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Natural radionuclide concentrations in Austrian mineral waters

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As an EU country, Austria has to meet the European Community guideline concerning waters for consumption; here a Total Indicative Dose of 0.10 mSv per year for all nuclides with the exception of tritium, potassium-40, radon and radon progeny, is fixed. In our investigation we measured the radium isotopes Ra-226 and Ra-228, the uranium isotopes U-248 and U-234, as well as Pb-210 and Po-210; although the latter two are radon daughters and therefore exempted from the guideline, they can contribute considerably to the committed dose due to their higher dose conversion factors.

1-1.5 L samples of brands from all over Austria were collected from different stores. Radium isotopes were separated by filtering the acidified and degassed mineral water through a Ra extraction disk containing an ion exchange resin¹. Radium was eluted from the filter with EDTA. The EDTA solution was mixed with a scintillation cocktail and then counted with a low-level counter (Quantulus 1220) using pulse-shape analysis. This procedure collects also the Pb-210, which can be seen in the β -spectrum close to the Ra-228 peak.

Po-210 was spontaneously deposited from the remaining solution onto Cu planchets together with a Po-208 tracer and measured α -spectrometrically with a PIPS detector².

After adding U-232 as a spike uranium was separated by anionic exchange and also measured α -spectrometrically after microprecipitation with neodymium fluoride³.

From our measured activity concentrations we will give an estimate of the radiological impact of mineral water on consumers. Generally, the calculated annual doses to the adult members of the public are far below the Total Indicative Dose of 0.1 mSv per year.

1 F. Schönhofer, G. Wallner. Very rapid determination of ²²⁶Ra, ²²⁸Ra and ²¹⁰Pb by selective adsorption and LSC. Radioactivity and Radiochemistry 12 No.2 (2001) 33.

2 WHO, World Health organisation. Methods of radiochemical analysis. Genf 1966.

3 F.D. Hindman. Neodymium fluoride mounting for α -spectrometric determination of uranium, plutonium and americium. Anal. Chem. 55 (1983) 2460.

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