

⁴⁵Ca

Radioisotope Safety Data Sheet Calcium 45

Half life 163 days

Radiations emitted

Beta rays 257 keV max, 77 keV average
Yield 100%

Safety precautions

Calcium 45 is a medium energy beta emitter presenting a mainly internal hazard.

As calcium is strongly retained by the bones control measures should aim at preventing uptake by skin contact, ingestion or inhalation. Standard laboratory protective clothing (gloves, lab coat, safety glasses, closed shoes) should always be used.

Work areas and equipment should be monitored using a suitable survey meter.

A fume cupboard should be used for processes that could produce aerosols.

Radiotoxicity data

⁴⁵Ca is classed as being of moderate hazard (group 3a) according to AS 2243.4

The Annual Limit on Intake by ingestion (ALI_{ing}) is 26 MBq and the most restrictive inhalation limit (ALI)_{inhal} is 7.4 MBq.

Shielding

The perspex shields used for ³²P will also provide effective shielding for ⁴⁵Ca beta radiation.

While the potential for bremsstrahlung production is very low, the range of the beta radiation (60 cm max) warrants the use of Perspex workstations and waste containers.

Dose rates

Beta dose rate to the basal skin cells from contamination of 1 kBq cm⁻² 838 μSv h⁻¹

Beta dose rate from a 1 kBq (0.05 ml) droplet on skin: 101 μSv h⁻¹

Licensing requirements

Under the *Radiation Safety Regulation 2010*, a licence is required for the possession of ⁴⁵Ca sources with concentrations of greater

than or equal to 10 kBq per gram and with activities of 10 MBq or greater.

In the University, possession licences are held by schools and centres rather than individuals. However, individual user licences are required for persons who use licenceable sources for research purposes.

Disposal data

The maximum concentration of ⁴⁵Ca in aqueous wastes released to a sewerage system is given in the 2010 *Regulation* as 1.8 MBq per m³ i.e. 1.8 kBq per litre.

The concentration of ⁴⁵Ca in solid wastes disposed of to either the general or pathology waste streams must be less than 5 kBq per gram (5 MBq per kg) – i.e. half the concentration limit for licensing.

Lengthy storage may be required for solid wastes so appropriate records need to be kept and durable labels applied to waste packages.

Radiation detection and monitoring

A Geiger Muller tube monitor is the most suitable type of meter for contamination control. For personal monitoring, TLD dosimeters may be used for both whole body and extremity monitoring. (For details see the Personal radiation monitoring Safety Guideline).

Laboratory requirements

Low level lab guidance activities

Bench: 3.7 MBq
Fume cupboard: 37 MBq

Medium level lab guidance activities

Bench: 7.4 MBq
Fume cupboard: 74 MBq

NB: While AS 2243.4 sets higher activity limits, the guidance activities are maximum amounts that should need to be used in most research projects.