

# Group-1 **H** (Hydrogen) Period-1

**Latin Name: Hydrogenium**

**Year Of Discovery: 1766**

**Discoverer: Henry Cavendish**

## Physical Properties

<b>Atomic Number</b>	1	<b>Electronic Configuration</b>	1s <sup>1</sup>
<b>Molar Mass (g mol<sup>-1</sup>)</b>	1.008	<b>Molecular Formula</b>	H <sub>2</sub>
<b>Density (g cm<sup>-3</sup>) at STP</b>	0.09	<b>Oxidation States</b>	-1, 0, +1
<b>Covalent Radius (pm)</b>	31 ± 5	<b>Van der Waals Radius (pm)</b>	120
<b>Melting Point (°C)</b>	-259	<b>Boiling Point (°C)</b>	-253
<b>Ionisation Energy (kJ/mol)</b>	1312	<b>Electron Affinity (kJ/mol)</b>	-72
<b>Electronegativity</b>	2.2 (Pauling scale)	<b>CAS Number</b>	12385-13-6 1333-74-0 (H <sub>2</sub> )
<b>Phase</b>	Gas (colourless)	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (298 K)</b>	-3.98×10 <sup>-6</sup>
<b>Magnetic Ordering</b>	Diamagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	0.1805
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	0.05868 0.117 (H <sub>2</sub> )	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	0.44936 0.904 (H <sub>2</sub> )
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	28.836 (H <sub>2</sub> )	<b>Vapour Pressure</b>	100 kPa (at 20 K)
<b>Triple Point</b>	13.8033 K, 7.041 kPa	<b>Critical Point</b>	32.938 K, 1.2858 MPa

## Chemical Properties

Hydrogen gas (H<sub>2</sub>) burns in air to give H<sub>2</sub>O (heat of combustion = -286 kJ/mol). H<sub>2</sub> acts as reducing agent many metal oxides (e.g. CuO to Cu). Preparation of vegetable ghee by hydrogenation.

<b>Nuclear Properties</b>	Not radioactive but its isotope Tritium is radioactive.
<b>Isotopes</b>	Protium-H <sup>1</sup> (99.986%), Deuterium (D)-H <sup>2</sup> (0.014%), Tritium (T)-H <sup>3</sup> (7×10 <sup>-16</sup> %). Tritium is radioactive.
<b>Abundance</b>	Most abundant chemical substance in the universe.
<b>Uses</b>	Hydrogenation of fats and oils, rocket fuel, welding, ammonia by Haber process.
<b>Compounds</b>	H <sub>2</sub> O, H <sub>2</sub> O <sub>2</sub> , metal hydride (e.g. NaH).

# Li (Lithium)

Group-1 Period-2

**Latin Name:** Lithium      **Year Of Discovery:** 1817      **Discoverer:** Johan August Arfwedson

## Physical Properties

<b>Atomic Number</b>	3	<b>Electronic Configuration</b>	$1s^2 2s^1$ or $[\text{He}] 2s^1$
<b>Molar Mass (g mol<sup>-1</sup>)</b>	6.94	<b>Molecular Formula</b>	Li
<b>Density (g cm<sup>-3</sup>) at 20°C</b>	0.534	<b>Oxidation States</b>	+1 (Li <sup>+</sup> )
<b>Atomic Radius (pm)</b>	Empirical: 152	<b>Flame Colouration</b>	Crimson Red
<b>Covalent Radius (pm)</b>	$128 \pm 7$	<b>Van der Waals Radius (pm)</b>	182
<b>Ionic Radius (pm)</b>	68	<b>Ionisation Energy (kJ/mol)</b>	520.2 (1 <sup>st</sup> ), 7298.1 (2 <sup>nd</sup> ), 11815.0 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>	12.97	<b>Electronegativity</b>	0.98 (Pauling scale)
<b>Melting Point (°C)</b>	180	<b>Boiling Point (°C)</b>	1326
<b>Phase at STP</b>	Solid	<b>CAS Number</b>	7439-93-2
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	92.8	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (298 K)</b>	$+14.2 \times 10^{-6}$
<b>Magnetic Ordering</b>	Paramagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	84.8
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	3.00	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	136
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	24.860	<b>Vapour Pressure (at 1610 K)</b>	100 kPa
<b>Crystal Structure</b>	Body Centred Cubic (BCC)	<b>Critical Point</b>	3220 K, 67 MPa

## Chemical Properties

Li is least reactive among alkali metals. When burnt in air or oxygen Li forms mono oxide Li<sub>2</sub>O. With N<sub>2</sub>, Li forms Li<sub>3</sub>N (the only alkali metal which reacts with N<sub>2</sub>). Lithium combines with H<sub>2</sub> at 700-800°C, stable LiH forms. With water LiOH forms. When put in acids, H<sub>2</sub> gas is liberated. Gets dissolved in liquid ammonia to give coloured solution (conductor). With NH<sub>3</sub> gas LiNH<sub>2</sub> forms and H<sub>2</sub> is liberated.

<b>Nuclear Properties</b>	Not radioactive.
<b>Isotopes</b>	<sup>6</sup> Li (5% abundance) <sup>7</sup> Li (95% abundance)
<b>Ores</b>	Petalite LiAl(Si <sub>2</sub> O <sub>5</sub> ) <sub>2</sub> , Spodumene LiAl(SiO <sub>3</sub> ) <sub>2</sub>
<b>Uses</b>	Aircraft manufacture, certain batteries, mental health.
<b>Compounds</b>	LiH, Li <sub>2</sub> O, Li <sub>3</sub> N, Li <sub>2</sub> C <sub>2</sub> , Li <sub>3</sub> PO <sub>4</sub> , Li <sub>2</sub> CO <sub>3</sub> .

# Na (Sodium)

Group-1

Period-3

Latin Name: Natrium

Year Of Discovery: 1807

Discoverer: Sir Humphry Davy

## Physical Properties

Atomic Number	11	Molar Mass (g mol <sup>-1</sup> )	22.99
Electronic Configuration	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>1</sup> or [Ne]3s <sup>1</sup>		
Density (g cm <sup>-3</sup> ) at 20°C	0.972	Oxidation States	+1 (Na <sup>+</sup> )
Atomic Radius (pm)	Empirical: 186	Flame Colouration	Golden Yellow
Covalent Radius (pm)	166 ± 9	Van der Waals Radius (pm)	227
Ionic Radius (pm)	98	Ionisation Energy (kJ/mol)	495.8 (1 <sup>st</sup> ), 4562 (2 <sup>nd</sup> ), 6910.3 (3 <sup>rd</sup> )
Molar Volume (cm <sup>3</sup> mol <sup>-1</sup> )	23.68	Electronegativity	0.93 (Pauling scale)
Melting Point (°C)	97.8	Boiling Point (°C)	883
Phase at STP	Solid (silvery white)	CAS Number	7440-23-5
Electrical Resistivity (nΩm) (293.15 K)	47.7	Magnetic Susceptibility (cm <sup>3</sup> mol <sup>-1</sup> ) (298 K)	+16.0×10 <sup>-6</sup>
Magnetic Ordering	Paramagnetic	Thermal Conductivity (Wm <sup>-1</sup> K <sup>-1</sup> )	84.8
Heat Of Fusion (kJ mol <sup>-1</sup> )	2.60	Heat Of Vapourization (kJ mol <sup>-1</sup> )	97.42
Molar Heat Capacity (J mol <sup>-1</sup> K <sup>-1</sup> )	28.23	Vapour Pressure (at 1153 K)	100 kPa
Crystal Structure	Body Centred Cubic (BCC)	Critical Point	2573 K, 35 MPa

## Chemical Properties

When Na is burnt in air or oxygen it forms Na<sub>2</sub>O and Na<sub>2</sub>O<sub>2</sub>. Sodium combines with H<sub>2</sub> at 350-430°C, NaH forms. With water NaOH forms. When Na is put in acids, H<sub>2</sub> gas is liberated. Gets dissolved in liquid ammonia to give deep blue coloured solution (conductor). With NH<sub>3</sub> gas NaNH<sub>2</sub> forms and H<sub>2</sub> is liberated.

Nuclear Properties	<sup>23</sup> Na is not radioactive. But <sup>22</sup> Na (half life = 2.602 yr) and <sup>24</sup> Na (half life = 14.96 hr) are radioactive.
Isotopes	<sup>22</sup> Na (trace abundance), <sup>23</sup> Na (≈100% abundance), <sup>24</sup> Na (trace abundance)
Ores	Rock Salt(NaCl), Chile Saltpetre (NaNO <sub>3</sub> ), Sodium Sesquicarbonate (Na <sub>2</sub> CO <sub>3</sub> ·NaHCO <sub>3</sub> ·2H <sub>2</sub> O), Cryolite (Na <sub>3</sub> AlF <sub>6</sub> ).
Uses	Food preservative. Plays a key role to maintain the blood pressure.
Compounds	Na <sub>2</sub> O, Na <sub>2</sub> O <sub>2</sub> , NaH, Na <sub>2</sub> SO <sub>4</sub> , Na <sub>2</sub> CO <sub>3</sub> ,

# Group-1 **K** (Potassium) Period-4

Latin Name: Kalium

Year Of Discovery: 1807

Discoverer: Sir Humphry Davy

## Physical Properties

Atomic Number	19	Molar Mass (g mol <sup>-1</sup> )	39.10
Electronic Configuration	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>1</sup> or [Ar]4s <sup>1</sup>		
Density (g cm <sup>-3</sup> ) at 20°C	0.859	Oxidation States	+1 (K <sup>+</sup> )
Atomic Radius (pm)	Empirical: 227	Flame Colouration	Violet
Covalent Radius (pm)	203 ± 12	Van der Waals Radius (pm)	275
Ionic Radius (pm)	133	Ionisation Energy (kJ/mol)	418.8 (1 <sup>st</sup> ), 3052 (2 <sup>nd</sup> ), 4420 (3 <sup>rd</sup> )
Molar Volume (cm <sup>3</sup> mol <sup>-1</sup> )	45.36	Electronegativity	0.82 (Pauling scale)
Melting Point (°C)	64	Boiling Point (°C)	756
Phase at STP	Solid (silvery gray)	CAS Number	7440-09-7
Electrical Resistivity (nΩm) (293.15 K)	72	Magnetic Susceptibility (cm <sup>3</sup> mol <sup>-1</sup> ) (298 K)	+20.8×10 <sup>-6</sup>
Magnetic Ordering	Paramagnetic	Thermal Conductivity (Wm <sup>-1</sup> K <sup>-1</sup> )	102.5
Heat Of Fusion (kJ mol <sup>-1</sup> )	2.33	Heat Of Vapourization (kJ mol <sup>-1</sup> )	76.9
Molar Heat Capacity (J mol <sup>-1</sup> K <sup>-1</sup> )	29.6	Heat of atomisation (kJ mol <sup>-1</sup> )	90.2
Crystal Structure	Body Centred Cubic (BCC)	Critical Point	2223 K, 16 MPa

## Chemical Properties

When K is burnt in air or oxygen it forms superoxide KO<sub>2</sub>. Potassium combines with H<sub>2</sub> at 350-430°C, KH forms. With water KOH forms. When K is put in acids, H<sub>2</sub> gas is liberated. Gets dissolved in liquid ammonia to give deep blue coloured solution (conductor). With NH<sub>3</sub> gas NaNH<sub>2</sub> forms and H<sub>2</sub> is liberated.

Nuclear Properties	<sup>39</sup> K and <sup>41</sup> K are not radioactive, they are stable. But <sup>40</sup> K (half life = 1.248×10 <sup>9</sup> yr) is radioactive.
Isotopes	<sup>39</sup> K (93.258%), <sup>40</sup> K (0.012% abundance), <sup>41</sup> K (6.73 abundance)
Ores	Carnallite (KCl.MgCl <sub>2</sub> .6H <sub>2</sub> O), Kainite (KCl.MgSO <sub>4</sub> .3H <sub>2</sub> O), Indian Saltpetre (KNO <sub>3</sub> ), Polyhalite (K <sub>2</sub> SO <sub>4</sub> .MgSO <sub>4</sub> .CaSO <sub>4</sub> .2H <sub>2</sub> O), Schonite (K <sub>2</sub> SO <sub>4</sub> .MgSO <sub>4</sub> ), Langbenite (K <sub>2</sub> SO <sub>4</sub> .2MgSO <sub>4</sub> ).
Uses	For potassium very few uses are found. It is occasionally used in photoelectric cells and synthesis of organic compounds.
Compounds	KO <sub>2</sub> , KH, K <sub>2</sub> SO <sub>4</sub> , K <sub>2</sub> CO <sub>3</sub> ,

# Rb (Rubidium)

Group-1

Period-5

**Latin Name: Rubidium Year Of Discovery: 1861 Discoverer: Robert Bunsen & Gustav Kirchhoff**

## Physical Properties

<b>Atomic Number</b>	37	<b>Molar Mass (g mol<sup>-1</sup>)</b>	85.48
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>1</sup> or [Kr]5s <sup>1</sup>		
<b>Density (g cm<sup>-3</sup>) at 20°C</b>	1.530	<b>Oxidation States</b>	+1 (Rb <sup>+</sup> )
<b>Atomic Radius (pm)</b>	Empirical: 248	<b>Flame Colouration</b>	Violet
<b>Covalent Radius (pm)</b>	220 ± 9	<b>Van der Waals Radius (pm)</b>	303
<b>Ionic Radius (pm)</b>	148	<b>Ionisation Energy (kJ/mol)</b>	403 (1 <sup>st</sup> ), 2632.1 (2 <sup>nd</sup> ), 3859.4 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>	55.80	<b>Electronegativity</b>	0.82 (Pauling scale)
<b>Melting Point (°C)</b>	38.9	<b>Boiling Point (°C)</b>	688
<b>Phase at STP</b>	Solid (silvery white)	<b>CAS Number</b>	7440-17-7
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	128	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	+17.0×10 <sup>-6</sup>
<b>Magnetic Ordering</b>	Paramagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	58.2
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	2.19	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	69
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	31.06	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	82.1
<b>Crystal Structure</b>	Body Centred Cubic (BCC)	<b>Critical Point</b>	2093 K, 16 MPa

## Chemical Properties

When Rb is burnt in air or oxygen it forms superoxide RbO<sub>2</sub>. Rubidium combines with H<sub>2</sub> at 350-430°C, RbH forms. With water RbOH forms. When Rb is put in acids, H<sub>2</sub> gas is liberated. Gets dissolved in liquid ammonia to give deep blue coloured solution (conductor). With NH<sub>3</sub> gas NaNH<sub>2</sub> forms and H<sub>2</sub> is liberated. Rb is more reactive than K.

<b>Nuclear Properties</b>	<sup>85</sup> Rb and <sup>87</sup> Rb are not radioactive, they are stable. But <sup>83</sup> Rb (half life = 86.2 d), <sup>84</sup> Rb (half life = 32.9 d), <sup>86</sup> Rb (half life = 18.7 d) are radioactive.
<b>Isotopes</b>	<sup>83</sup> Rb, <sup>84</sup> Rb, <sup>85</sup> Rb (72.17% abundance), <sup>86</sup> Rb, <sup>87</sup> Rb (27.83% abundance)
<b>Ores</b>	It occurs naturally in minerals Leucite, Pollucite etc.
<b>Uses</b>	Rb is used to induce living cells to take up DNA. It is used as a biomarker.
<b>Compounds</b>	RbCl, RbOH, Rb <sub>2</sub> CO <sub>3</sub> .

# Cs (Caesium)

Group-1

Period-6

**Latin Name:** Caesium **Year Of Discovery:** 1860 **Discoverer:** Robert Bunsen & Gustav Kirchhoff

## Physical Properties

<b>Atomic Number</b>	55	<b>Molar Mass (g mol<sup>-1</sup>)</b>	132.90545196
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>2</sup> 5p <sup>6</sup> 4d <sup>10</sup> 6s <sup>1</sup> or [Xe]6s <sup>1</sup>		
<b>Density (g cm<sup>-3</sup>) at 20°C</b>	1.903	<b>Oxidation States</b>	+1 (Cs <sup>+</sup> )
<b>Atomic Radius (pm)</b>	Empirical: 265	<b>Flame Colouration</b>	Violet
<b>Covalent Radius (pm)</b>	244 ± 11	<b>Van der Waals Radius (pm)</b>	343
<b>Ionic Radius (pm)</b>	167	<b>Ionisation Energy (kJ/mol)</b>	375.7 (1 <sup>st</sup> ), 2234.3 (2 <sup>nd</sup> ), 3400 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>	69.95	<b>Electronegativity</b>	0.79 (Pauling scale)
<b>Melting Point (°C)</b>	28.7	<b>Boiling Point (°C)</b>	690
<b>Phase at STP</b>	Solid (pale gold)	<b>CAS Number</b>	7440-46-2
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	205	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	+17.0×10 <sup>-6</sup>
<b>Magnetic Ordering</b>	Paramagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	35.9
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	2.09	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	63.9
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	32.21	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	78.2
<b>Crystal Structure</b>	Body Centred Cubic (BCC)	<b>Critical Point</b>	1938 K, 9.4 MPa

## Chemical Properties

When Cs is burnt in air or oxygen it forms superoxide CsO<sub>2</sub>. Caesium combines with H<sub>2</sub> at 350-430°C, CsH forms. With water CsOH forms. When Cs is put in acids, H<sub>2</sub> gas is liberated. Gets dissolved in liquid ammonia to give coloured solution (conductor). With NH<sub>3</sub> gas NaNH<sub>2</sub> forms and H<sub>2</sub> is liberated. Cs is more reactive than K and Rb.

<b>Nuclear Properties</b>	<sup>133</sup> Cs is stable. <sup>134</sup> Cs (half life = 2.0648 y), <sup>135</sup> Cs (Half life = 2.3×10 <sup>6</sup> y), <sup>137</sup> Cs (Half life = 30.17 y)
<b>Isotopes</b>	<sup>133</sup> Cs (≈100% abundance), <sup>134</sup> Cs, <sup>135</sup> Cs, <sup>137</sup> Cs
<b>Ores</b>	It occurs naturally in minerals like Pollucite etc.
<b>Uses</b>	Cs is used in atomic clocks. Photoelectric cells, vacuum tubes. As catalyst in hydrogenation of few organic compounds.
<b>Compounds</b>	CsCl, CsI, Cs <sub>2</sub> CO <sub>3</sub> , Cs <sub>2</sub> SO <sub>4</sub> , CsOH.

# Fr (Francium)

Group-1 Period-7

**Latin Name:** Francium

**Year Of Discovery:** 1939

**Discoverer:** Marguerite Perey

## Physical Properties

<b>Atomic Number</b>	87	<b>Molar Mass (g mol<sup>-1</sup>)</b>	223
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>2</sup> 5p <sup>6</sup> 4d <sup>10</sup> 6s <sup>2</sup> 4f <sup>14</sup> 5d <sup>10</sup> 6p <sup>6</sup> 7s <sup>1</sup> or [Rn]7s <sup>1</sup>		
<b>Density (g cm<sup>-3</sup>) at 20°C</b>	2.8-3.0	<b>Oxidation States</b>	+1
<b>Atomic Radius (pm)</b>	Empirical: 348		
<b>Covalent Radius (pm)</b>	260	<b>Van der Waals Radius (pm)</b>	348
<b>Ionic Radius (pm)</b>	180	<b>Ionisation Energy (kJ/mol)</b>	380 (1 <sup>st</sup> ), 2100 (2 <sup>nd</sup> ), 3100 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>	69.95	<b>Electronegativity</b>	>0.79 (Pauling scale)
<b>Melting Point (°C)</b>	30	<b>Boiling Point (°C)</b>	680
<b>Phase at STP</b>	Solid (Silver)	<b>CAS Number</b>	7440-73-5
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	3		
<b>Magnetic Ordering</b>	Paramagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	15
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	2	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	65

## Chemical Properties

Francium has very similar characteristics as Cs.

<b>Nuclear Properties</b>	<sup>221</sup> Fr (Half life = 4.8 min.), <sup>222</sup> Fr (Half life = 14.2 min.), <sup>223</sup> Fr (Half life = 22 min.)
<b>Isotopes</b>	<sup>221</sup> Fr (trace), <sup>222</sup> Fr (synthetic), <sup>223</sup> Fr (trace)
<b>Ores</b>	-
<b>Uses</b>	-
<b>Compounds</b>	-

# Be (Beryllium)

Group-2 Period-2

**Latin Name:** Beryllium      **Year Of Discovery:** 1797      **Discoverer:** Louis Nicolas Vauquelin

## Physical Properties

<b>Atomic Number</b>	4	<b>Molar Mass (g mol<sup>-1</sup>)</b>	9.012182
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> or [He]2s <sup>2</sup>		
<b>Density (g cm<sup>-3</sup>)</b>	1.85	<b>Oxidation States</b>	+2
<b>Atomic Radius (pm)</b>	Empirical:112	<b>Flame Colouration</b>	
<b>Covalent Radius (pm)</b>	96±3	<b>Van der Waals Radius (pm)</b>	153
<b>Ionic Radius (pm)</b>		<b>Ionisation Energy (kJ/mol)</b>	899.5 (1 <sup>st</sup> ), 1757.1 (2 <sup>nd</sup> ), 14848.7 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>		<b>Electronegativity</b>	1.57 (Pauling Scale)
<b>Melting Point (°C)</b>	1287	<b>Boiling Point (°C)</b>	2469
<b>Phase at STP</b>	Solid	<b>CAS Number</b>	7440-41-7
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	36	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	-9.0×10 <sup>-6</sup>
<b>Magnetic Ordering</b>	Diamagnetic	<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	200
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	12.2	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	292
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	16.443	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	
<b>Crystal Structure</b>	hcp	<b>Critical Point</b>	

## Chemical Properties

**Nuclear Properties**

**Isotopes**

**Ores**

**Uses**

**Compounds**



# Mg (Magnesium)

Group-2 Period-3

**Latin Name: Magnesium**

**Year Of Discovery: 1755**

**Discoverer: -**

## Physical Properties

<b>Atomic Number</b>	12	<b>Molar Mass (g mol<sup>-1</sup>)</b>	24.3050
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 2s <sup>2</sup> or [Ne]2s <sup>2</sup>		
<b>Density (g cm<sup>-3</sup>)</b>		<b>Oxidation States</b>	+2
<b>Atomic Radius (pm)</b>	Empirical: 160	<b>Flame Colouration</b>	
<b>Covalent Radius (pm)</b>	141±7	<b>Van der Waals Radius (pm)</b>	173
<b>Ionic Radius (pm)</b>		<b>Ionisation Energy (kJ/mol)</b>	737.7 (1 <sup>st</sup> ), 1450.7 (2 <sup>nd</sup> ), 7732.7 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>		<b>Electronegativity</b>	1.57 (Pauling Scale)
<b>Melting Point (°C)</b>		<b>Boiling Point (°C)</b>	
<b>Phase at STP</b>	Solid	<b>CAS Number</b>	7439-95-4
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	43.9	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	
<b>Magnetic Ordering</b>		<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	156
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	8.48	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	128
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	24.869	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	
<b>Crystal Structure</b>	hcp	<b>Critical Point</b>	

## Chemical Properties

<b>Nuclear Properties</b>	Not radioactive
<b>Isotopes</b>	<sup>24</sup> Mg (79%), <sup>25</sup> Mg (10%), <sup>26</sup> Mg (11%)
<b>Ores</b>	
<b>Uses</b>	
<b>Compounds</b>	

# Ca (Calcium)

Group-2

Period-4

Latin Name: Calcium

Year Of Discovery: 1808

Discoverer: Humphry Davy

## Physical Properties

Atomic Number	20	Molar Mass (g mol <sup>-1</sup> )	40.078
Electronic Configuration	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 2s <sup>2</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> or [Ar]4s <sup>2</sup>		
Density (g cm <sup>-3</sup> )	1.55	Oxidation States	+2
Atomic Radius (pm)	Empirical: 197	Flame Colouration	
Covalent Radius (pm)	176±10	Van der Waals Radius (pm)	231
Ionic Radius (pm)		Ionisation Energy (kJ/mol)	589.8 (1 <sup>st</sup> ), 1145.4 (2 <sup>nd</sup> ), 4912.4 (3 <sup>rd</sup> )
Molar Volume (cm <sup>3</sup> mol <sup>-1</sup> )		Electronegativity	1.00 (Pauling Scale)
Melting Point (°C)		Boiling Point (°C)	
Phase at STP		CAS Number	7440-70-2
Electrical Resistivity (nΩm) (293.15 K)	33.6	Magnetic Susceptibility (cm <sup>3</sup> mol <sup>-1</sup> ) (303 K)	
Magnetic Ordering		Thermal Conductivity (Wm <sup>-1</sup> K <sup>-1</sup> )	201
Heat Of Fusion (kJ mol <sup>-1</sup> )	8.54	Heat Of Vapourization (kJ mol <sup>-1</sup> )	154.7
Molar Heat Capacity (J mol <sup>-1</sup> K <sup>-1</sup> )	25.929	Heat of atomisation (kJ mol <sup>-1</sup> )	
Crystal Structure		Critical Point	

## Chemical Properties

Nuclear Properties

Isotopes

Ores

Uses

Compounds

# Sr (Strontium) Period-5

Group-2

**Latin Name: Strontium**      **Year Of Discovery: 1787**      **Discoverer: William Cruickshank**

## Physical Properties

<b>Atomic Number</b>	38	<b>Molar Mass (g mol<sup>-1</sup>)</b>	87.62
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>2</sup> or [Kr]4s <sup>2</sup>		
<b>Density (g cm<sup>-3</sup>)</b>	2.64	<b>Oxidation States</b>	+2
<b>Atomic Radius (pm)</b>	Empirical: 215	<b>Flame Colouration</b>	
<b>Covalent Radius (pm)</b>	195±10	<b>Van der Waals Radius (pm)</b>	249
<b>Ionic Radius (pm)</b>		<b>Ionisation Energy (kJ/mol)</b>	549.5 (1 <sup>st</sup> ), 1064.2 (2 <sup>nd</sup> ), 4138 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>		<b>Electronegativity</b>	0.95(Pauling Scale)
<b>Melting Point (°C)</b>	777	<b>Boiling Point (°C)</b>	1377
<b>Phase at STP</b>	Solid	<b>CAS Number</b>	7440-24-6
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	132	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	
<b>Magnetic Ordering</b>		<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	35.4
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	7.43	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	141
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	26.4	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	
<b>Crystal Structure</b>		<b>Critical Point</b>	

## Chemical Properties

<b>Nuclear Properties</b>	
<b>Isotopes</b>	
<b>Ores</b>	
<b>Uses</b>	
<b>Compounds</b>	

# Ba (Barium)

Group-2 Period-6

**Latin Name:** Barium      **Year Of Discovery:** 1772      **Discoverer:** Carl Wilhelm Scheele

## Physical Properties

<b>Atomic Number</b>	56	<b>Molar Mass (g mol<sup>-1</sup>)</b>	137.327
<b>Electronic Configuration</b>	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>2</sup> 4d <sup>10</sup> 5p <sup>6</sup> 6s <sup>2</sup> or [Xe]4s <sup>2</sup>		
<b>Density (g cm<sup>-3</sup>)</b>	3.51	<b>Oxidation States</b>	+2
<b>Atomic Radius (pm)</b>	Empirical: 222	<b>Flame Colouration</b>	
<b>Covalent Radius (pm)</b>	215±11	<b>Van der Waals Radius (pm)</b>	268
<b>Ionic Radius (pm)</b>		<b>Ionisation Energy (kJ/mol)</b>	502.9 (1 <sup>st</sup> ), 965.2 (2 <sup>nd</sup> ), 3600 (3 <sup>rd</sup> )
<b>Molar Volume (cm<sup>3</sup> mol<sup>-1</sup>)</b>		<b>Electronegativity</b>	0.89 (Pauling Scale)
<b>Melting Point (°C)</b>	727	<b>Boiling Point (°C)</b>	1845
<b>Phase at STP</b>	Solid	<b>CAS Number</b>	7440-39-3
<b>Electrical Resistivity (nΩm) (293.15 K)</b>	332	<b>Magnetic Susceptibility (cm<sup>3</sup> mol<sup>-1</sup>) (303 K)</b>	+20.6×10 <sup>-6</sup>
<b>Magnetic Ordering</b>		<b>Thermal Conductivity (Wm<sup>-1</sup>K<sup>-1</sup>)</b>	18.4
<b>Heat Of Fusion (kJ mol<sup>-1</sup>)</b>	7.12	<b>Heat Of Vapourization (kJ mol<sup>-1</sup>)</b>	142
<b>Molar Heat Capacity (J mol<sup>-1</sup>K<sup>-1</sup>)</b>	28.07	<b>Heat of atomisation (kJ mol<sup>-1</sup>)</b>	
<b>Crystal Structure</b>	bcc	<b>Critical Point</b>	

## Chemical Properties

<b>Nuclear Properties</b>	
<b>Isotopes</b>	<sup>130</sup> Ba (0.11%), <sup>133</sup> Ba(0.10%), <sup>133</sup> Ba (Synthetic), <sup>134</sup> Ba(2.42%), <sup>135</sup> Ba(6.59%), <sup>136</sup> Ba(11.23%), <sup>137</sup> Ba(11.23%), <sup>138</sup> Ba(71.7)
<b>Ores</b>	
<b>Uses</b>	
<b>Compounds</b>	

# Ra (Radium)

Group-2

Period-6

Latin Name: Barium

Year Of Discovery: 1898

Discoverer: Pierre and Marie Curie

## Physical Properties

Atomic Number	88	Molar Mass (g mol <sup>-1</sup> )	226
Electronic Configuration	1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup> 3s <sup>2</sup> 3p <sup>6</sup> 4s <sup>2</sup> 3d <sup>10</sup> 4p <sup>6</sup> 5s <sup>2</sup> 4d <sup>10</sup> 5p <sup>6</sup> 6s <sup>2</sup> 4f <sup>14</sup> 5d <sup>10</sup> 6p <sup>6</sup> 7s <sup>2</sup> or [Rn]7s <sup>2</sup>		
Density (g cm <sup>-3</sup> )	5.5	Oxidation States	+2
Atomic Radius (pm)		Flame Colouration	
Covalent Radius (pm)	221±2	Van der Waals Radius (pm)	283
Ionic Radius (pm)		Ionisation Energy (kJ/mol)	509.3 (1 <sup>st</sup> ), 979.0 (2 <sup>nd</sup> )
Molar Volume (cm <sup>3</sup> mol <sup>-1</sup> )		Electronegativity	0.9 (Pauling Scale)
Melting Point (°C)	700	Boiling Point (°C)	1737
Phase at STP	Solid	CAS Number	7440-14-4
Electrical Resistivity (nΩm) (293.15 K)	1	Magnetic Susceptibility (cm <sup>3</sup> mol <sup>-1</sup> ) (303 K)	
Magnetic Ordering		Thermal Conductivity (Wm <sup>-1</sup> K <sup>-1</sup> )	18.6
Heat Of Fusion (kJ mol <sup>-1</sup> )	8.5	Heat Of Vapourization (kJ mol <sup>-1</sup> )	113
Molar Heat Capacity (J mol <sup>-1</sup> K <sup>-1</sup> )		Heat of atomisation (kJ mol <sup>-1</sup> )	
Crystal Structure	bcc	Critical Point	

## Chemical Properties

### Nuclear Properties

### Isotopes

<sup>223</sup>Ra (trace), <sup>224</sup>Ra (trace), <sup>225</sup>Ra (trace), <sup>226</sup>Ra (trace), <sup>228</sup>Ra (trace)

### Ores

### Uses

### Compounds