

Xenon

Xe

General Information

Discovery

Xenon was discovered by Sir William Ramsay and M.W. Travers in 1898 in London.

Appearance

Xenon is a colourless, odourless gas.

Source

Xenon is present in the atmosphere at a concentration of 0.086 parts per million by volume. It can be found in the gases which evolve from certain mineral springs. Commercially it is obtained by extraction from liquid air.

Uses

Xenon is little used outside research. However, it is used in certain specialised light sources which require an instant, intense light such as the high-speed electronic flash bulbs used by photographers. The high volatility of this element's electron structure produces this type of light. Xenon in a vacuum tube produces a beautiful blue glow when excited by an electrical discharge, and finds application in electron tubes, stroboscopic lights and bactericidal lamps.

Biological Role

Xenon has no known biological role. Xenon is not toxic, but its compounds are highly toxic because of their strong oxidising characteristics.

General Information

Xenon is inert towards most other chemicals but reacts with fluorine gas to form xenon fluorides. Xenon oxides, acids and salts are also known.

Physical Information

Atomic Number	54
Relative Atomic Mass ($^{12}\text{C}=12.000$)	131.29
Melting Point/K	161.3
Boiling Point/K	166.1
Density/kg m ⁻³	5.9 (gas, 273K)
Ground State Electron Configuration	[Kr]4d ¹⁰ 5s ² 5p ⁶
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	-41

Key Isotopes

Nuclide	¹²⁷ Xe	¹²⁹ Xe	¹³⁰ Xe	¹³¹ Xe	¹³² Xe	¹³³ Xe
Atomic mass		128.9	129.9	130.9	131.9	
Natural abundance	0%	26.4%	4.1%	21.2%	26.9%	0%
Half-life	36.4 days	stable	stable	stable	stable	5.27 days
Nuclide	¹³⁴ Xe	¹³⁶ Xe				
Atomic mass	133.9	135.9				
Natural abundance	10.4%	8.9%				
Half-life	stable	stable				

Ionisation Energies/kJ mol⁻¹

M - M ⁺	1170.4
M ⁺ - M ²⁺	2046
M ²⁺ - M ³⁺	3097
M ³⁺ - M ⁴⁺	4300
M ⁴⁺ - M ⁵⁺	5500
M ⁵⁺ - M ⁶⁺	6600
M ⁶⁺ - M ⁷⁺	9300
M ⁷⁺ - M ⁸⁺	10600
M ⁸⁺ - M ⁹⁺	19800
M ⁹⁺ - M ¹⁰⁺	23000

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	3.1
Enthalpy of Vaporisation/kJ mol ⁻¹	12.65
Oxidation States	
Main	Xe ⁰ , Xe ^{II} , Xe ^{IV}
Others	Xe ^{VI} , Xe ^{VIII}
Covalent Bonds/kJ mol⁻¹	
Xe - O	84