

DETERMINATION OF THORIUM, URANIUM AND POTASSIUM IN MONAZITE AND
QUARTZ SANDS BY SPECTROMETRY OF NATURAL GAMMA ACTIVITY

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About 2 gms of monazite sand from Neresnica (~90% pure) was used to make a circular source (2.5 cm ϕ ; 0.4 gcm⁻²). The natural gamma spectrum was analysed and compared to the set of spectra from several standard point gamma-sources. From this comparison the quantities of U and Th were deduced, under the assumption that equilibrium is not violated throughout the chains. The known activity of U and Th per unit weight of monazite was used to obtain efficiency curves for the samples of larger volumes. Using this calibration the contents of U and Th were determined in quartz sand from Laško polje (mass of the sample 1010 gms). Potassium was determined with the help of an efficiency curve obtained from ²¹⁴Pb (²³⁸U chain) and ²²⁸Ac (²³²Th chain). The results are listed in the Table:

Element	Concentration (g/g)	
	Monazite sand	Quartz sand
Th	$(4.6 \pm 0.4) \times 10^{-2}$	$(3.6 \pm 1.3) \times 10^{-6}$
U	$(1.1 \pm 0.1) \times 10^{-3}$	$(0.7 \pm 0.3) \times 10^{-6}$
K	&)	$(1.8 \pm 0.1) \times 10^{-2}$

&) not determined due to the strong interference of the 1459.2 keV line from the ²³²Th sequence with the 1460.05 keV line from ⁴⁰K.

The monazite spectra (Ge(Li) detector 5% efficiency, 15 cm Pb shield, exposure time 80 ks) show 26 gamma transitions observed only in 1975 in the spectra of ²²⁶Ra and ²²⁸Ac (1,2)!

References:

1. M.A.Hachem, C.R.Acad.Sci, 281(1975)45
2. J.D.Horen, Nucl.Data Sheets, 17(1976)376