

Radioisotopes of significance to environmental radioactivity

^{99}Tc

$^{99\text{m}}\text{Tc}$

Technetium (Tc)

Element classification: Transition metal

No. of isotopes: 35 (none are stable); numerous 'meta' states

Typical elemental concentrations: None (element synthetically produced)



Behaviour in the Environment

- ◆ Chemical behavior of Tc is dependent upon the oxidation state of the Tc species and its redox potential
- ◆ Tc (+VII) predominates in the environment under aerobic conditions (i.e. where oxygen is present) and is relatively 'mobile'
- ◆ Tc (+IV) predominates in reduced conditions (i.e. where no oxygen is present) and is less 'mobile' in the environment
- ◆ Studies of ^{99}Tc in the environment have concentrated on marine ecosystems

Technetium

radioecology

Key sources of radioisotopes

- ◆ **Nuclear cycle:** Generated by nuclear fission of ^{235}U ; present in radioactive waste (discharged to marine environment via nuclear reprocessing plants)
- ◆ **Fallout:** None
- ◆ **Nuclear accidents:** [Chernobyl](#)
- ◆ **Natural sources:** None



Why is it of interest?

- ◆ A key radionuclide with respect to geological repositories of nuclear waste
- ◆ Some long lived isotopes (e.g. ^{99}Tc) have high transfer to seaweeds and lobsters
- ◆ $^{99\text{m}}\text{Tc}$ is used in nuclear medicine
- ◆ Poor knowledge of behaviour in terrestrial ecosystems

For more information ...

[IRSN \$^{99}\text{Tc}\$ factsheet](#)