

RADIOLOGICAL INFORMATION SHEET (SAFETY DATA SHEET)

Radioactive materials do not typically have Safety Data Sheets.

These SDS have been produced to provide radiological summary information only and have been produced by RSWA for internal client use only. They are not designed to meet legislative standards typically required by law for other chemicals and do not provide directions in relation to the chemical properties of a material.

Physical Properties

Natural uranium is made up of approximately 99.3 % ²³⁸U and 0.7 % ²³⁵U (by weight). Physical form and interactions may vary – particularly in consideration of decay products.

Radiological Characteristics

The uranium series has numerous radioactive elements as shown in the figure below. If all radionuclides are in equilibrium the activity of each will be the same as that of the parent. The Head of Chain for the series is ²³⁸U.

Natural uranium (undisturbed) is typically in secular equilibrium. Please refer to the Decay Series shown on next page. Decay products (progeny) also interact chemically – these interactions may occur naturally (i.e., groundwater), or artificially (i.e. processing of ore via heating or leaching), and may result in higher percentages of certain radioisotopes.

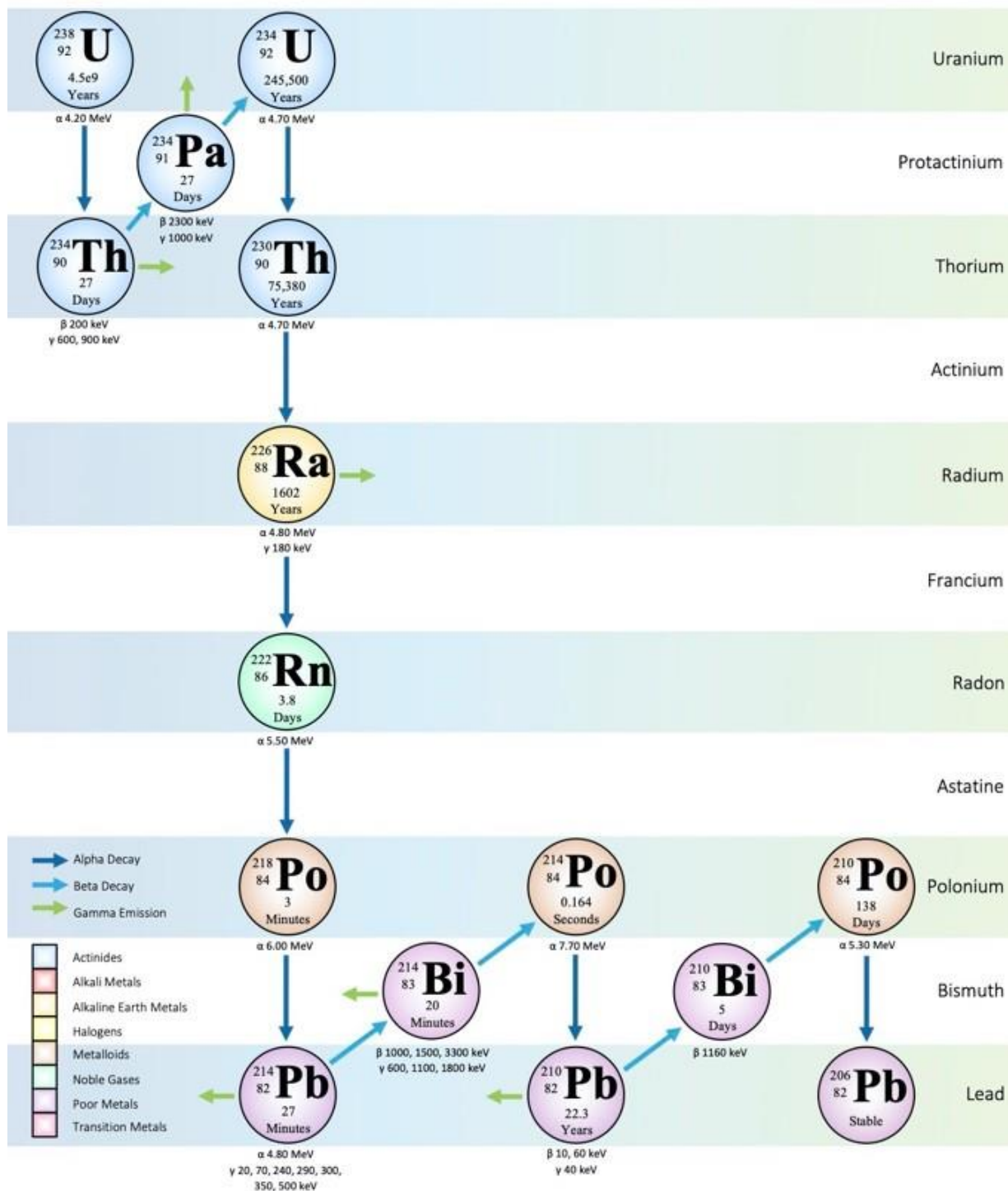
²³⁸ U Half-life	4.47 billion years		
ALI (ingestion)	450 kBq	ALI (Inhalation)	2.7 kBq

Radiation Emitted:

Alpha	Various
Beta	Various energies
Gamma	Various energies



Radioactive Decay - Uranium Series



RSWA - Radioactive Decay - Uranium Series

Hazard Identification

Triuranium octoxide (U_3O_8) is a compound of uranium. The most abundant isotope of natural uranium is ^{238}U , which is radioactive and part of the uranium series decay chain. A decay chain contains numerous radioactive elements with varying degrees of radiological hazards.


Radioactive materials are known to be carcinogenic, however health risks are dependent on the type and nature of exposure to radioactive material and ionising radiation (that may be emitted from radioactive material).

Adverse health effects are possible from either internal or external exposure to radiation & radioactive material.

Tissue reaction effects (acute, deterministic effects) are only possible from exposure to large radiation doses.

Stochastic effects (chronic, long term), such as cancer, are possible from any radiation exposure, and risk is generally accepted to be 5% (chance of contracting a fatal cancer) from 1000 mSv of radiation exposure. In perspective, on average, an Australian is likely to receive an average of 1.5mSv of dose each year.

These SDS do not deal with the chemical hazards, however it is worth offering the GHS labelling information in summary form below.

Pictograms	
Signal Word	Danger
Hazard Statements	H300; H330; H373; H411

First Aid Measures

In case of emergency life-saving rescue and first-aid measures should be taken. Rescue crew to be made aware of possible contact with radioactive material. Delayed effects can be expected after exposure.

Skin contact: Immediately decontaminate skin.

Ingestion: Induce vomiting to remove ingested material from the body.

Emergency Procedures

This advice is for trained and competent radiological first responders.

Assess nature and magnitude of incident – is there damage to the package, device or source itself. Consider the possibility of potential contamination.

In case of emergency life-saving rescue and first-aid measures should be taken. Rescue crew to be made aware of possible contact with radioactive material.

Notify the Responsible Person (owner), Radiation Safety Officer, who will notify the relevant regulatory body. Response shall be in accordance with existing emergency response plans.

Establish 5m exclusion zone and warning signage. If required, rescue personnel and administer first-aid as required.

General personal precautions & PPE:

- Obtain radiation survey meter and personal dosimeters (if possible)
- Keep unprotected persons away
- Avoid contact & handling of damaged material
- Wear protective equipment (nitrile gloves, respiratory protection, safety glasses, consider Tyvec suit & footwear covers)

Personal decontamination (if required):

- Wash skin well with soap and water (decon-90 if available)
- Remove exposed clothing, if required
- Assess with contamination survey meter (if available)
- Do not scrub skin – dry blot only

Damaged source or leakage control:

- Confine package / device / source and protect from further damage – consider the use of absorbent materials
- Assess locality of drains, surface-water, groundwater and soft ground (soil, etc)
- Recovery of device/source to be considered carefully

Firefighting:

- Consider SCBA (self-contained breathing apparatus) and full protective equipment.

Storage and Transport

Transport shall only be performed by authorised and competent personnel - a licence for the transport of radioactive material is required in most jurisdictions.

During transport or while stored, radioactive material shall be appropriately segregated from:

- Other dangerous goods
- Food and food packaging
- Personnel (consider dose)
- Undeveloped photographic film

Disposal Considerations

Disposal shall only be performed after consultation with the relevant radiological regulator. Use of a radiation service provider is recommended.

Typical disposal pathways include:

- Return to source (or device) manufacturer
- Transfer to another licensed user
- Transfer to an authorised radiation service provider (such as Radiation Services WA)
- In some jurisdictions (eg Western Australia), it is possible to transfer the source to an approved intractable waste disposal facility

Disclaimer

Safety Data Sheets (SDS) are not generally required for radioactive materials.

Radiation Services WA has produced this SDS for use by clients, with the best available information at the time of production. Radiation Services WA makes no guarantee of the accuracy of the information contained herein.

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