

**Radioisotopes of significance to environmental radioactivity**

$^{134}\text{Cs}$

$^{135}\text{Cs}$

$^{137}\text{Cs}$

**Caesium (Cs)**

**Element classification:** Alkali metal

**No. of isotopes:** 40 ( $^{133}\text{Cs}$  is stable)

**Typical elemental concentrations:**

Soil (dry): ~0.3-25 mg/kg

Sea water: ~0.2-0.5  $\mu\text{g/l}$



**Behaviour in the Environment**

- ◆ Similar bio-geochemically to K and Rb
- ◆ Low mobility in mineral soils: binds to clay particles
- ◆ More mobile in organic soils
- ◆ Highly available for plant uptake, lower uptake in cereal grains
- ◆ Highly bio-available to animals, migrates easily across cells
- ◆ Distributes evenly throughout muscle and soft tissues
- ◆ Binds to bottom sediments and suspended solids in water
- ◆ Concentrations in sea water higher than in fresh water

# Caesium

*radioecology*

**Key sources of radioisotopes**

- ◆ **Nuclear cycle:** Nuclear power plants, reprocessing, waste
- ◆ **Fallout:** Nuclear weapons testing
- ◆ **Nuclear accidents:** e.g. Windscale, Chernobyl, Fukushima Daiichi
- ◆ **Natural sources:** None

**For more information ...**

[IRSN  \$^{137}\text{Cs}\$  factsheet](#)

[ATSDR profile for Cs](#)

[Remediation](#)



**Why is it of interest?**

- ◆ Easily transferred to food products– intervention was required following Chernobyl & Fukushima
- ◆ Some long lived isotopes ( $^{137}\text{Cs}$ , esp.  $^{135}\text{Cs}$ )
- ◆ Major contributor to dose
- ◆ Has low boiling point making it environmentally mobile & important in atmospheric releases