

The Periodic Table

Arrangement of Elements

- The Periodic table is a method of classifying elements.
- Elements are arranged in order of increasing atomic number (each proceeding element has one more proton)
- Made up of rows called **periods** and columns called **groups**, the position of an element helps determine its electronic configuration.
- **Period number**: can be determined by total number of shells.
- **Group number**: number of electrons in outer shell electrons.

Elements in the same group have similar chemical properties.

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9											1 H hydrogen 1					
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Al aluminium 27	32 Si silicon 28	33 P phosphorus 31	34 S sulfur 32	35 Cl chlorine 35.5	36 Ar argon 40
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganeson —

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

Periodic Trends

1. The table moves from metals on the left to non-metals on the right.
2. Down a group of metals, elements become more reactive.
3. With non-metals going down a group, reactivity decreases.

Group I Properties

- **Group I Metals:** Lithium, sodium, potassium, etc.

Chemical Properties	Physical Properties
Readily react with oxygen and water; stored in oil	Good conductors of heat and electricity
React violently with chlorine	Soft and easy to cut
Burst into flames when heated with oxygen[red flame for lithium; yellow flame for sodium; lilac flame for potassium]	Shiny when freshly cut
Produce soluble white compounds.	Melting points decrease down the group.
React with water to form alkaline metal and hydrogen gas	Increase density down the group

- Predicting the properties of other Group I alkali metals: Rubidium, Caesium and Francium [reactivity increases down the group].

Element	Reaction with Water
Lithium	Floats and gives off hydrogen gas (effervescence)
Sodium	Vigorous Reaction and moves very quickly
Potassium	Explosive Reaction, lilac flame

Group VII(Halogens) Properties: Salt Producers

Halo: Salt

Gen: Formers

Properties	Patterns/Trends
States and Colours, at RTP: Fluorine(F₂) - Pale-Yellow-green gas Chlorine(Cl₂) - Greenish/Pale Yellow -Green gas Bromine(Br₂) - Red-Brown liquid Iodine(I₂) - Purple-Grey-Black solid	Top to Down the group, reactivity, size, mass and density increase
Halogens are colored, poisonous , non-metals, low m.p, b.p, Exist as diatomic covalent compound/molecules.	Down the group, the colour darkens
<ul style="list-style-type: none"> • Halogens are also reactive no-metals. • Diatomic; form halide ions in a displacement reaction • Halogen are reactive metal 	Reactivity decreases down the group, because it has to gain an electron, so the closer the electron is to the positive nucleus, the more easily it will be gained, so atoms with fewer shells will react more easily.
Do not conduct electricity	melting point increases down the group

Transition Elements

Physical Properties

- High melting & boiling points
- Malleable and ductile
- Good conductors of heat & electricity
- High density

Chemical Properties

- Act as catalysts
- Form coloured compounds
- Variable Oxidation Numbers (Iron (II) or Iron (III))

Noble Gases

Properties	Uses
Density increases down the group	Helium-filling balloons
Monoatomic and colourless	Argon – Lamps
M.P. and B.P. increases down the group	Neon – advertising signs
Don't conduct electricity	
Inert & stable due to full outer shell electrons	

Catalyst:

In simpler terms, catalysts are substances that make chemical reactions happen faster without being used up in the process. They speed up reactions by providing an easier route for the reaction to occur, making it more efficient. Catalysts play a crucial role in various industries, helping to produce products more quickly and with less energy. They are like facilitators that enable chemical processes to happen smoothly.