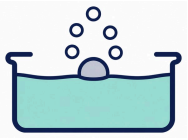
Period 3 Elements and Oxides Map

AQA A-level Chemistry · 3.2.4 Properties of Period 3 elements and their oxides

1 With water

3.2.4i

- Na: fast, pH 13–14
- Mg: very slow in cold
- Steam: MgO + H_2
- Na loses **one** electron



2 With oxygen

3.2.4ii

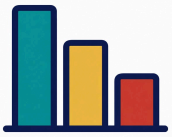
- Na, Mg, Al: white solids
- Si: needs strong heat
- $P_4 + 5O_2 \rightarrow P_4O_{10}$
- S gives SO_2, blue flame

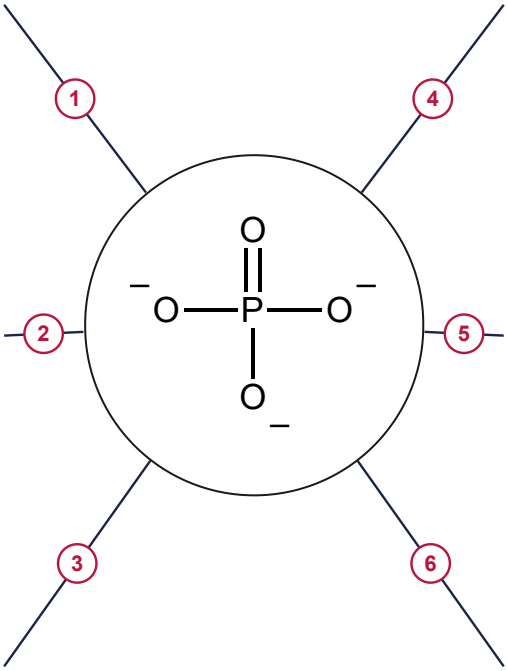


3 Melting points

3.2.4iii

- Na_2O, MgO, Al_2O_3: **ionic**
- SiO_2: giant covalent
- P_4O_{10}, SO_3: molecular
- van der Waals forces

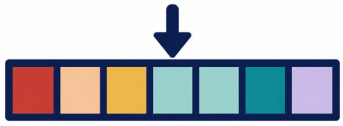




4 Oxides with water

3.2.4iv, vi

- Na_2O: pH 13–14
- MgO: pH 9–10
- Al_2O_3, SiO_2: stay at 7
- P_4O_{10}, SO_3: pH 0–1



5 Acids and anions

3.2.4v

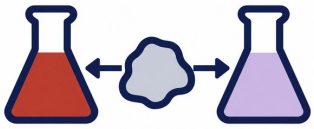
- H_3PO_4 gives PO_4^{3-}
- H_2SO_3 gives SO_3^{2-}
- H_2SO_4 gives SO_4^{2-}
- Draw acid, remove H^+



6 Amphoteric Al_2O_3

3.2.4vii

- Reacts with **both**
- Acid: $Al_2(SO_4)_3$
- Base: $NaAl(OH)_4$
- Water alone: pH 7



The oxides at a glance

structure and behaviour

Oxide	Structure	With water
Na_2O	Giant ionic	NaOH, pH 13–14
MgO	Giant ionic	$Mg(OH)_2$, pH 9–10
SiO_2	Giant covalent	None, pH 7
P_4O_{10}	Simple molecular	H_3PO_4, pH 0–1
SO_3	Simple molecular	H_2SO_4, pH 0–1

Worked examples

Burning P_4

- 6.20 g of P_4 (Mr 124)
- 0.0500 mol × 5
- **0.250 mol O_2**

Oxide in water

- 0.62 g Na_2O in 250 cm^3
- 0.0200 mol NaOH
- **0.080 mol dm^{-3}**

Neutralise

- 0.0100 mol P_4O_{10}
- 12 NaOH per P_4O_{10}
- **0.120 mol NaOH**

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