones,
               etc $\diagup$ Ref 2-5 $\diagup$. The molar coefficient of absorption E varies from
               610 at the wave length 420 mμ on the border of the visible spectrum
               to 4,812 at 370 mμ in the field of maximum light absorption. It is
               difficult to differentiate complex compounds by photometric methods.
               For this purpose spectrophotometric analysis measures the light ab-
               sorption at its maximum. If substances must be analyzed which have a
               similar color, one of them must be transformed into a colorless compound,
               so that analysis becomes possible. In many cases measurements at two
Card 1/3   different wave lengths permit the differentiation of two components in

Spectrophotometric Analysis

SOV/63-4-2-5/39

the mixture. The Soviet spectrophotometers SF-2 and SF-4 operate in the short-wave part of ultraviolet and are equipped with a hydrogen lamp and quartz optical instruments. Light filters permit the use of very sensitive photoelements. Such an apparatus is FEK-57 which operates nearly in the same part of the spectrum as SF-4, but is much cheaper. The resolving power of an apparatus with light filters is lower than that of the monochromatic devices, but is is sufficient for most practical purposes. Deviations in the measurements are caused by electro-lytic dissociation of the colored complex. The deviation is consider-able, if the numerical value of the concentration is approximate to the numerical value of the dissociation constant of the complex group. The proportionality between the general concentration and the optical density is maintained, if the excess concentration of the reagent remains con-stant during dilution. The transformation of colorless components into colored compounds depends in many cases on the pH value of the solution. The optical density is also affected by the temperature $\sqrt{\text{Ref } 14\text{-}18\sqrt{}}$. The colored compounds used in spectrophotometric analysis are ions of permanganate, chromate hydrated ions of copper, nickel, rhodanides of various metals, like iron, cobalt, uranium, etc. Many organic solvents, e.g. acetone, are very important, especially in combination with the rhodanides. Heteropolyacids, though still insufficiently investigated,

Card 2/3

Spectrophotometric Analysis   SOV/63-4-2-5/39

are used in the determination of phosphorus, silicon, germanium, etc.
Uranium, titanium, vanadium, etc, are determined by the formation of
their peroxides or carbonate-peroxides. Acid dyes are used in the ana-
lysis of beryllium, boron, aluminum, etc. For tin two special reagents,
stilbazo and hematoxylin have been developed. New reagents with very
small absorption bands, different complex-forming groups and a molar
coefficient of light absorption of 10^5 and higher should be developed.
There are 9 graphs and 25 references, 16 of which are Soviet, 6 English,
and 3 German.

Card 3/3

5(2)

AUTHORS:

TITLE:

PERIODICAL:

ABSTRACT:

Card 1/3

SOV/78-4-2-21/40

Babko, A. K., Dubovenko, L. I.

The Oxalic Acid Complexes of Titanium (IV) (Shchavelevokislyye kompleksy titana (IV))

Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 2, pp 372-378 (USSR)

The production conditions of the titanium complexes with oxalic acid in an acid medium were determined and the composition and stability of these complexes investigated. Physico-chemical methods were used for investigating the oxalate-complex formation. The absorption spectra of the titanyloxalic acid complex in the ultra-violet zone were recorded and it was found that the absorption maximum is at 213-220 mμ. The composition of the complex was determined at a wave length of 213 mμ by the method of isomolar series. It was found that at pH $\leqslant$ 1 titanium and oxalate ions form a complex of the composition $TiOC_2O_4$. Upon increase of the pH value of the solution complex anions are formed, e. g. $TiO(C_2O_4)_2^{2-}$. The dissociation constant of the titanylmono-

The Oxalic Acid Complexes of Titanium (IV)

oxalate complex and the stability constant of the titanyl-dioxalate complex were determined. The average values are as follows:

$$K_{TiOC_2O_4} = \frac{[TiO^{2+}][C_2O_4^{2-}]}{[TiOC_2O_4]} = 2.5 \cdot 10^{-7} = K_1$$

$$K_{TiO(C_2O_4)_2^{2-}} = \frac{[TiOC_2O_4][C_2O_4^{2-}]}{[TiO(C_2O_4)_2^{2-}]} = 5 \cdot 10^{-4} = K_2$$

The complete dissociation constant of the titanyldioxalate complex is:

$$K = \frac{[TiO^{2+}][C_2O_4^{2-}]^2}{[TiO(C_2O_4)_2^{2-}]} = K_1 \cdot K_2 = 1.25 \cdot 10^{-10}$$

The conditions of precipitating the titanyl ion in the form of titanyl hydroxide in the presence of oxalate ions were determined. Titanyl hydroxide precipitates from the $TiOC_2O_4$

Card 2/3   solution starting at pH ~3. If the excess   oxalic acid

The Oxalic Acid Complexes of Titanium (IV)   SOV/78-4-2-21/40

is fivefold titanyl hydroxide does not precipitate before pH > 5. There are 6 figures, 2 tables, and 6 references, 2 of which are Soviet.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: November 22, 1957

Card 3/3

5(2)
AUTHORS: Babko, A. K., Get'man, T. Ye.   SOV/78-4-3-16/34

TITLE: Chloride Complexes of Pentavalent Molybdenum (Khloridnyye
              kompleksy pyativalentnogo molibdena)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 3,
              pp 585-590 (USSR)

ABSTRACT: The complex compounds of pentavalent molybdenum in hydro-
              chloric acid solutions were investigated by spectrophoto-
              metric determinations in the ultraviolet and visible range.
              A reddish-brown complex with the absorption maximum at
              295 and 395 mμ forms in $<$ 2 n hydrochloric acid concentration.
              With the increase in the concentration to 4-5 n a greenish-
              brown complex forms with the absorption maximum at 450 and
              730 mμ. At a further increase in the hydrochloric acid
              concentration a greenish-blue complex forms with the absorp-
              tion maximum at 240 and 310 mμ. The absorption spectra of
              molybdenum (V) were recorded at different hydrochloric acid
              concentrations and are given by figures 1, 2, and 3. For
              the explanation of the differences between the absorption
              spectra and for the measurement of the optical density at
              λ = 450 mμ experiments were carried out in series with

Card 1/4

Chloride Complexes of Pentavalent Molybdenum   SOV/78-4-3-16/34

molybdenum (V) solutions at constant concentration of hydro-
chloric acid (1.5 n) and variable concentration of lithium
chloride, as shown in figure 4. From these experiments it
follows that the complex formation is due to the variation
of the oxygen content in the coordination sphere. At constant
concentration of the hydrogen ions in the case of an increase
in the chlorine ionic concentration the second form of the
complex is formed and in the case of a further increase in
the [LiCl] -content to ~6.5 n the complex passes over into
the third form. This transition of the complex is explained
by the introduction of the chlorine ion into the coordination
sphere. For the purpose of determining the composition of
the chloride complex of molybdenum (V) some isomolar series

of Mo^V-LiCl were investigated in the presence of perchloric
acid. The experiments confirm that the absorption spectra
run parallel, measured in the range of the wave length of
350-500 mμ; they are also dependent on the acidity of the
solution. For the second complex form $MoOCl_3$ the ratio

Mo^V : Cl' = 1 : 3 was found. For the third form of the

Card 2/4

Chloride Complexes of Pentavalent Molybdenum   SOV/78-4-3-16/34

complex $MoOCl_5^{2-}$ was suggested. The values of the equilibrium constants of the three complexes were computed: reaction $MoO_2^+ + 2H^+ \rightleftharpoons MoO^{3+} + H_2O$; at a hydrogen concentration ~ 3 n, $K_I = \dfrac{[MoO^{3+}]}{[MoO_2^+] \, [H^+]^2} \approx 10^{-1}$. For the reaction

$MoO^{3+} + 3 Cl^- \rightleftharpoons MoOCl_3$, in the case of acidity of the solution ~ 6 n, $K_{II} = \dfrac{[MoOCl_3]}{[MoO^{3+}] \, [Cl^-]^3} \approx 5 \cdot 10^{-3}$. For the reaction

$MoO_2^+ + 2H^+ + 3Cl^- \rightleftharpoons MoOCl_3 + H_2O$, the value

$K_{III} = \dfrac{[MoOCl_3]}{[MoO_2^+] \, [H^+]^2 \, [Cl^-]^3} = K_I \cdot K_{II}$. There are 7 figures

and 10 references, 1 of which is Soviet.

Card 3/4

Chloride Complexes of Pentavalent Molybdenum   SOV/78-4-3-16/34

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk USSR
                (Institute of General and Inorganic Chemistry of the Academy
                of Sciences, UkrSSR)

SUBMITTED: July 2, 1957

Card 4/4

SOV/78-4-5-18/46

5(4)
AUTHOR: Babko, A. K.

TITLE: The Metal-indicator Method for Determining the Stability of
              Complexes (Metall-indikatornyy metod opredeleniya prochnosti
              kompleksov)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 1055-1059
              (USSR)

ABSTRACT: For the purpose of determining the stability of the complexes
              of various metal ions forming complexes with one and the same
              addendum, the metal-indicator method was suggested, which had
              been developed by V. I. Kuznetsov at the In-t geokhimii i
              analiticheskoy khimii im. V. I. Vernadskogo Akademii nauk
              (Institute for Geochemistry and Analytical Chemistry imeni
              V. I. Vernadskiy of the Academy of Sciences) (published in
              Zh. analit. khimii 8, 90 (1953)). To a sample of the indicator
              system, which contains the anion A, a salt solution of an-
              other metal M^{II} is added (also metals M^{III} and M^n may be
              added) until the original optical effect of the indicator
              system is attained. If the complex $M^I A$ is found to be more
              stable than the complex $M^{II}A$, a larger quantity of M^{II} must
Card 1/2   be introduced. From the ratio of the salt concentration of

SOV/78-4-5-18/46

The Metal-indicator Method for Determining the Stability of Complexes

M^I and M^{II} or by the corresponding volume of their solutions, the relative stability of complexes M^IA and $M^{II}A$ can be determined. By means of the new method it is possible to determine the dissociation constant of the complexes. If the same optical effect is attained, the following dependence exists:

$$\left[M^I\right] : \left[M^{II}\right] : \ldots \left[M^n\right] = K_{M^IA} : K_{M^{II}A} \ldots : K_{M^nA}.$$

If the dissociation constant of one of these complexes is known, the dissociation constant of the other complex is determined according to the aforementioned dependence. The advantages and disadvantages as well as the particular features of this method are discussed. By means of this method it is possible to determine the relative stability of numerous complexes easily and rapidly. A previous determination of the composition of complexes is not necessary. A disadvantage of this method is the occurrence of secondary reactions.

SUBMITTED: February 21, 1958

Card 2/2

5(4)

AUTHORS: Babko, A. K., Shimadina, L. G.   SOV/78-4-5-19/46

TITLE: Investigation of the Stability of the Fluorine Complexes of
           Some Metals (Izucheniye prochnosti ftoridnykh kompleksov
           nekotorykh metallov)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5, pp 1060-1066 (USSR)

ABSTRACT: The present paper gives results obtained by the application of
           the metal-indicator method (Ref 1) for the determination of the
           relative stability of the fluorine complexes of some metals.
           As indicator systems Fe^{3+}-SCN^- and Ti^{4+}-H_2O_2 were used. The

           ferric thiocyanate indicator system was used in connection with
           the following elements: Ga^{3+}, H_3BO_3, Be^{2+}, Al^{3+}, Ta^{5+}, Nb^{5+},
           La^{3+} and Ti^{3+} (Table 1). Mode of operation: In a 50 ml-measur-
           ing flask 0.3 ml 0.1 molar solutions $Fe(NO_3)_3$ and a 5 ml 10%
           ammonium thiocyanate solution were added. In these solutions
           various quantities (of 0.5-4 ml) a 1-molar sodium fluoride
           solution were added and adjusted to 50 ml with 0.2 N nitric
           acid. The optical density of the solution was measured by means
           of the spectrophotometer FM. Figure 1 shows the calibration
           curve of the dependence of the optical density of the ferric
           thiocyanate indicator system on the concentration of the sodium
           fluoride. The results obtained make it possible to determine

Card 1/2

SOV/78-4-5-19/46

Investigation of the Stability of the Fluorine Complexes of Some Metals

the relative stability of fluorine complexes in all metals.
The following series for the determination of the stability
of simple fluorine complexes of the type MF^{n+} were found:

$$Zr^{4+}(Hf) > Th^{4+} > La^{3+} > Nb^{V} > Ta^{V} > Al^{3+} > Sn^{IV} >$$

$$> Be^{2+} > Fe^{3+} > BO_2^{-} > Ga^{3+} > Tl^{3+} > (In^{3+}, Ge^{IV}, SiO_2).$$
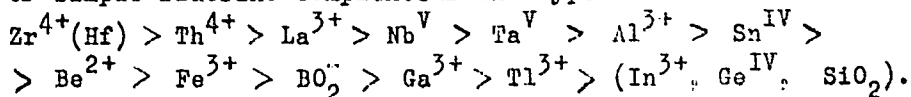
The indicator system $Ti^{4+}-H_2O_2$ is suited for the purpose of
investigating the more stable fluorine complexes. The method
employed is similar to that of the ferric thiocyanate system.
Figure 2 shows the calibration curve for the dependence of the
optical density of the titanium-ferroxide indicator system on
the concentration of sodium fluoride. Elements forming weak
complexes, such as boron cannot be investigated by means of
this system. For some complexes the approximate values of the
stability constant were determined and found to be in agreement
with the values mentioned in publications ($K_{AlF^{2+}} = 4.10^{-7}$ and
$K_{BeF^{+}} = 4.10^{-6}$). There are 2 figures, 2 tables, and 11 refer-
ences, 6 of which are Soviet.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko
            (Kiyev State University imeni T. G. Shevchenko)
SUBMITTED: February 21, 1958
Card 2/2

SOV/78-4-5-20/46

5(4)
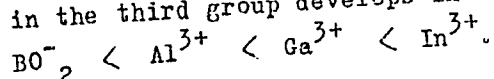AUTHOR: Babko, A. K.

TITLE: The Dependence Between the Stability of Fluorine Complexes
              and the Position of the Central Atoms in the Periodic System
              (Svyaz' mezhdu prochnost'yu ftoridnykh kcmpleksov i polozhe-
              niyem tsentral'nykh atomov v periodicheskoy sisteme)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 5,
              pp 1067-1069 (USSR)

ABSTRACT: The dependence between the stability of the fluorine complexes
              in aqueous solution and of the position of the corresponding
              central atoms in the periodic system was explained. The
              stability of the fluorine complex in general increases with
              a decrease of the ionic radius and with an increase of the
              ionic charge. The first group of the periodic system contains
              the insoluble fluoride of the lithium ion. In the second
              group a stable fluorine complex of beryllium is formed. In
              the third group the most stable complex is not that of boron
              but that of aluminum. The stability of the fluorine complexes
              in the third group develops in the following series:

              $BO_2^- < Al^{3+} < Ga^{3+} < In^{3+}.$

Card 1/2

SOV/78-4-5-20/46

The Dependence Between the Stability of Fluorine Complexes and the Position
of the Central Atoms in the Periodic System

        In the fourth group zirconium forms the most stable complex.
        Elements of higher periods, which have ions with a complete
        electron configuration, form very stable fluorine complexes.
        Thus, the fluorine complexes of zirconium and titanium are
        more stable than those of germanium and lead. The fluorine
        complexes of niobium and tantalum are more stable than those
        of bismuth and antimony. There are 1 figure and 7 references,
        4 of which are Soviet.

SUBMITTED: February 21, 1958

Card 2/2

SOV/75-14-2-5/27

5(4), 5(2), 5(3)

AUTHORS: Babko, A. K., Nazarchuk, T. N.

TITLE: Spectrophotometric Investigation of the Colored Complexes of Tetravalent Tin With Some Reagents Containing OH Groups (Spektrofotometricheskoye issledovaniye okrashennykh kompleksov chetyrekhvalentnogo olova s nekotorymi reaktivami, soderzhashchimi OH-gruppy)

PERIODICAL: Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 2, pp 174-180 (USSR)

ABSTRACT: The present paper gives a survey of the advantages and disadvantages of some dyes used for the photometric determination of tetravalent tin. Some hydroxyanthraquinones (alizarin, quinizarin, quinalizarin), quercetin, hematoxylin and stilbazo were comparatively investigated by the spectrophotometric method. It was found that the optical characteristics are the most important criteria for the suitability of these reagents. In the investigations the differences between the absorption spectra of the H-form of the reagent and the spectrum of the corresponding tin complex were used as criteria for the sensitivity and accuracy of the determination. The color of all reagents investigated becomes more intensive

Card 1/4

SOV/75-14-2-?/?

Spectrophotometric Investigation of the Colored Complexes of Tetrava-
Tin With Some Reagents Containing OH Groups

with increasing pH value; for this reason the interval between the pH value of the formation of the complex and the pH value at which the often intensively colored anionic form of the dyes (R⁻) is formed is of great importance for the sensitivity of the determination. Among the dyes investigated quercetin, hematoxylin (oxidized) and stilbazo reveal the highest sensitivity. For their comparison the absorption spectra of the HR form and of the SnR form were shown on a diagram. The comparisons showed that stilbazo shows the greatest sensitivity in the qualitative detection of tin. In the detection of tin by stilbazo no reagent excess should be used because the self-absorption of stilbazo may falsify the results. Since, however, in a photometric determination of tin an excess of the reagent is necessary, this self-absorption of the reagent, in all parts of the spectrum superimposes the absorption of the tin complex, renders the quantitative determination of tin very difficult. Hematoxylin is somewhat less sensitive than stilbazo, it is, however, of great advanta for the quantitative determination since its self-absorption compared to that of the tin complex, is only unimportant.

Card 2/4

SOV/75-14-2-5/27

Spectrophotometric Investigation of the Colored Complexes of Tetravalent
Tin With Some Reagents Containing OH Groups

Quercetin is still less sensitive, in the photometric deter-
mination it shows, however, the same advantages as hematoxylin.
Besides, quercetin is easily accessible. Fluctuations in the
pH value of the solution to be analyzed show the least ef-
fects in the use of quercetin for the photometric determina-
tion because the free reagent in the part of the spectrum in
which the absorption maximum of the tin complex is found does
not absorb at all. The color of the tin-quercetin complex
is stable at a pH = 3 - 6. The color of the tin-hematoxylin
complex also varies only little between pH = 2 and 6. The
properties for the determination of tin of the three dyes men-
tioned which are important are tabulated (pH values of appli-
cability, λ_{max} of the absorption of the tin complex, molar
absorption coefficients of the reagent and the corresponding
complex).On the basis of the results obtained the optimum
conditions for the photometric determination of tin by quercetin,
hematoxylin and stilbazo are determined. These conditions are
described in detail in this paper. There are 6 figures, 1 table,
Card 3/4   and 12 references, 6 of which are Soviet.

SOV/75-14-2-5/27

Spectrophotometric Investigation of the Colored Complexes of Tetravalent
Tin With Some Reagents Containing OH Groups

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR, Kiyev
(Institute of General and Inorganic Chemistry of the AS UkrSSR,
Kiyev)

SUBMITTED: August 23, 1957

Card 4/4

BABKO, A. K.

SOV/75-14-4-30/30

AUTHOR: Bilmorich, G. K.

TITLE: Section of Analytical Chemistry of the VIII Mendeleyev Congress on General and Applied Chemistry

PERIODICAL: Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp 511-512 (USSR)

ABSTRACT: Approximately 300 persons participated in the work of the Department of Analytical Chemistry, among them representatives of various scientific research institutes, higher schools and industrial enterprises in Russia, scientists from China, Bulgaria, the GDR, Poland, Hungary, and Italy. Approximately 70 reports were heard. In his opening speech I. P. Alimarin reported on the achieved results and on modern problems of analytical chemistry. V. V. Fomanzev reported on the application of physico-chemical analysis in heterogeneous systems for the solution of a series of problems of analytical chemistry/ T. I. Kuznetsov reported on modern aims in the use of organic reagents. A. K. Babko showed at the example of halide and thiocyanate complexes the correlation between the stability of complexes and the position of the corresponding central atoms in the periodic system. L. M. Pashkova and V. M. Pozhkova lectured on the stability of oxinates of Cu, Co, and Ni as depending on the structure of the oxine molecule. I. I. Tomeora lectured on the double character of reaction of some compounds in the formation of complexes. The problem of the application of heteropolyacids in analytical chemistry was dealt with in the lectures of L. P. Pashkova and co-workers, and A. I. Bokorin and M. A. Poloshenko. A large number of lectures dealt with the use of new organic reagents in analysis: A. I. Busev and M. I. Ivanyutin reported on the application of dialkyl and diaryl dithiophosphoric acid for the separation of elements, A. I. Lazarskiy and aryl arsonic acid and aryl phosphinic acid. R. P. Laskorkiy and his co-workers treated some properties of new complexones. The lecture of L. A. Reinirenko G. S. Shitareva and L. I. Kononenko dealt with the photometric determination of tantalum using fluorine derivatives. A. I. Cherkesov lectured on the use of halochromation in analytical chemistry. A. M. Babkina and T. M. Malyutina lectured on the determination of tantalum using differential spectrophotometry. U. I. Korchevskaya and L. A. Stolyarova reported on new highly sensitive analysis methods using an ultraviolet microscope. Several lectures dealt with methodical and theoretical problems of spectrum analysis (G. M. Zakhariy and G. A. Pernini, K. Yu. Tretiakov and co-workers). N. S. Poluektov and N. S. Nikonova treated the perfection of flame photometry. Several lectures dealt with the determination of elements by polarography (A. I. Sizyakova, N. P. Pozhiokiyankan and I. A. Tserny), Yu. P. Gokhshteyn, New results in using fixed electrodes were reported by I. D. Panchenko and Yu. S. Lyalikov and co-workers. The lecture of E. A. Udaltseva and N. N. Feru treated the use of amperometric titration with two electrodes in the chemistry of uranium and thorium. K. M. Savarin showed possibilities of predicting the conditions of chromatographic separation of elements based on their position in the periodic system. I. I. Selyavkaya reported on the use of ion exchange in the investigation of the state of substances in solution. A. S. Tarnidub and T. I. Potmenani lectured on the chromatographic separation of a series of elements. E. G. Polyankiy reported on adsorptic the properties of ion exchanger resins. I. N. Chusyakin and associates reported on the chromatographic proof of sulfanilamide preparations in liquids of the organism. G. L. Starobinets and associates treated the application of high polymers in chromatographic analysis. The lecture of A. I. Shukharitskiy and N. N. Turtilianb, C. Shey with gas chromatography. Several lectures treated the use of radioactive isotopes for the chromatographic investigation of complex formation (D. I. Ryabchikov and associates), for the investigation of the co-precipitation mechanism of ions of rare metals with sulfides (G. A. Rudney) and for determining rare elements by means of isotope dilution. I. P. Alimarin, C. I. Bilmyrich). Is the field of elementary organic microanalysis, the lectures of E. O. Korshun, T. A. Faltman and V. A. Klimov with associates have to be mentioned, who treated the elaboration of rapid micromethods for the simultaneous determination of several elements from one weight portion of boron, fluorine and silicium-organic compounds.

Card 1/4

Card 2/4

Card 3/4

5(2), 0
AUTHORS: Babko, A. K., Zharovskiy, F. G.   SOV/32-25-1-21/51

TITLE: Application of Extraction in Inorganic Analysis (Primeneniye ekstragirovaniya v neorganicheskom analize) Survey (Obzor)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 1, pp 42-52 (USSR)

ABSTRACT: The analyses of materials pertaining to the metallurgical industry usually involve separation processes of either the substance to be determined or of its impurities. In this connection an ample survey of the pertinent methods is given. The advantages offered by the extraction methods are described as well as the factors influencing such extraction processes. An enumeration of the inorganic complex compounds which may be formed in such extractions is also given. The various fluorides, chlorides, bromides, iodides, thiocyanates, nitrates and heteropolyacids are mentioned and described, and the respective references are indicated. Since organic solvents are also often used in extraction processes, the respective organo-metallic compounds are enumerated, among them the diphenyl-thio carbazonates, diethyl-dithio carbamates, ethyl xanthates, cupferronates, oxy-quinolates, nickel dimethyl

Card 1/2

Application of Extraction in Inorganic Analysis. Survey

SOV/32-25-1-21/51

glyoximate and acetylacetonates. A table illustrating the
form by which various metals solve in various organic solvents
is given as well (Table 2).
There are 2 figures, 2 tables, and 166 references, 93 of
which are Soviet.

Card 2/2

BABKO, A.K.; SHEVCHENKO, L.L.

Stability of halogen complexes of cobalt. Ukr.khim.zhur. 25
no.1:120-124 '59.
(MIRA 12:4)

1. Institut obshchey i neorganicheskoy khimii AN USSR.
(Cobalt halides)

5(2)

AUTHOR: Babko, A. K.   SOV/32-25-5-1/56

TITLE: Development of Analytical Chemistry in the Year 1958
               (Razvitiye analiticheskoy khimii v 1958 g.)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 5, pp 515-534 (USSR)

ABSTRACT: The present paper gives a survey of the development of
               analytical chemistry in 1958. The data, only a part of which
               concerns the field of inorganic chemistry, are dealt with
               in sections. In the case of new reactions made to determine
               individual elements it is mentioned that for the most part
               analyses were carried out on the basis of colored substances,
               i. e. photometric methods were applied. A table is given
               with new analytical reactions for about 35 cations (Table 1),
               and another one (Table 2) with 12 reactions for nonmetals.
               Another chapter deals with the deficiencies of investigations
               in the field of the new reactions, as for example, the
               insufficiency of data concerning the characteristics of the
               respective reactions. Also the fact is mentioned that often
               the requirements of analytical practice as well as the
               necessity of elaborating theoretical problems are not
Card 1/2   complied with. Next, a comparison is made among various

Development of Analytical Chemistry in the Year 1958   SOV/32-25-5-1/56

analytical methods. The subject of pure metal analysis,
especially as concerns the determination of microimpurities
is dealt with, and reference is made to the compilation
"Trudy komissii po analiticheskoy khimii" ("Transactions
of the Commission of Analytical Chemistry") Volume IX(XII).
The volumetric determination of metal cations is then
discussed, together with the photometric determination of
substances in larger quantities, the problem of automatizing
the production control, and finally, a few organizational
problems are mentioned, in which connection it is stated
that foreign periodicals often carry suggestions of various
modern laboratory equipments, while in the USSR this is
a too much neglected problem. It is also necessary to improve
scientific information, so as to keep the world informed on
scientific development in the USSR. There are 2 tables and
184 references, 84 of which are Soviet.

Card 2/2

5(2)
AUTHORS: Babko, A. K., Shtokalo, M. I.   SOV/32-25-7-2/50

TITLE: Co-precipitation in Quantitative Analysis (Soosazhdeniye v
             kolichestvennom analize). Investigation of Crystal Growth
             of Barium Sulfate (Izucheniye rosta kristallov sernokislogo
             bariya)

ABSTRACT: In spite of investigations hitherto carried out on crystalliza-
             tion of barium sulfate (I) the problem is not solved whether the
             growth process takes place in an agglomeration of cross-shaped
             particles, an enlargement of "snow flakes" while retaining the
             shape or by an aggregate of the small particles. In the present
             case various crystallization stages of (I) were investigated by
             the aid of an electron microscope thus employing a different
             preparation technique. It was found that two kinds of crystal
             growth of the primary (I) crystals exist; the first variation
             occurs by the continuation of the reaction of

             Ba^{2+} and SO_4^{2-}, whereas   aging causes completely different

Card 1/2   alterations. In both cases larger crystals with a regular

Co-precipitation in Quantitative Analysis.   SOV/32-25-7-2/50
Investigation of Crystal Growth of Barium Sulfate

shape are formed, in the case of aging, however, it takes place
by decomposition of the sharp edges of individual cross-shaped
double crystals. Some microphotographs of crystals are given
(Figs 1-5). In order to determine the connection between the
shape of particles of the solid phase and its absorptive power,
co-precipitations of (I) with KCl and $KMnO_4$ were carried out.

It was found that in both cases co-precipitation is considerably
higher if crystals are formed with a ramified surface.
There are 5 figures and 7 references, 3 of which are Soviet.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk USSR
(Institute for General and Inorganic Chemistry of the Academy
of Sciences of the UkrSSR)

Card 2/2

5(2)

AUTHORS: Babko, A. K., Marchenko, P. V.

TITLE: Determination of Microimpurities in Zirconium by Means of
               Basic Dyes

ABSTRACT: For the enrichment of zinc, cadmium, molybdenum, and bismuth,
               occurring as microimpurities in high-purity metallic zirconium,
               a precipitation of the former may be carried out by means of
               the basic dyes methyl blue (I) and crystal violet (II) in the
               presence of iodides (III) or thiocyanates (IV). The resulting
               precipitate may be separated by a flotation with the aid of
               light, non-water mixable, liquids (toluene, ether). The im-
               purities may then be determined colorimetrically from the
               concentrate. The completeness of the zinc precipitation with
               (I) and (IV) in the presence of larger zirconium quantities
               was investigated by means of Zn^{65}, and it was found that
               20 γ Zn can be separated from 0.5 - 2.0 g Zr practically with-
               out loss, e.g. that 5.10^{-5} - 1.10^{-5}% Zn may be determined.

Card 1/3

Determination of Microimpurities in Zirconium by Means of Basic Dyes

(II) besides (III) was used as precipitant for the concentration of cadmium. The analysis was carried out with Cd^{115}. 30 γ Cd were separated from 0.5 - 4 g Zr with maximum losses of 5%; this method permits the determination of 1.10^{-5} - 2.10^{-5}% Cd in 2 g of zirconium. The determination of the microquantities of molybdenum in Zr was most favorable with (II) besides (IV); it was also found that with Mo^{6+} a better precipitation can be obtained than with Mo^{5+} (Table 1). A precipitation of Bi is likewise obtained best with (II) (according to Kuznetsov and Panushina, Ref 6), as is shown by experiments with other dyes ((I) and rhodamine) (Table 2). An ammonium thiocyanate concentration of maximally 0.2 g.equivalent/l should be used (Table 3). According to the two methods mentioned last, quantities of 5.10^{-5}% Mo and Bi respectively, can be determined in a 2 g weighed portion, the precipitate separating, as above, by flotation. There are 3 tables and 8 Soviet references.

Card 2/3

SOV/32-25-9-7/53

Determination of Microimpurities in Zirconium by Means of Basic Dyes

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk USSR
(Institute of General and Inorganic Chemistry of the Academy of
Sciences, UkrSSR)

Card 3/3

5. (3) .

AUTHORS: Babko, A. K., Get'man, T. Ye.   SOV/79-29-7-69/83

TITLE: Investigation of the Reaction of Chromate With Diphenyl Carbazide
                (Izucheniye reaktsii khromata s difenilkarbazidom)

ABSTRACT: The formation of an intensely colored compound on the reaction of
                chromates with diphenyl carbazide (further designed as DC) is
                frequently used in the chemical analysis. Nevertheless, the
                chemism of this reaction has hitherto been vigorously discussed.
                Quite recently a number of new papers on this subject was
                published. Without dealing with the details of these papers,
                table 1 presents the principal data regarding methods and results
                obtained by various scientists. It can be seen from it that the
                data are contradictory. The investigations carried out by the
                authors (Ref 5) with respect to the reaction of the trivalent
                chromium with DCO in the presence of an acetate buffer solution
                gave the following results: the trivalent chromium reacts
                neither with diphenyl carbazide nor with diphenyl carbazone;
                the bivalent one does not react with diphenyl carbazone. The
                inaccurate data of a number of authors are explained by a side-
Card 1/3   process, i.e. by the formation of the above-mentioned compound

Investigation of the Reaction of Chromate With   SOV/79-29-7-69/83
Diphenyl Carbazide

in the reaction of acetic acid with diphenyl carbazone, irrespective of presence or absence of chromium. In the reaction of Cr^{VI} with diphenyl carbazide a complex compound of the trivalent chromium with the colored oxidation product of diphenyl carbazide is formed. The colored reaction product of Cr^{VI} with diphenyl carbazide can be separated partially or nearly completely, according to the conditions, from chromium by extraction with isoamyl alcohol, in which connection the absorption spectrum of the solution of the colored compound does not vary. In the presence of complex-forming compounds the chromium combines with them without any loss of color of the solutions. In the presence of reduction agents added on reaction of Cr^{VI} with diphenyl carbazide no colored compound is formed. Some questions regarding the reaction mechanism of Cr^{VI} with diphenyl carbazide were discussed. There are 2 tables and 8 references, 2 of which are Soviet.

Card 2/3

Investigation of the Reaction of Chromate With   SOV/79-29-7-69/83
Diphenyl Carbazide

ASSOCIATION: Institut obshchey i neorganicheskoy khimii Akademii nauk USSR
              (Institute of General and Inorganic Chemistry of the Academy of
   Sciences of the Ukrainian SSR)

SUBMITTED: May 29, 1958

Card 3/3

ACC NR: AP7002820   SOURCE CODE: UR/0078/66/011/012/2835/2836

AUTHOR: Babko, A. K.; Gorlach, V. F.

ORG: none

TITLE: Extraction of niobium and tantalum from sulfuric acid solutions in the form of peroxy complexes

SOURCE: Zhurnal neorganicheskiy khimii, v. 11, no. 12, 1966, 2835-2836

TOPIC TAGS: niobium, tantalum, hydrogen peroxide

ABSTRACT: A new method is proposed for extracting niobium and tantalum in which use is made of sulfuric acid solutions containing hydrogen peroxide to dissolve niobium pentoxide and tantalum pentoxide, no hydrofluoric acid being employed. With niobium and tantalum, hydrogen peroxide forms cationic complexes which are extracted with acid esters of phosphoric acids. At a sulfuric acid concentration of 1-3 moles/liter and a hydrogen peroxide concentration exceeding the niobium and tantalum content by a factor of 2 to 8, niobium is extracted to the extent of 90-91% the first time and 99% after a second extraction; tantalum to the extent of 80-82% the first time and 90-91% after a second extraction. A part of the tantalum is apparently in a polymeric state and is not extracted. These degrees of extraction of the two metals remain virtually unchanged as the sulfuric acid and hydrogen peroxide concentrations are varied within

Card 1/2   UDC: 546.882.5-39 + 546.883.5-39:542.61

ACC NR: AP7002820

the above-indicated limits.

SUB CODE: 07/ SUBM DATE: 23Mar66/ ORIG REF: 004/ OTH REF: 001

4,

Card 2/2

KORENMAN, Izrail' Mironovich; VINOGRADOV, A.P., akademik, glavnyy red.;
BUSEV, A.I., prof., red.toma; ALIMARIN, I.P., red.; BABKO, A.K.,
red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV,
V.I., prof., red.; PALEY, P.N., red.; RYABCHIKOV, D.I., red.;
TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.; VOLYNETS, M.P.,
red.izd-va; KASHINA, P.S., tekhn.red.

[Analytical chemistry of thallium] Analiticheskaia khimiia
talliia. Moskva, Izd-vo Akad.nauk SSSR, 1960. 170 p.
(MIRA 14:3)

(Thallium--Analysis) ·

RYABCHIKOV, Dmitriy Ivanovich; GOL'BRAYKH, Yevgeniya Kas'yanovna; VINOGRADOV,
A.P., akademik, glavnyy red.; ALIMARIN, I.P., red.toma; PALEY, P.N.,
red.toma; BABKO, A.K., red.; BUSEV, A.I., red.; VAYNSHTEYN, E.Ye.,red.;
YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; TANANAYEV, I.V.,red.;
CHERNIKHOV, Yu.A., red.; TRIFONOV, D.N., red.izd-va; POLENOVA, T.P.,
tekhn.red.

[Analytical chemistry of thorium] Analiticheskaia khimiia toriia.
Moskva, Izd-vo Akad.nauk SSSR, 1960. 295 p.   (MIRA 13:10)
                    (Thorium—Analysis)

BABKO, A. K.

PHASE I BOOK EXPLOITATION   SOV/3350

Soveshchaniye po khimii, tekhnologii i primeneniyu proizvodnykh piridina i khinolina. Riga, 1957

Khimiya, tekhnologiya i primeneniye proizvodnykh piridina i khinolina; materialy soveshchaniya (Chemistry, Technology and Utilization of Pyridine and Quinoline Derivatives; Materials of the Conference) Riga, Izd-vo AN Latviyskoy SSR, 1960. 299 p. Errata slip inserted. 1,000 copies printed.

Sponsoring Agencies: Akademiya nauk Latviyskoy SSR. Institut khimii; Vsesoyuznoye khimicheskoye obshchestvo.

Ed.: S. Bazhanova; Tech. Ed.: A. Klyavinya; Editorial Board: Yu. A. Bankovskiy, Candidate of Chemistry, E. V. Vanga, Candidate of Chemistry (Resp. Ed.); L. P. Zalukayev, Doctor of Chemistry, and M. M. Kingyn.

PURPOSE: This book is intended for organic chemists and chemical engineers.

COVERAGE: The collection contains 33 articles on methods of synthesizing or producing pyridine, quinoline, and their derivatives from natural sources. No personalities are mentioned. Figures, tables, and references accompany the articles.

BABKO, A. K., MARKOVAYA, L. V.

"Photometric Determination of Micro-Quantities of Sulfides and Sulfur in Metals by Catalytic Action in the Iodine-Azide Reaction

submitted at the Conference on Kinetic Methods of Analysis, Ivanovo, 14-16 June 1960

So: Izvestiya Vysshikh Uchebnykh Zavedeniy SSSR, Khimiya i Khimicheskaya Technologiya, Vol III, No 6, Ivanovo, 1960, pages 1113-1116.

BABKO, A. K., LUKOVSKAYA, N. M.

"Effect of Complexating Agents on the Catalysis of a Chemiluminescence Reaction"

submitted at the Conference on Kinetic Methods of Analysis, Ivanovo, 14-16 June 1960

So: Izvestiya Vysshikh Uchebnykh Zavedeniy SSSR, Khimiya i Khimicheskaya Technologiya, Vol III, No 6 Ivanovo, 1960, pages 1113-1116.

Biblio, his

Analizy pass SSSR. Emissiya po additelmy kistall

Metody opredeleniya primesey v chistykh metallakh (Methods of Determining Admixtures in Pure Metals) Moscow, 1960. 411 p. (Series: Its: Trudy, 12) 3,500 copies printed.

Resp. Eds.: A.P. Vinogradov, Academician, and D.I. Ryabchikov, Doctor of Chemical Sciences; Ed. of Publishing House: M.P. Volynets; Tech. Ed.: T.V. Polyakova.

PURPOSE: This collection of articles is intended for chemists, metallurgists, and engineers.

COVERAGE: The articles describe methods for detecting and determining various admixtures and their traces in pure metals. Also discussed are many chemical, physicochemical, electrochemical, spectrochemical and luminescence methods of analyzing materials of high purity. The editors state that these methods have been developed within the last five or six years by various Soviet scientific institutes, and are now widely used in research and factory laboratories of the Soviet Union. No personalities are mentioned. References, mostly Soviet, accompany each article.

5(0)
AUTHOR:

Babko, A. K., Academician of the
Academy of Sciences of the UkrSSR

S/030/60/000/01/003/067
B015/B008

TITLE: Modern Problems of Analytical Chemistry

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, Nr 1, pp 22-27 (USSR)

ABSTRACT: The author mentions 3 practical problems of analytical
chemistry: methods for the analysis of complicated technical
and natural materials; methods for the determination of micro-
impurities; the elaboration of automatic inspection methods
for production. With reference to the analytical method, the
author states that organic solvents have been used lately for
the separation of chemical elements by extraction. The pos-
sibilities of analyzing complex mixtures have augmented in
connection with the application of new organic agents, especial-
ly precipitants. Extraction methods for nearly all metals are
known at present. The methods of gas chromatography have also
developed during the last years. The methods of the direct
titration of the salts of many metals were worked out. The
problem of determination methods for microimpurities has
become significant only through the development of a number of

Card 1/2

Modern Problems of Analytical Chemistry   S/030/60/000/01/003/067
                                                   B015/B008
            fields of metallurgy and physics, and their significance is
            increasing continuously. New determination methods for micro-
            impurities are searched for in the Soviet Union and abroad,
            the microwave spectroscopy method offering considerable pro-
            spects. Soviet and foreign authors have succeeded lately in
            increasing the sensitivity of the determination of some micro-
            impurities up to $10^{-6} - 10^{-9}\%$ by means of catalytic reactions.
            Problems of automatic production methods are gradually being
            worked out in all countries. The lack of laboratory equipment
            in the Soviet Union is described as the cause for the slow
            development of the automation of production control. The lack
            is felt of a center to deal with the design and introduction of
            laboratory equipment. The wish is expressed for measures to be
            taken in this field by the Akademiya nauk SSSR (Academy of
            Sciences USSR). The author states finally that many theoretical
            problems of analytical chemistry have been left unmentioned
            in the paper under review.

    Card 2/2

BABKO, A.K., akademik; NABIVANETS, B.I. [Nabyvanets', B.I.]

Use of ion-exchange chromatography in determining the polymerization factor of zirconium in solutions. Dop.AN URSR no.5:646-648 '60.
(MIRA 13:7)

1. Institut obshchey i neorganicheskoy khimii AN USSR. 2. AN USSR (for Babko).
(Chromatographic analysis)
(Zirconium)

BABKO, A.K.; MARKOVA, L.V.

Color reactions for the sulfate ion. Trudy kom. anal. khim. 11:309-322
'60.   (MIRA 13:10)

1. Institut obshchey i neorganicheskoy khimii AN USSR.
        (Sulfates)

BABKO, A.K.; GET'MAN, T.Ye.

Spectroscopic determination of small amounts of hydrogen in metallic germanium. Trudy Kom. anal. khim. 12:36-47 '60.   (MIRA 13:8)
          (Germanium—Hydrogen content)   (Hydrogen—Spectra)

BABKO, A.K.; KOZACHUK, N.S.

Determination of microinclusions of nitrogen in metallic germanium.
Trudy Kom. anal. khim. 12:48-52 '60.   (MIRA 13:8)
        (Germanium—Analysis)   (Nitrogen—Analysis)

BABKO, A.K.; VOLKOVA, A.I.; DRAKO, O.F.

Determining small amounts of oxygen in metallic germanium. Trudy Kom.
anal. khim. 12:52-64 '60.   (MIRA 13:8)
          (Germanium--Analysis)   (Oxygen--Analysis)

5.2200
5.4130

S/153/60/003/02/03/034
B011/B003

AUTHORS: Babko, A. K., Dubovenko, L. I.

TITLE: Oxalate Complex Compounds of Zirconium

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i
            khimicheskaya tekhnologiya, 1960, Vol. 3, No. 2,
            pp. 226-234

TEXT: The authors studied the hitherto insufficiently investigated
formation conditions of oxalate complex compounds of zirconium in
acid medium. The physicochemical analysis was applied for determining
the complex compound formation in the system $Zr^{4+} \rightleftharpoons C_2O_4^{2-}$. The
optical density of solutions was measured in ultraviolet light. The
authors found that the following three complex compounds form in the
above system depending on the concentration of the oxalic acid and on
the pH of the solution: $ZrC_2O_4^{2+}$, $Zr(C_2O_4)_2$, and $ZrOC_2O_4$. Their
formation was confirmed by the investigation of the direction of motion
of the ions in electrolysis. The authors determined the dissociation

Card 1/3

Oxalate Complex Compounds of   S/153/60/003/02/03/034
Zirconium   B011/B003

constant of the zirconium monoxalate complex compound on the basis of
the absorption of light in the ultraviolet range. It is $1.6 \cdot 10^{-10}$. A
similar value was obtained from the equilibrium of the ferric thiocyanate
and oxalate complex compound. The dissociation constants were also
calculated for the complex compounds of $Zr(C_2O_4)_2$ ($= 4.6 \cdot 10^{-8}$) (Table 3),
$Zr(C_2O_4)_3{}^{2-}$ ($= 1.9 \cdot 10^{-4}$), and for $Zr(C_2O_4)_4{}^{4-}$ ($= 5.08 \cdot 10^{-1}$). Furthermore,
the instability constant of the zirconyl-oxalate complex compound
$ZrOC_2O_4$ ($= 2.1 \cdot 10^{-7}$) and the second instability constant of
$ZrO(C_2O_4)_2{}^{2-}$ ($= 4.57 \cdot 10^{-4}$) were calculated (Table 6). Finally, the
authors calculated the nomogram of the equilibria of the oxalate complex
compounds of zirconium and zirconyl in solution (Fig. 7). It characterizes
the relation between the equilibrium conditions and the stability of
complex ions in the system. The following optical densities are shown in
tables 1, 4, and 5: those of the isomolar series of the solutions Zr^{4+} in
0.5 and 1.0 M $HClO_4$ in Table 1, those of the system Fe^{3+} — SCN^- — Zr^{4+} —
$H_2C_2O_4$ at variable concentrations in Table 4, and those of the system

Card 2/3

Oxalate Complex Compounds of
Zirconium

S/153/60/003/02/03/034
B011/B003

Fe^{3+} — SCN^- — $H_2C_2O_4$ — $ZrOCl_2$ at variable concentration of the $ZrOCl_2$ in Table 5. The light-absorption curves are given at various pH of the solution in Figs. 1 and 3. The dependence of the formation of the complex compound on time is illustrated in Fig. 2. The isomolar series of the system $ZrOCl_2$ — $H_2C_2O_4$ in various concentrations of the $HClO_4$ are represented in Fig. 4. The dependence of the absorption of light on the concentration of the oxalic acid is indicated in Fig. 5. The dependence of the concentration of free oxalate ions on the ratio $(ZrC_2O_4^{2+})$: $(Zr(C_2O_4)_2)$ is shown in Fig. 6. There are 7 figures, 6 tables, and 8 references, 4 of which are Soviet.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko;
Kafedra analiticheskoy khimii (Kiyev State University
imeni T. G. Shevchenko; Chair of Analytical Chemistry)

SUBMITTED: September 4, 1958

Card 3/3

BABKO, A.K.; MIKHEL'SON, P.G.

Three-component complex compound containing iron, tin, and dimethyl-glyoxime. Zhur. neorg. khim. 5 no.10:2284-2289 O '60.

(MIRA 13:11)

1. Kiyevskiy gosudarstvennyy universitet.
(Tin compounds)   (Iron compounds)   (Glyoxime)

AUTHORS: Babko, A. K., Kodenskaya, V. S.

TITLE: Study of Equilibrium in the Solution of Carbonatic Uranyl
             Complexes

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 11,
             pp. 2568 - 2574

TEXT: The authors conducted experiments to study the conditions of an
equilibrium between the uranyl hydroxide precipitate and the solution of
complex uranyl carbonates. In particular, it was attempted to establish
the optimum pH value for the formation of soluble complexes. A method
described previously (Ref. 12) was used for determining the solubility
product $LP_{UO_2(OH)_2}$, with the hydroxide being precipitated from a uranyl
nitrate solution with ammonia. Experimental results and calculation values
for LP (Table 1) show that in a 0.2 M ammonium nitrate solution

$LP_{UO_2(OH)_2} = 1.8 \cdot 10^{-22}$. The instability constant of the complex uranyl

Card 1/3

Study of Equilibrium in the Solution of   S/078/60/005/011/016/025
Carbonatic Uranyl Complexes   B015/B060

carbonate was determined by the method of solubility in aqueous carbonate
solutions (Tables 2,3, results) and it was noted that $K_{NO_2(CO_3)_2^{2-}}$

$= 2.7 \cdot 10^{-16}$ and $K_{UO_2(CO_3)_3^{4-}} = 2 \cdot 10^{-21}$, for determinations made at pH 7 and

9. It is known on the strength of experimental and literature data that
the solid uranyl carbonate is unstable under normal conditions and
practically hydrolyzes to completeness. The nomogram for the equilibrium
of the formation of uranyl carbonate complexes is calculated (Fig. 2) and
the equilibrium between the solutions of complexes and uranyl hydroxide
is explained to illustrate the dependence on the pH by the example of the
solubility of $UO_2(OH)_2$ in a sodium carbonate solution. If for pH = 9
10^{-3} g.mol of an uranyl carbonate complex are to be maintained in the
solution, the concentration of free uranyl ion must amount to $1.8 \cdot 10^{-12}$,
and it must be $- \log \left[CO_3^{2-} \text{ free} \right] = 4.5$ and $\left[CO_3^{2-} \text{ total} \right] = 1 \cdot 10^{-3}$ mol,
respectively. Under these conditions 20% of uranyl is in the form of

Card 2/3

Study of Equilibrium in the Solution of   S/078/60/005/011/016/025
Carbonatic Uranyl Complexes   B015/B060

$UO_2(CO_3)_2^{2-}$ and 80% in the form of $UO_2(CO_3)_3^{4-}$. There are 3 figures, 3 tables, and 13 references: 6 Soviet, 1 US, 2 German, 1 Italian, 1 Indian, 1 Canadian, and 1 French.

SUBMITTED: September 15, 1959

Card 3/3

S/075/60/015/005/015/026/XX
B002/B056

AUTHORS: Babko, A. K. and Volkova, A. I.

TITLE: Photometric Determination of Titanium as Pyridine-sali-
             cylate Complex

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 5,
             pp. 587 - 590

TEXT: The authors found that titanium between pH 3.5 and 5 forms a com-
plex with salicylic acid, which, together with organic bases such as
pyridine, quinoline, pyramidon forms a highly colored compound which is
only little soluble in water and easily soluble in chloroform. Visually,
10 μg titanium can be detected in 25 ml chloroform. The following for-
mula is assumed on the basis of further not yet published investigations:

$$PyH \left[(TiO) \left(\begin{array}{c} O \\ \diagup \diagdown \\ HOOC \diagdown \diagup \end{array} C_6H_4 \right) \right]_3$$
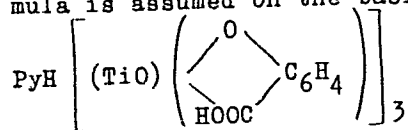
. With a single extraction, 89 to 96% of
the titanium complex pass over into the
chloroform phase, viz. rising in the fol-
lowing order:

Card 1/3

Photometric Determination of Titanium as   S/075/60/015/005/015/026/XX
Pyridine-salicylate Complex   B002/B056

pyridine complex - quinoline complex - pyramidon complex. As the most
favorable pH range, the following was found: pH 3 - 3.5 for the
pyridine complex, pH 2.5 - 4 for the quinoline and pyramidon complexes.
V^{5+}, Cu^{2+}, Fe^{3+}, and Cr^{VI} may interfere with the determination and are
therefore reduced before determination with thiosulfate. The nickel
complex is extracted only from pH 4 - 5, but not yet in the case of
pH 3.5. The maximum of the light absorption is about 365 mμ, but within
this range, absorption of the salicylic acid already begins; therefore,
measurements are carried out at 400 or 430 mμ. Within the concentration
range investigated (5 - 25$\cdot 10^{-5}$g Ti), the Beer law holds for both wave-
lengths, but the sensitivity at 400 mμ is higher. The titanium content
in several kinds of steel was determined; the maximum error was 4%
(mean value from 6 - 8 determinations). There are 3 figures, 1 table,
and 1 non-Soviet reference.

Card 2/3

Photometric Determination of Titanium as   S/075/60/015/005/015/026/XX
Pyridine-salicylate Complex   B002/B056

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR, Kiyev
               (Institute of General and Inorganic Chemistry AS UkrSSR,
               Kiyev)

SUBMITTED: July 10, 1959

Card 3/3

S/073/60/026/004/015/018/XX
B023/B064

AUTHORS: Babko, A. K. and Vasilenko, V. T.

TITLE: Comparison of Reagents for the Colorimetric Zirconium
              Determination

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 4,
              pp. 514-518

TEXT: In the introduction the authors state that zirconium exerts no
chromophoric effect. For color reactions with respect to Zr it is there-
fore necessary to use reagents that are colored themselves and do not
change their color in complex formation with Zr. The spectrophotometric
characteristic of the reagent and of the reaction product are of greatest
importance for the selection of the reagents. Five of these characteristics
are mentioned, and it is stated that it has hitherto not been established
which of them is of greatest importance in the selection of a reagent in
photometry. The following characteristics are mentioned: 1) The difference
between the wavelengths of the absorption spectrum maxima of the complex
with Zr and the wavelengths of the reagent itself at the same pH; 2)

Card 1/3

Comparison of Reagents for the Colorimetric   S/073/60/026/004/015/018/XX
Zirconium Determination   B023/B064

relative, and 3) absolute difference between the molar coefficients of
light absorption of the complex and the reagent at λ_{max}; 4) relative and
5) absolute difference between the integral regions of the absorption
spectra of the complex and the reagent. This problem is discussed with
respect to the reagents for zirconium. A table shows the spectrophotometric
characteristics of 16 reagents. 1-6 are dyes of the triphenyl methane
type, 7-10 oxyketone dyes, 11-16 azo dyes. The curves of light absorption
were measured with the CΦ-2M(SF-2M) spectrophotometer. A 10^{-3} mole
solution of zirconium chlorine oxide in 1 N hydrochloric acid was used.
The solutions of the organic reagents were used at 10^{-3} mole, except for
stilbazole, for which the concentration was $5 \cdot 10^{-4}$ mole/l. The optimum
conditions of the reagent for zirconium, as well as the optimum pH were
determined. The spectrophotometric curves for xylene orange were recorded
at pH 5, for thymol methyl blue in 1 N perchloric acid and for all other
reagents at pH 1.5. Data were found on the basis of the absorption spectra.
Fig. 1 shows the absorption spectra of the complexes and the reagents.
The detectable minimum is recommended as criterion for the sensitivity of
the reaction. The angle of inclination of the calibration curves (Fig. 2)

Card 2/3

Comparison of Reagents for the Colorimetric   S/073/60/026/004/015/018/XX
Zirconium Determination   B023/B064

may serve as criterion for the photometric analysis. The calibration curves
were, as usual, recorded with the ФЭК M-57 (FEK M-57) photocolorimeter.
In each case the respective reagent served as comparative solution. The
degree of the angle of inclination depends on the absorption spectrum and
corresponds to the molar ratio between the light absorption coefficient of
the complex and the reagent. Among all reagents investigated xylene orange,
thymol methyl blue, p-nitrobenzene azopyrocatechol, and phenyl fluorone
proved to be most sensitive in the photocolorimetric determination of
zirconium. There are 2 figures, 1 table, and 13 references: 5 Soviet.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR
              (Institute of General and Inorganic Chemistry AS UkrSSR)

SUBMITTED: November 25, 1959

Card 3/3

S/)32/60/026/06/07/044
BO 0/B126

AUTHOR: Babko, A. K.

TITLE: The Development of Analytical Chemistry in 1959

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 6, pp. 679 - 703

TEXT: In continuation of a communication of this type on 1958, a detailed
survey of the different methods of analysis published in 1959, with re-
spective explanations, is given. The following methods are discussed: pre-
cipitation and co-precipitation; complex formation reactions; catalytic
reactions; methods of extraction (formation of ternary complexes, methods
of studying the composition of extracted complexes, and the conditions of
extraction); titration of metals; photometric analysis (apparatus and
measuring techniques, precision photometry, methods). A detailed table
(pp. 684-692) is given, which shows the analysis methods discussed, with
information on the element to be determined, the analysis reaction, the
characteristics of the method of analysis, and the respective information
in publications. V. I. Kuznetsov and K. B. Yatsimirskiy are named in the
text. There are 1 table and 277 references, 91 of which are Soviet.

Card 1/1

BABKO, A.K.; GORDEYEVA, L.M.

Ternary complexes in the system titanium (IV) - pyrocatechol -
organic base. Ukr. khim. zhur. 26 no.6:762-766 '60.
(MIRA 14:1)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.
(Titanium compounds)   (Pyrocatechol)
(Quinoline)

BABKO, A. K.; MARCHENKO, P. V.

Photometric determination of boron in steel with brilliant green.
Zav.lab. 26 no.11:1202-1206 '60.   (MIRA 13:11)

1. Institut obshchey i neorganicheskoy khimii Akademii nauk USSR.
        (Boron--Analysis)   (Steel)

S/137/62/000/003/180/191
A160/A101

AUTHORS: Babko, A. K.; Rybal'chenko, L. V.

TITLE: Comparison characteristic of methods for determining zirconium in titanium-zirconium ores

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 3, abstract 3 K 10 (Khim., fiz.-khim. i spektr. metody issled. rud redk. i rasseyan. elementov," Moscow, Gosgeoltekhizdat, 1961, 5 - 12)

TEXT: Methods used for determining Zr in ores containing 1 - 30 % ZrO_2, 1 - 2 % Fe_2O_3 and 30 - 50 % TiO_2 included precipitation of Zr with the aid of salicylic, phenylarsonic, phthalic and mandelic acids and cupferron, in the form of phosphate and hydroxyquinoline, and a titration of Zr with versene solution. It has been found that for ores of this type the methods using salicylic, phenyl-arsonic and phthalic acids are ineffective, because they do not ensure a suffi-cient separation of Zr and Ti. Mandelic acid, phosphate-hydroxyquinoline methods and the method using versene can be used for analyzing titanium-zirconium ores. The latter method is least time consuming and produces satisfactory results. Its

Card 1/2

Comparison characteristic of methods .....

S/137/62/000/003/180/191
A160/A101

shortcoming consists in unclear transition of indicator's (eriochrome black) coloration at the end of titration. This method must be somewhat improved. There are 14 references.

N. Gertseva

[Abstracter's note: Complete translation]

Card 2/2

BABKO, A.K. akademik; SHTOKALO, M.I.

Reaction of niobium with xylenol orange. Dop. AN URSR no.9:1179-1182 '61.   (MIRA 14:11)

1. Institut obshchey i neorganicheskoy khimii AN USSR.
2. AN USSR (for Babko).
            (Niobium)
            (Xylenol)

BABKO, A.K., akademik; KISH, P.P.

Investigation of reagents for the photometric determination of indium. Dop. AN URSR no.10:1323-1326 '61.   (MIRA 14:11)

1. Uzhgorodskiy gosudarstvennyy universitet. 2. AN USSR (for Babko).

(Indium)
(Photometry)

21363
S/021/61/000/011/011/011
D299/D304

$S.2620$

AUTHORS: Babko, A. K., Academician AS UkrRSR, and Lukachina, V. V.

TITLE: Investigating ternary complexes of tantalum and niobium by means of pyrogallol and addend III

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi, no. 11, 1961, 1504-1507

TEXT: Tantalum- and niobium complexes, formed in the presence of pyrogallol (H_2Pg) and ethylenediamine tetra-acetic acid (denoted in the following by EDTA) were studied by spectrophotometric methods. The spectrophotometer $C\Phi-4$ (SF-4) was used. The absorption spectra showed that by adding EDTA to the solutions of pyrogallate complexes of tantalum and niobium, new complex compounds are formed, having characteristic (eigen) absorption bands with λ_{max} = 375 mμ (for tantalum) and 480 mμ (for niobium). In order to determine the nature of the EDTA interaction, the isomolar series EDTA-tantalum (niobi-

Card 1/3

Investigating ternary complexes ...

21363
S/021/61/000/011/011/011
D299/D304

um) were studied in the presence of excess pyrogallol. Tantalum (niobium) pyrogallate also absorbs light. It was found that EDTA acts not only as a medium, but enters into the composition of pyrogallate complexes of tantalum and niobium, forming compounds in the ratio EDTA:Ta (Nb) = 1:1. The three-component systems form ternary compounds which have 2 different addends in the coordination sphere. The formation of new absorption bands (under the action of the EDTA) is apparently due to a change in the state of the central atom in

a reaction of type $NbO_3^- + H_4Y \rightleftarrows NbOY^- + 2H_2O$. Graphs show the effect of pyrogallol concentration on the niobium (tantalum) complexes and other graphs show the effect of EDTA concentration on niobium (tantalum) pyrogallate. It was found that the dependence of 1 g $\dfrac{[Nb \cdot Y \cdot Pg \ m]}{[NbY]}$ on 1 g $[H_2Pg]$ is linear with $tg\alpha = 1$; hence the number of moles of pyrogallol m = 1, which confirms the results of the isomolar series. Knowing the composition and the molar coefficients of absorption ($E_{Ta}^{(375)} \approx E_{Nb}^{(480)} = 5700$) of the ternary complexes, it

Card 2/3

21363
S/021/61/000/011/011/011
D299/D304

Investigating ternary complexes ...

is possible to calculate their dissociation constants. These constants are listed in 2 tables. There are 4 figures, 2 tables and 6 references: 2 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publications read as follows: E. C. Hunt, R. A. Wells, Analyst, 79, 345, 1954; D. F. Wood, I. A. Scholes, Anal. Chim. Acta, 21, 121, 1959; K. S. Lee, E. O. Price, J. E.Land, J. Amer. Chem. Soc., 78, 1325, 1956; V. Patrovsky, Collection, 23, 1774, 1958.

ASSOCIATION: Instytut zahal'noyi ta neorhanichnoy khimiyi AN USSR (Institute of General and Inorganic Chemistry AS UkrRSR)

SUBMITTED: June 8, 1961

X

Card 3/3

BIDKO, A.K.; SHKARAVSKIY, Yu.F.

Extraction of heteropolyacids. Siliconolybdic acid. Izv.vys. ucheb.zav.;khim.i khim.tekh. 4 no.3:370-373 '61.
(MIRA 14:10)

1. Kiyevskiy gosudarstvennyy universitet imeni Shevchenko, kafedra analiticheskoy khimii.
(Siliconolybdic acid)

BABKO, A.K.; DUBOVENKO, L.I.

Equilibrium in solution during the interaction of tricharged cations with doubly charged addenda. Zhur. neorg. khim. 6 no.1:136-139 '61.
(MIRA 14:2)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.
(Complex ions)   (Dissociation)

S/078/61/006/002/005/017
B017/B054

AUTHORS: Babko, A. K., Volkova, A. I., Get'man, T. Ye.

TITLE: Crystalline Salicylate Complex Compounds of Titanium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1961, Vol. 6, No. 2,
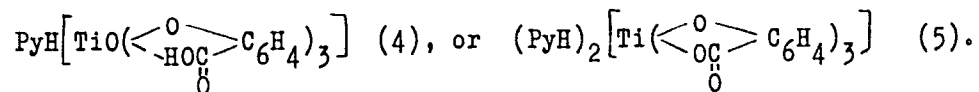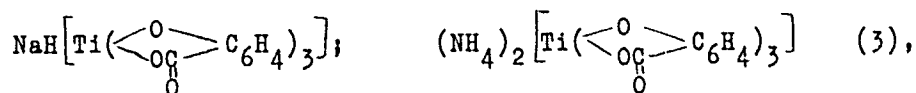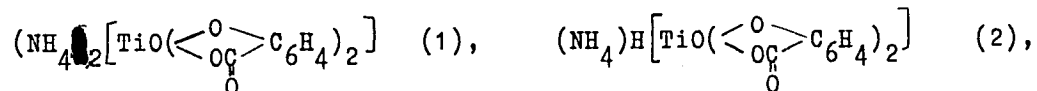   pp. 354 - 359

TEXT: The authors studied the composition and properties of salicylate
and pyridine salicylate complexes of titanium separated from aqueous solu-
tions in solid form. The solubility of titanium salicylate depends on the
pH of the solution. Fig. 1 shows the solubility of titanium salicylate as
dependent on the pH of the solution. The formation of titanium salicylate
complexes from aqueous solutions proceeds stepwise. The investigation of
the composition of the crystalline titanium salicylate complexes shows
that the titanium salicylate ratio in these compounds in dependence on the
pH of the solution is 1 : 1, 1 : 2, and 1 : 3. The pyridine salicylate
complexes of titanium were produced by adding pyridine to the aqueous
titanium salicylate solution, a fine crystalline yellow powder being formed
in the cold, in which the ratio of components Ti : Sal : Py = 1 : 3 : 1,

Card 1/3

Crystalline Salicylate Complex Compounds   S/078/61/006/002/005/017
of Titanium   B017/B054

whereas from hot solutions a crystalline orange-colored precipitate is
separated in which the ratio of components Ti : Sal : Py = 1 : 3 : 2.
Titanium pyridine salicylates are extractable with chloroform. The
following formulas were suggested for the structure of solid titanium
salicylate complexes:

$$(NH_4)_2 \left[TiO \left(<^{O}_{OC} > C_6H_4 \right)_2 \right] \quad (1), \qquad (NH_4)H \left[TiO \left(<^{O}_{OC} > C_6H_4 \right)_2 \right] \quad (2),$$

$$NaH \left[Ti \left(<^{O}_{OC} > C_6H_4 \right)_3 \right]; \qquad (NH_4)_2 \left[Ti \left(<^{O}_{OC} > C_6H_4 \right)_3 \right] \quad (3),$$

$$PyH \left[TiO \left(<^{O}_{-HOC} > C_6H_4 \right)_3 \right] \quad (4), \quad or \quad (PyH)_2 \left[Ti \left(<^{O}_{OC} > C_6H_4 \right)_3 \right] \quad (5).$$

Card 2/3

Crystalline Salicylate Complex   S/078/61/006/002/005/017
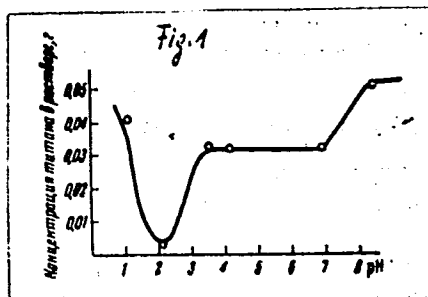Compounds of Titanium   B017/B054

There are 2 figures, 2 tables, and 8 references: 4 Soviet, 3 German, and
1 French.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR (Insti-
               tute of General and Inorganic Chemistry, Academy of Sciences
               UkrSSR)

SUBMITTED: . December 28, 1959

Legend to Fig. 1: a) concentration
of Ti in the solution

Fig. 1

Card 3/3

BABKO, A.K.; VOLKOVA, A.I.; GET'MAN, T.Ye.

Determination of the composition of strongly hydrolyzing cations.
Zhur.neorg.khim. 6 no.5:1035-1041 My '61.

(MIRA 14:4)

1. Institut obshchey i neorganicheskoy khimii AN USSR.

(Complex compounds)

BABKO, A.K.; GRIDCHINA, G.I.

Study of the polymerization of zirconium ions in solutions by
means of dialysis. Zhur.neorg.khim. 6 no.6:1326-1331 Je '61.
(MIRA 14:11)

1. Institut obshchey i neorganicheskoy khimii AN USSR.
(Zirconium) (Complex compounds)

BABKO, A.K.; SHKARAVSKIY, Yu.F.

Study of the phosphorotitanomolybdenum complex. Zhur.neorg.khim.
6 no.9:2091-2097 S '61.   (MIRA 14:9)

1. Institut obshchey i neorganicheskoy khimii Akademii nauk USSR.
          (Titanium compounds) (Molybdenum compounds)

BABKO, A.K.; CHALAYA, Z.I.

Fluorescence method used in the determination of microamounts of metals in the form of compounds of metalthiocyanate (halide) with a basic dye. Report No.1: Determination of zinc by the fluorescence quenching of aqueous solution of rhodamine C. Zhur.anal.khim. 16 no.3:268-271 My-Je '61.
(MIRA 14:6)

1. T. G. Shevchenko Kiev State University.
                (Zinc —Analysis)
                (Rhodamine)
                (Fluorescence)

BABKO, A.K.

"Inorganic ultramicroanalysis" by I. P. Alimarin, M.N. Petrikova.
Reviewed by A. K. Babko. Zhur.anal. khim. 16 no.3:377-378 My-Je '61.
(MIRA 14:6)

(Microchemistry)
(Chemistry, Inorganic)
(Alimarin, I.P.)(Petrikova, M.N.)

BABEC, A.K.; LULIC, V.V.

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106 '1.   (~~~ 14~~)

1. ~~~~~~~~ ~~~~~~~~ ~~ ~~~~ ~~~tet im. T.G. Shevchenko.
          (T~~ ~~~ ~~~~~~~~)

11. 2140

24070
S/073/61/027/003/001/004
B103/B203

AUTHORS: Babko, A. K., Ul'ko, N. V.

TITLE: Peroxide complexes of zirconium

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, v. 27, no. 3, 1961, 290-295

TEXT: The authors proved the existence of water-soluble peroxide com-
plexes of zirconium (Zr). These complexes have a ratio $Zr : H_2O_2 = 1 : 1$
and $2 : 1$ in strongly acid medium ($1 - 2$ N HCl), and $1 : 2$ in alkaline
medium (pH 12 - 14). No data have been published on composition and sta-
bility of these complexes. (A) Study of the system $[TiO(H_2O_2)]^{2+} - Zr^{4+}$
in acid medium by the method of isomolar series. The authors prepared
0.03 M solutions of titanium- (Ti) and Zr chlorides in 1 N HCl and mixed
the solution of the titanium peroxide complex ($Ti : H_2O_2 = 1 : 1$) with
solutions of zirconium chloride. After filling to 50 ml with HCl, they
measured the optical density D' with an ФМ (FM) photometer. From the dif-
ference between the optical density (D) of a specimen series without Zr,
and D' (Fig. 1) it is concluded that several Zr peroxide complexes are

Card 1/7

Peroxide complexes of...

24070
S/073/61/027/003/001/004
B103/B203

formed, those with a ratio Zr : H_2O_2 = 2 : 1 and 1 : 1 prevailing. Since experiments in 1 N and 2 N HCl yielded the same results, the authors conclude that the equilibrium is independent of $[H^+]$ in the complex formation in acid medium. Since Zr and H_2O_2 move toward the cathode in the electrolysis of acid solutions, the Zr^2 peroxide complexes are products of accumulation of H_2O_2 molecules on Zr or zirconyl ions. (B) Method of isomolar series and absorption spectra in the ultraviolet range. Spectra of solutions of zirconium chloride and H_2O_2 of the same concentration in 2 N HCl were measured with an $C\Phi$-4 (SF-4) ^{2} instrument at λ 350 to 250 mμ. The spectra of Zr peroxide complexes differed from those of H_2O_2. Similar measurements as under (A) of D' (Zr and H_2O_2) and D (H_2O_2 without Zr) confirmed the existence of the two complexes. (C) Equilibrium in the system $[TiO(H_2O_2)]^{2+}$-ZrO^{2+}. Experiments were made with constant concentration of the Ti complex $2.1 \cdot 10^{-3}$ mole. The Zr concentration was varied. On the basis of equations for the established equilibrium of the dissociation constants of the resulting complex, the authors calculated the dissociation constant:

$$\log \frac{\left[((ZrO)_n H_2O_2)^{2n+}\right]}{\left[H_2O_2\right]_{free}} = n \log \left[ZrO^{2+}\right] + p, \text{ where } p = -\log K \quad (6).$$

Card 2/7

Peroxide complexes of...

According to test conditions, $[Ti_{tot}] = [H_2O_{2tot}] = 21 \cdot 10^{-4}$ moles. From the data of Figs. 1 and 4, they calculated the concentration of free TiO^{2+}.

On the basis of $[TiO(H_2O_2)]^{2+} + nZrO^{2+} \rightleftharpoons [(ZrO)_nH_2O_2]^{2n+} + TiO^{2+}$ (1),

$[((ZrO)_nH_2O_2)^{2n+}] = [TiO^{2+}_{free}]$. The concentration of free H_2O_2 is equal to the equilibrium concentration of $[(TiOH_2O_2)^{2+}]$. It can be determined from the data of Figs. 1 and 4. On the basis of their results, the authors

calculate the value of $\log \dfrac{[((ZrO)_nH_2O_2)^{2n+}]}{[H_2O_{2free}]}$ for certain values of

$\log [ZrO^{2+}]_{free}$, whose concentration is determined by the equation

$[ZrO^{2+}]_{free} = [ZrO^{2+}]_{introd} - [((ZrO)_nH_2O_2)^{2n+}]$. Fig. 5 shows the function

$\log \dfrac{[((ZrO)_nH_2O_2)^{2n+}]}{[H_2O_2]_{free}} = F\{\log [ZrO^{2+}]_{free}\}$. The inclination (tan α) of

the straight line is equal to the coordination number n. With low concentrations of Zr^{2+}, the inclination of the lower section of the curve is

Card 3/7

Peroxide complexes of...

near n = 1, while the upper one suggests a possible formation of peroxide complexes with n>1 in the system. The calculated equilibrium constants of the complex formation with a ratio $Zr : H_2O_2 = 1 : 1$ are not stable, and vary between 0.04 and 1.01. The complex with $Zr : H_2O_2 = 2 : 1$ forms in prevalent quantity if the total concentration of Zr is higher than that of H_2O_2, i. e., from $[Zr^{2+}] = 24 \cdot 10^{-4}$ mole to $42 \cdot 10^{-4}$ mole (Fig. 4). Then the calculated values of the equilibrium constant of the complex formation lie between $1.58 \cdot 10^{-6}$ and $3.7 \cdot 10^{-6}$. A complex of the dimer $(ZrO^{2+})_2$ with H_2O_2 is formed. (D) Zr peroxide complex in alkaline medium. At pH 12 - 14, Zr forms a soluble peroxide complex, and does not precipitate as a hydroxide. Since at pH 14, a Zr- and H_2O_2-containing, fine-crystalline precipitate is formed on settling, the authors studied the equilibrium between this poorly soluble compound and the soluble complex. The Zr concentration remained constant, that of H_2O_2 was varied. It was found that $Zr : H_2O_2$ was about 1 : 2 in the solution. As long as this ratio in the solution is

Card 4/7

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Peroxide complexes of...   B103/B203

below 1 : 2, no precipitate is formed. The Tyndall cone appears only
when this ratio is overstepped. It is concluded that at least 2 moles
H_2O_2 in the solution are required to keep 1 mole Zr in solution. Thus,
a Zr peroxide complex with a ratio Zr : H_2O_2 = 1 : 2 should exist in the

alkaline solution. Since the complex ion in the electrolysis wanders to
the anode, the formula $[ZrO(O_2)_2]^{2-}$ is ascribed to it. There are 5 fig-
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