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Production and purification of 56Co at the Leipzig cyclotron

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60Co (T1/2 = 5.27 a) is one of the most used radionuclide for sterilization of medical equipment, as a radiation source for medical radiotherapy, industrial radiography and food irradiation due to the high gamma-energy of 1.33 MeV. In case of release in the geosphere, e.g. soil and aquatic systems, the migration behaviour of cobalt is not well understood. For geochemical investigations, e.g. migration and adsorption studies in soil and rock formations, the short-lived isotope 56Co (T1/2 = 77 d) can be used.
We produced 56Co at a recently installed 18 MeV-cyclotron by using the nuclear reaction 56Fe(p,n)56Co.[1] The target was prepared by pressing metallic iron powder into an aluminium plate and cover it with an aluminium foil. After the irradiation with 11 MeV protons for 1 h at a current of 25 µA, the iron was dissolved with a mixture of concentrated HCl and concentrated H2O2.[2] The separation of 56Co from the target material was done by liquid-liquid extraction with methyl-tert-butylether (MTBE) from 5.2 M HCl.[3] Alternatively, an anionic exchange with DOWEX 1x8 as a column material can be used.[4] Due to the shorter separation time the liquid-liquid extraction is preferred. The radiochemical yield was 82% ± 6%. The activity concentration in the 56Co stock solution was ˜4.5 MBq / ml.

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[2] Lagunas-Solar, M. C., Jungerman, J. A., (1979) Int. J. Appl. Radiat. Isot. 30(1) 25-32.
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[4] Kraus, K. A., Moore, G. E., (1953) J. Am. Chem. Soc. 75(6) 1460-1462.

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