On the Absolute Age of the Rocks of the East-Antarctic Platform SOV/20-126-1-39/62

first 40 determinations of the absolute age by means of the argon method made more precise ideas possible concerning the structure of the aforesaid plateau. Several results were surprising and their geological interpretation meets with serious difficulties (Table 1). The highest age, i. e. 1020-1270 million years were obtained at first for the oases Lengeneset, Grirson, Banger, and Obruchev, i. e. for leucocratic granites and pegmatites. The age of the weakly migmatitic (Banger oasis andother regions of the crystalline basement) rocks fluctuates between 940 and 1050 million years. So-called poly-migmatites which are 700-730 million years old occur at the same time at several places, especially in the Banger oasis. Thus two migmatitization stages can be separated: a) an earlier one which occurred more than 1000 million years ago, and b) a late one - more than 700 million years ago. Thus the migmatitization of the oldest masses of the eastern Antarctic belongs to the Proterozoic. A packet of gneisses in the region of the Einsvort bay and the Vil'son elevation is for the time being the only exception. Weakly migmatitized biotite-gneisses are here 425-485 million years old. This agrees almost with the age of the

On the Absolute Age of the Rocks of the East-Antarctic Platform SOV/20-126-1-39/62

here occurring porphyroblastic granites. The age of the green schists and mica phyllites (middle stage of the plateau) fluctuates between 400 and 500 million years. This corresponds to Sinisian and Lower Cambrian. The Rapakivi granites in the extreme east of the investigated region has approximately the same age. The most recent granitoids are the subalkaline biotite-hornblende varieties. They are Caledonian, with an age of 305-315 million years. The age of the gabbro-dolerite from a stratiform intrusion within the Bikon (Beakon) series (170 million years old) agrees rather well with the geological position (Lower Triassic). The same holds in the case of Tertiary leucite-granite (mountain Gauss) which is approximately 20 million years old. The age determinations of the mentioned rocks confirm on the whole the authors' assumption concerning the 3-stage structure of the plateau. The old Gerling constant $\lambda_k = 6.02 \cdot 10^{-11}$ year^{-1} which is much used in the USSR was used for the determination. The data are only temporary and probably

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somewhat too low. There are 1 table and 3 Soviet references.

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR). Nauchno-issledovatel'skiy institut geologii Arktiki (Scientific Research Institute of the Geology of the Antarctic)

SUBMITTED: January 19, 1959

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3(1)

AUTHORS: Starik, I. Ye., Corresponding Member, AS USSR, Sobotovich, E. V., Lovtsyus, G. P., Shats, M. M., Lovtsyus, A. V.

SOV/20-128-4-14/65

TITLE: Isotopic Composition of Lead in Iron Meteorites

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 4, pp 688-690 USSR

ABSTRACT: C. Patterson et al. (Refs 1,3) found the same composition with respect to lead isotopes in 3 different meteorites, i.e. Pb^{204} 1; Pb^{206} 9.5; Pb^{207} 10.4; Pb^{208} 29.5. His data are in good accordance with the theoretically predicted isotopic composition of lead in iron meteorites. Several authors theoretically computed the isotopic composition of the original lead, extrapolating back into the past (4.5 billion years) the change in the isotopic composition of the lead of varying age found in ore. The values obtained in this way are close to those established experimentally by Patterson. The authors intended to carry out a close investigation of the problem mentioned in the title. They first examined the lead content of the Sikhote-Alin' and Chinge meteorites (I. Ye. Starik,

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Isotopic Composition of Lead in Iron Meteorites SOV/20-128-4-14/65

E. V. Sobotovich, G. P. Lovtsyus, Ref 2). The lead content of these meteorites in the metallic phase is less by at least one order of magnitude than that published by Patterson for the Cañon Diavolo meteorite ($3.7 \cdot 10^{-7}$ g/g). The isotopic composition of the troilite and of the metallic phase of the Sikhote-Alin' meteorite are entirely different from the Patterson data. Because of this discrepancy the authors analyzed the meteorites examined by Patterson. The meteorite samples were chemically separated and the lead was pyrochemically removed (E. V. Sobotovich, Ref 4). Table 1: degree of impurity of the meteorite caused by foreign lead. This impurity caused by foreign lead is only 10-24%. Assuming that iron meteorites contain original lead, the impurity by ordinary lead must be at least 1000% of its cosmic content. These experiments confirmed the results obtained on content and isotopic composition of the lead in the analyzed iron meteorites and they made possible to introduce a correction for the foreign-lead impurity. Table 2 contains data on the isotopic composition of the lead in 3 iron meteorites and the troilites contained in them. According to it the composition

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Isotopic Composition of Lead in Iron Meteorites SOV/20-128-4-14/65

of the Sikhote-Alin' and Hanbury meteorites is the usual and the isotopic composition of the lead in the ore is analoguous to an age of several hundreds of millions of years. The results obtained by the authors are factually valid for the lead contained in the iron meteorite and they cannot be explained by impurities caused by ordinary lead during the analysis. According to the results of the present paper the meteorites have no common genesis in spite of the generally accepted theory. Possibly some of them do not belong to our solar system or they were formed under conditions when lead originating from radioactive processes was already present. These meteorites therefore cannot be as old as was previously assumed. If these meteorites do not originate from our solar system, nothing precise can be said about them. If they come from our solar system they have developed 400-500 millions of years ago. The authors express their acknowledgements to the Komitet po meteoritam AN SSSR (Committee for Meteorites of the AS USSR) and the Estonskiy geologicheskiy institut (Estonian Geological Institute) for putting at their disposal the meteorite samples. There are 2 tables and 4 references, 2 of which are Soviet.

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Isotopic Composition of Lead in Iron Meteorites SOV/20-128-4-14/65

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences, USSR)

SUBMITTED: July 6, 1959.

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SOV/20-129-5-50/64

~~5(0)~~

AUTHORS: Starik, I. Ye., Corresponding Member, AS USSR, Kuznetsov, Yu. V., Nikolayev, D. S., Legin, V. K., Lazarev, K. F., Grashchenko, S. M., Kolyadin, L. B.

TITLE: Distribution of Radio Elements 19 in the Sediments of the Black Sea 12

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 5, pp 1142-1145 (USSR)

ABSTRACT: The radioactivity of the sediments in the enclosed seas is almost uninvestigated. The Black Sea shows characteristic hydrological and hydrochemical conditions. It is also intensively fed with sedimentary material. For this reason its sedimentation strongly differs from that in large oceanic waters (Ref 5). In this connection the authors wanted to explain the influence of these specific conditions on the sedimentation and on the type of distribution of the radio elements in the Black Sea bottom sediments. The results achieved are not sufficient to draw final conclusions. For this reason only some assumptions are expressed. The authors studied the vartical distribution of uranium, radium, ionium, thorium, iron, and calcium in a sediment core which was taken from the central part of the Black Sea from a depth of 2137 m. It was 227 cm long and consisted mainly of gray homogeneous clay with 5 intermediate sand strata. The upper 18 cm

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SOV/20-129-5-50/64

Distribution of Radio Elements in the Sediments of the Black Sea

consisted of extremely fine-disperse mud with thin sapropel intermediate strata. Figure 1 shows the vertical distribution of the above-mentioned elements in the core. Table 1 gives the corresponding figures. From these data it may be concluded that in the upper horizons of the core the radioactive equilibrium in the uranium series is widely disturbed: the ionium content is almost 4 times higher than the amount corresponding to the equilibrium with uranium; the radium content, however, constitutes only 1/4 of this amount. The radium content in the water of the Black Sea is only 15% of the equilibrium value of uranium dissolved in the water. Thus the radium content in the sediment is hardly one fourth of the amount which should be measured if 85% of the radium were sedimentated from the water. Assuming that no radium migration takes place in the cores of marine sediments (Ref 1) the discrepancy in the radium balance in the water and in the sediment of the Black Sea may be explained by radium leaching from the sediment in its upper layers. On the other hand, the upper horizons are considerably enriched with ionium and uranium. Their content decreases downwards to 42-48 cm rapidly and then practically remains constant. According to N. M. Strakhov more than 50% of $CaCO_3$ were sedimentated by chemical

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Distribution of Radio Elements in the Sediments of the Black Sea

methods. The main bulk of iron, however, is transported into the deep-seated sediments with the river water. The authors conclude therefrom that the vertical $CaCO_3$-distribution reflects the change of the chemical conditions in the course of time. Since the vertical distribution of ionium and uranium agrees with that of $CaCO_3$ it indicates that the main amount of ionium and uranium was separated from the solution. On the other hand it may be concluded from the parallel change in the thorium content with that of iron that the major part of thorium is of terrigenous origin. The authors calculated the rate of sedimentation in the Black Sea from the data from table 1. It is 12-13 cm within thousand years. If it is however assumed that in the horizon 100-106 cm the equilibrium between ionium and uranium is still attained (Fig 2) the rate of sedimentation is only 0.4-0.5 cm per 1000 years. The problem as to which of the two values is correct has hitherto not been definitely solved. There are 2 figures, 1 table, and 6 references, 4 of which are Soviet.

SUBMITTED: August 22, 1959

Card 3/3

STARIK, I. Ye., RUDENKO, S. I., ARTEMEV, V. V., BUTOMO, S. V., DROZHZHIN, V. M.,
ROMANOVA, Ye. N. (USSR)

"Liquid Scintillators for Radiocarbon Dating in Archaeology [illegible]."

report presented at the Conference on Radioisotopes in Metallurgy and Solid State Physics, IAEA, Copenhagen, 6-17 Sept. 1960.

STARIK, I.Ye.

PHASE I BOOK EXPLOITATION SOV/4290
SOV/37-S-38

Akademiya nauk SSSR. Komitet po meteoritam

Meteoritika; sbornik statey, ~~vyp.~~ 18 (Meteoritics; Collection of Articles, No. 18)
Moscow, AN SSSR, 1960. 1,200 copies printed.

Ed.: V.G. Fesenkov, Academician; Deputy Resp. Ed.: Ye.L. Krinov; Ed. of Publishing
House: I.Ye. Rakhlin; Tech. Ed.: A.P. Guseva.

PURPOSE: This publication is intended for astrophysicists, astronomers, and geolo-
gists, particularly those interested in the study of meteorites.

COVERAGE: This collection of 26 articles on problems in meteoritics includes the
Transactions of the Eighth Meteoritic Conference which took place in Moscow,
June 3 - 5, 1958. An introductory article reviews recent progress in the field,
particularly in the matter of determining the age of meteorites. Individual
articles discuss the fall, physical and chemical properties, and age of meteor-
ites. The danger presented by meteors to artificial earth satellites is dis-
cussed. V.G. Fesenkov describes the theory and adduces computations for

determining the distribution of ozone in the atmosphere during lunar eclipses.
References accompany individual articles.

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(15)

STARIK, I.Ye., otv.red.; TARASOV, L.S., red.izd-va; BRUZGUL', V.V., tekhn.red.

[Determination of the absolute age of Pre-Quaternary geological formations] Opredelenie absoliutnogo vozrasta dochetvertichnykh geologicheskikh formatsii. Moskva, Izd-vo Akad.nauk SSSR, 1960. 251 p. (Doklady sovetskikh geologov. Problema 3). (MIRA 13:10)

1. International Geological Congress. 21st, Copenhagen, 1960.
2. Chlen-korrespondent AN SSSR (for Starik).

(Geological time)

STARIK, I.Ye., otv.red.; SHCHERBAKOV, D.I., akademik, zamestitel' otv.red.; BARANOV, V.I., prof., zamestitel' otv.red.; SHATSKIY, N.S., akademik, red.; POLKANOV, A.A., akademik, red.; VINOGRADOV, A.P., akademik, red.; AFANAS'YEV, S.D., red.; GERLING, E.K., prof., red.; PEKARSKAYA, T.B., kand.geologo-mineral.nauk, red.; IVANOV, B.V., red.izd-va [deceased]; GUSEVA, A.P., tekhn.red.

[Transactions of the sixth session of the Committee on the Determination of the Absolute Chronology of Geological Formations, May 22-27, 1957] Trudy shestoi sessii komissii po opredeleniiu absoliutnogo vozrasta geologicheskikh formatsii; 22-27 maia 1957 g. Moskva, 1960. 306 p. (MIRA 13:7)

1. Akademiya nauk SSSR. Komissiya po opredeliniyu absolyutnogo vozrasta geologicheskikh formatsiy.
(Geological time)

STARIK, I.Ye., otv.red.; SHCHERBAKOV, D.I., akademik, zamestitel' otv. red.; BARANOV, V.I., prof., zamestitel' otv.red.; VINOGRADOV, A.P., akademik, red.; POLKANOV, A.A., akademik, red.; SHATSKIY, N.S., akademik, red.; AFANAS'YEV, G.D.; GERLING, E.K., prof., red.; PEKARSKAYA, T.B., kand.geol.-miner.nauk, red.; SIMKIN, S.M., red. izd-va; MAKUNI, Ye.V., tekhn.red.

[Transactions of the Seventh Commission on the Determination of the Absolute Chronology of Geological Formations] Trudy Sed'moi sessii Komissii po opredeleniiu absoliutnogo vozrasta geologicheskikh formatsii, 8-12 maia 1958 g. Moskva, 1960. 432 p. (MIRA 13:6)

1. Akademiya nauk SSSR. Komissiya po opredeleniyu absolyutnogo vozrasta geologicheskikh formatsiy. 2. Chleny-korrespondenty AN SSSR (for Starik, Afanas'yev).

(Geology, Stratigraphic)

PHASE I BOOK EXPLOITATION SOV/4626

Starik, Iosif Yevseyevich, Corresponding Member of the Academy of Sciences USSR

Osnovy radiokhimii (Principles of Radiochemistry) Moscow, Izd-vo AN SSSR, 1960. 459 p. Errata slip inserted. 10,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Radiyevyy institut imeni V.G. Khlopina.

Ed. of Publishing House: G.M. Aron; Tech. Ed.: R.A. Zamarayeva.

PURPOSE: This book is intended for researchers in radiochemistry; it may also be used as a text for students and aspirants.

COVERAGE: This is the first systematic book on the theoretical principles of modern radiochemistry following the ideas of the Soviet radiochemistry school founded by the chemist V.G. Khlopin. The material is based on a course in radiochemistry taught by the author at the Leningradskiy gosudarstvennyy universitet (Leningrad State University) over a period of 12 years. It covers the laws of radioactive isotope behavior and properties of individual radioactive isotopes,

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STARIK, I.Ye.; SOBOTOVICH, E.V.; LOVTSYUS, G.P.

Determining the lead content of iron meteorites. Meteoritika no.19: 100-102 '60. (MIRA 13:11)
(Meteorites--Analysis) (Lead)

S/186/60/002/002/021/022
E071/E433

AUTHORS: Starik, I.Ye., Arslanov, Kh.A., and Zharkov, A.P.

TITLE: A scintillation technique of counting natural radioactive carbon and its application for the determination of absolute age

PERIODICAL: Radiokhimiya, 1960, Vol.2, No.2, pp.259-260

TEXT: The scintillation technique is little used for the determination of age probably due to the complexity of the chemical preparation of specimens. The authors developed a method of counting natural radioactive carbon in the form of ethylbenzene or benzene. The scheme of preparation of specimens is as follows:

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A scintillation technique ...

S/186/60/002/002/021/022
E071/E433

A complete method of chemical treatment will be described later. The measurement of specific activities of ethylbenzene and [illegible] benzene was carried out using a coincidence technique. The method has been used for one year for dating geological specimens and due to its high efficiency can be used for other soft β radiations. There are 1 table and 2 references: 1 Soviet and 1 non-Soviet.

SUBMITTED: January 12, 1960

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24098

S/186/60/002/006/024/026
A051/A129

21.4200

AUTHORS: Starik, I. Ye.; Lazarev, K. F.

TITLE: The effect of grinding minerals on the extractability of radioactive elements

PERIODICAL: Radiokhimiya, v. 2, no. 6, 1960, 749 - 752

TEXT: The relationship between the extractability of ThX, U, RdTh and Th atoms and the degree of grinding of monazite samples was studied. It was shown that the change in the lixiviation depends not only on the change in the surface of the mineral when the latter is ground, but also on the change in the adsorption properties of the surface. It was established that with an increase in the specific surface of the minerals the lixiviation percentage of the radium isotopes increases. In some cases this relationship was linear. The ratio of lixiviated ThX and U remains constant within the limits of error when monazite is ground, regardless of an increase in the specific surface by over 100 times. It is assumed that the behavior of the thorium isotope is connected with the change of the adsorption properties of the mineral surface when ground. The percentage of desorption of the thorium atom from the walls of the capillaries de-

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A051/A129

The effect of grinding minerals on the ....

creases when going over to samples of less than 0.25 mm grinding. The increase in the adsorption properties of the mineral surface is associated with the appearance of a high specific surface in the particle samples ($\Sigma > 800$ cm^{-1}). The values of the maximum lixiviation of RdTh and Th were computed from the formula of (Ref. 10: K. F. Lazarev, Radiokhimiya, 1, 5, 603, 1959):

$$B = \frac{b \cdot 100}{\%\ \text{indicator yield}},$$

where B is the percentage of the maximum lixiviation of the radioelement and b the percentage of lixiviation of the radioelement under the conditions of the experiment. By comparing the values of the maximum lixiviation of the investigated isotopes, it was noted that with an increase in the degree of grinding of the mineral their ratios $\left(\frac{B_{ThX}}{B_U}, \frac{B_{ThX}}{B_{RdTh}}, \frac{B_{ThX}}{B_{Th}}\right)$ remain constant within the margin of error of the experiment. The constancy confirms the homogeneous distribution of the radioelements in the capillaries of the

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A051/A129

The effect of grinding minerals on the ....

investigated sample of the mineral which proves its preservation. It is therefore thought that the conducted investigation may serve as an additional criterion for determining the preservation of the mineral sample. There are 2 tables, and 10 Soviet-bloc references.

SUBMITTED: February 3, 1960.

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S/020/60/134/003/006/020
B019/B060

AUTHORS: Starik, I. Ye., Corresponding Member of the AS USSR, Sobotovich, E. V., Lovtsyus, G. P., Shats, M. M., Lovtsyus, A. V.

TITLE: Lead and Its Isotopic Composition in Iron Meteorites

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 3, pp. 555 - 558

TEXT: By way of introduction the authors refer to their discovery (Ref. 1) that meteorites contain lead with various isotopic compositions. The present article deals with the investigation of all main groups of iron meteorites (octahedrites of various structure, hexahedrites, and ataxites). From two to three quantitative analyses were made on all of the 12 meteorites investigated, and the isotopic composition of lead was determined at the same time. The results tabulated in Table 1 show that in the majority of these meteorites the isotopic composition of lead corresponds to that of terrestrial lead. No intermediate isotopic composition of lead was discovered. Judging from their composition, the

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12 meteorites can be classified into two groups. The first comprises four meteorites of the same isotopic composition of lead as was first ascertained by Patterson (Ref. 2) and later by the authors themselves. These meteorites are octahedrites of various structures and contain $1 - 2\cdot10^{-7}$ g Pb per gram. The second group comprises the remaining eight meteorites containing lead with an isotopic composition corresponding to terrestrial lead of various ages. All principal meteoritic groups are represented here. All hexahedrites and ataxites thus belong to that group which contains lead in terrestrial isotopic composition. In them, the lead concentration lies at the lower distribution limit of $2 - 4\cdot10^{-8}$ g Pb per gram. The same lead content was established for coarsely structured octahedrites. A lead content of $2\cdot10^{-7}$ g Pb per gram was found for medium-structured octahedrites. The first group did not exhibit any marked inhomogeneity in the lead distribution, while the inhomogeneous lead distribution in the second group accounted for difficulties encountered in the determination of the lead content. There are cases in which meteoritic surface zones contain more or less lead

Lead and Its Isotopic Composition in Iron Meteorites

S/020/60/134/003/006/020
B019/B060

than the core. Closer studies are required to explain this. No relationship was established between the lead content and the isotopic composition on the one hand, and the type and structure of iron meteorites on the other. Reference is made to the one to two times larger lead content in troilite inclusions as compared with the content in the iron-nickel phase. Indications regarding the formation of iron meteorites were inferred from the existence of the two groups. The conclusion is drawn from the existence of two analogous groups in stony meteorites that the analogous groups originate from a parental body. The authors thank L. G. Kvash and A. A. Yavnel' for their valuable advice. They further thank the komitet po meteoritam AN SSSR (Committee on Meteorites of the AS USSR), the komitet po meteoritam AN BSSR (Committee on Meteorites of the AS BSSR), the Tartusskiy geologicheskiy muzey (Tartu Geological Museum), and the Leningradskiy gornyy muzey (Leningrad Mining Museum). There are 1 table and 5 references: 3 Soviet and 2 British.

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Lead and Its Isotopic Composition in Iron Meteorites

S/020/60/134/003/006/020
B019/B060

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin of the Academy of Sciences USSR)

SUBMITTED: June 4, 1960

Card 4/4

STARIK, I.Ye.; RAVICH, M.G.; KRYLOV, A.Ya.; SILIN, Yu.I.; ATRASHENOK, L.Ya.; LOVTSYUS, A.V.

Recent data on the absolute age of rocks in eastern Antarctica. Dokl. AN SSSR 134 no.6:1421-1423 O '60. (MIRA 13:10)

1. Radiyevyy institut im. V.G.Khlopina Akademii nauk SSSR. 2. Chlen-korrespondent AN SSSR (for Starik).
(Antarctic regions--Rocks) (Geological time)

STARIK, Iosif Yevseyevich; SMIRNOVA, N.P., red.; NAZAROVA, A.S.,
tekhn.red.

[The age of rocks and of the earth; based on radioactive data]
Vozrast gornykh porod i zemli; po radioaktivnym dannym.
Moskva, Izd-vo "Znanie," 1961. 31 p. (Vsesoiuznoe obshchestvo
po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.12,
Geologiia i geografiia, no.6). (MIRA 14:4)

1. Chlen-korrespondent AN SSSR (for Starik).
(Earth--Age)

STARIK, I.Ye., otv. red.; SHCHERBAKOV, D.I., akademik, zam. otv. red.; BARANOV, V.I., prof., zam. otv. red.; VINOGRADOV, A.P., akademik, red.; SHATSKIY, N.S., akademik, red.[deceased]; POLKANOV, A.A., akademik, red.; AFANAS'YEV, G.D., red.; GERLING, E.K., prof., red.; PEKARSKAYA, T.B., kand. geol.-miner. nauk, red.; ARON, G.M., red. izd-va; ZAMARAYEVA, R.A., tekhn. red.

[Transactions of the ninth session of the Commission for the Determination of the Absolute Age of Geologic Formations, June 14-18, 1960] Trudy deviatoi sessii Komissii po opredeleniiu absoliutnogo vozrasta geologicheskikh formatsii, 14-18 iiunia 1960 g. Moskva, 1961. 331 p. (MIRA 14:8)

1. Akademiya nauk SSSR. Komissiya po opredeleniyu absolyutnogo vozrasta geologicheskikh formatsiy. 2. Chlen-korrespondent AN SSSR (for Starik, Afanas'yev).

(Geological time)

PHASE I BOOK EXPLOITATION SOV/5388

Starik, Iosif Yevseyevich

Yadernaya geokhronologiya (Nuclear Geochronology) Moscow, Izd-vo AN SSSR, 1961. 630 p. Errata slip inserted. 3, 200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Radiyevyy institut im. V. G. Khlopina. Ed. of Publishing House: G. M. Aron; Tech. Ed.: R. A. Zamarayeva .

PURPOSE: The book is intended for geologists, chemists, and other scientists concerned with the problems of determining the age of geologic formations.

COVERAGE: The author, a Corresponding Member of the AS USSR, discusses in detail the theoretical principles and the problems of practical application of radioactive methods for the determination

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of the absolute age of geologic formations, the Earth, and meteorites. Radioactive methods are evaluated by the author on the basis of his own specific point of view regarding the ways of detecting the radioactive elements in minerals and rocks and the conditions of migration of radioactive isotopes, as well as their stable decay products. Various chapters of the book were written by the author in cooperation with other scientists: Ch. II with E. V. Sobotovich and Ye. P. Petryayev; Ch. VI with Yu. V. Kuznetsov; Ch. VII with D. G. Fleyshman, S. V. Butomo, A. P. Zharkov, and Kh. A. Arslanov; Ch. III with M. M. Rubinshteyn and Yu. I. Silin; Ch. IV was written in cooperation with V. M. Aleksandruk; Chs. I and VIII with S. M. Grashchenko, V. M. Aleksandruk, and B. A. Mikhaylov; while the paragraphs, "Flame Photometry", "Method of Isotope Dilution" and "Applicability of

Argon Method" in Ch. III were written by M. M. Rubinshteyn and O. Ye. Gel'man, who also made the calculation of errors in the argon method. Ch. X was compiled by M. M. Rubinshteyn on the basis of foreign data and the Soviet scale of geological time, accepted by the 9th Session of the Committee for the Determination of the Absolute Age of Geologic Formations. The author thanks A. N. Simonyak, Ye. I. Yefimova, M. M. Shats, A. N. Yelizarova, G. A. Karapetyan and M. S. Frenklikh. There are 1224 references: 387 Soviet and the rest chiefly English and German.

TABLE OF CONTENTS:

STARIK, I.Ye.; KRYLOV, A.Ya.; SILIN, Yu.I.

Absolute age of base rocks in the eastern part of the Russian Platform. Biul.Kom.po opr.abs.vozr.geol.form. no.4:64-65 '61. (MIRA 15:1)

(Russian Platform--Rocks, Crystalline and metamorphic)
(Geological time)

STARIK, I.Ye.; SOBOTOVICH, E.V.; LOVTSYUS, G.P.

Pyrochemical methods for lead separation from natural formations. Biul.Kom.po opr.abs.vozr.geol.form. no.4:114-127 '61. (MIRA 15:1)
(Lead)

S/081/62/000/005/019/112
B158/B110

AUTHORS: Starik, I. Ye., Sobotovich, E. V., Lovtsyus, A. V., Leont'yev, V. G.

TITLE: Separation of chemical forms of lead

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 5, 1962, 119, abstract 5G13 (Byul. Komis. po opredeleniyu absolyutn. vozrasta geol. formatsiy, AN SSSR, no. 4, 1961, 128 - 135)

TEXT: A method of high temperature sublimation of lead is used for a study of the forms in which Pb is found in natural formations (RZh Khim, 1962, 1D72). Fractional sublimation of Pb in uranium pitch was carried out at 700°C in a current of N_2 (purified of O_2 by passing through CuO at 500°C). Under these conditions, only PbS is sublimated. At 900°C the mixture of residual PbS and metallic Pb may be sublimated; at 1200°C the residual metallic Pb is sublimated as well as part of the $PbSO_4$, which is converted to PbO. After driving off the Pb in a current of N_2, when its

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separation becomes negligible (~0.1% per hour), further distillation is carried out in a current of H_2 (obtained electrolytically and dried by passing through H_2SO_4). The fractions distilled in the H_2 current are PbO of radiogenic origin and partly impurity origin. Forms of Pb on ferritorite were studied in a similar manner. Approximately 70% Pb in all was separated in the N_2 current, and ~7% Pb in the H_2 current. [Abstracter's note: Complete translation.]

STARIK, I.Ye.; LAZAREV, K.F.

Study of adsorption processes in leaching. Biul.Kom.po opr.abs.vozr.geol.form. no.4:136-143 '61. (MIRA 15:1)
(Leaching) (Isotopes)

STARIK, I.Ye.; BARANOVSKAYA, N.V.; ZHIROVA, V.V.; KRYLOV, A.Ya.

Determining the age of magnetites by the helium method. Biul.
Kom.po opr.abs.vozr.geol.form. no.4:151-159 '61. (MIRA 15:1)
(Geological time)
(Magnetites)

S/081/62/000/004/014/087
B149/B101

AUTHORS: Starik, I. Ye., Starik, F. Ye., Yelizarova, A. N.

TITLE: Comparative leaching properties of some isotopes

PERIODICAL: Referativnyy. zhurnal. Khimiya, no. 4, 1962, 113, abstract 4G15 (Byul. Komis. po opredeleniyu absolyutn. vozrasta geol. formatsiy, AN SSSR, no. 24, 1961, 160-165)

TEXT: Investigation has been made of leaching the isotopes of Ra, Th, and Pb from specimens of uraninites (from Chkalov and Kamennaya Taybola mines) and monazite (Alakurti). The methods of determination used were as follows: Th by colorimetry; Ra, ThX, AcX, RdTh, RdAc, UX_1 and Ac - radiochemically; Pb - electrolytically; the isotope analysis of Pb by mass-spectrometry. The leaching of Ra isotopes (Ra^{226}, ThX and AcX) has been carried out in 0.1 N HNO_3 from the demolished and intact specimens of uraninite. The demolished specimen showed larger percentage of leaching, and in both specimens AcX and ThX > Ra. The leaching from uraninites of Th has been carried out in 0.1 and 0.01 N HNO_3, 0.1 N

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STARIK, I.Ye.; SOBOTOVICH, E.V.; LOVTSYUS, G.P.; SHATS, M.M.; LOVTSYUS, A.V.

Isotopic constitution of lead in iron meteorites. Meteoritika no.20: 103-113 '61. (MIRA 14:5)
(Meteorites) (Lead--Isotopes)

STARIK, I.Ye.; SOBOTOVICH, E.V.; SHATS, M.M.; LOVTSYUS, G.P.

Uranium and lead in tektites. Meteoritika no.20:204-207 '61. (MIRA 14:5)

(Tektite) (Lead) (Uranium)

S/195/61/002/005/002/027
E040/E485

AUTHOR: Starik, I.Ye.

TITLE: Capture of small amounts of impurities by solid particles in the process of precipitation from solutions

PERIODICAL: Kinetika i kataliz, v.2, no.5, 1961, 648-656

TEXT: In an attempt to apply more widely the knowledge gained recently in the field of radiochemistry to problems concerning the kinetics and catalysis of chemical reactions, the author surveys the results of his own and other studies concerning the mechanism of adsorption of micro-quantities of radioactive indicators on solid surfaces, the absorption of electrolyte impurities from solutions, distribution of radioisotope indicators between the solid and liquid phases etc. The problem is approached from the practical point of view and is studied on two basic processes: efficiency and mechanism of removal of small quantities of impurities by a precipitate during its formation and the mechanism and efficiency of intentional introduction of a small quantity of impurity elements into a precipitate. The sorption of radio-isotope impurities (Pa^{233}, Sr^{90}, Tl^{204}, Cs^{137}, Ag^{110}, Zr^{99}) on

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23875
S/186/61/003/001/008/020
A051/A129

21 3230

AUTHORS: Starik, I.Ye., Ampelogova, N.I.

TITLE: The state of microquantities of radioelements in solutions
XV. Sorption of polonium by ionites

PERIODICAL: Radiokhimiya, v 3, no 1, 1961, 37-43

TEXT: The article deals with the investigation of the nature of polonium sorption on ionites of various types in 0.1-12 M solutions of HCl and HNO_3 and the charge sign of the polonium complexes formed. The authors used the КУ-2 (KU-2) cationite and two types of anionites: the ПЭ-9 (PE-9) medium-basic anionite and the strongly-basic АВ-17 (AV-17). The sorption of polonium was also studied on a styrene and divinylbenzene copolymer. In order to check the degree of shift of equilibrium between the cation and anion forms of polonium during the sorption process on the ionite, the sorption of polonium on PE-9 was studied from fresh solutions and from solutions, in which previously sorption was conducted on KU-2. The results of

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the polonium sorption from solutions of HCl are given in Fig 1 and from HNO_3 in Fig 2. Obtained experimental data were compared to the electromigration of polonium ions in HCl and HNO_3 solutions. The curves of the relationships of the polonium migration to the anode and cathode and the curves of the relationship of the sorption on the anionite and cationite in HNO_3 are found to have the same shape. This coincidence of data obtained by two different methods led the authors to the conclusion that at a HNO_3 concentration from 2.5 to 10 M negatively-charged forms prevail. In the diluted and concentrated (over 10 M HNO_3) solutions the cation forms are prevalent. No interaction of polonium complexes with the organic resin base (Fig 1) is noted in concentrated HCl and sorption increases somewhat on the cationite. The authors assume that sorption takes place here on the cationite and anionite of the neutral complex forms, polarizing under the action of the highly-polar ionic groups. In order to check the reversibility of the polonium sorption on the cationites and anionites, the relationship was investigated of the distribution coefficient of polonium to the ratio V/m (V- the volume of the solution, m- mass of the resin in grams) and the desorption of polonium from ionites (percentage of desorption was calculated from the relationship of polonium

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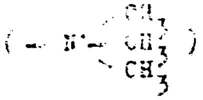
in solution to polonium in the resin). The results of the investigation of the electromigration of polonium in HCl media showed that polonium is present in the form of negatively-charged complexes, even at low concentrations of HCl (0.1 M). The sorption of polonium on the anionites in HCl media is found to be high and non-reversible to a great extent. By comparing the distribution coefficients of polonium on a styrene and divinylbenzene copolymer, KU-2 and AB-17, the authors conclude that in the case of sorption on KU-2 the reaction of polonium with the organic resin base may play an important part, and in the case of sorption on AB-17 the part of these reactions is slight. It is quite probable that polonium forms certain complexes with the groups of the quaternary ammonium base, such as



$(-N^{+}(CH_3)_3)$

in the AB-17 resin, or with the amino-groups (N=, HN =, E_2N-) in the PE-9 anionite. The nature of the complexes formed is thought to determine the extent and irreversibility of the polonium sorption on the anionites. The authors draw these general conclusions from their observations: 1) they show that the sorption of polonium by AB-17, KU-2, PE-9 ionites is not a purely ion-exchanging process; 2) they note that in weakly-acidic media there is a

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noticeable reaction of polonium with the organic resin base; 3) they establish that at all HCl concentrations polonium sorption by the anionites is high and to a great extent non-reversible, which is due to the complex-formation of polonium with the ionic groups; 4) they show that during the sorption process of polonium on the ionites in weakly-acidic media a shift of the equilibrium between the cation and anion forms present in the solution takes place; 5) they establish that in HCl solutions at a concentration of 0.1-9 M the negatively-charged polonium complexes prevail, in 9-11 M HCl the presence of uncharged complex forms is possible; 6) it is found that in HNO_3 solutions at a concentration from 2.5 to 10 M the anion complexes prevail. In a weakly-acidic medium (0.1-2.5 M) and in concentrated HNO_3 (over 10 M) polonium cation forms are present. The polonium sorption by ionites in HNO_3 media is irreversible. There are 4 tables, 4 graphs and 15 references: 4 Soviet-bloc, 11 non-Soviet-bloc.

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S/186/61/003/001/009/020
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21.3230

AUTHORS: Starik, I.Ye., Ginzburg, F.L.

TITLE: The state of microquantities of radioelements in diluted solutions
XVI. An investigation of the state of americium by the ion-exchange method

PERIODICAL: Radiokhimiya, v 3, no 1, 1961, 45-50

TEXT: The authors conducted a detailed study on the behavior of americium when using ion-exchanging resins and compared the obtained data with previously derived theories of americium behavior in diluted solutions (Ref 10-12). The main considerations were given to the cation exchange from the point of view of improving conditions of separation. The greatest attention was given to the study of HCl media. It was shown that the use of concentrated HCl as a washing-out solution has a great effect in group separation of actinide and rare-earth elements adsorbed on the cationite. The authors used the method of ion-exchange for studying the state of americium in nitrate solutions. The sorption of Am^{241} on resins under static condi-

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tions was investigated depending on the pH of the solution and concentration of HNO_3. The КУ-2 (KU-2) and Dowex-50 cationites were used as the adsorbents, as well as ionites of the strong-acid type with a mono-functional sulfo-group. АВ-17 (AV-17) and Dowex-1 anionites containing strongly dissociated active amine groups of the tetra-ammonium base. The absorption of Am from solutions of various pH was conducted on KU-2 resins in the potassium form and AV-17 in the NO_3^- form. The sorbability of Am on the ionites was determined at room temperature under conditions of achieving an adsorption equilibrium state. The concentration of Am in the water phase was determined according to the activity of an aliquot part of the solution. The results of the experiments were expressed in % of adsorption determined by the formula:

$$\text{percentage of adsorption} = \frac{A_2 - A_1}{A_2} \cdot 100,$$

where A_2 is the initial activity of the solution (in pulses/min), A_1 - the equilibrium activity of the solution (in pulses/min). The relationship of Am sorption to the pH of solution was studied on the KU-2 cationite and AV-17 anionite. The sorption was conducted from solutions in the presence of 10^{-3}M KNO_3. Fig 1 shows the relationship of Am sorption on KU-2 resin to the pH of the solution. It is seen

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that at pH 1-3.5 the sorption on the cationite is at a maximum. Under these conditions Am is not absorbed on the anionite. By using the methods of adsorption, desorption and ultrafiltration, it was shown that in the ion-dispersed state Am is in the solution up to pH~6-7. Then the increase in the pH causes the formation of a colloidal solution. It is assumed that the formation process of the hydrolyzed forms begins at pH~3.5-4. At pH > 5 the hydrolysis is thought to increase. The investigations showed that Am hydroxide does not become absorbed by the cationite. The sorbability of hydrolyzed forms of Am by the anionite is determined by the physical sorption (on a highly-developed surface) of the particles, having comparatively greater size. It is further assumed that the adsorption of the charged colloidal particles facilitates the accumulation of a high charge of opposite sign on the anionite (Ref 8). Published data (Ref 9) and data obtained by the authors showed that the migration of Am in an electrical field in solutions of 0.1-2 M HNO_3 is mainly toward the cathode. A comparison of the data obtained by the ion-exchange method to that of electromigration showed that in solutions of pH 4 to 1 M HNO_3 the ions of Am with a higher positive charge are dominant. The authors assume that an increase in the sorbability

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by the cationite in concentrated solutions of HNO_3 takes place due to partial dehydration of ions, but the nature of this process remains undescribed. It is thought that in concentrated solutions of HNO_3 Am forms neutral complexes. Applying the law of active masses to the equilibrium exchange reaction between two ions under conditions of $A_2 \ll [H^+]$ and the solution volume and resin particle in all experiments maintaining constant values, the following relationship can then be used:

$$\lg \frac{C_1}{C_2 - C_1} = n \lg [H^+],$$

where C_2 is the initial concentration of the element, C_1 - the equilibrium concentration of the element, n - ion charge. The value of the ion charge is determined from the slope of the straight line, expressing the relationship

$$\lg \frac{C_1}{C_2 - C_1} \text{ to } \lg [H^+].$$

The ion charge adsorbed by the resin from 0.5-3 M HNO_3 solutions is equal to 3. In addition to complex ions there are always simple ions present in the solution and the determined charge of the Am ions 3^+ in the resin phase is determined by the shift of equilibrium according to sorption of the cations by the resin. The authors draw the following conclusions: 1) when studying

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the sorption of Am^{241} from nitrate solutions (1-18 M) in solutions of various pH, it is shown that in solutions of pH=4 to 1 M HNO_3 simple Am ions prevail with a charge of 3^+; with an increase of the pH of the solution (pH > 4) the positive charge of the ions decreases due to hydrolysis; 2) in the colloidal state Am is not adsorbed by the cation; the sorption of the colloidal particles of Am by the anionite reaches 80%; 3) the results of investigations of electromigration and sorption of Am on the anionites in nitrate solutions show that positively charged Am complexes are formed in solutions of 1-4 M HNO_3. Neutral complexes of Am are dominant in solutions of 4-16 M HNO_3. There are 6 figures, 1 table and 24 references: 12 Soviet-bloc, 12 non-Soviet-bloc.

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Scintillation technique of counting ...

$$(NH_4)_2CO_3 + Sr(NO_3)_2 \longrightarrow SrCO_3 \xrightarrow{+\,Mg} SrC_2$$

$$SrC_2 + H_2O \longrightarrow C_2H_2$$

$$3C_2H_2 \xrightarrow[25\ \text{atm.},\ 65^{\circ}C]{Ni(CO)_2\,[P(C_6H_5)_3]_2} C_6H_6$$

$$C_2H_2 + C_6H_6 \xrightarrow[65^{\circ}]{Al,\ AlCl_3,\ HCl} C_6H_5\overset{*}{C}_2H_5$$

A coincidence scintillation counter was designed for counting C^{14}, and benzene and ethylbenzene were used as the liquid scintillator solvents, synthesized according to the above-given scheme. Combined with a highly-effective counter these can be used to determine the absolute age up to 37,000 years in the case of ethylbenzene, and 48,000 years in the case of benzene. In selecting a scintillation counting method the authors base their attempts on finding a substance which is easily prepared and does not require large

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Scintillation technique of counting ...

amounts of carbon, so that the advantages of both the proportionate and scintillation methods could be combined. Ethylbenzene and benzene chosen by the authors as the carriers of the natural carbon activity are said to render the scintillation method applicable to young samples and in the case of old ones increase the sensitivity of the method. Ethylbenzene is recommended from the following considerations: 1)22.3% from the sample can be introduced into the ethylbenzene molecule; 2) the ethylbenzene molecule itself is an excellent solvent of liquid scintillators, being inferior only to the very best solvents, such as toluene, xylene; 3) its preparation and purification are simple and do not require complex apparatus or reagents difficult to obtain; 4) for its synthesis a relatively low amount of carbon, 8-15 g, is required. The apparatus used by the authors to count natural C^{14} is described: the photomultipliers function at room temperature, the complete amplification of the amplifier is 400. The counting rate of the noise pulses at an effectiveness of the count of natural C^{14} equalling 60-65% is 0.5 pulses/min. An upper level discriminator is used to lower the counting rate of the background determined by the cosmic and external radiations in the given apparatus. Fig 1 is a block-diagram of the described

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apparatus and Fig 2 shows the principal circuit of coincidences. The tubes of the apparatus are fed by stabilized sources of anode and incandescent voltage, and the photomultipliers by a ВС-9(VS-9)-type high-voltage source. The positive pulses from the exits of two non-overloaded amplifiers are fed to the inputs of the diode low-level discriminators (λ_2, λ_9, in Fig 2). The limiting (λ_1, λ_8) diodes are used for eliminating the negative pulse outputs fed to the low-level discriminator inputs. The selected photomultiplier should satisfy the following requirements: 1) a high sensitivity of the photocathode, 2) a high total sensitivity, 3) a low noise level, 4) stability over long periods of service, 5) a good temporary resolving power. The adjustment of the counter for the C^{14} spectrum is carried out according to the γ-line of Cs^{137}. The discriminators of the lower level are installed so that the number of the noise pulses at the output of the circuit of coincidences would be equal to 0.5-1 pulses/min. The sample is counted in a 15.5 cm^3-volume cuvette made of optic quartzite. The preparation of ethylbenzene and benzene from the carbon of the investigated material involves the following chemical steps: 1) formation of CO_2 from the sample, 2) production of strontium carbonate from CO_2 of the sample, 3) reduction of the strontium carbonate to strontium carbide, 4) decomposition of strontium carbide, separation of acetylene from hydrogen and purification of acetylene, 5) synthesis of ethylbenzene from acetylene, 6) purification of ethylbenzene and benzene. The samples to be measured are carbonates or organic substances (coal, wood, peat, etc.). In both cases the carbon of the sample is separated out in the form of CO_2. The formation of CO_2 from the carbonate samples is performed by the decomposition of the sample with hydrochloric acid. If the investigated sample is an organic material, the formation of CO_2 is carried out by heating the sample in an oxygen flow. The single synthesis of large amounts of acetylene (up to 30 l) is carried out according to the Suess method (Ref 4), the main advantage of which is said to be the almost quantitative yield of acetylene (95%). The synthesis of ethylbenzene is carried out according to the method of hydroalkylation of benzene with acetylene in the presence of metallic Al, $AlCl_3$ and hydrogen chloride (Ref 16). The authors conducted a complete synthesis of benzene from the investigated material according to Reppe's method (Ref 13). The catalyst for the synthesis of benzene by the given method is a compound of a mixed type having both an organic as well as an inorganic nature: $Ni(CO)_2[P(C_6H_5)_3]_2$.

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Scintillation technique of counting ...

The latter is produced by the interaction of nickel tetracarbonyl on an ether solution of triphenyl-phosphine at the boiling point of ether. Results of determinations of the absolute age of four samples are listed. A comparison of various methods is made. There are 2 tables, 6 diagrams and 21 references: 4 Soviet-bloc, 17 non-Soviet-bloc.

Figure 2: Principal circuit of coincidences
(1) - input
(2) - output
(3) - resistance
(4) - v(volt)
(5) - discriminator input of the upper level
(for Fig. 2 see card 8/8)

22994

S/186/61/003/002/004/018
E111/E452

21,3200

AUTHORS: Starik, I.Ye. and Rozovskaya, N.G.

TITLE: Sorption of radio-elements from solutions
I. Sorption of Ag^{110}, P^{32} and Zr^{95} on a fluorinated glass surface

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.2, pp.144-149

TEXT: In their study of the sorption of polonium and tellurium by glass from solutions, the authors observed that etching of the glass surface with hydrofluoric acid greatly reduces sorption. For example sorption of polonium in 15 hours was reduced 4-fold on type Л-36 (L-36) glass and 75-fold on quartz glass; that of Te^{127} on L-36 glass in 100 minutes was reduced about 3-fold. The present work was undertaken to study this phenomenon further. In the first part the sorption in nitric acid solution of silver ($Ag^{x}NO_3$) and phosphorus ($Na_2HP^{x}O_4$) on L-36 glass in the polished and then in the ground state was investigated. These elements were selected as pronouncedly metallic and non-metallic respectively. Four specimens (two etched and two unetched) were left simultaneously in 30 ml of solution (activity of Ag^{110} generally 1.5×10^5 to 1.7×10^5; and of P^{32} 5.8×10^5 to 1.7×10^6 imp/min)

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Sorption of radio-elements ...

for 24 hours at room temperature without stirring. The specimens were then removed, washed in ethyl alcohol and air dried. Activity of specimens and a standard was determined on both sides with a Б-2 (B-2) installation, the standard being a plate of the same dimensions but with a known amount of the test solution deposited on it. The area of each side was 3 cm^2 for polished and 5 cm^2 for ground specimens. The results are presented as the ratio of the sorption-coefficient values for the etched (K_2) to that for the unetched (K_1) specimens. The coefficient K is defined as the ratio x100 of the activity sorbed on 1 cm^2 of surface to that of 1 ml of solution. For silver from 0.1 N HNO_3, K_2/K_1 x 100 is 44 - 58 for polished and 19 - 64 for ground specimens; from 0.01 N HNO_3, the value for ground specimens is 15 - 19. For phosphate-ion sorption from 0.1 N HNO_3, K_2/K_1 x 100 is 50 for polished and 23 - 36 for ground specimens. The results indicate that HF-treatment of the glass surface lowers its ion-exchange function, which leads to the lower adsorption of cations (here Ag^+) by the etched specimens. The effect with Ag^+ can be explained by the decrease in the negative charge of the glass through replacement

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Sorption of radio-elements ... E111/E452

of hydroxyl groups in the surface by fluorine ions. The lower adsorption of anions (HPO_4^{2-}) by the HF-treated surface is due to removal as fluorides of metal ions from the surface layer. It was, therefore, interesting to repeat the experiments with sorption of an element which exists in solution in a neutral form; zirconium-95 was chosen. In 0.1 N HNO_3, the values of K_2/K_1 x 100 for polished specimens was 85 - 577 and in 0.5 N HNO_3, 107 - 826. The scatter of these results is attributable to the instability of the forms of zirconium present in the solutions. They show that with zirconium, the HF-treated surface adsorbs more (or about the same amount) than does the unetched surface. This difference from Ag^+ and HPO_4^{2-} could be due to zirconium being adsorbed in the molecular form which suggests similarity to zirconium adsorption on tetrafluoroethylene plastic (Ref.15: I.Ye.Starik, I.A.Skul'skiy, Izv.AN SSSR, OKhN, 10, 1278 (1958); Ref.16: I.Ye.Starik, N.I.Ampelogova, F.L.Ginzburg, M.S.Lambet, I.A.Skul'skiy, V.N.Shchebetkovskiy, Radiokhimiya, 1, e, 370 (1959)). Available data are not sufficient for considering the mechanism of adsorption and this is to be the object of a future investigation. The authors suggest that a comparison of
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Sorption of radio-elements ...

adsorption on ordinary and HF-treated glass can serve to distinguish roughly ionic and molecular forms of existence of radioelements in solution. There are 7 tables and 16 references: 11 Soviet-bloc and 5 non-Soviet-bloc. The four most recent references to English language publications read as follows: W.A.Weyl, Glass Industry, 28, 5, 231 (1947); W.A.Weyl, Glass Industry, 28, 8, 408 (1947); J.W.Hensley, J.Am.Ceram.Soc., 34, 6, 188 (1951); B.A.Lister, L.A.McDonald, J.Chem.Soc., 4315 (1952).

SUBMITTED: April 19, 1960

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22995

S/186/61/003/002/005/018
E037/E419

21.3230

AUTHORS: Starik, I.Ye., Sheydina, L.D. and Il'menkova, L.I.

TITLE: The state of protoactinium in aqueous solution IV. Ion-exchange study

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.2, pp.150-154

TEXT: C.J.Hardy, D.Scargill and J.M.Fletcher (Ref.9: J.Inorg. Nucl.Chem.7, 3, 257 (1958)) have studied the adsorption of protoactinium (10^{-4} - 10^{-7} M) on De-Acidite FF and Zeocarb 225 from nitric acid solution. This work is concerned with the ion-exchange behaviour of micro-quantities of Pa^{233} in nitric acid solutions and with determination of the charges on the cations and anions in the HNO_3 concentration range studied. A batch procedure was used with 10^{-11} M Pa^{233} solutions and 200 mesh Dowex 50 (H^+-form) and Dowex 1 (NO_3^--form). The distribution coefficient K_p was calculated as the ratio of the Pa^{233} activity adsorbed by 1 g of resin to the equilibrium activity of 1 ml of solution, i.e.

$$K_p = \frac{(A_1 - A_2) V}{pA_2}$$

where A_1 is the specific activity of the initial solution,

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The state of protoactinium ... E037/E419

A_2 is the specific activity of the solution after equilibration with the resin, V is the volume of solution and p the weight of resin. Fig.1 and 2 show the Pa^{233} distribution coefficient as a function of nitric-acid concentration for the cation-exchange and anion-exchange resins used. It is evident that positively-charged Pa species exist in 1 - 5 N HNO_3. The increase in K_p above 5 N HNO_3, as shown in Fig.2, reflects the increasing charge on the Pa anion complexes. The slight increase in K_p above 10 - 12 N HNO_3 which is observed for the anion-exchange resin (Fig.1) is probably due to the conversion of hydroxy groups into aquo-groups. J.D.Strickland's(Ref.15: Nature, 169, 620 (1952)) method was used to determine the charge on the protoactinium ions. The charge on an ion is given by the slope of a plot of log $C_1/(C_2 - C_1)$ vs. log $[H^+]$ or log $[NO_3^-]$, where C_1 is the concentration of the ion of unknown charge in the aqueous solution after equilibration with the resin and C_2 is the initial concentration of the same ion. The slope of the log $[H^+]$ dependence is found to be $2.6 \cong 3$ from Fig.3, so that the mean charge on the Pa^{233} cation in the resin phase (1 - 4 N HNO_3) is 3. The slope of the log $[NO_3^-]$ dependence is 3.1 (Fig.4) and this corresponds to the mean charge on the
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The state of protoactinium ...

protoactinium anion in the resin phase (8 - 12 N HNO_3). It is clear that in HNO_3 solutions of these concentrations Pa ions with charges +3 and -3 and below exist. Our results do not establish the numbers of OH^- and NO_3^- coordinated to Pa but the following forms are possible:

in 1 - 4 N HNO_3: $Pa(OH)_3^{2+}$; $[Pa(OH)_3(NO_3)]^+$; $Pa(OH)_2^{3+}$; $[Pa(OH)_2(NO_3)]^{2+}$; $[Pa(OH)_2(NO_3)_2]^+$; $Pa(OH)_4^+$.

in 8 - 12 N HNO_3: $[Pa(OH)(NO_3)_5]^-$; $[Pa(OH)(NO_3)_6]^{2-}$; $[Pa(OH)(NO_3)_7]^{3-}$; $[Pa(NO_3)_6]^-$; $[Pa(NO_3)_7]^{2-}$; $[Pa(NO_3)_8]^{3-}$.

The neutral forms of protoactinium have not been considered in this article; they were described by the authors in a previous paper (Ref.14: Radiokhimiya, 3, 1, 24 (1961)). The data obtained by the authors agree with and complete those given by C.J.Hardy et (Ref.9). There are 4 figures and 16 references: 7 Soviet-bloc and

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The state of protoactinium ...

9 non-Soviet-bloc. The four most recent references to English language publications read as follows: A.G.Maddock, J.Inorg.Nucl. Chem., 2, 2, 114 (1956); G.R.Choppin, J.Chem.Ed., 36, 9, 462 (1959); C.J.Hardy, D.Scargill, J.M.Fletcher, J.Inorg.Nucl.Chem., 7, 3, 257, (1958); K.A.Kraus, D.C.Michelson, F.Nelson, J.Am.Chem.Soc., 81, 13, 3204 (1959).

SUBMITTED: April 18, 1960

Card 4/6

23002

S/186/61/003/002/013/018
E111/E452

21.3200

AUTHORS: Starik, I.Ye., Lazarev, K.F. and Petryayev, Ye.P.

TITLE: The form in which atoms of radioactive elements exist in minerals

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.2, pp.207-214

TEXT: The authors' study of the leachability of radioactive elements from minerals has shown that their capillaries contain atoms of isotopes of radium and other daughter radio-elements finding their way there through radioactive recoil. Uranium and thorium, as well as various non-radioactive elements, are also present. They are leached out of monazite and viikite by the action of acid solution even when they do not dissolve. These results could be explained only by the capillaries of these minerals containing, in addition to daughter-element atoms, those of uranium, thorium and the rare-earth elements. For a deeper understanding of the form in which atoms of the elements exist in minerals, the isotope ratios in the damaged parts of the mineral must be found. The authors have developed various methods for finding that proportion of atoms of elements which is located in capillaries and damaged parts of minerals accessible to the leaching solution.

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They have called the percentage of all the atoms of an isotope present in a mineral which exist in capillaries and disturbances of its crystal lattice the "limiting leachability" of this isotope. Limiting leachability values show that capillaries contain enough atoms to form an independent solid phase. The composition of the compounds present there varies with the mineral. Different minerals also have different capillary structures, which accounts for the relative effects of neutral and acid leaching solutions varying from mineral to mineral. Fig.2 shows the values of limiting leachability for radium, uranium and thorium (curves 1, 2 and 3 respectively) as a function of acidity (0 - 0.2 N hydrochloric acid). This indicates that for determinations of limiting leachability acid solutions must be sufficiently acid to dissolve fully the colloidal compounds in the capillaries and bring the atoms of the elements present there into a form capable of exchange with ions of the leaching solution. Solutions containing salts give leachability values less than obtained with salt-free solutions of the same acidity. There is no sharp boundary between the capillary material, i.e. the fully disrupted lattice, and the undamaged lattice. The maximum depth from which atoms can reach

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the surface of the mineral crystal lattice will be different for those formed in alpha-composition and for those ejected from lattice points by alpha-particles or recoil nuclei. The authors show, using results published by Ye.P.Petryayev (Ref.13: Radiokhimiya, 1, 1, 105 (1959)) that in the test sample of monazite the radius of the sphere without capillaries or damaged parts in its surface is 1.7 x 10^{-4} cm. The surface zone has the greatest damage and supplies most atoms entering the capillaries. Unlike atoms in capillaries, those in the damaged parts of the lattice can only be removed by more concentrated acid solutions. The dynamic leaching of minerals by strong solutions of acids is a fruitful way of studying this part of the lattice. For this leaching rate relative to the quantity of solution passing through a mineral-filled column in a given time interval is observed. Graphical analysis then enables the quantities of radioelement entering the solution through leaching and through dissolution to be found separately. For most minerals, the authors conclude that the main mass of atoms composing the mineral are in the undamaged lattice, a small part are in the capillaries and damaged parts and in the surface damaged part of the lattice (10 to 15%). In

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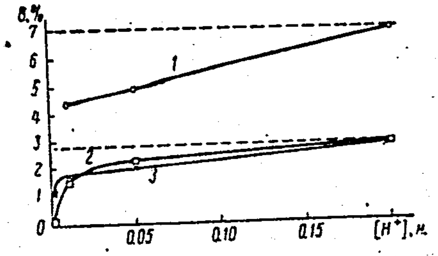
monazite and viikite, distribution of radioelements is non-uniform, with enrichment of the surface zone of the lattice and capillaries with certain daughter and parent elements. In monazite capillaries radium-isotope elements exist in two forms with different capacities for exchange with ions of leaching solutions. There are 2 figures, 5 tables and 13 references: 9 Soviet-bloc and 4 non-Soviet-bloc. The reference to the English language publication reads as follows: P.M.Hurley, H.W.Fairbairn, Bull. Geol. Soc. Am., 64, 659 (1953).

SUBMITTED: April 18, 1960

Fig.2.



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22486
S/186/61/003/003/004/018
E071/E435

21.3200

AUTHORS: Starik, I.Ye. and Ampelogova, N.I.

TITLE: Extraction of Polonium in Various Valency States

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.3, pp.261-271

TEXT: A brief review of the literature on the valency states of polonium and its extraction is given. It is pointed out that the valency state of polonium in the presence of reducing and oxidizing agents remained uncertain. For this reason the authors investigated the extraction of polonium from hydrochloric and nitric acid containing media in the presence of oxidants and reducers, controlling its electrode potential of separation under the same conditions, since the value of the electrode potential is an objective indicator of the valency state of polonium. The extraction of polonium with diethyl ether and a 10% solution of tributylphosphate (TBPh) in benzene from solutions of hydrochloric (0.1 to 11 M) and nitric (0.1 to 13 M) acids was studied. The concentration of polonium was 1 to 2 x 10^{-12} M. Sulphur dioxide, hydrogen peroxide and hydrazine were used as reducing agents and chlorine and potassium dichromate as oxidizing agents. Equal volumes of aqueous phase and a 10% TBPh solution in benzene

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were shaken for 5 minutes. After settling, the phases were separated and polonium was re-extracted from the organic phase with equal volume of 1N HCl. Aliquot portions for the measurements were then taken from the aqueous phase and re-extracted. In the case of extraction with diethyl ether, the latter was preliminarily shaken with a non-active solution of the same composition as that investigated since, at high acid concentrations, a considerable increase in the volume of aqueous phase was observed which was caused by dissolution in it of ether. From the ether phase, polonium was re-extracted with 0.1N hydrochloric acid. The reduction was carried out by heating a given volume of the solution to 60 to 70°C and bubbling sulphur dioxide for 15 min. After standing for 0.5 to 1 hour, carbon dioxide was bubbled through the solution. In nitric acid solutions the evolutions of NO_2 and oxidation of SO_2 to sulphate ion was observed. For comparison, extraction of polonium from nitric acid solution containing sulphuric acid was carried out. The reduction with hydrazine and hydrogen peroxide was done under the same conditions adding them in the form of solutions. Chlorine was bubbled for 30 minutes through the solution which was heated to 60 to 70°C.

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The chlorine saturated solution was left standing for some hours and extracted. Potassium dichromate was added to similarly heated solutions in an amount of 3.6 mg per ml of the solution. Chromium was noticeably extracted by the solvents used. On contact with the solvents, dichromate was undergoing reduction probably due to the presence of peroxide compounds. Measurements of the electron potential were done according to the method described by D.M.Ziv and G.S.Sinitsyna (Ref.33: Tr.Rad.inst., 8, 127 (1958)). As a reference, a standard quinhydrone electrode was used. An 0.01 M potassium permanganate solution in 2 M potassium chloride was used on the anode. A gold disc was used as the cathode. The cell was polarized with a current from an external source. In some cases (in 5 M HNO_3 and HCl in the presence of oxidants) the method of external electrolysis with separation of cathodic and anodic space was used. All the results quoted are the mean values of 2 - 6 determinations. The reproducibility of the extraction experiments was 12%. The accuracy of determination of the electrode potentials was ± 0.005 V, by external electrolysis 0.01 V. The experimental results are

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given in the form of graphs. Electrode potentials φ of polonium in hydrochloric acid media are plotted in Fig.1 (A, imp/min vs φ,V). The dependence of the electrode potentials (φ,V) on the concentration of hydrochloric acid is plotted in Fig.2. Plots are also included giving results on: extraction of polonium with ether and TBPh from hydrochloric acid solutions; electrode potentials of polonium in nitric acid solutions; the dependence of the electrode potential on the concentration of nitric acid; the extraction with ether and TBPh from nitric acid solutions; the dependence of the potential of anodic precipitation of polonium on the concentration or nitric acid. On the basis of experimental results it is concluded that: 1) In hydrochloric acid solutions in the presence of hydrogen peroxide and sulphur dioxide ,polonium is reduced to the divalent state and in the presence of chlorine it is oxidized to the hexavalent state. 2) From hydrochloric acid media diethyl ether extracts only hexavalent polonium which is present in the form of acidocomplexes. TBPh extracts polonium in tetravalent state as well as in the reduced (divalent) state. 3) It was proved that in nitric acid media, reducing agents transfer

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polonium into a lower valency state only up to a certain concentration of nitric acid (1.5 to 2.5 M). At higher nitric acid concentrations, oxidation of polonium to the hexavalent state was observed during oxidizing-reducing processes taking place in the solution. In nitric acid solutions, polonium is disproportionate in all valency states. 4) It was found that TBPh does not extract hexavalent polonium from nitric acid solutions, removing only polonium in lower valency states. 5) It was established that from nitric acid media, diethylether extracts only hexavalent polonium, present in an acidocomplex form and does not extract polonium in reduced states. 6) It is shown that oxidation of polonium with a mixture of nitric acid and potassium dichromate, transfers polonium into the state of (PoO_4^{2-}) which separates only on the anode and is not extracted with ether or tributylphosphate. There are 9 figures and 35 references: 8 Soviet-bloc and 27 non-Soviet-bloc. The four most recent references to English language publications read as follows: K.W.Bagnall, Chemistry of rare radioelements, London (1957); H.Irving, D.N.Edgington, J.Inorg.Nucl.Chem., 10, 3/4, 306 (1959);

Card 5/7 6

26604

S/186/61/003/004/003/007
E037/E119

21.4200 also 2209

AUTHORS: Starik, I.Ye., Skul'skiy, I.A., and Shchebetkovskiy, V.N.

TITLE: Adsorption of radioactive isotopes on non-ion-exchange polymeric adsorbents. I. Adsorption of zirconium on ftoroplast-4 (polytetrafluoroethylene) from hydrochloric acid solutions

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.4, pp. 428-434

TEXT: So far most studies have been concerned with ion-exchange and colloidal adsorption of radioactive isotopes. To establish the features of molecular adsorption of radioactive isotopes it is most expedient to study a particular element under conditions such that it may form uncharged compounds in solution. In such a case it is possible to consider the molecular adsorption as a distribution of neutral particles of electrolyte between liquid and solid phases, and to compare the results with distribution of the element in extraction processes. Zirconium is particularly suitable for such a study as in aqueous solution it may form neutral complexes of type $[Zr(OH)_xA_{x-4}]^o$ (Ref.5: B.A.Lister, L.H. McDonald, J.Chem.Soc., 4315 (1952), where A is an anion.

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26604

Adsorption of radioactive isotopes on ... S/186/61/003/004/003/007
E037/E119

The composition of the complexes depends on the composition of the solution. In this way we may study adsorption as a function of the solution composition and obtain information on the dependence of adsorption on the state of the element in solution in order to deduce the mechanism of molecular adsorption. The present work considers Zr adsorption on polytetrafluoroethylene (PTFE) from hydrochloric acid solutions, Zr desorption from PTFE surfaces with tributyl phosphate (TBP), and the extraction of Zr into TBP. It was necessary to take spcaial measures to ensure that tracer Zr^{95} and carrier zirconium are in the same state, e.g. as regards hydrolysis. Adsorption was studied on polished PTFE discs 5.5 cm^2 in area and 1.5 mm thick. Surface treatment with hot concentrated sulphuric acid and water guaranteed rapid and complete desorption of Zr^{95} while not affecting the adsorption properties. Zr^{95} activity was measured on torsion counter with Al foil to absorb the Nb^{95} β-radiation from the Nb formed in the course of the experiment. The dependence of zirconium adsorption from 1.2 N HCl on zirconium concentration may be expressed by a Freundlich equation of form

$$G = 10^{-3} C^{0.91}$$

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where G is the adsorption in g.atom Zr/cm^2 and C is the zirconium concentration in g.atom/mℓ. For tracer concentrations K = G/C is independent of C and is a function only of the state of the Zr. With increasing Zr concentration the adsorption approximates to that corresponding to a monolayer, which indicates that adsorption is taking place over the whole surface and not on individual parts. The temperature dependence of the adsorption was studied in 10 N HCl to avoid hydrolytic effects which are also temperature dependent. The value obtained for the heat of adsorption on the hydrophobic PTFE surface is 2.2 ± 0.2 kcal/mole, which is usually characteristic for van der Waals adsorption. The dependence of Zr95 adsorption on HCl concentration may be explained by the change in state of the Zr with changing H$^+$ and Cl$^-$ concentration. Calculations based on published complex formation constants (Ref.12: A.S. Solovkin, ZhNKh, Vol.2, 3, 611 (1957)) show that the concentration of neutral zirconium species is very high. It is found that the adsorption increases with the number of hydroxyl groups in the neutral zirconium complex; this is possibly due to the formation of hydrogen bonds between these

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26605

S/186/61/003/004/004/007
E037/E119

21.4240

AUTHORS: Starik, I.Ye., Shchebetkovskiy, V.N., and Skul'skiy, I.A

TITLE: Adsorption of radioactive isotopes on non-ion-exchange polymeric adsorbents. II. Adsorption of zirconium on ftoroplast-4 (polytetrafluoroethylene) from acid solutions of alkali-metal salts

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.4, pp. 435-439

TEXT: Considering molecular adsorption processes as the distribution of uncharged species between aqueous solution and the surface of a hydrophobic non-ion-exchange adsorbent, I.Ye. Starik and I.A. Skul'skiy (Ref.1: Izv. AN SSSR, OKhN, 10, 1278 (1958)) showed that a salting-out effect is observed in molecular adsorption as well as in extraction processes. It is interesting to establish how this effect depends on the nature of the cation of the neutral salt in order to make further comparisons between molecular distribution in liquid-solid and liquid-liquid systems. The present work deals with the adsorption of tracer concentrations of Zr95 from 1N nitric, hydrochloric and hydrobromic acids under conditions such that colloidal and hydrolytic forms of zirconium are

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competing with Zr for adsorption on the PTFE but must be connected with a change in state of the zirconium in solution. For extraction of Zr into TBP the salting-out effect for the cations is in the reverse order: Li > Na > K > NH_4 (in HCl). In this case the effect is usually attributed to the different thermodynamic activity of water in the salt solutions. For the same ionic strength as the water activity increases, from Li to Cs, the salting-out effect of the cation decreases in extraction. The reverse seems to hold for the molecular adsorption of Zr on PTFE. Total or partial reversal of this series is sometimes observed in extraction processes however, and is usually associated with organic solutions of high dielectric constant. Generally speaking, the adsorption is not contrary to extraction theory and the main points of similarity are: 1) in most cases of adsorption and extraction there is an increase in uptake with increase in concentration of similar anions, and 2) the coefficients of adsorption and extraction depend on the nature of the salting-out electrolyte. The increase in adsorption with increase in anion concentration is evidently connected with the equilibrium:

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Adsorption of radioactive isotopes ....

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$$Zr(OH)_x^{4-x} + (4 - x) A^- \rightleftarrows [Zr(OH)_x A_{4-x}]^0$$

Various suggestions are put forward to explain the effect of the nature of the neutral salt cation on the zirconium adsorption. As the adsorption increases with the degree of hydrolysis of the Zr solutions the effect may be due to different degrees of hydrolysis in solutions containing different alkali metal salts. Other suggestions are based on the different hydration of Li^+ and Na^+ compared with that of the other alkali metals and the effect of the cation on the extent of complex formation of Zr with chloride ions.

There are 4 figures, 3 tables and 8 references: 7 Soviet and the following English reference:

Ref.4: R.M. Diamond. J. Phys. Chem., Vol.63, 5, 659 (1959).

SUBMITTED: June 9, 1960

Card 4/4

STARIK, I.Ye.; [illegible], Yu.V.; LEGIN, [illegible]; [illegible], [illegible]

Certain characteristics of radioionium dating. Radiokhimiia 3 no.4:490-497 '61. (MIRA 14:7)

(Thorium--Isotopes)

S/186/61/003/005/021/022
E040/E485

AUTHORS: Starik, I.Ye., Ampelogova, N.I.

TITLE: Comments on R.Tauber and T.Schönfeld's article "On the adsorption of polonium on cellulose and glass" published in J. Chromatography, v.4, no.3, 1960, 222

PERIODICAL: Radiokhimiya, v.3, no.5, 1961, 640-641

TEXT: From their study of polonium adsorption on cellulose and glass from solution containing lanthanum nitrate and maintained in the range of pH = 1 to 6, Tauber and Schönfeld concluded that the presence of lanthanum nitrate has an appreciable effect on the adsorption of polonium, reducing it in some cases and increasing in others. The final conclusion was that at pH $\geqslant$ 1.5, the polonium adsorbed on such surfaces is in the form of radiocolloids and not as ions. The present authors disagree with the above conclusions and suggest that the results of their previous investigations of the form in which polonium exists at various pH values and also those of investigations of the lanthanum adsorption by glass and cellulose and its variation with the pH of the medium, point to a different mechanism of polonium adsorption

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Comments on R. Tauber and ...

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E040/E485

the adsorption of polonium. Some doubt is also expressed with regard to the accuracy of Tauber and Schönfeld's method of determining the activity of polonium. It is suggested that for the final elucidation of the mechanism of polonium adsorption it is necessary to carry out more investigations of the effect of various impurity electrolytes and of the desorption of polonium from the glass and cellulose surfaces. There are 10 references: 7 Soviet-bloc and 3 non-Soviet-bloc. The reference to an English language publication reads as follows:
Ref.7: G.K.Schweitzer, W.M.Jackson, J. Amer. Chem. Soc., v.74, 16, 1952, 4178.

SUBMITTED: April 24, 1961

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Card 3/3

STARIK, I.Ye.; GINZBURG, F.L.

Nature of americium colloid behavior. Radiokhimiia 3 no.6:685-689 '61. (MIRA 14:12)

(Americium)

STARIK, I.Ye.; SHEYDINA, L.D.; IL'MENKOVA, L.I.

Study of the state of protactinium in aqueous solutions. Part 5: Region of occurrence of pseudocolloids. Radiokhimiia 3 no.6:690-693 '61. (MIRA 14:12)

(Protactinium)
(Colloids)

S/186/61/003/006/008/010
E040/E185

AUTHORS: Starik, I.Ye., Starik, F.Ye., and Yelizarova, A.N.

TITLE: Direct determination of protactinium and actinium in uranites

PERIODICAL: Radiokhimiya, v.3, no.6, 1961, 749-754

TEXT: Detailed knowledge of the relative concentrations of individual radioisotopes in the various radioactive series of elements is absolutely essential in interpretation of radioactive dating data obtained especially by the lead technique. In case of the actinide series, the radioactive equilibrium between Pa^{231}, Ac^{227} and U^{235} can be determined by a direct measurement only, because indirect methods pre-suppose a priori that such an equilibrium already exists. As a continuation of the previously undertaken investigations of the authors on the radiochemistry of uranites (lead dating and separation of isotopes), a direct determination was made of protactinium and actinium in samples of the same mineral, using methods reported previously (Ref.9: I.Ye. Starik, A.P. Ratner, M.A. Pasvik, L.D. Sheydina, ZhAKh,

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STARIK, I.Ye.; [illegible]

Lower valences [illegible] Zhur. neorg. khim. 6 no.1:222-224 '61. (MIRA 14:2)

([illegible])

STARIK, I.Ye.; SOBOTOVICH, E.V.

Age of meteoritic bodies and the Earth, based on radioactivity.
Izv.AN SSSR. Ser.geol.26 no.10:72-83 O '61. (MIRA 14:9)

1. Radiyevyy institut AN SSSR, Leningrad.
(Earth-age) (Meteorites)

STARIK, I.Ye.; ZHARKOV, A.P.

Rate of sediment accumulation in the Indian Ocean determined by radiocarbon dating. Dokl.AN SSSR 136 no.1:20[illegible]-205 Ja '61.
(MIRA 14:5)

1. Chlen-korrespondent AN SSSR (for Starik).
(Indian Ocean--Sedimentation and deposition)
(Radiocarbon dating)

20740

S/020/61/137/002/013/020
B101/B217

15.8115 2209

AUTHORS: Starik, I. Ye., Corresponding Member AS USSR, Skul'skiy, I. A., and Shchebetkovskiy, V. N.

TITLE: Spectroscopic study of zirconium chloride solutions in connection with the zirconium adsorption on fluoroplast-4

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 2, 1961, 356-358

TEXT: The authors deal with the problem of the distribution of Zr between solution and nonionogenic surface (fluoroplast-4) under the influence of the nature of the cation and the different degree of hydrolysis of the Zr complexes. In a previous paper it was shown that: 1) the distribution coefficient of Zr^{95} between solution and fluoroplast-4 decreases with increasing concentration of HCl; 2) at equal ionic strength the adsorption of Zr increases in the presence of cations in the order $Li^+ \ll H^+ \ll Na^+ < K^+ < NH_4^+$ (Fig. 1). The present paper aimed at establishing that this behavior is due to complex formation. For this

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Spectroscopic study of zirconium...

purpose solutions of spectroscopically pure zirconium oxychloride were studied in various concentrations by means of a СФ-4 (SF-4) spectrophotometer in the presence of acids and alkali chlorides, and the optical density D as well as the molar extinction coefficient ε were determined. Fig. 2 shows the absorption spectra of Zr solutions in hydrochloric and perchloric acid. In the presence of HCl, absorption increases rapidly with its concentration. The peak at 220-225mμ in 8 N and 9 N HCl is explained by the formation of $ZrCl^{5-}$ and $ZrCl^{6-}$ complexes. The optical density in the 213-250 mμ region may serve as a standard of the intensity of complex formation between Zn and Cl ions. Fig. 3 gives the absorption spectra of zirconium solutions in the presence of HCl, LiCl, NaCl, KCl and NH_4Cl. The right-hand part of the figure gives a portion of the spectra on an enlarged scale. The distinct dependence of the optical density on the type of neutral salt added is pointed out. In the presence of Na^+, K^+, and NH_4^+, the optical density is low and complex formation therefore slight, and, as is shown in Fig. 1, adsorption on fluoroplast-4 is considerable.

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Spectroscopic study of zirconium...

This is explained by the fact that in NaCl, KCl and NH_4Cl solutions Zr complexes are formed mainly by chlorine atoms being bound to free valences and the OH groups of the complex $\left[Zr(OH)_xCl_{4-x}\right]$ are not displaced. In this case the adsorption of Zr is caused by a salting effect. In the presence of HCl or LiCl however, the hydrolysis and thus also the adsorbability of the complexes is reduced. There are 3 figures and 1 table.

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radium Institute imeni V. G. Khlopin, Academy of Sciences USSR)

SUBMITTED: December 19, 1960

Card 3/6

STARIK, I.Ye; ARSLANOV, Kh.A.

Radiocarbon estimation of the age of certain Quaternary specimens.
Dokl.AN SSSR 138 no.1:102-105 My-Je '61. (MIRA 14:4)

1. Chlen-korrespondent AN SSSR (for Starik).
(Radiocarbon dating) (Geology, Stratigraphic--Quaternary)

STARIK, I.Ye.; NIKOLAYEV, D.S.; KUZNETSOV, Yu.V.; LEGIN, V.K.

Relationship between the radioactivity of sediments in the Sea of Azov and the Black Sea. Dokl. AN SSSR 139 no.2:456-459 Jl '61. (MIRA 14:7)

1. Chlen-korrespondent AN SSSR (for Starik).
(Azov, Sea of--Radioactive substances)
(Black Sea--Radioactive substances)
(Deep-sea deposits)

STARIK, I.Ye.; ZHARKOV, A.P.; LISITSYN, A.P.

Rate of recent and late Quaternary sedimentation in the southern part of the Pacific Ocean according to the data of the radiocarbon method. Dokl. AN SSSR 139 no.4:970-973 Ag '61. (MIRA 14:7)

1. Radiyevyy institut im. V.G. Khlopina AN SSSR i Institut okeanologii AN SSSR. 2. Chlen-korrespondent AN SSSR (for Starik).
(Pacific Ocean—Sedimentation and deposition)
(Geological time)

STARIK, I.Ye.; NIKOLAYEV, D.S.; KUZNETSOV, Yu.V.; LEGIN, V.K.

Radioactivity of sediments in the Black Sea. Dokl. AN SSSR 139 no.6:1456-1459 Ag '61. (MIRA 14:8)

1. Chlen-korrespondent AN SSSR (for Starik).
(Black Sea—Sedimentation and deposition)
(Radioactive substances)

STARIK, I.Ye.; BARBANEL', Yu.A.

Some regularities of chemical interaction expressed by the law of mass action. Dokl. AN SSSR 140 no.3:644-647 S '61. (MIRA 14:9)

1. Radiyevyy institut im. V.G.Khlopina AN SSSR. 2. Cheln-korrespondent AN SSSR (for Starik).
(Chemical reaction--Conditions and laws)

STARIK, I.YE., SOBOTOVICH, E.V., SHATZ, M.M., LOVTZUS, G.P.

Uranium and lead in the "Tectites."

40

"METEORITKA" (Meteorites-Studies) Issue no. 20 - 1961, sponsored by the "Committee on Meteorites" of the Soviet Academy of Sciences - Moscow 1961, 208 pages, and containing Collected Works("Trudy") of the "9th Meteorite Conference Organized by the Committee on Meteorites of the Soviet Academy of Sciences" and Held in KIEV on 2-4 June 1960.

STARIK, I.Ye., otv. red.; SHCHERBAKOV, D.I., akademik, zam. otv.
red.; BARANOV, V.I., prof., zam. otv. red.; VINOGRADOV,
A.P., akademik, red.; POLKANOV, A.A., akademik, red.;
AFANAS'YEV, G.D., red.; GERLING, E.K., prof., red.;
PEKARSKAYA, T.B., kand. geol.-miner. nauk, red.; ARON, G.M.,
red. izd-va; GALIGANOVA, L.M., tekhn. red.

[Transactions of the Tenth Session of the Commission on the
Determination of the Absolute Age of Geological Formations,
June 5-10, 1961]Trudy desiatoi sessii...; 5-10 iiunia 1961 g.
Moskva, Izd-vo Akad. nauk SSSR, 1962. 379 p. (MIRA 15:11)

1. Akademiya nauk SSSR. Komissiya po opredeleniyu absolyutnogo
vozrasta geologicheskikh formatsiy. 2. Chlen-korrespondent
Akademii nauk SSSR (for Starik, Afanas'yev).
(Geological time)

S/899/62/000/000/001/001
B117/B186

AUTHOR: Starik, I. Ye., Corresponding Member AS USSR

TITLE: Some results achieved during the 10-year activity of the Commission for the Determination of the Absolute Age of Geologic Formations (opening speech)

SOURCE: Trudy desyatoy sessii Komissii po opredeleniyu absolyutnogo vozrasta geologicheskikh formatsiy, 5-10 iyunya 1961 g. Moscow, Izd-vo AN SSSR, 1962, 4-9

TEXT: The X sessiya Komissii po opredeleniyu absolyutnogo vozrasta geologicheskikh formatsiy (10th Session of the Commission for the Determination of the Absolute Age of Geologic Formations) was opened with the following short report on its activity. The Conference took place from June 5 through June 10, 1961 and was attended by representatives from Czechoslovakia, Rumania, Poland, the GDR and the USA. Back in 1931, the Commission, which had been founded in 1924, began its investigations into the absolute age of geologic formations under the supervision of its president G. I. Vernadskiy. Research was interrupted during World War II,

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but resumed in 1951. Since that time, various radioactive methods have been used in geologic research: including the lead methods , with the exception of the α-lead, in the USA used, and the strontium and argon methods. The helium method was found inadequate for determining exact age. In various parts of the USSR a large number of geochronological research labs and collective groups of geologists are engaged in compiling a comprehensive geological stratigraphic time table. The Commission is charged with confirming the data obtained by different methods. It has been decided to publish annual supplements to the geochronological time table. Other fields of investigation will be: determination of recent formations by ionium and carbon methods (for such short periods as 50,000 years), as well as age determinations of celestial bodies and meteorites. The Commission also collaborates with other countries e. g. with China, Czechoslovakia, Bulgaria, the GDR, Hungary etc. During the period 1951-1961 9 sessions took place. The proceedings of the last session are in press and will shortly be available. Four bulletins and several monographs were issued, too. There is 1 figure.

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