



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

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:	238	Atomic Number:	92

Note: Uranium will always contain ^{238}U with varying amounts of ^{235}U and ^{234}U .

Part 2 - RADIATION CHARACTERISTICS

Physical Half-Life: 4.468×10^9 years
CNSC Exemption Quantity (in Bq): Dispersible (e.g., powder) 1×10^4 Non-dispersible: 1×10^7
 A CNSC license is not required if the amount of radioactive nuclides possessed is less than one Exemption Quantity.

Principal Emissions	Average Energy (MeV)**	Maximum Energy (MeV)***	Dose Rate at 1m Distance (mSv/h/GBq)	Recommended Shielding
Neutrons	-	-	-	-
Gamma & X-rays	0.1438, 0.1857 [†]	-	0.021 [‡]	-
Beta*	-	-	-	-
Alpha	4.174	-	-	-

* Where beta radiation is present, bremsstrahlung radiation will be produced. Shielding may therefore be required.

** Average energy of most abundant emission.

*** Maximum of most abundant emission.

[†] Both gamma rays emitted by ^{235}U .

[‡] Dose rate from natural uranium.

Progeny	Th-234(24.1d), 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(19.9min), Po-214(164 us), Pb-210(22.3y), Bi-210(5d), Po-210(138d).
----------------	---

Part 3 – DETECTION AND MEASUREMENT

Method of Detection: ZnS scintillation counter

Dosimetry:

External: TLD (whole body & skin) T Extremity T Neutron
 Other Faeces, personal air
 Internal: Whole body T Thorax T Urine analysis T (specify) sampler

Part 4 - PREVENTATIVE MEASURES

Soluble uranium compounds are quickly removed from the blood and deposit in the kidney, liver and bone - primarily where they 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, safety glasses/goggles and 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. Laboratory equipment used for radioactive work must not be used for other purposes. 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*

Compound Type	Ingestion		Inhalation		
	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)	5×10^5	3×10^6	3×10^4	1×10^4	4×10^3

*Note: Values are for natural uranium.

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.

Personal Decontamination Techniques

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

Spill and Leak Control

- C Alert everyone in the area
- C Confine the problem or emergency (includes the use of absorbent material)
- C Clear area
- C Summon Aid

Emergency Protective Equipment, Minimum Requirements

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

It should be noted that ²³⁸U is a component of natural uranium, consisting of ²³⁸U, ²³⁵U and ²³⁴U in mass percentages of 99.2837%, 0.7110% and 0.0053%, respectively, and with ²³⁴U and ²³⁸U present in equal activities per gram of natural uranium.

Revision number: 0

Date of revision: 23 Oct. 2003