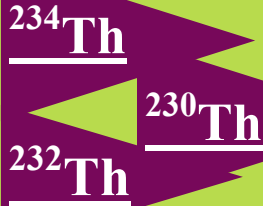


Radioisotopes of significance to environmental radioactivity



Thorium (Th)

Element classification: Actinide

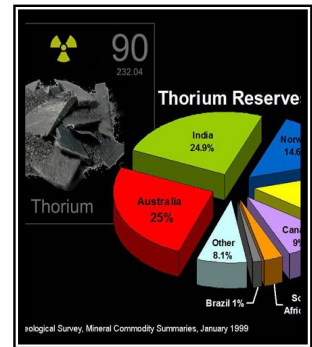
No. of isotopes: 26

Typical elemental concentrations:

Soil (dry): 6 mg/kg (2-12 mg/kg)

Sea water: 0.001 µg/L

Fresh water: 0.03 µg/l



Behavior in the Environment

- ◆ Present naturally in soil, rock and water (as part of the U and Th natural decay series)
- ◆ Strongly binds to bottom sediments and suspended solids in water; One of the largest K_d of all radionuclides
- ◆ Exists as Th^{4+} in soils and waters, and is the largest tetravalent cation (ionic radius 1 Å)
- ◆ Isotopes and isotope ratios can be used to study ecosystem processes (e.g., dating, marine sedimentation flux)
- ◆ Important mining sources

Thorium

radioecology

Key sources of radioisotopes

- ◆ **Nuclear cycle:** Nuclear power plants, reprocessing, waste
- ◆ **Natural sources:** Yes
- ◆ **Fallout:** No
- ◆ **Others:** Gas mantle (industrial) and thorotrast medical)
- ◆ **Nuclear accidents:** No

Why is it of interest?

- ◆ It is a naturally occurring element; enriched in certain minerals (e.g., monazite).
- ◆ Th-232 (13.9 Gyr) heads one of the three natural decay chains, with a number of dose-contributing daughters
- ◆ Radio and chemically toxic
- ◆ Potential fuel for new generation nuclear reactors



For more information ...

[IRSN Th factsheet](#)

[IRSN Th health sheet](#)