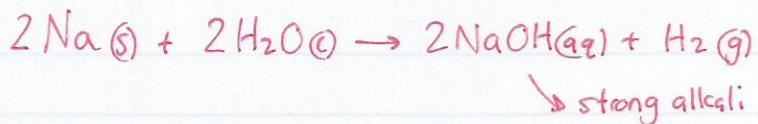


Reactions of Period 3

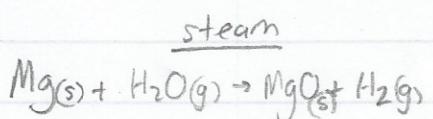
- Sodium is more reactive than magnesium because it takes less energy to remove one electron from sodium than two from magnesium.

- Sodium reacts vigorously with water producing H_2 gas.



- Magnesium reacts very slowly with cold water, hard to see anything happening but will form weakly alkaline solution (pH 9-10). Magnesium Oxide (~~Hydroxide~~) is not very soluble. It reacts much more readily with steam!

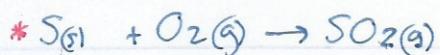
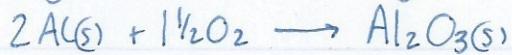
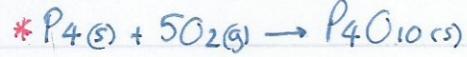
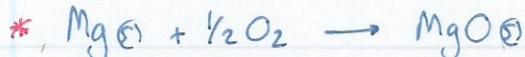
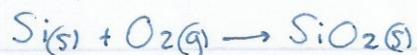
cold water



no hydroxide as
only Mg(OH)_2 thermally
decomposes to give MgO .

- Most period 3 elements react readily with oxygen. They form oxides and are usually oxidised to their highest oxidation state (Group No.). Sulphur is the exception as it usually forms SO_2 (+4). It needs high temperature and a catalyst to form SO_3 .

Equations are all : Element + Oxygen \rightarrow oxide



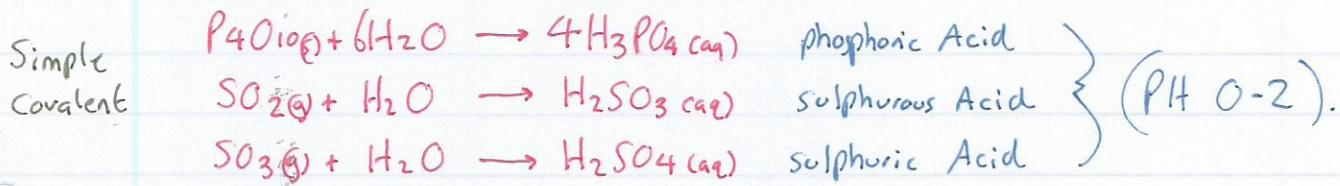
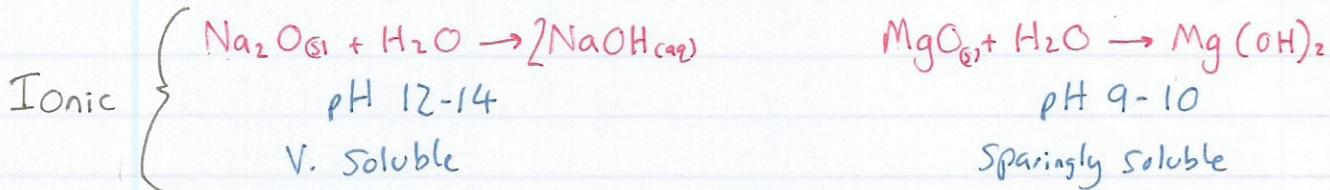
* = reacts easily in air

Sodium = yellow flame Magnesium = white flame

phosphorus = white flame

sulphur = blue flame.

• Ionic oxides are alkaline, Covalent oxides are acidic.

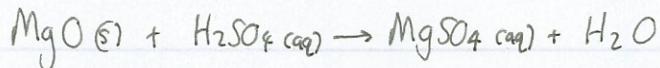
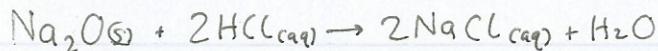


Giant
Covalent SiO_2 is INSOLUBLE in water but will react with bases to form salts so is classified as acidic.

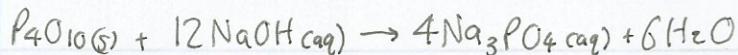
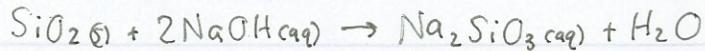
Aluminium oxide has both ionic and covalent characteristics and is insoluble in water. It will react with BOTH acids and bases to produce salts so it is amphoteric (acts as both an acid and a base).

Neutralisation equations! Acid + Base \rightarrow Salt + Water.

Basic Oxides



Acidic Oxides



Amphoteric oxides



- The bonding and structure of period 3 oxides affect melting points.
- Na_2O , MgO and Al_2O_3 (metal oxides). → High melting points.
→ giant ionic lattices
- MgO melting point is higher due to forming $2+$ ions (bonds are stronger).
- Al_2O_3 is lower than MgO surprisingly. This is due to the $+3$ ions distorting oxygens electron cloud causing partially covalent bonds. (Al^{3+} small with v high charge - pulls some e^-)
 \downarrow
 $\text{density towards it} \therefore \text{covalent character}$
- SiO_2 has a higher melting point than other non metal oxides due to giant macromolecular structure.
- P_4O_{10} and SO_2 have low melting points because they have simple molecular structures. (Dipole-dipole and Van der Waals are relatively weak).

