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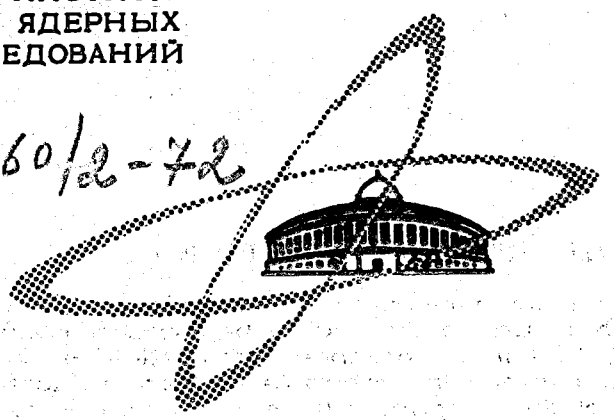

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# ON THE IDENTIFICATION OF $^{78}$Rb (T 1/2 = 19 MIN)

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# ON THE IDENTIFICATION OF $^{78}$Rb (T 1/2 = 19 MIN)

*Submitted to Radiochemical and Radioanalytical Letters*

Nolte [1] has reported a 19 min activity and ascribed this activity either to $^{78}Rb$ or more probably to $^{78}Sr$.

In the present work we show, that this 19 min activity must belong to the low spin member of the $^{78m}Rb$, $^{78g}Rb$ isomeric pair. The used method for production and investigation of the radioactive $Sr$ -and $Rb$ -isotopes has been described in detail [2].

$Zr$ - $Nb$ -alloy targets of about 100 mg have been irradiated with the external beam of the Dubna synchrocyclotron for about 10-15 minutes ($I_p \approx 10^{11}$ p/cm$^2$.sec; $E_p$ = 660 MeV). After irradiation the target has been placed directly into the ion source of the electromagnetic isotope separator (YASNAPP-facility). Using a surface ionization ion source only $Rb$ and $Sr$ were ionized and separated with the mass separator.

For the radiochemical separation of rubidium and strontium after isotope separation the collector tape (an aluminized polyester tape) was dissolved in a few drops of aqua regia. 60 mg strontium and rubidium carriers have been added in form of $RbCl$ and $SrCl_2$ -solutions.

By adding of sulfuric acid strontium was precipitated as strontium sulfate and filtered off by suction. In the filtrat rubidium was precipitated with perchloric acid as rubidium perchlorate. The precipitates were washed 3 times with water. The time needed for the chemical separation was about 3 minutes.

From the activity corresponding to the mass position 78 gamma-ray spectra have been measured with a 38.5 $cm^3$ $Ge(Li)$ -detector coupled to an 4096-channel analyser. The gamma-ray spectra have been taken once before and after the radiochemical separation of $Sr$ and $Rb$.

The half lives of some $\gamma$ -lines in the spectrum of the chemically purified $^{78}Rb$ samples were determined (See Fig. 1). The intensities of the $\gamma$ -lines with the energies 455 keV and 664 keV decreased with two components - $T_{1/2}$ = 6 min and $T_{1/2}$ = 19 min. These $\gamma$ -rays are known to deexcitate the levels 455 keV and 1148 keV with $I^{\pi} = 2^+$ in the $^{78}_{36}Kr_{42}$ nucleus /1/. In this way we have ascribed the 19 min activity to the lower spin member of the two $^{78}Rb$ isomeric states.

The intensity of the $\gamma$ -ray 664 keV - deexciting the level at 1119 keV in the $^{78}Kr$ nucleus ( $I^{\pi} = 4^+$ ) decreases with only one component $T_{1/2}$ = 6 min. In this way the higher spin state of $^{78}Rb$ has the half life of 6 min.

The authors of /3/ probably could not find the second component due to the short irradiation time used (≈ 1 min) and the heavy backg round from the high spin state decay, which has a relatively larger cross section

in the $Br\ (^{3}He, xn)\ Rb$ reaction than the low spin state, compared with the spallation reaction used in this work.

## References


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2. R. Arlt, V.A. Bystrow, W. Habenicht, E. Herrmann, V.I. Raiko, H. Strusny, H.Tyrroff. JINR E13-6224, Dubna, 1972.
3. C.J. Toeset, A.H.W. Aten. Jr. Radiochimica Acta, 9, 55 (1968).



Received by Publishing Department
on March 9, 1972.

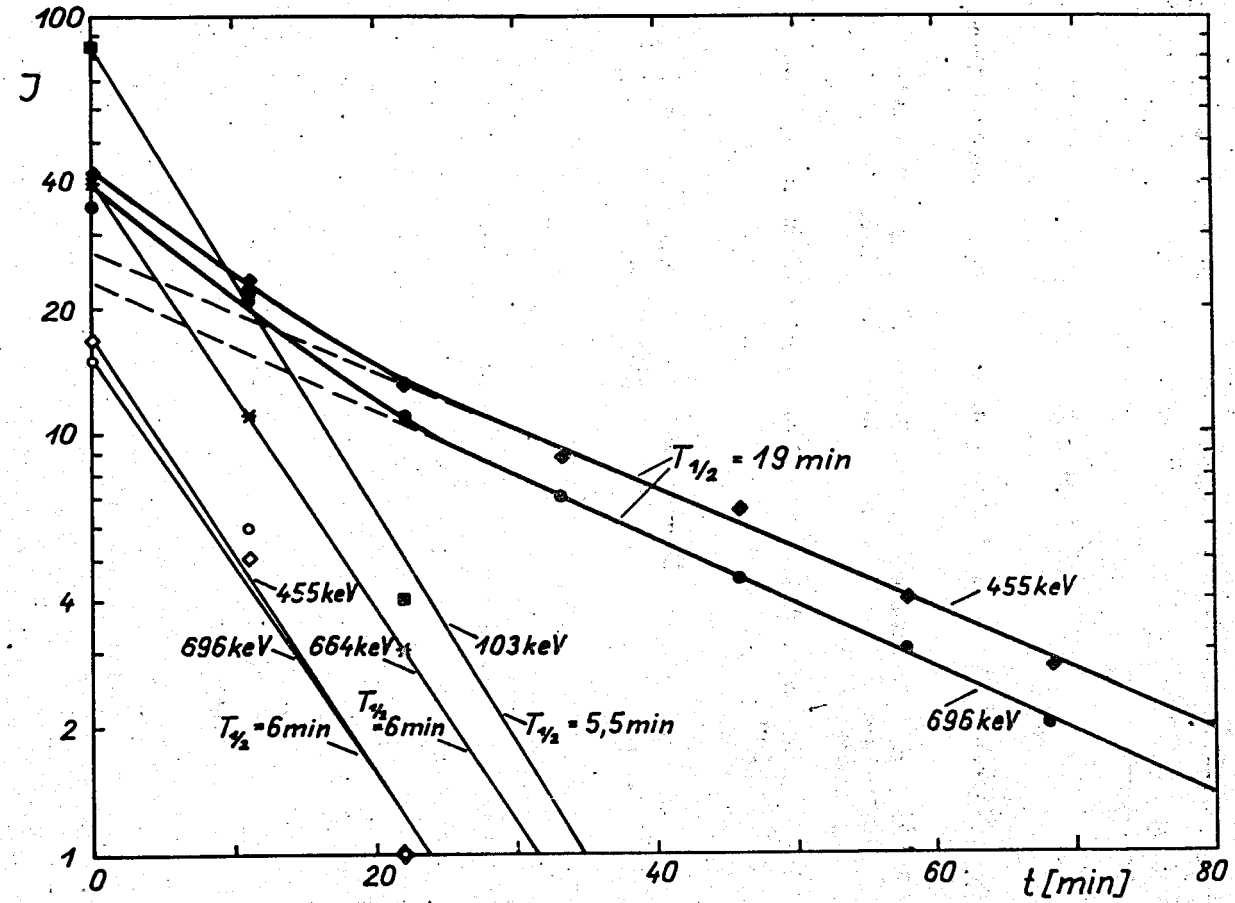


Fig. 1. Decay curves of the intensities of some $\gamma$ -lines emitted by a chemically purified $^{78}Rb$ source.