Isotopes of Uranium

Isotope	Atomic Mass	Half-life	Mode of Decay	Nuclear Spin	Nuclear Magnetic Moment
U-230	230.03393	20.80 days	α to Th-226	0	No data available
U-231	231.03626	4.20 days	α to Th-227	5/2	No data available
U-232	232.03715	68.90 years	α to Th-228	0	No data available
U-233	233.039628	1.59×10^5 years	α to Th-229; SF	5/2	0.59
U-234	234.0409468	2.45×10^5 years	α to Th-230; SF	0	No data available
U-235	235.0439242	7.04×10^8 years	α to Th-231; SF	7/2	0.38
U-236	236.045561	2.34×10^7 years	α to Th-232; SF	0	No data available
U-237	237.048723	6.75 days	β- to Np-237	1/2	No data available
U-238	238.0507847	4.46×10^9 years	α to Th-234; SF	0	No data available

Uranium was discovered in 1789 by Martin Heinrich Klaproth and named after the planet Uranus, which had just been discovered. It was isolated in 1841 by Eugène-Melchior Péligot, and its radioactive properties were discovered in 1896 by Henri Becquerel.

The heaviest naturally-occurring element, uranium is a silvery-white metal that is malleable, ductile and slightly paramagnetic. The metal exists in three crystal forms: an *orthorhombic alpha phase* with a density of 18.97 g/cm^3 and stable up to 667 ºC, a *tetragonal beta phase* with density of 18.11 g/cm^3 and stable from 688-776 ºC, and a *body-centered cubic form* with a density of 18.06 g/cm^3 and stable in the range of 776-1132 ºC. It is insoluble in water and alkalis and soluble in acids. Uranium metal reacts with almost all nonmetallic elements and their compounds, its reactivity increasing with temperature. Hydrochloric and nitric acids dissolve uranium, but non-oxidizing acids other than hydrochloric acid attack the element very slowly. When finely divided, it can react with cold water; in air, uranium metal becomes coated with a dark layer of uranium oxide. Uranium in ores is extracted chemically and converted into uranium dioxide or other chemical forms usable in industry.

The major application of uranium in the military sector is in high-density penetrators. This ammunition consists of depleted uranium (DU) alloyed with 1–2% other elements. Depleted uranium is also used as a shielding material in some containers that store and transport radioactive materials. Uranium-235 has been used as the fissile explosive material to produce nuclear weapons. The main use of uranium in the civilian sector is to fuel nuclear power plants: one kilogram of Uranium-235 can theoretically produce as much energy as 3000 tonnes of coal. Uranium has also been used in small amounts for yellow glass and pottery glazes, such as uranium glass and in Fiesta® dinnerware. Uranium is a toxic metal. Exposure can affect kidneys, brain, liver, heart and other systems. The metal is commonly handled with gloves as a precaution; uranium concentrate is handled and contained in order to prevent its inhalation or ingestion.

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Properties of Uranium

Name	Uranium
Symbol	U
Atomic number	92
Atomic weight	238.02891
Standard state	Solid at 298 ºK
CAS Registry ID	7440-61-1
Group in periodic table	N/A
Group name	Actinoid
Period in periodic table	7 (Actinoid)
Block in periodic table	f-block
Color	Metallic gray
Classification	Metallic
Melting point	1132.20 °C
Boiling point	3900 °C
Vaporization point	4131 °C
Thermal conductivity	27.60 W/(m·K)
Electrical resistivity	28 x 10^{-8} Ω·m
Electronegativity	1.38
Heat of vaporization	420.00 kJ·mol^{-1}
Heat of fusion	14.00 kJ·mol^{-1}
Density of liquid	17.30 g/cm^3 at 1132.2 °C
Density of solid	19.05 g/cm^3
Electron configuration	[Rn]$5f^3 6d^1 7s^2$
Ionic radii	U^{3+}: 1.03 Å, U^{4+}: 0.89 Å, U^{5+}: 0.76 Å (coordination number 6); U^{6+}: 0.45 Å (coordination number 2); U^{6+}: 0.81 Å (coordination number 7)
Oxidation states	+2, +3, +4, +4, +5, +6

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