
(Air compressors)
Lozovskii, V. M., Nazarenko, V. A. and Rusinov, L. I.

TITLE: Letter to the Editor. The Polarizational $\beta$-$\gamma$-Correlation in the $\beta$-Decay of Co$^{60}$

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, No 6, pp 1810-1811 (USSR)

ABSTRACT: As was predicted by A. Z. Dolginov (cf., Zhur. Eksp. 1 Teoret. Fiz., 35, 178, 1958) and H. A. Tolhock (cf., Rev. Mod. Phys., 28, 277, 1956), a transverse polarisation of $\beta$-electrons escaping in a plane perpendicular to the nuclear spin, takes place during the $\beta$-decay of polarized nuclei. The authors have investigated the correlation between the transversely polarized electrons and circularly polarized $\gamma$-quanta formed in the $\beta$-decay of Co$^{60}$ ($\sim$100 $\mu$ Cu). A case was studied where the electron momentum $\mathbf{p}$ lies in the plane perpendicular to the momentum $\mathbf{q}$ of $\gamma$-quantum, which possesses circular polarization $\sigma$. The spin of electron $s$ was anti-parallel to $\mathbf{q}$. Measurements
were made of the degree of the circular polarization of \( \gamma \)-quanta, which coincide with \( \beta \)-electrons. The circular polarization of \( \gamma \)-quanta was determined from the Compton scattering forward on magnetized iron. The substitution of the results in the equation

\[
\Delta = 2(l_1 - l_2)/(l_1 + l_2), \quad l_{1,2} = R_e/R_pR_0
\]

gave \( \Delta = (0.50 \pm 0.18)\% \). The calculation with the aid of the equation

\[
W(\alpha) = 1 + A\alpha.
\]

yielded \( A = 0.32 \pm 12 \). The theoretical value for \( A \) is 0.24 (cf., A. Z. Dolginov, loc. cit.). This work was performed under the guidance of A. Z. Dolginov;
Letter to the Editor. The Polarizational \( \beta - \gamma \) -Correlation in the \( \beta \)-Decay of Co60

O. V. Saltykovskiy, V. S. Andryukevich and A. V. Kurakin participated in the experimental part of this study. There is a schematic diagram of the setup; and 6 references, 1 Soviet, 1 German, 4 " U.S. The U.S. references are: H. A. Tolhoek, Rev. Mod. Phys., 28, 277 (1956); H. Schopper, Phil. Mag., 2, 710 (1957); F. Bohem, A. H. Wapstra, Phys. Rev., 109, 456 (1958); N. Sherman, Phys. Rev., 103, 1601 (1956).


SUBMITTED: August 14, 1959
TEXT: Within the framework of experiments made for the purpose of verifying the T-invariance of the \( \beta \)-decay, the \( \beta \gamma \)-correlation in the decay of polarized neutrons and the \( \beta \gamma \)-correlations in the decay of orientated nuclei has already been measured, and it was found that (with an accuracy of 15-30%) no imaginary part occurs in the \( \beta \)-interaction Hamiltonian. The amount of this correlation in these experiments depends on the imaginary part of the interference \( VA \) terms; as, however, an \( S \) - and \( T \)-admixture could hitherto not be excluded, this should also be taken into account. This was the purpose of the present paper. By trying to estimate the amount of \( \text{Im}(VT, SA) \), the correlation between the transverse polarization of the electron and the circular polarization of the gamma quantum were experimentally determined.
The experimental arrangement is shown in Fig. 2. A theoretical study of the correlation coefficient K for allowed transitions (according to A. Z. Dolginov) shows that K depends on the degree of interference of the Gamow-Teller and the Fermi matrix elements. Thus, Sc46 was chosen as a source owing to its high degree of interference of the matrix elements. The electrons coming from the source (S) are collimated on a bismuth film (0.5 mg/cm²), scattered through ~135°, and recorded by means of a scintillator, which is connected with the photomultiplier via a light pipe. Owing to the azimuthal asymmetry, which is connected with Mott scattering, the beam of the scattered electrons is polarized in the direction \( \mathbf{P}_1 \mathbf{P}_2 \), (\( \mathbf{P}_1 \) is the momentum of the electron before, and \( \mathbf{P}_2 \) that after scattering). In order to increase counting intensity, circular geometry was used. The circular polarization of the \( \gamma \)-quanta was measured by means of the method of the Compton forward scattering on magnetized iron. The outputs of the photomultiplier of the \( \beta \)- and \( \gamma \)-detectors were connected in fast-slow coincidence with \( 2\tau = 1.6 \times 10^{-8} \) sec. From the measured results \( \Delta = 2(I_1 - I_2)/(I_1 + I_2) \), \( I_{1,2} = R \text{coinc}/R_{\beta \gamma} \text{was calculated, and thus } K = \Delta/F_{\gamma \beta} \text{was determined, where} \)
βγ- polarization correlation ...

Pγ and Pβ are the efficiency of the γ and β-polarizers. One obtained:

Δ = (0.15 ± 0.11)% and henceforth the correlation coefficient was found to be K = 0.08 ± 0.06. The experiments were repeated by means of a thick scatterer (~5 mg/cm²), from which it followed that the experimental arrangement had no asymmetry. Thus, it was found that, as

\[ K = +0.04 \text{ with } \text{Im}(VT,AS) = 0 \]
\[ K = +0.23 \text{ with a maximum } \text{Im}(VT,AS) \]

\[ \text{Im}(VT,AS) = 0 \text{ with a statistical accuracy of } \sim 30\% \]. For the purpose of checking the experimental method, also other correlation experiments were carried out on Sc46 and Co60, and results were obtained, which showed good agreement with those obtained by other authors. The authors finally thank A. Z. Dolginov for discussions and for his interest, O. M. Saltykovskiy, V. V. Andryukevich, and A. V. Kurakin for the experimental assistance.

There are 2 figures and 5 references: 2 Soviet-bloc and 2 non-Soviet-bloc.

Card 3/5
§γ-Polarization correlation...

ASSOCIATION: Leningradskiy fiziko-tekhnichestkiy institut Akademii nauk SSSR (Leningrad Institute of Physics and Technology of the Academy of Sciences USSR)

SUBMITTED: June 22, 1960

Legend to Fig. 2: S - source, 1) electron scatterer, 2) plastics scintillator, 3) light pipes, 4) vacuum chamber, 5) outlet window for γ-quanta, 6) magnet of the γ-polarimeter, 7) photomultipliers.
LOBASHOV, V.K.; NAZARENKO, V.A.

Studying the decay of Pr^{144} by the \( R \)-correlation method.
Zhur. eksp. i teor. fis. 41 no. 5:1435-1437 II '61. (MIHA 14:12)

1. Leningradskiy fiziko-teknicheskiy institut AN SSSR.
(Fraserodymium—Decay)
(Quantum theory)
The dependence of the $\phi$ correlation coefficient on gamma quanta and electron velocity in the $\phi$ decay of $^{36}$Cr and $^{36}$Fe.

The dependence of the $\phi$ correlation coefficient on gamma quanta and electron velocity in the $\phi$ decay of $^{36}$Cr and $^{36}$Fe was measured with $^{51}$Cr and $^{51}$Fe gamma quanta. The purpose was to find out whether it is dependent on $v/c$. Fage et al. (Phys. Rev. 125, 649, 1962) have found that it is not, whether it is $\sim v/c$ as found by P. Ye, Spirin et al. (ZhETF 43, 1394, 1962), or $\sim 1/c$ (e.g., Phys. Rev. D8, 336, 1973; 102, 201, 1976) and deviates from $v/c$ by an energy-dependent amount. A. I. Al'tabnov, A. F. Yel'tezov, V. A. Dubinin (ZhETF 67, 967, 1974) found a 20% variation in the 60 keV range. An arrangement (Fig. 1) with carefully selected photo-multipliers was used. The pulses from these multiplier were fed into a fast slow coincidence circuit with a time resolution of 140 ns (F. H. Kehl).
investigation of the dependence...

the rate of the β-emission with the pulse selection method using the charged particle
for the source was prepared by electrostatic precipitation of 14C. A 1960
\( \beta \)-source was used. The activity was 55 mCi. The
coefficient was calculated from \( \Delta \beta / \Delta \beta' \). For

the value of the \( \beta \)-value, the value for the influence of different
factors on the \( \beta \)-value, all of which had less than 6%.

For multiple scattering effects, it was found that for 0.1 \( 10^{-2} \) of the fraction \( \Delta \beta / \Delta \beta' \) steeper than the straight line on

For \( \Delta \beta / \Delta \beta' \) to 0.6\%, the values measured for the straight line \( \Delta \beta / \Delta \beta' \) which confirmed the data obtained by E. W. Steffen and approved of the

assumption that the \( \Delta \beta / \Delta \beta' \) decay is a Coulomb transition. V. V.

Abov, A. P. Lebedev, O. D. Palkina and L. I. Lipov are

were of great assistance. There are several and 12 references for this and the

section. The four most recent references are: English, language, psychology,
Investigation of the dependence...


ASSOCIATION: Leningradskiy fiziko-tekhnikcheskiy institut Akademii nauk SSSR (Leningrad Physicotechnical Institute of the Academy of Sciences, USSR)

SUBMITTED: July 21, 1961

Legend to Fig. 1: (1) Source, (2) stilbene crystal, (3) NaI(Tl) crystal, (4) light pipe, (5) lead collimator, (6) lead shield, (7) dispemling magnet, (8) jacket of Armoor iron, (9) Ferrelloy jacket.

Fig. 1

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The well-known Mn$^{56} \to$ Fe$^{56}$ decay was studied in detail. This transition takes place to the first excited level of Fe$^{56}$, which goes over to the ground state with emission of an 845-kev gamma quantum. The angular correlation of this (allowed) transition was measured with an apparatus similar to that described by Steffen (see text). The source was obtained by irradiating Mn$^{55}F_2$, on an Al backing, with $\sim 10^{14}$ neutrons/cm$^{-2}$ sec$^{-1}$. The $\beta$-electrons were detected with a stilbene crystal and an $\text{NaI}:Tl$ (PEU-36) photomultiplier, the gamma quanta with an NaI(Tl) crystal and an $\text{NaI}:Tl$ (PEU-13) multiplier. Both multipliers had Armco and Permalloy housings. The NaI(Tl) crystal was lead shielded.

Card 1/3
The multipliers were connected in a fast coincidence circuit with a time resolution of 6.10^{-9} sec; the random coincidence background was 3.0%. An anisotropy of the angular yγ correlation was observed. Ω(θ) = 1 + A_2 cos^2θ. the anisotropy factor was

A_2 = +(0.022 ± 0.003); θ is the angle between y-electron and y-ray quantums. Inner bremsstrahlung and multiple scattering are neglected. the correction for asymmetry due to yγ-coincidences was ~0.2%. The correlation between y-electron emission and circular polarization of the y-ray quantum was determined for the same y-decay component. The correlation factor for the Gamow-Teller transition was found to be 0.7 ± 0.1. The angular anisotropy and the anomalous magnitude of the polarization correlation can be explained from estimates of the second forbidden matrix elements. Measurements were also made of the polarization yγ correlation in the F^20 y-decay. For the F^20 ground state spin and parity were found to be 1, the correlation factor was calculated as 0.12±0.02. its measured value was 0.14±0.07. Professor D. W. Kaminker is thanked for interest.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut Akademii nauk SSSR (Leningrad Physicotechnical Institute of the Academy of Sciences, USSR)

SUBMITTED: August 8, 1961 (initially), February 5, 1962 (after revision)
Determination of the spin of Eu$^{152m}$

The $\beta^-$correlation between the momentum of the $\beta$-electron and the circular polarization of the 1.327 Mev $\gamma$-quantum in the allowed branch of the Eu$^{152m}$ $\beta$-decay with a $\beta$-electron end-point energy of 560 kev is measured. This $\beta$-decay, whose frequency of occurrence among all decays of Eu$^{152m}$ is 1.2%, leads to the 1.315 Mev excited 1$^-$ state of Gd$^{152}$. The measurements were made with an apparatus described earlier (V. M. Lobashov et al., ZhETF 41, 1433, 1961), then used for investigating the similar Pr$^{144}$ decay by an analogous experimental procedure. The Eu$^{152m}$ source was made of about 100$\mu$g/cm$^2$ europium oxide on an Al backing foil, irradiated in the PTI AN SSSR reactor. The value of $\Delta = 2(I_1 - I_2)/(I_1 + I_2)$ Card 1/3
is found to be $(1.6 \pm 0.4)\%$ where $I_{1,2} = R_{\text{coine}} / R_{\text{coine}} \theta_\beta$; $R_{\text{coine}}$ and $R_{\text{coine}} \theta_\beta$ denote the counting rates for coincidences and single pulses of the $\gamma$-channel respectively, and $\psi_\beta$ is a correction factor for the influence of the magnetic field on the $\beta$-channel (0.03\%). The subscripts 1 and 2 respectively correspond to different magnetization directions in the $\gamma$-polarimeter. From this, the correlation coefficient $A_1$ is calculated taking into account the background of casual coincidences; also the geometry and the efficiency of the $\gamma$-polarimeter; $A_1 = +(0.40 \pm 0.10)$.

For the transitions $0^- \beta$, $1^- \beta$, $0^- \beta$, a correlation coefficient of 1.00 is to be expected, but for the transitions $1^- \beta$, $1^- \beta$, $0^+$ a correlation coefficient of the observed magnitude is possible. It is concluded that spin and parity of the Eu$^{152m}$ isomeric state are $1^-$ instead of the previously accepted value $0^-$. The reliability of the applied experimental procedure is confirmed by the fact that $\beta$-correlation measurements in the $\beta$ decays of Co$^{60}$ and Au$^{198}$ (V. M. Lobashov et al., ZhETF 42, 358, 1962) Card 2/5.
Determination of the spin of $^{152m}$ Eu

have given results in good agreement with those of other authors. It is important to know the spin and parity of the $^{152m}$ Eu isomeric state in connection with the experiment of Goldhaber et al. (Phys. Rev. 109, 1019, 1958) whereby the polarization of the neutrino from the K decay was measured. Goldhaber's main result i.e. his conclusion on the chirality of the neutrino, is not affected, but the expected greater accuracy from further such experiments with $^{152m}$ Eu to determine the polarization of the neutrino is diminished. There is 1 figure.

ASSOCIATION: Fiziko-teknicheskiy institut im. A. F. Ioffe Akademii nauk SSSR (Physicotechnical Institute imeni A. F. Ioffe of the Academy of Sciences USSR)

SUBMITTED: April 20, 1962

Card 3/3
NAZARIenko, V.A.; FLEkTinOV, G.V.


1. Institute of General and Inorganic Chemistry, Academy of Sciences, Ukrainian S.S.R., Laboratories in Odessa.
"Relative Measurements of the Longitudinal Polarization of Electrons in Beta Decay of P^32 and Zn^64, Ho^195 and Re^196."

Report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22 Feb 64.

ITI (Physico Technical Inst)
Alkalimetric determination of germanium as tridiphano-germanic acid. 
(МІІА 1975)

1. Institute physical and chemical kinetics AN USSR, laboratory 
v Odessa.
NASTENKO, V.A.; RAVIYKATA, V.V.

Trihydroxyflurorene as protonate reagents for metal I.r.

khm. zhurn. 30 no.7 1987 74-78.

1. Institut odborného z nezvyklebného klimatizácie, laboratóriu v

Glasse.
KAZANNEKO, V.A.; FLYANTIKOVA, G.Y.

Volumetric determination of germanium in the form of dipolyol-
germanic acids. Ukr. khim. zhur, 30 no.7(62-763 164
(HIRA 1641)

1. Institut obshcheskoy neorganicheskoy khimii Akh UcrSSR,
laboratoriya v Odessе.
AUTHORS: Kaminker, D. M.; Lobashov, V. M.; Nazarenko, V. A.;

TITLE: Relative measurement of the longitudinal polarization of electrons in Beta decay

SOURCE: Zhurnal eksperimental’noj i teoreticheskoi fiziki, t. 47, no. 5, 1964, 1668-1670

TOPIC TAGS: beta decay, electron polarization, electron energy, circular polarization, bremsstrahlung, nuclear structure

ABSTRACT: To check on the hypothesis advanced to explain some anomalies in the longitudinal polarization of electrons, namely, that the internal structure of the nucleus gives rise to higher-order corrections, the authors attempted to ascertain the dependence of these anomalies on the electron energy. To this end, relative
measurements of the longitudinal polarization of electrons were measured in β decay of P32, In114, Pr142, Ho166, and Re188 at energy Eβ = 1250 keV. The experiments consisted of measuring the circular polarization of the bremsstrahlung produced by deceleration of the β electrons in a lead target, using the setup shown in Fig. 1 of the enclosure. The circular polarization of the bremsstrahlung γ quanta of the β electrons of In114, Pr142, Ho166, and Re188 was compared with the circular polarization of the bremsstrahlung γ quanta of P32 β electrons. The electron energy was determined with the aid of a magnetic lens spectrometer. The values obtained for the longitudinal polarization relative to that of P32 were 0.960 ± 0.0015, 0.934 ± 0.015, 0.942 ± 0.015, and 1.005 ± 0.016 for In114, Pr142, Ho166, and Re188 respectively. The observed increase in the deviation of the longitudinal polarization of the electrons from -0.16° to -0.43° indicates a change in the spatial structure of the nucleus. The observed deviations of the
Longitudinal polarization do not correlate with available data on
the form of the spectra of the corresponding transitions. The
authors thank V. A. Knyaz'kov, V. D. Bel'kov, V. P. Kazakov, and
D. Chuklin for help in preparing the apparatus for measurements,
and also A. N. Timokhin for participating in preparation of the p³
and In¹⁴ sources. Orig. art. has: 1 figure.

ASSOCIATION: Fiziko-tekhničeskiy institut im. A. F. Ioffe Akademii
nauk SSSR (Physicotechnical Institute, Academy of Sciences SSSR)

SUBMITTED: 23 May 64

SUB CODE: NP

NR REF SOV: 004

OTHER: 002

Card 3/4
Fig. 1. Schematic diagram of installation. 1 - Source, 2 - magnetic-spectrometer
cell, 3 - vacuum chamber, 4 - compensation coils, 5 - lead target, 6 - gamma
photometer, 7 - NaI(Tl) crystal, 8 - light pipe, 9 - normality screens, 10 -
anti-scatter, 11 - lead screens, 12 - crystal detector, 13 - lead shield
and 474
The number of deuterium atoms is given in this formula and the mass spectra taken for a 1:1 mixture of H₂O and D₂O. Formation of "metastable" ions (according to the first formula above) is reflected in the appearance of j(k-j+2) lines instead of one line corresponding to pure H₂O. Distinct identification of these lines follows from another formula.
respond to the starting "metastable" ion. Similar results were obtained with the
"On the Determination of Beryllium by Quinolinate. V. A. Nazarenko (Beryllia Laboratory Works Lab.), 1925, c. 1, 200, 265; [To Realize:]
Fe(OH), Al(OH), and Be(OH) are precipitated with NH₄OH, the precipitate
is extracted with hot KOH and the alkaline solution is treated with quinol-
inate for the volumetric determination of Be; Ca⁺ and Ba⁺ interfere slightly
but should be separated by the preliminary NH₄OH precipitation.—D. N. S.
Titration of barium salts and sulfate ion with potassium chromate. V. A. Ratner and M. G. Fedosov, Zavodskaya Lab., 44, 385 (1933); L'vov and Saveliev, C. R. 159, 80 (1899). A sharp change in color of the indicator with an accuracy of 0.01% is observed on the titration of BaCl₂ with K₂Cr₂O₇ in the presence of a weak acid by adding 1 ml of 0.1N HCl to 3 vol. of the salt. Similar improvement enables determination of sulfates by pipette with BaCl₂ and titrating the excess of BaCl₂ as above. All and some other Ba salts are precipitated by adding 1 N HCl or NaOH, resp., before titrating with K₂Cr₂O₇. To determine Ba in BaNO₃, ignite a mixture of 2 g BaSO₄, 2 g of solid, charcoal, and 0.5 g of sodium. Cool, add 1 ml of 1 N HCl, filter, and titrate the supernatant with 1 N HCl in the presence of K₂Cr₂O₇ and K₂Cr₂O₇. Char, Blane.
Determinants in Catalytic dust of synthetic acid fumaric. V. A. Datsyuk and A. M. Gribitskaya
(J. Chem. Eng. Data, 1984, 29, 633--634). The dust contains 0.006--0.014% of Bi.
R. T.
Colorimetric determination of zirconium.

V. A. Nastasevskii, J. Appl. Chem. Russ., 1987, 10, 1006—1008. 5 ml. of 40% HCl are added to the solution, which is evaporated down to 0.5 ml. 5 ml. of 25% HCl and excess of 1% 

$\text{Me}_2\text{C}_2\text{H}_2\text{NNC}_2\text{H}_4\text{Zr(OH)}_4$ in 5% HCl in 

EtOH (1 ml. per 0.1 g. Zr, +1 ml. excess) are added, and the solution is filtered after 2 hr. The residue is washed successively with 0.01% HCl in EtOH and with 60% EtOH, dissolved in 25% KOH, the solution is diluted to 80—250 ml. with 25% KOH, and the coloration is compared with that given by standard 

Zr solution. Th, Th, Ce, Fe, and U do not interfere.

R. T.
An application of a ferrous hydrazyl complex in microchemical analysis. N. V. Polyakova and V. A. Nagornova.

The complex was obtained by dissolving 0.66 g of FeCl₃·6H₂O, 0.5 g of H₂O₂, and 0.25 g of NaCl in 100 mL of hot water. The reaction of the following acids were investigated with respect to their reactivity and sensitivity toward the reagent: HCl, HBr, HI, HCN, HNO₂, HNO₃, H₂SO₄, H₂SO₃, H₂O₂, H₂O, H₂, H₂O₃, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. The reagents, HCl, HBr, HI, and HCN, have in neutral and acid forms formed with the reagent only slight dioxane phase.

The sensitivity of the reagent in neutral or weakly acidic solution, sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. Sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. Sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. Sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. Sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively. Sensitivity 1 (dioxane), H₂SO₄, H₂SO₃, H₂O₂, H₂O₄, H₂O₅, H₂O₆, H₂O₇, H₂O₈, H₂O₉, H₂O₁₀, H₂O₁₁, H₂O₁₂, respectively.

For references:
A. A. Podgorny.
Drop analysis of minerals. V. A. Nazarenko and N. A. Podubets. Kserebnaia Shkola 1961, No. 1, p. 6. Akad. Nauk S.S.S.R., Izd. Nauka, 1954. --- Spot tests are proposed for identifying minerals under field conditions. Detailed directions are given for detecting V, Li, and Zr, and a no. of the most specific reactions for 25 elements are given. The sensitivities of these reactions are listed. W. H.
Microchemical reaction for genidolind (I). V. A. Nazarenko, Appl. Clay Sci., 1981, 14, 159-166; J. A. 128, 3, 5528-29. In a solution of 0.011 M, excess of NaCl in 0.005 M, 0.01 M, or 5.0 M, genidolind can be detected by "diffusion" with NaCl. The color of the blue solution is due to the reaction between NaCl and HCl. Dark red, needle-like crystals and aggregates of NaCl and HCl, which are distinguishable from the red-colored, needle-like crystals of genidolind, are formed. Red crystals of genidolind, which are similar to those of NaCl, are also formed. However, the sensitivity of the reaction is lower, and the crystals are of different sizes and shapes. A solution of NaCl do not react with (I).
"A New Colour Reaction for Mercury."

Zhur. Analit. Khim., No. 5-6, 1946
Application of complex-forming substances in the analysis of sulfates and chlorides in solutions containing salts of tungstate and molybdate acids. V. A. Nazarenko and P. O. Petruk. Nemadspis Lab. 18, 131-3 (1990). Citrates may be used to form complex ions with W and Mo acids; provided the proper acidity is maintained and a large excess of citrate is avoided, which delays the onset of reaction. Perform the procedure for 30 g of sample. Procedure: Add to 7.5 g of sample in 10 ml of 110% HBr, 1 drop of 6 N HCl (1:12) until the solution is colorless. Add 1 ml of 110% HCl and 1 ml of 10% BaCl₂. Compare standards after 10 min. Add 1 ml of 10% BaCl₂, 1 ml of 10% HCl, and 1 ml of water standards after 10 min. Add 1.5 ml of 10% BaCl₂, 1 ml of 10% HCl, and 1 ml of water standards after 10 min. Add 1.5 ml of 10% BaCl₂, 1 ml of 10% HCl, and 1 ml of water standards after 10 min. Add 1 ml of 10% BaCl₂, 1 ml of 10% HCl, and 1 ml of water standards after 10 min. Add 1 ml of 10% BaCl₂, and 1 ml of 10% HCl. Compare the results after 10 min. Add 1 ml of 10% BaCl₂, 1 ml of 10% HCl, and 1 ml of water standards after 10 min. Add 1 ml of 10% BaCl₂, and 1 ml of 10% HCl. Compare the results after 10 min. Add 1 ml of 10% BaCl₂, and 1 ml of 10% HCl. Compare the results after 10 min.

G. M. Kondratyev.
Determination of Small Amounts of Antimony in Mercury, V. A. Nazarevich Zhur. Lab., 1950, 12, (2), 340. — [In Russian]. 10 g of specimen are dissolved in cone. HNO₃ and the solution evaporated. Large quantities of Hg interfere with the analysis and must be eliminated by heating; loss of volatile Sb is prevented by adding a non-volatile oxide such as MgO. Heating is carried out at first gently in a gas flame and subsequently in a muffle furnace for 1-2 hr at 600-650° C. The residue is dissolved in 5 ml. H₂SO₄, (1 : 1) and made up with distilled H₂O to 25 cc. 2 cc of this solution are taken, and to these are added 8 ml. of a mixture made up of 10 ml. 0.3% KI solution, 1 ml. 10% pyridine solution, 1 ml. H₂SO₄ (saturated solution), 1 ml. 10% ppyridine solution, 63 ml. H₂SO₄ (6 parts acid to 1 part H₂O). The yellow solution is compared with standards in a colorimeter. — T. O. L.
Colorimetric determination of Sn in ores. V. A. Nasa.


~The method is best done colorimetrically with 1-methyl-4-dimercaptan-

tone (I) in dil. HCl. W, Ti, or Ce is kept from interfering.

~by addition of 1% nitric acid. Thioglycolic acid is used to

~reduces Sn to the tetravalent state and a little AgN is used to

~reduce Sn in the tetravalent state to the trivalent state. The Sn drop is ad-

~in HCl, AgNO₃, and HClHCl; this can be used as a means of separ.

~from other elements. The AgNO₃ is precipitated with HCl.

~in 1% nitric acid. The product is obtained by reduction of tetravalent Sn with granular lead.

~by HCl with mild warming, followed by steam dono.
NAZARENKO, V.A.


QE364.N3
Rapid semimicro colorimetric determination of lithium in minerals and ores. V. A. Nazarenko and V. V. Filatova. "Zavod. Anal. Khim. 3, 254 (1958)." The method is based on the use of LiKFeO₄, dissolving the ppt. in acetic acid, and measuring colorimetrically Fe as thiocyanate. The content of Li is found by multiplying the Fe content by 0.124 (cf. Proctor and Stand, C.A. 48, 1274). Rogers and Caley, C.A. 47, 2280). To prepare the reagent dissolve 2.2 g of KFeO₄ in 50 ml of 0.5 N KOH, add 12 ml of 0.1 M FeCl₃ in 0.5 N HCl while stirring, and dil. with 2 N KOH to 100 ml. To det. Li in silicate tune 1-35 mg of finely ground sample with 100-150 mg of powdered KOH in a Pt crucible. Transfer the melt to 6-10 drops of HCl, transfer to a 5-mL porcelain crucible, add 0.2-0.5 g of powdered silica, "pap", and heat slowly to complete decomposition of silica. Melt with a few drops of HCl (NiCl₂)Cl₃ transfer to a crucible tube, make up to 2 ml, and centri- fugage. Transfer (dry powder) 1 ml of the clear soln. to a 5-mL porcelain crucible, "pap", to dryness, add 3-5 drops of concd. HCl, evap., and ignite slightly. Add 0.2 ml of concd. HCl, 0.5 ml of 10% NaCl, "pap" for 5 min., etch from time to time, and filter into a standard crucible. Wash residue in the crucible and on the filter with a mct. of HCl and H₂O (1:1). Evap., filter, ignite slightly, and dissolve in 1-3 drops of HCl. Add 1 ml of N KOH, heat to near boiling, and add 2 ml of equally hot reagent. Heat for 5 min., and cool in cold HCl. Filter with suction, wash 4 times, each with 0.75 ml of N KOH, and dissolve in 10 ml of N HCl. Add to 25 ml, take 0.5 ml, add 0.2 ml of 0.1 M HCl, 30% KCN, 0.1 to 0.5 ml, and det. Fe colorimetrically. Multiply the quantity of Fe by 0.924. A better method is described by G. H. C. M. Houtz.
Use of benzidine in the analysis of phosphatungstate.

V. A. Nazarenko and L. B. Shvartsbord, Zemledel'skaya Lab. 16, 357-61 (1930).—Benzidine gives not only the
phosphatungstate but also the phosphotungstate and leads to
errors in comp. W from small ants. of P. In solns.
already contg. phosphotungstate, its sota. is quant.
To det. phosphatungstate anhydride and W's by calc.
in Na phosphatungstate: Treat 0.5 g. of sample with
100 ml of 0.1 N HCl and add 30 ml of boiling 4%
benzidine-HCl soln. Let stand 2 hrs. and filter, wash
benzidine-HCl soln. (0.5% benzidine-HCl soln.), dry and ash. Heat at 600-
700° to const. wt. to form Na2P2W7O24, contg. 2.35 g
Na2O.
NAZARENOV, V. A.

16, 536-8 '50.
(CA 47 no. 21;11079 '52)
Detection of ethylene glycol in forensic analysis. N. A. Lapkina and V. A. Nazareuk (Odessa Regional Forensic Med. Lab.). Zheleznova. Khim. O., 8, 283-4 (1961).—Ground 10 g of liver (or stomach fluid if death occurred soon after intake of ethylene glycol) with 5 g of cryolite, caustic acid.

Transfer into 100-ml flask, add 50 ml benzene, connect upright condenser provided with a calibrated U-shaped trap, and heat on water bath. Heat for 10-15 min until HCOOH in trap does not increase. Transfer 8 ml of distillate to a test tube, add 3 ml of 1:1 HCl, add 5 drops of 5% NaNO₂ or KI, in 5% H₂SO₄; after 5 min. add dropping a satd. soln. of H₂SO₄ to decolorize, add 4 drops of fuchsin mullin acid, and stopper test tube. After 3-30 min intense red-violet or pink color indicates the presence of ethylene glycol.

M. Hoosh
Identification reactions for dichloroethane. V. A.

Nacarovsky, G. N. and Lapha, J., and Chem., USSR, 1952, 7, pg. 28. 2-Dichloroethane can be detected by means of reactions giving ethylene glycol, acetone, or ethyleneimine.

The first two can be used for its detection in gl solutions. 0.5 ml of the solution is placed with 0.5 ml of 10% NaOH in a 1 ml test-tube. The ampoule and the sealed ampoule is heated at 100° for 1 hr. The contents are then transferred to a test-tube, and 2 drops of 10% HNO₃ are added, and 2 drops of KCNO in a H₂SO₄. After heating, 1 ml of this solution is removed by dropping addition of SO₂. A red color is indicated. A red color indicates 1:2-dichloroethane. 0.5 ml of the 1.2-
interference. For the formation of oxymethylene, 0.5 ml of the 1:2-
dichloroethane solution and 0.5 ml of 30% NaOH are introduced into an ampoule with as little mixing as possible. The ampoule is sealed, and the vial heated at 100° for 30 min. The liquid is then transferred to a test-tube by means of a capillary pipette. 30% acetic acid is added dropwise to give an acid reaction in litmus, and the solution is treated with 2 drops of ammonium Cu solution. A red or cherry-red color with gradual formation of a ppt. indicates 1:2-dichloroethane. The precipitate is prepared by dissolving 1 g of Ca(NO₃)₂ and 4 g of hydroxylamine hydrochloride in a small amount of water, addition of 8 ml of 30% gl. NH₄, and dilution to 50 ml after decolorization. 0.15 ml nitric acid can be detected at a dilution of 1:2000. 1:1-Dichloroethane, 1:2-dichloroethane, and 1:1:2-trichloroethane give similar colors, and 1:1:2:4-tetrachloro- and 1:1:2:4-tetrachloroethane, ethyleneimine, and amyl form dichloroethane interfere. The characteristic crystals are observed. 1:2-Dichloro-
ethane interferes. No interference occurs in any of the reactions in presence of CH₃Cl, CCl₄, monochloroethane, 1:1:1:1-trichloro-
ethane, 1:4:1:4-tetrachloroethane, perfluoroethyl chloride, or chloro.

G. B. Seiff

The solution of a pink colour with Erlich's blue - black II can be used to detect 0.51 to 0.02 μg of Mg in 2 ml of solution. To determine 0.05 to 0.30 μg of Mg, 2 ml of the solution in a small separating funnel are mixed with 0.20 ml of 0.5 per cent Na dehydrogen carbonate solution and the mixture is shaken with 1 ml of ethyl acetate. The ethyl acetate layer is rejected and the operation of adding 1 ml of extracting solution is repeated several times until the ethyl acetate no longer shows the yellow colour due to the presence of Mg. The solution is then evaporated to dryness, the residue is dissolved in 3 ml of water and 0.20 ml of 0.02 per cent of Erlich's blue - black II in ethanol is added. The extinction of the solution is measured at 665 nm in a 10 mm cell. The concn. of Mg is determined from a calibration curve.

G. S. Smith
Coprecipitation of microgram quantities of arsenic with magnesium ammonium phosphate. V. A. Novitskii and


Arsenic (0.01 mg) was dissolved by cupric nitrate, then MgNH₄PO₄. From the ppt. As was liberated as arsenic, then oxidized to arsenic acid with a mixture of HgCl₂ and MnO₄⁻; molybdenum blue (I) in the presence of hydrazine was formed. I was extracted with benzyl alcohol, and detd. colorimetrically. There was a direct relation between As and I.

M. Hisch
Two methods of the separation of arsenic from the byssic metal are described in the paper, for the purpose of its (i.e. of arsenic) chemical evaluation. In both cases it is recommended the so-called "universal" type of the separation of microquantities of arsenic from pure metals on further extraction of the diethylidithiocarbamate complex from a strongly acid mixture by chloroform, as well as the final determination after the formation of arsenic-molybdenum-blue in all cases. Then the process of the separation of arsenic from antimony, vanadium, niobium and silicon is described and the use of a suitable apparatus is demonstrated. In the case of an analysis of antimony and niobium previous precipitation of arsenic is recommended is the form of magnesium-ammonium-arsenate with a phosphate carrier. In the case of vanadium and silicon the separation of arsenic from the corresponding solutions is directly performed. The process of the determination of arsenic after the extraction by diethylidithiocarbamate acid is described. In this case a freshly prepared solution of diethylthiocarbamic acid is used for the extraction of arsenic. In that connection it is pointed out that the application of a chloroform solution of diethylammonium -diethylidithiocarbamate would be more
Analysis of Pure Metals. Determination of the Arsenic Content.

Convenient, but this reagent is at present difficult to obtain. This method is also applicable to the determination of the arsenic content of other metals which do not form any diethylcarbamates in strongly-acid solutions, neither in the presence nor in the absence of complex producers.

There are 2 tables and 1 illustration and 5 references.
Especially with respect to the use of semi-conductors in atomic energy, fire-proof alloys, and others, modern engineering often requires the produced materials to be ideally pure. It is mentioned e.g. that in such cases the germanium semi-conductor must not even contain a ten millionth percent of the content of the secondary component (phosphorus, arsenic, copper, boron, and others). Antiquated conceptions with respect to "traces" have been surpassed since long. Outstanding elaborate studies in this field are those by Alimarin, I. F., as well as by S. L. Kandelin, A. I. Zaidel, and A. P. Vinogradov. The methods according to Nazarenko, V. A., are reported to be especially sensitive with respect to the determination of the secondary component of germanium and silicon. An especially great number of methods of polarographic investigations of the secondary component of alloys are described here. The solution of a "difficult problem", the determination of the aluminum content in chrome-nickel-magnesium alloys is attributed here to Kazachkov, V. I., and R. B. Golubtsova, which for the first time applied "artendzo" in this case.
Analysis of Pure Metals

Spectral analyses are rarely applied (according to the opinion of the author) with respect to the investigation of pure metals. Preference is given in this case to the colorimetric methods, several of which are described here. Elaborate studies referring to this subject are mentioned in this context such as by Pelzekov, M. S., Lur'ye, Yu. I., Kiselev, A. M., Shafran, I. G., Gordeyeva, F. I., and Shatayeva, S. G. - The following question is raised in one of these investigations. Which kind of method. radioactivation, spectroscopic analysis, or chemical analysis should be preferred with pure metals. The first, viz., the method of radioactivation is characterized as quick and practical only in some special cases, the behaviour of radioisotopes, however, often exercises a disturbing effect by their secondary effects, or limited applicability. Spectroscopic analysis is rapid and simple for control organization of every day, it is, however, too little sensitive in too poor concentrations because of the necessity of investigating only small doses of the sample. Working up processes cannot also not always be applied. Concerning chemical methods, it is mentioned here that they can be applied with any quantities and concentrations whatsoever. They are simple, need no complicated outfit and are therefore recommended. Concluding, it is stated that the problem of determination of the content of both the micro- and submicro-component in
Analysis of Pure Metals

pure metals have not yet definitely solved. For this reason the further development of investigation work in this field is recommended.
There are 41 references, 43 of which are Slavic.

AVAILABLE:
Library of Congress
1. Metals—Pure—Analysis
Analysis of Pure Metals. Determination of the Tantalum Content in Zirconium and Niobium (Analiz chistых металлов. Определение примеси тантала в цирконии и ниобии)

For the purpose of determining the tantalum content by the colormetric method the derivatives of 2, 3, 7-trioxide-6-fluorine are recommended and dimethyl fluoron results in a bright red coloring. Without a content of tantalum the solution is yellow. Determination of the tantalum content at its minimum 3% is carried out from the 10 ml of the solution, which is deconormal with respect to hydrochloric acid, and 0.4% ammonium oxalate and contains 1 ml of the 1% gelatin solution. The following solutions are recommended for the processes of determination: 1. Mixtures of acids: a) 4-nitric acid + 1-n hydrofluoride acid (70 ml of the 11-nitric acid + 118 ml water + 12 ml 40% hydrofluoride acid); b) 4-n with respect to hydrochloric acid + 2-n according to fluoric acid (70 ml of the 11-nitric acid + 106 ml of water + 24 ml of 40% fluoric acid). 2. Dimethylfluoron
Analysis of Pure Metals. Determination of the Tantalum Content in Zirconium and Niobium

32-11-3/60

- 0.05% solution (50 mg + 0.5 ml of the 6-n nitric acid solution + 50 ml of 96% spirit). 3. Dilution solution: 10 g potassium pyrosulphate melt + 100 ml of the 4% solution of the ammonium oxalate + 250 ml water neutralized to slightly yellow by means of caustic potash. To this 50 ml of 2-n hydrochloric acid is added, and the entire mixture is dissolved in water up to 1000 ml. 4. Rinsing solution for extraction: 30 ml acid mixture as 1b + 20 ml ammonium sulphate solution + 20 ml isobutanol + 20 ml acetone. 5. Tantalum standard solution: 25 mg tantalum is dissolved in the mixture of fluorine- and nitric acid, after which 1 ml of sulphoric acid is added, and the whole is vaporised and then melted together with 2.5 g potassium pyrosulphate. The melt is dissolved in ammonium oxalate up to 250 ml. The paper then describes the process of determining the tantalum content in zirconium and in niobium. There are 4 tables.

AVAILABLE: Library of Congress

Card 2/2
AUTHORS: Nazarenko, V. A., Vinkovetskaya, S. Ya. 75-13-3-13/27

TITLE: A New Method for the Fluorimetric Determination of Gallium (Novyy metod fluorimetricheskogo opredeleniya galliya)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol 13, Nr 3, pp 327-331 (USSR)

ABSTRACT: Many reagents for the fluorimetric determination of gallium have been described in publications (Refs 1-9). These methods, however, have a comparatively low sensitivity, besides iron the complete separation of which is not always simple mostly is disturbing. Seeking for more sensitive and specific methods for determining small amounts of gallium the authors investigated several reagents which were described by Poluektov and Kiseleva (Ref 10). A dye of the group of solochrome, resorcin-[4-azo-1']-2'-naphtol-4'-sulfonic acid proved to be best suitable. In an alcoholic-aqueous solution at pH 3 in the ultraviolet this compound yields a strong orange-colored fluorescence with gallium. In this manner 0.015 g gallium can still be proved. The intensity of fluorescence is proportional to the concentration of gallium. The specificity of this reaction is better than in the analogous determination with 8-hydroxyqui-
A New Method for the Fluorimetric Determination of Gallium

nolins. Thus large amounts of concomitant metals must not be separated in the quantitative determination of gallium according to this method in various natural objects. In many cases the separation of gallium by extraction of its trichloride with ether is sufficient. In the presence of tin, antimony, large amounts of copper and other heavy metals this separation is not sufficient, as these metals are to a certain degree co-extracted and later precipitated. In this case the heavy metals were first separated by cementation on metallic cadmium (Ref 1), where iron was simultaneously reduced to the bivalent stage. Then gallium was extracted. In this manner very satisfactory results were obtained. A method for the preparation of bauxites, silicates, sulfidic ores, products of the metallurgy of nonferrous metals and other substances prior to the gallium determination is given in detail. In the determination of gallium in stone coals these are prepared by heating with a mixture of calcium oxide and calcium nitrate, as the combustion method cannot be employed because of a partial volatilization of gallium. The described method of determination also proved suitable for the analysis of some metals, especially aluminum, zinc and lead. The respective metals must
A New Method for the Fluorimetric Determination of Gallium

be present in a hydrochloric acid solution, nitric acid must be previously removed. The sensitivity of this determination is up to $10^{-7}$% gallium. The performance of the analysis from the preparation until the determination of gallium is described in detail for all above-mentioned substances. There are 4 tables and 10 references, 3 of which are Soviet.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii AN USSR, laboratorii v g. Odessa (Odesa Laboratories of the Institute of General and Inorganic Chemistry, AS USSR)

SUBMITTED: May 16, 1957

1. Gallium--Determination
SOV/75-13-4-12/29

AUTHORS: Nazarenko, V. A., Biryuk, Ye. A., Havitskaya, R. V.

TITLE: The Determination of Indium Admixtures in Germanium (Opr edeleniya primesi indiya v germanii)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol. 13, Nr 4, pp. 445-448 (USSR)

ABSTRACT: The authors of the present paper investigated various color reactions sensitive to indium. They found the reaction with diphenyl carbazole best suited for the quantitative determination of indium (Ref 2). Diphenyl carbazole with indium in a weakly acid solution yields a violet coloration; no precipitation takes place with larger amounts of indium. In the absence of indium the solution has a yellow-brown color. The optimum \( p_H \)-value for this determination is at \( p_H \) 6. At \( p_H \) 5-6 the foreign ions of Mg, Ca, Al, Cr(III), Ti, Mn(II), U(VI), Cd, Pb, Bi, Sn(IV), Sb, As, Ag, Ge, and Ta do not disturb the determination if their excess is not greater than 10-fold. Gallium yields the same reaction as indium, however, with a considerably lower sensitivity. Fe(III) under the conditions...
The Determination of Indium Admixtures in Germanium

of the determination does not show a reaction with diphenyl
 carbazone, it masks, however, indium almost completely. This
disturbing influence can, however, be removed by thiourea.
There a pH of 5.6 is necessary (hydrochloric acid-pyridine-
buffer). At pH 6 no means for the masking of iron could be
found. Thiourea besides iron also masks copper and reduces the
disturbing influence of zinc. In order to exclude the distur-
bing influence of iron it is useful to work at pH 5.6. At this
pH the intensity of the color is by 50% weaker than at pH 6,
the specific character is, however, greater. The maximum of
the absorption is at 530 μ; at this wave length, however, al-
so the reagent still absorbs noticeably. Therefore the indium
is determined at 570 μ, where the reagent does no longer ab-
sorb, while the absorption of the complex is only little below
the normal value. Solutions with an indium content of 0.4 - 5 μ
follow Beer's law. The color of the solutions is constant only
for 15 minutes as the complex then coagulates. Indium traces
in germanium can be determined by means of this method when
the germanium is evaporated in the form of tetrachloride. Then
indium is obtained as a quantitative residue. In the analysis
The Determination of Indium Admixtures in Germanium  

of impurified GeO₂ and also of metallic germanium the residue does still contain disturbing metals; therefore the indium must be separated. This is achieved by the extraction with ether from hydrogen bromide acid solution. In order to prevent the iron being co-extracted TiCl₃ is added. Because of the low capacity of the hydrochloric acid-pyridine-buffer the solutions to be analyzed must be as neutral as possible. In order to prevent that in the boiling down of the acid solutions to dryness a hydrolysis of the indium salts takes place a little sodium chloride is added. Thereby the hydrolysis is prevented as natural chloroindinate is formed. The plotting of the calibration curve, the preparation of the reagents as well as the carrying out of the determination of indium in germanium are described in all details. The sensitivity is then 2.10⁻⁵; this determination is well suited for the indium traces in germanium.

There are 4 figures, 3 tables, and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut obscheys i neorganicheskoy khimii AN USSR, laboratoriya v g. Odessa (Institute for General and Inorganic
The Determination of Indium Admixtures in Germanium

Chemistry, AS Ukr ESR, Odessa Laboratory

SUBMITTED: June 16, 1957

AUTHORS: Nazarenko, V.A., Lebedeva, N.V., Ravitskaya, R.V.

TITIE: The Method of Determining Germanium in Ores, Coals, and Industrial Waste (Mетод определения германия в рудах, углях и промышленных отходах).

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 1, pp. 9-13 (USSR)

ABSTRACT: In the introduction to this work it is said that the best-known method for this purpose is the phenyl-fluorocolorimetric method. Phenylfluoroc (9-phenyl-2,3, 7-trioxide-fluoroc) forms a red precipitation with the tetravalent germanium in which to each germanium atom there correspond two molecules of the reagent. Various varieties of this method, in the first line such developed by foreign scientists like Cluley, Ladenbauer, Slama and Hecht, Luke and Campbell, Schneider and Sandell, as well as by the Soviet scientists Gillebrand and Lendel and others are cited. It is further mentioned here that phenylfluoroc reacts (like to germanium) also to many other elements of the groups IV, V and VI of the periodic system. In order to separate germanium from disturbing elements it is recommended to extract the germanium tetrachloric from the 5-n hydrochloric acid by distillation or by extraction with tetrachloride carbon from 8-9-n hydrochloric acid (examples). In conclusion it is recommended to apply the method.
The Method of Determining Germanium in Ores, Coals, and Industrial Waste

The method is described uniformly to all materials. A difference in treatment is possible solely in the introductory work of separating elements. This generalized method consists in the extraction of the germanium with carbon tetrachloride from 9-n hydrochloric acid, with following re-extraction with water and colorimetric determination with phenylfluorin. A table of results is given with respect to pyrite-, copper-, zinc-, lead-, antimony-, and iron ores, coal, coke, and coal resin. The experimental part of the present work contains three chapters: "Separation of Samples", "Extraction and Determination of Germanium", and the "Construction of the Calibrating Curve". There are 11 references, 2 of which are Slavik.

ASSOCIATION: Ukrainian Branch of the State Institute for Rare Metals and Such as Occur in Small Quantities (Ukrainskiy filial Gosudarstvennoy instituta redkikh i malykh metallov).

AVAILABLE: Library of Congress

Card 2/2

1. Germanium-Determination
2. Germanium-Separation
AUTHORS: Vinkovetskaya, S. Ya., Nazarenko, Z. A.

TITLE: The Volumetric Vanadometric Determination of Gallium (Ob'yemnoye vanadatometricheskoye opredelenie galliya)


ABSTRACT: A dibromoquinoline-method with vanadometric final determination of gallium according to a method already suggested [Ref. 7] is described. If iron, copper, zinc, tin etc. are present, gallium must be separated first. This may be accomplished in two ways, viz. by precipitation with pyridine with aluminum as collector, or by extracting the gallium tetrachloride with ether. Processes of analysis for both methods are given as well as two tables showing the results obtained. Titanium can be removed by hydrogen peroxide, whereas aluminum, indium, lead, cadmium and manganese do not disturb the precipitation of gallium with 5,7-dibromquinoline. For mass analysis the method with pyridine is the more favorable because of the repeated ether extraction necessary in the case of the other method. In this manner it is possible also to determine gallium in anode alloys. There are 4 tables, and 9 references, 5 of which are Slavic.
Analysis of Pure Metals (Analiz chistykh metallov), The Determination of Silico Admixture in Some Semiconductor Metals (Opr edeleniye primei kremnya v nekotorykh poluprovodnikovykh metallakh)

A method of determination is described which is not based upon the insulation of microquantities of silicon accompanied by the forming of silicon molybdenum-blue and a possible extraction, as suggested in some papers, but upon the formation of volatile compounds of the metals to be analyzed. For antimony: tribromide, for gallium: ortho-oxynitrate, and for indium: trichloride and the oxide for thallium were selected. The boiling temperature of the tribromide of antimony is 280°, and by evaporation with hydrobromic acid a complete volatilization of antimony takes place because SbBr₃ has a high vapor pressure. The ortho-oxynitrate of gallium sublimates already below 100°, and at 267° the surplus oxynitroline is volatilized. Indium trichloride is volatilized already below 400° and is sublimated completely at 600°, whereas thallium is sublimated in form of the oxide during the melting of
Analysis of Pure Metals. The Determination of Silicon
Admixtures in Some Semiconductor Metals

its salts with caustic sodium; silicon can then be determined in
the thallium-free alkaline melt. In connection with the determi-
nation of gallium, indium, and thallium the silicon-molybdic acid
must be extracted, as platinum from the vessel disturbs colorime-
tric determination, whereas possible disturbances by phosphorus,
arsonic, or germanium are eliminated with the aid of citric acid.
If the reagents used are purified from silicon and if the neces-
sary precautionary measures are taken a correction to the blank test
of 0.5 to 0.7% Si in the antimony analysis and up to 1.5% Si in gali-
um-, indium-, and thallium analyses can be attained, so that, by
using a calibration curve when working with a photometer or a
photocolorimeter, it is possible to determine silicon up to 0.5%.
With a weighed portion of 0.5 g of the metal a sensitivity of
1.0 to 2% was attained. Detailed instructions concerning the produc-
tion and application of reagents and detailed descriptions of the
analyses carried out are given separately for each of the above
mentioned metals. The results obtained are shown by a table. There
are 1 table, and 7 references, 3 of which are Soviet.

ASSOCIATION: Institut obshchey neorganicheskoy khimii Akademii nauk USSR
(Institute for General and Inorganic Chemistry, AS Ukrainian SSR)

Card 2/2
1. Silicon--Determination 2. Semiconductors--Analysis 3. Inter-
metallic compounds--Vaporization 4. Intermetallic compounds--Analysis
AUTHORS: Nazarenko, V. A., Plyantikova, G. V.

TITLE: The Analysis of Pure Metals. The Determination of Cadmium Impurities in Indium and Thallium (Analiz chistyh metallov. Opredeniye primei kadmii v indii i tallii)


ABSTRACT: Numerous attempts to separate micro amounts of cadmium from greater amounts of indium and thallium showed that an extraction of the pyridine-thiocyanate complex of cadmium by chloroform is most favorably used. At pH=5 tartaric acid must be added in order to prevent a precipitation of indium hydroxide. The thallium thiocyanate, which is difficult to dissolve must be filtered out previous to the extraction. In doing this, the thallium salt solution must be poured into an excess of thiocyanate solution in order to prevent a coprecipitation of cadmium. The experiments showed that by this method 0.05% of cadmium can quantitatively be separated from 0.5g thallium. The disturbing influence of silver, mercury, copper, zinc, nickel and cobalt in the determination with dithizone was
The Analysis of Pure Metals. The Determination of Cadmium Impurities in Indium and Thallium

removed by the application of cyanide. It is emphasized that the reactants must be purified from copper and that only pure reactants may be used. A procedure for the determination of cadmium in indium and thallium is described. In order to find the sensitivity and the accuracy of the method, determinations with cadmium-free thallium samples were carried out, a known amount of cadmium being added and then determined. From the results of the analysis given in a table it may be seen that the method yields satisfactory results. There are 1 table and 1 reference, which is Soviet.

ASSOCIATION: Laboratoriya Instituta obshchey i neorganicheskoy khimi Akademii nauk USSR (Laboratory of the Institute of General and Inorganic Chemistry, AS UkrSSR)

TITLE: The Analysis of Pure Metals. The Determination of Free Amounts of Cobalt in Bismuth (Analiz ob'v. metalev. Opredelenie primesi kobal'ta v bismute)


ABSTRACT: The determination of cobalt with nitroso-R salts cannot be carried out directly in the presence of bismuth. Extraction of the complex compound formed by cobalt with \( \alpha \)-nitroso-\( \beta \)-naphthol into an organic solvent seemed to be a suitable means of separating these two metals. Experiments showed, however, that by masking the bismuth with citrate microgram quantities of cobalt could be determined starting from gram quantities of sample. A similar method has already been described for analysing biological materials. In this biological method the cobalt is determined by first extracting with nitroso-naphtholate and then complexing the cobalt with nitroso-R salt. In colorimetric and spectrophotometric determinations nitroso-R salts have been found to be as sensitive as \( \alpha \)-nitroso-\( \beta \)-naphthol. The determinations with nitroso-R salts
The Analysis of Pure Metals.

**Determination of Trace Amounts of Cobalt in Bismuth**

are usually carried out photometrically at 510-525 m\(\mu\), or visually. It was observed that at low concentrations of cobalt an excess of reagent adds to the color given by the complex, thus decreasing the sensitivity of the determination. To avoid this effect an attempt was made to destroy the excess reagent by adding bromate in weakly acidic solution. In doing so the stability of the color was markedly reduced, but this is not important as long as no prolonged determinations are carried out. The analytical procedure is given. The results obtained show that as little as \(1.1 \times 10^{-5}\) g cobalt in bismuth can be determined using this method.

There are 1 table and 4 references, 2 of which are own.

Institute of the Chemical Laboratory of the Institute for General Chemistry (Academy of Sciences Ukrainian S.S.S.R.)
Fluorometric Determination of Sulfate Ions and Spectrophotometric Determination of Thorium Using Derivatives of Trioxylfluoron (Fluorometricheskoye opredeleniye sul'fat-ionov i spektrofotomricheskoye opredeleniye toriya a pomeshch'ye: proizvodnykh trioksifluoronov)

Zavodskaya Laboratoriya, 1958, Vol. 24, No 11, pp 1344-1346 (USSR)

Compounds such as the 9-((o-oxy-phenyl), 9-trichloro-methyl, and 9-propyl-2,3,7-trioxylfluoron can be used as complex-forming reagents for barium, thorium, and zirconium. Solutions of the unreacted fluoron, however, exhibit a tendency to fluorescence. Among the various trioxylfluoron derivatives available for the determination mentioned in the title the 9-((o-oxy-phenyl)-trioxylfluoron (Salicylfluoron) appears to be the most suitable. This compound forms a red complex with thorium in weakly acidic medium (pH > 2). The maximum light absorption of this complex lies at 500-530 m\(\mu\) (pH=4.4). The ratio of thorium to fluoron in the complex is 1:2. The measurements were carried...
Fluorometric Determination of Sulfate Ions and Spectrophotometric Determination of Thorium Using Derivatives of Trioxylfluorone

out on a Pulfrich (Pülüf-rık) photometer after 24 hours on mixtures containing $0.4 \times 10^{-5}$ to $3.6 \times 10^{-5}$ moles Th and $3.6 \times 10^{-5}$ to $0.4 \times 10^{-5}$ moles salicylfluorone in 20% ethanol. The molar extinction coefficient of the salicylfluorone complex with thorium was found to be 26,000 at pH 4.4, 530 mμ and using 0.3-1.0 $\times 10^{-5}$ moles Th. The reaction obeys Beer's (Ber) Law. The determination of sulfate ion with salicylfluorone is based on the formation of a sulfate complex which forms with the thorium complex, and according to the fluorescence of the free unreacted salicylfluorone the concentration of $SO_4^{2-}$ ion can be determined. For the determination of microgram quantities of sulfate ion solutions of $2 \times 10^{-4}$ molar thorium nitrate and $5 \times 10^{-5}$ molar salicylfluorone are prepared. For quantitative determinations it is necessary to prepare a series of standard solutions, for example, with 0-0.25-0.5-1.0-1.5-2.0 $\times 50_4^{2-}$ sulfate ion. There are 2 figures and 5 references, 2 of which
Fluorometric Determination of Sulfate Ions and Spectrophotometric Determination of Thorium Using Derivatives of Trioxylfluorone

are Soviet.

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AUTHOR: Nazarenko, V.A., Candidate of Chemical Sciences

TITLE: The Determination of Micro-Impurities in Semiconductor Materials and Metals of High Purity

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1959, Vol 4, N 2, pp 235-241 (USSR)

ABSTRACT: Impurities in semiconductor elements, like silicon and germanium, should not exceed a ten-millionth or a hundred-millionth part of a percent. It is necessary to determine admixtures in concentration of $1 : 10^6$ to $1 : 10^{12}$ or even lower. For this purpose the analyzed mixture must be separated from other admixtures and the basic component. A quantity of 1 μg of the admixed element is the upper limit in analytic research. The reagents must be free of the analyzed substance and the vessels must be resistant to these reagents. In many cases the reagents must be purified. This is especially difficult if the analyzed elements are very common, like iron, calcium, silicon, etc. and the reagents are used in large quantities, e.g. water, acids, etc. Boiling water dissolves small quantities of quartz. Vessels made of plastics are often more resistant to acids and organic solvents. The laboratory atmosphere must also be free of the analyzed substances. The dis-
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solution of the analysed substance by preliminary grinding is another source of errors. There are several methods for separating the admixtures. Zone melting in combination with spectral or radiometric methods is used for the analysis of very small quantities. Evaporation or sublimation at high temperature attains a sensitivity of 10^-9%. It is carried out in high vacuum (Ref 4.12), or in a stream of air or inert gas (Ref 3, 12, 13). Separation in the form of highly volatile chemical compounds is applied to sulfur, arsenic, and boron. The transformation of volatile compounds into non-volatile ones is also used. The volatilization of the basic component is used in the case of germanium (Ref 15-17) and other elements. Extraction by solvents not mixing with water is used in the group extraction of aluminum, tin, zirconium and selenium (Ref 21). Coprecipitation with collector is especially suitable for cases when spectral determination follows it. Organic coprecipitating agents are very selective (Ref 25). Electrodialysis is the method for the determination of light metals or non-metals in heavy metals. The mercury cathode is used for the group separation of heavy and non-ferrous metals from very diluted solutions. After separation the various admixtures are determined by different methods.
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The optical spectral method is broadly applied in production control. Its sensitivity is only $10^{-2}$ to $10^{-4}$% and can be increased only by using samples of several grams. The flame-photometric method is important for the determination of alkali and alkali earth metals. Its sensitivity is $10^{-4}$%. Mass-spectroscopy has a high sensitivity only in combination with isotope dilution, in which case it attains $10^{-10}$%. The radioactivation method is one of the most sensitive, but its sensitivity is not equal for all elements. Neutronic irradiation of the analyzed element produces sometimes isotopes of the element adjacent in the periodic system. It is the method mostly used for the simultaneous determination of several admixtures in metals of high purity [Ref 57, 58]. Many laboratories, however, have no source of neutrons. The method of isotope dilution determines the relation of isotopes or the specific activity of an element, on the base of which the concentrations are calculated [Ref 53, 60]. In some cases radioisotopes with a sufficient half-life are not available. Photometric methods are most sensitive when based on fluorescent and catalytic reactions. The sensitivity may be increased to $10^{-6}$ or $10^{-7}$% if a microcolorimeter is used. Electrometric analysis is of low sensitivity in the case of zinc.
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and titanium ∑ Ref 65, 66. In the polarographic determination of indium it reaches 10⁻⁶%. Radiometric titration with the extraction of the reaction product by organic solvent permits the determination of 0.01 µg.

There are 71 references, 36 of which are Soviet, 21 English, 11 German and 3 Japanese.
AUTHORS: Sakharov, V. N., Koleanikov-Svinarev, V. I., Hazarenko, V. A., Zabidov, Ye. I.

TITLE: The Angular Distribution of the Radiation of $^{198}$Au Scattered in Air Above Ground

PERIODICAL: Atomnaya energiya, 1959, Vol 7, No 3, pp 266-267 (USSR)

ABSTRACT: From a ~10,000 c $^{198}$Au source, which was located 1.5 m and 2.5 m above the ground, the total intensity of radiation in distances of up to 600 m from the source as well as the angular distribution of radiation in distances of 150, 250 and 400 mm from the source was measured. The total intensity was measured by means of a Geiger counter described in reference 1, in which the multiple scattered $\gamma$-quanta with energies of between 120 and 410 kev were recorded with the same sensitivity. Radiation with energies of between 60 and 120 kev were measured by means of a somewhat more sensitive counter. $\gamma$-quanta with energies below 50 kev were not recorded. Angular distribution was measured by means of a detector consisting of 4 counters connected in series, which was placed behind a thick lead disk (diameter 21 cm) in such a manner that the centers of this disk and of the detector were in one line with the center of the source. The following measuring results are graphically...
The Angular Distribution of the Radiation of $^{198}$Au Scattered in Air Above Ground

given: Dependence of the absorption coefficient and of the intensity of the non-scattered radiation on the distance between the source and the detector. Angular distribution of the scattered radiation. By placing source and detector near the ground, the radiation intensity at large distances becomes about twice as small as in homogeneous air. If the distance between source and the ground is increased, this difference becomes smaller and attains only the 1.5-fold and a height of about 25 m at the same distances as before. This is in agreement with the predictions made by reference 4. With respect to angular distribution it may be said that, from distances of 150 m onward, it practically undergoes no further change. The results obtained may be used in order more easily to calculate $\gamma$-shields.

The problem was raised by O. I. Leypunskiy, V. A. Rogachkov, V. A. Shabashov and V. N. Rodionov assisted in working with the strong $\gamma$-preparation. There are 4 figures and 4 Soviet references.

SUBMITTED: February 18, 1959

Card 2/2
AUTHORS: Biryuk, Ye. A., Nazarenko, V. A.  
TITLE: Use of Trioxyfluorone Derivatives in Photometric Analysis for the Determination of Scandium (Primenenie proizvodnykh trioksifluorona v fotometricheskom analize opredeleniya skandiya)  
PERIODICAL: Zhurnal analiticheskoi khimii, 1959, Vol 14, Nr 3, pp 298-302 (USSR)  
ABSTRACT: The derivatives substituted in position 9 of the 2,3,7-trioxy-6-fluorone were investigated with respect to their applicability in photometric recording. The synthesis of the derivatives was carried out from triacetyl-oxy-hydroquinone and the corresponding aldehyde. Table 1 gives the color reactions of the derivatives obtained with scandium. Only the 9-propyl derivative proved to be suitable if acetyl acetone is added for masking germanium, lead, antimon etc. The determinations were carried out with the spectrophotometer SF-4. Figures 1-5 show the diagrams of the light absorption, color intensity, molar ratio, and optical density in dependence on the scandium concentration. Table 3 gives the equilibrium constants. The molar extinction coefficient was found to be 32 000 for 550 m\textmu. Table 4 presents the analysis results obtained in the
Use of Trioxyfluorone Derivatives in Photometric Analysis for the Determination of Scandium

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presence of Al, Y, La, Ce and Th. 9-Prozyl-trioxyfluorone permits the photometric determination of 0.04 - 2.10^(-5) mg/l scandium in a solution 1 : 5. The solutions of the scandium-complex compounds obey Beer's law. There are 5 figures, 4 tables, and 8 references, 2 of which are Soviet.

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SUBMITTED: January 25, 1958
AUTHORS: Nazarenko, V. A., Biryuk, Ye. A.

TITLE: Determination of Bismuth, Lead and Cadmium in Vanadium and Niobium (Opravedeniye vismuta, svintsa i kadmiya v vanadii i niobii)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, N 1, pp 26-30 (USSR)

ABSTRACT: A method is described, which allows to analyze a pure metal on several admixtures simultaneously. It is based on the extraction of admixtures in the form of diethyl-dithio-carbamates. Bismuth is then determined according to the iodide-ketone method, lead and cadmium with diphenyl thiocarbazone. When treating chloroform extracts of carboxamides from an alkaline medium with 0.2 n hydrochloric acid, lead and cadmium pass to the aqueous phase, while the bismuth compound remains in the chloroform. A new variant of the iodide method was devised for the bismuth determination; it is based on the extraction of the bismuth-iodide complex compound with methyl isobutyl ketone (Ref 3). Thiourea was used for the masking of copper, so that under the conditions given up to 100% copper and 10% antimony can be present in the determination of 1 - 5% bismuth.
Determination of Bismuth, Lead and Cadmium in Varadium and Niobium

If the blank test sample is corrected appropriately, lead or cadmium can be determined up to 0.2%, and bismuth up to 1%. In the niobium determination only lead and cadmium can be determined simultaneously, as niobium enters solution. The various analysis procedures are mentioned. There are 1 table and 4 references, 2 of which are Soviet.

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Nazarenko, V. I., Lebedeva, N. V.

**TITLE:** Application of Trioxyfluoron Derivates in Colorimetric Analysis

**PERIODICAL:** Zavodskaya laboratoriya, 1959, Vol 25, Nr 8, pp 899 - 905 (USSR)

**ABSTRACT:**
The application of phenylfluoron (9-phenyl-2,5,7-trioxy-6-fluor-ron) (I) for the determination of germanium (II) has the disadvantage that the formed complex compound is colloidal. Therefore, (Refs 1,2) p-dimethyl-aminophenyfluoron (III) was recommended as a reagent, as (III) forms with (II) real solutions. It was established that different 2,3,7-trioxyfluoron (substituted in the 9 position) derivates can be more or less used as reagents for (II). To establish the suitability of the different trioxyfluoron derivates (TD) for the colorimetric (II)-determination the molar absorption coefficients of several complex compounds of (II) were investigated with synthesized (TD). The reaction occurred at the optimum acidity of 0.5 n HCl. The optical density was measured on a Pulfrich photometer at a wave length of 530 µ. The measuring results (Table) proved that the sensitivity of the 2-nitro, 4-nitro, and 2,4-dinitro-phenyl-fluorons is greater than that of (I). Concerning spectrometric
Application of Trixyfluorone Derivates in Colorimetric Analysis

Sensitivity of the reaction disulfophenylfluorone (IV) surpasses that of (II) with the last-mentioned nitro compounds as well as that of (I). The advantage of (IV) is that the determinations can be made at a low acidity (from pH 5 to 0.2 n HCl). In case of strongly acid solutions the use of (I) is preferable and there also is a possibility that insoluble compounds are formed with (II) which precipitate. Thus, (II) is most favorably determined by spectroscopy with (IV) in weakly acid solutions (0.02 - 0.05 n HCl) with the addition of gelatin, while for strongly acid solutions (above 0.1 n HCl) the (I) and the above mentioned nitro compounds are to be preferred as reagents. There is mention of the photometric determinations of Kazhinnova and Vasil'yeva, reference 6, which appeared at the time the present paper was being printed, but which in principle is in accordance with the presented experimental results. There are 7 figures, 1 table, and 6 references, 3 of which are Soviet.

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