

Radon

Rn

General Information

Discovery

Radon was discovered by F.E. Dorn in 1900 in Halle, Germany, who named it radium emanation. The element was isolated in 1908 by Ramsay and Gray, who named it niton. Since 1923 it has been called radon.

Appearance

Radon is a colourless, odourless, chemically unreactive inert gas.

Source

Radon is produced naturally from the decay of a radium isotope, ^{226}Ra .

Uses

Radon decays into radioactive polonium and alpha rays, and this emitted radiation made radon useful in cancer therapy. The gas was sealed in minute tubes called seeds or needles, and implanted into the tumour. The diseased tissue was thus destroyed *in situ* by the radiation.

Biological Role

Radon has no known biological role. It is toxic due to its radioactivity, the main hazard arising from inhalation, as the element and its radioactive daughters collect on dust particles.

General Information

Radon is the densest known gas.

Chemically, radon should resemble xenon, but it has been little studied because any compounds which are formed are destroyed by hazardous radiation. It is reported that radon reacts with fluorine to give radon fluoride, and radon clathrates have also been reported. At ordinary temperatures radon is a colourless gas, but when cooled below freezing point it exhibits a brilliant phosphorescence which becomes yellow as the temperature is lowered and orange at the temperature of liquid air.

Physical Information

Atomic Number	86
Relative Atomic Mass ($^{12}\text{C}=12.000$)	222 (radioactive)
Melting Point/K	202
Boiling Point/K	211
Density/kg m ⁻³	9.73 (gas, 273K)
Ground State Electron Configuration	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁶
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	+41

Key Isotopes

Nuclide	²¹⁹ Rn	²²⁰ Rn	²²² Rn
Atomic mass	219.01	220.01	222.02
Natural abundance	trace	trace	trace
Half-life	4 secs	55 secs	3.82 days

Ionisation Energies/kJ mol⁻¹

M - M ⁺	1037
M ⁺ - M ²⁺	
M ²⁺ - M ³⁺	
M ³⁺ - M ⁴⁺	
M ⁴⁺ - M ⁵⁺	
M ⁵⁺ - M ⁶⁺	
M ⁶⁺ - M ⁷⁺	
M ⁷⁺ - M ⁸⁺	
M ⁸⁺ - M ⁹⁺	
M ⁹⁺ - M ¹⁰⁺	

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	2.7
Enthalpy of Vaporisation/kJ mol ⁻¹	18.1

Oxidation States

Rn⁰, Rn⁺²