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REGISTRATION of SYNTHESIS of $_{45}Rh^{102}$ in MEDIA of EXCITED NUCLEI of $_{28}Ni^{58}$

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For the purpose of searching for heavy nuclei generated in the result of low energy nuclear processes we used samples of $_{28}Ni^{58}$ which were bombarded with 27 MeV electrons from the Resonance accelerator MI-30. The samples of nickel of 48 mm in diameter and 20 mm thick were irradiated with electrons to the level of absorbed energy of around 2.5 10^6 J/cm^3 which is approximately 5 times exceeds the minimum specific energy at which as it followed from the authors' theoretical model the process of generating transmuted elements will become quite noticeable.

The experimental work consisted in measuring gamma-spectra accompanying decay of radioactive nuclei generated inside Nickel samples in the result of photo nuclear reactions and other nuclear interactions.

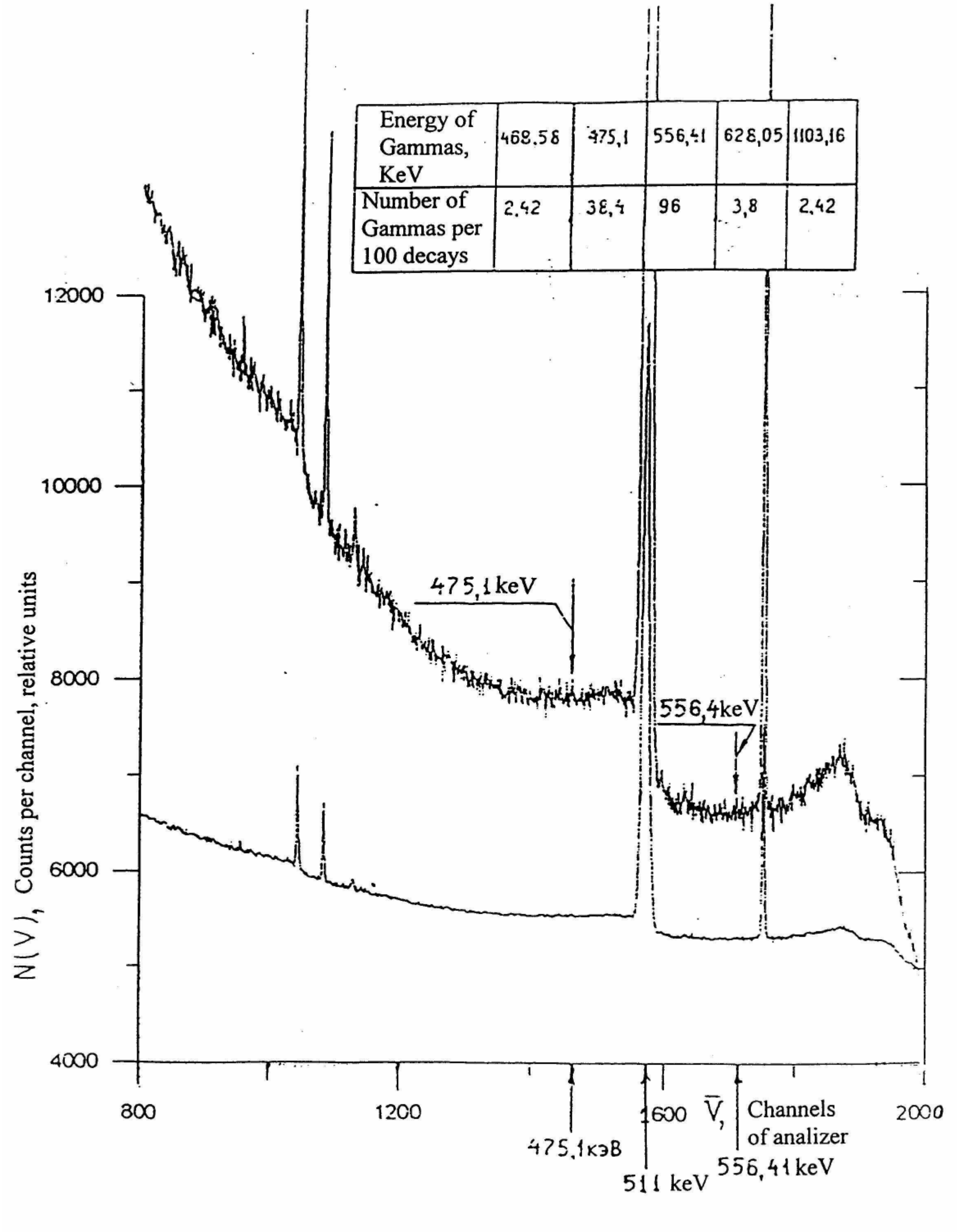
The Nickel samples of 48 mm in diameter and 10 mm thick were irradiated with 27 MeV electrons. After 9 months delay which resulted in decreasing the induced radioactivity the samples were measured with a Ge-Li detector of coaxial type that had resolution of 2.2 keV at 1.33MeV using a multichannel MatchMaker analyzer. The total count rate of the spectrometer was kept at the level at which the relative "dead time" did not exceed 3-5%. In order to limit the background the detector and the samples were placed inside a lead shield container with the thickness of the walls equal to 3 cm. with a purpose of increasing the relative amount of high energy gamma-quanta in the spectra to be measured and decreasing the intensity of "soft" gamma-quanta(Co^{57}-122keV; 136keV0 thin filters of Pb(0.6 mm) and Cd(1.0 mm) were placed between the Ni-samples and the detector.

All the spectra lines of gamma-quanta originating from the nuclides within the range from $_{39}Y^{88}$ to $_{77}Ir^{192}$ were carefully analyzed with a special attention toward those of them which obtain the $T_{1/2}$ periods from 100 up to 300 days. The information related to a number of those nuclides did not allow to come to a reliable conclusion about the presence or absence of the synthesized nuclei. It can be stated more surely about availability of such isotopes as $_{45}Rh^{102}$, $_{76}Ta^{182}$, $_{76}Os^{185}$, $_{77}Ir^{192}$. The most exactly the presence of $_{45}Rh^{102}$ can be stated. Disintegration of this isotope is accompanied with irradiation of gamma-quanta with energies of 475.1 keV and 556.41 keV. These energies in the spectrum were identified with maximum errors of 0.18 keV for the energy of 475.1 keV and 0.17 keV for the energy of 556.41 keV.

While determining the specific intensities of gamma-quanta with such energies special careful attention was given to evaluation of the absence of energy coincidences in those energy regions. It was determined that those energy lines resulted from the coincidences have the energy resolution which is 1.5 times worse than the resolution for the real energy lines of gamma-quanta at the same energies. At the same time the amplitudes of those lines are several decades of magnitude lower than the amplitudes of real energy lines.

Based upon the careful analysis of the likely errors in identification of gamma-radiation of the synthesized nuclides it was determined that the error of their identification depends only from the statistical errors and the errors in calibration of the energy scale of the spectrometer.

So, in the result of the careful analysis it was reliably determined that the synthesis of ${}_{45}Rh^{102}$ from the nuclei and fragments of nuclei of ${}_{28}Ni^{58}$ is a real experimental fact.



Energy of Gammas, KeV	468.58	475,1	556,41	628,05	1103,16
Number of Gammas per 100 decays	2,42	38,4	96	3,8	2,42

Fig.1. Instrumental spectra of gamma-quanta in the vicinity of the energies of identification of ${}_{45}Rh^{102}$

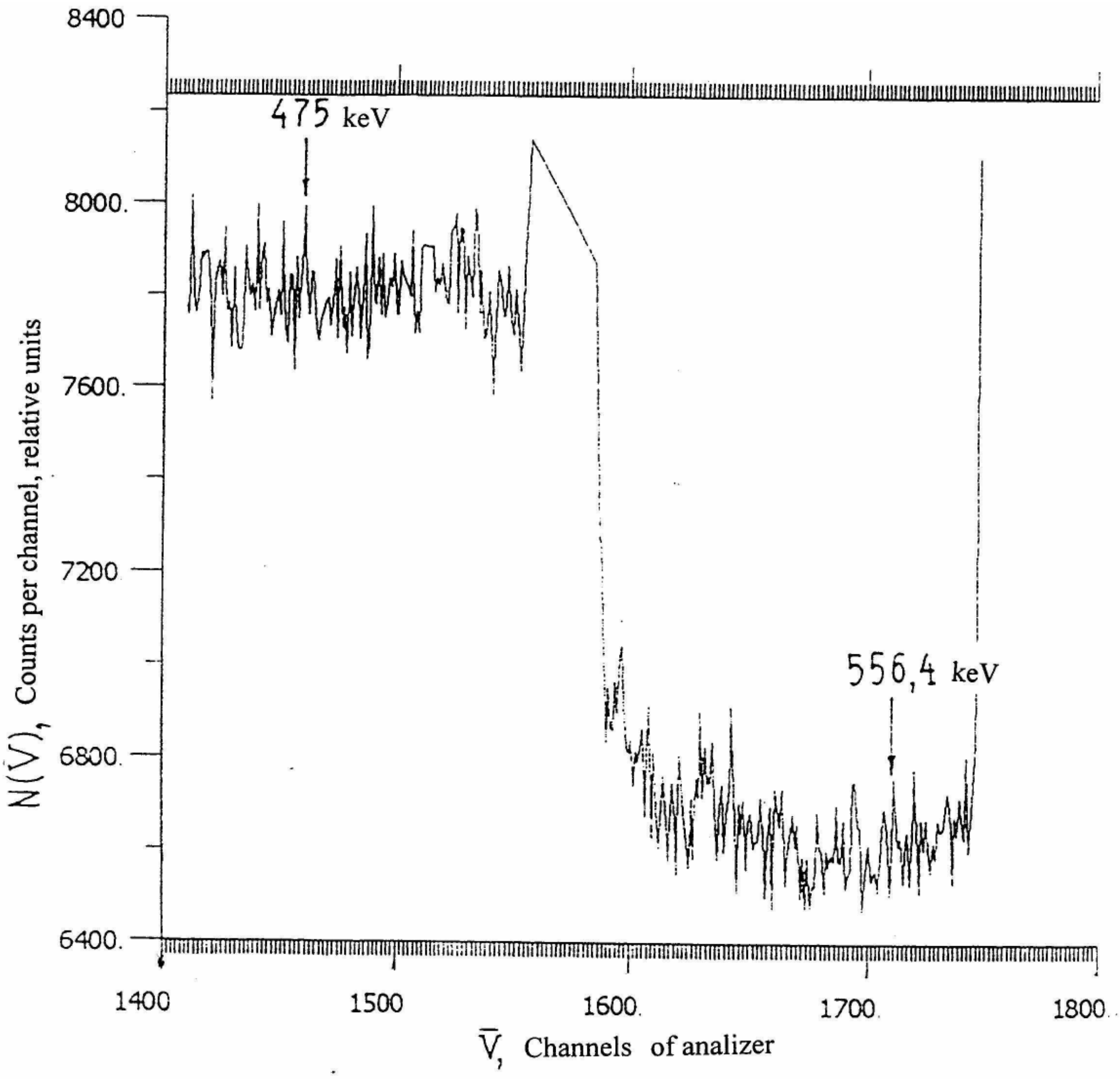


Fig.2. Instrumental spectra of gamma-quanta in the vicinity of the energies of identification of $_{45}Rh^{102}$: E=475.1 keV (38.4 quanta per 100 decays) and E=556.41 keV (96 quanta per 100 decays)