



Canadian Nuclear Safety Commission Radiation Safety Data Sheet

This data sheet presents information on radioisotopes only.

For information on chemical compounds incorporating this radionuclide, see the relevant Material Safety Data Sheet.

Part 1 - RADIOACTIVE MATERIAL IDENTIFICATION

Chemical Symbol:	U	Common Names:	Uranium
Atomic Weight:	234, 235, 238	Atomic Number:	92

Note: Data in this sheet is for ²³⁴U, ²³⁵U and ²³⁸U.

Part 2 - RADIATION CHARACTERISTICS

Physical Half-Life:
²³⁴U: 2.44 × 10⁵ years
²³⁵U: 7.04 × 10⁸ years
²³⁸U: 4.47 × 10⁹ years

Unconditional Clearance Levels: Activity Concentration (Bq/g) 1 x 10⁰

CNSC Exemption Quantity: Activity Concentration (Bq/g) 1 x 10¹
Activity (Bq) 1 x 10⁴

Progeny	<p>U-238 decay chain: Th-234(24.1 d), Pa-234m(1.17 min), U-234(2.4E5 y), Th-230(7.7E4 y), Ra-226(1600 y), Rn-222 (3.8 d), Po-218(3.1 min), Pb-214(26.8 min), Bi-214(19.9 min), Po-214(164 µs), Tl-210(1.3 min), Pb-210(22.3 y), Bi-210(5 d), Hg-206(8.1 min), Tl-206(4.2 min), Po-210(138 d).</p> <p>U-235 decay chain: Th-231(1.06 d), Pa-231(32 788 y), Ac-227(21.8 y), Th-227(18.7 d), Fr-223(21.7 min), Ra-223(11.4 d), At-219(0.9 min), Rn-219(4 s), Bi-215(7.7 min), Po-215(1.8 ms), Pb-211(31.2 min), At-215 (100 µs), Bi-211(2.14 min), Tl-207(4.8 min), Po-211(516 ms).</p>
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Part 3 – DETECTION AND MEASUREMENT

Method of Detection:

Alpha probe (e.g., ZnS scintillation counter)

Dosimetry:

External: TLD (whole body & skin) Extremity Neutron
Internal: Whole body Thyroid Urine analysis Other (specify)
Feces, personal air sampler, lung

Part 4 - PREVENTATIVE MEASURES

Soluble uranium compounds are quickly removed from the blood and deposit in the kidney, liver and bone - primarily where they may cause damage. Insoluble uranium compounds may affect the lungs because the deposited radioactive particles are cleared slowly. The inhalation of insoluble compounds may lead to osteosarcoma and lung cancer because of the prolonged irradiation of the thorax.

Uranium reacts with both air and water, and may form a pyrophoric surface when stored in the presence of moist air. Uranium dust is easily ignited and uranium in powder form will ignite spontaneously in air. No protective clothing is necessary for work with sealed sources.

When working with unsealed sources wear appropriate protective clothing, such as laboratory coats (which must be monitored before leaving the laboratory), coveralls, gloves, and safety glasses/goggles. Use a suitable mask if the radioactive material is in the form of a dust, powder or if it is potentially volatile.

Optimize time, distance and shielding. Handle uranium and its compounds in well ventilated areas. Use metal containers for storage. Store uranyl nitrate away from organic and combustible substance. Monitor equipment and supplies for loose contamination before removing from laboratory. Use disposable absorbent liners on trays.

Consult CNSC license for requirements concerning engineering controls, protective equipment, and special storage requirements.

Part 5 - ANNUAL LIMIT ON INTAKE					
	Ingestion		Inhalation		
Compound Type	Unspecified compounds*	Most tetravalent compounds, e.g., UO ₂ , UF ₄ *	Most hexavalent compounds, e.g., UF ₆ *	UO ₃ , UF ₄ , UCl ₄ *	Insoluble compounds, e.g., UO ₂
Annual Limit on Intake (Bq)	4.3 × 10 ⁵	2.5 × 10 ⁶	3.3 × 10 ⁴	1.1 × 10 ⁴	3.2 × 10 ³

* ALI values consider radiological risk, however, chemical toxicity is limiting.

EMERGENCY PROCEDURES

The following is a guide for first responders. The following actions, including remediation, should be carried out by qualified individuals. In cases where life threatening injury has resulted, **first** treat the injury, **second** deal with personal decontamination. In the case of an emergency, the Radiation Safety Officer should be contacted as soon as practicable.

Personal Decontamination Techniques

- Wash well with soap and water and monitor skin
- Do Not abrade skin, only blot dry
- Decontamination of clothing and surfaces are covered under operating and emergency procedures

Spill and Leak Control

- Alert everyone in the area
- Clear area
- Summon Aid

Emergency Protective Equipment, Minimum Requirements

- Gloves
- Footwear Covers
- Safety Glasses
- Outer layer or easily removed protective clothing
- Suitable respirator selected

Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
Ottawa, Canada
K1P 5S9

Tel: (613) 995-5894 Fax: (613) 995-5086
24 Hour Emergency Hotline: (613) 995-0479

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