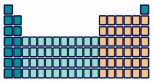
Periodicity Map

AQA A-level Chemistry · 3.2.1 Periodicity

1 Blocks 3.2.1.1

- Position set by **proton number**
- Block: sub-shell of the **highest-energy** electron
- **s**: Groups 1–2; **p**: Groups 13–18
- **d**: Sc–Zn; **f**: lanthanides, actinides
- Periodicity: a repeating pattern



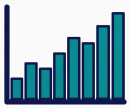
2 Atomic radius 3.2.1.2 i

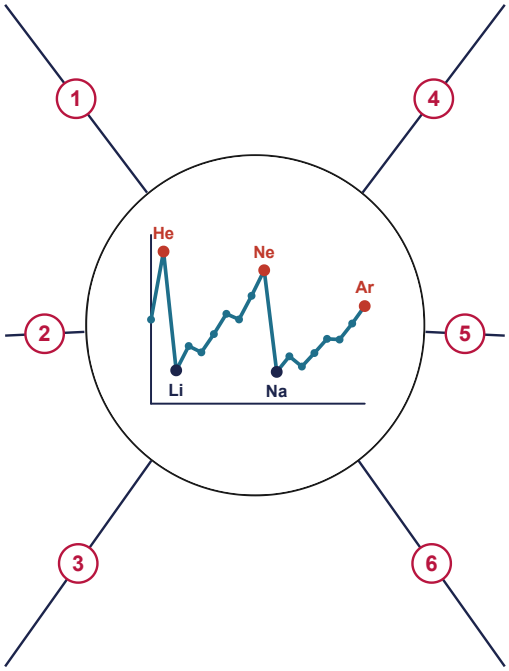
- **Decreases** Na (186 pm) → Cl (99 pm)
- More **protons** each time
- Outer electrons in the **same shell**
- **Similar shielding** (2,8)
- Argon: no bonded radius



3 First ionisation energy 3.2.1.2 i

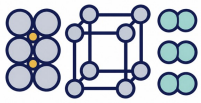
- General **rise** Na (496) → Ar (1521)
- More protons, smaller atoms
- **Al dip**: 3p electron, higher energy
- **S dip**: paired 3p electron repelled
- Smaller atom: electron held tighter





4 Metallic: Na, Mg, Al 3.2.1.2 ii

- **Giant metallic** lattices
- Cations 1+, 2+, 3+; smaller across
- 1, 2, 3 **delocalised electrons**
- Stronger metallic bonding: **higher m.p.**
- Good conductors



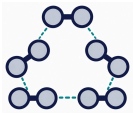
5 Giant covalent: Si 3.2.1.2 ii

- **Macromolecular** (giant covalent) lattice
- Each Si bonded to **four** others
- Melting breaks **many strong covalent bonds**
- **Highest m.p.** in Period 3 (1683 K)
- A semiconductor



6 Molecular: P, S, Cl, Ar 3.2.1.2 ii

- **P_4, S_8, Cl_2**; Ar single atoms
- Melting overcomes **London forces**
- More electrons: stronger forces
- **S_8 > P_4 > Cl_2 > Ar**
- Covalent bonds stay intact



Period 3 at a glance

atomic radius in pm; first IE in kJ mol^{-1}; melting point in K

Element	Radius	First IE	Structure	Melting point
Na	186	496	giant metallic	371
Mg	160	738	giant metallic	923
Al	143	578	giant metallic	933
Si	117	789	macromolecular	1683
P	110	1012	molecular, P_4	317
S	104	1000	molecular, S_8	392
Cl	99	1251	molecular, Cl_2	172
Ar	–	1521	monatomic	84

Explaining the trends

Across the period

- Nuclear charge rises
- Same shell, similar shielding
- Atoms shrink; IE rises

The two dips

- Mg → Al: 3s to 3p
- P → S: a paired 3p electron
- Evidence for sub-shells

The melting cliff

- Si: covalent bonds break
- P: London forces only
- A drop of over 1300 K

Next: 3.2.2 Group 2 and 3.2.4, the reactions of the Period 3 elements and their oxides.

Online Learning System · onlinelearningsystem.net · © 2026 Online Learning System. All rights reserved. Not for redistribution.