



UZ0502742

MEASUREMENTS OF ALUMINIUM IN DURALUMINUM BY PIXE METHOD

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Measurement of aluminum content in aluminum alloys with a use of $^{27}\text{Al}(p,\gamma)^{28}\text{Si}$ resonance reaction is described in this work. Resonance gamma-transition of 992.0 KeV energy with a width of 80 eV was induced by 1.3 MeV energy proton beam of EG-2 Van-de-Graaff generator built at the IAP NUU. Gamma-spectra was measured with a help of NaI(Tl) crystal scintillation detector of 63×63 mm provided energy resolution of 9% at ^{137}Cs radionuclide's 661 KeV line. Spectrometric data acquisition and processing with a help of a Multiport 2 analyzer were controlled by Genuie-2000 program. Exposed samples were plates of 1 mm thick A16, B95, Ak4 and AB aluminum alloys. Content of aluminum in the measured samples were in the range of 0.91÷0.99. The data were in good agreement with ones of PIXE method results. High accuracy was provided in both cases.



UZ0502743

INVESTIGATION OF ELEMENT CONTENTS OF NATURAL DIAMOND CRYSTALS OF DIFFERENT GEMOLOGICAL FEATURES BY INAA AND AUTORADIOGRAPHY.

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The work presented aims at understanding the role of *Co, Ni, Ti, Cr, Mn, Cu* impurities on the natural diamond (Type I) quality, microstructure and morphology having different gemological features for identification their deposit.

An according of the Kimberley Process there is Certification Scheme for regulating trade in diamonds to exclude "bloody" diamonds. The "four C's" criteria (color, clarity, carat weight, cut) had for decades been used by gemologists worldwide to evaluate precious gem diamonds. Those four parameters were believed to determine the value of the stones. Some 10 years ago gemologists added to those traditional criteria a fifth C, signifying Confidence. The role of the fifth C in pricing precious stones increased over time.

An according of the Kimberley Process it is necessary to determine diamond deposit. Impurity content of natural diamonds is basic feature to for identification their deposit.

We have used autoradiographic technique for investigation of spatial impurity distributions in natural diamond crystals. It is based on the secondary beta irradiation registration. Impurities were identified by energy lines of the gamma spectra obtained and by half-life periods.

We bring information which allow to clarify the spatial distributions of *Co*, *Ni*, *Ti*, *Cr*, *Mn*, *Cu* impurities depended inner morphology of diamond crystal.

It was established several types of impurity distributions depending from inner morphology of diamond crystals. Results of INAA and autoradiographic study of natural diamonds use for to make of international data for identification their deposit.



UZ0502744

DETERMINATION OF ARGON POTASSIUM IN BONE REMAINS OF ARCHANTROP FROM SELUGUR USING NEUTRON ACTIVATION ANALYSIS TECHNIQUE

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The problem of argon and potassium activation determination in bone remains appeared due to studies at ancient paleolytic settlement of selungur carried out by republican archaeologists. Jaws of fossil archantrop were selected to be an object of this research. The sample was labeled. A tooth was taken from the presented material. The sample was cleaned from foreign materials by methanol till white clean surface. The tooth occurred to be well saved, however it has signs of putrefaction at the base of jaw.

This report contains methodologies of potassium argon and another 30 chemical elements determination, their metrological characteristics, questions related to remained radiargon in bone fossils, account of argon contained in air and impact of combined effect of neutron and gamma radiation and temperature on argon and potassium determination results are considered.

Contribution of (n, p) (n, α) reactions to ^{40}Ar production from calcium is studied experimentally. Argon and potassium content determination limits were $3 \cdot 10^{-10}$ and $2,1 \cdot 10^{-2}$ %, respectively.

This methodology was used to estimate ages of bone fossils of archantrop from selungur. The age of a tooth of Archantrop occurred to be $1,5 \pm 0,22$ million years, whereas a fang of bear was aged to be $0,56 \pm 0,15$ million years.