

SL & HL Answers to questions on the Particulate nature of matter and chemical change

- $2\text{HCl}(\text{aq}) + \text{CaCO}_3(\text{s}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
 - $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{l})$
- $\text{Cl}^-(\text{aq}) + \text{Ag}^+(\text{aq}) \rightarrow \text{AgCl}(\text{s})$
 - $\text{CO}_3^{2-}(\text{aq}) + 2\text{H}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- Distillation (to remove all the water)
 - Fractional distillation (as hexane boils at 68 °C and octane boils at 125 °C).
 - Paper chromatography (or thin layer chromatography).
- 70 °C (where the straight line extrapolated from BC crosses the temperature axis).
 - The stearic acid is changing state. As the liquid condenses to the solid heat is given out which counteracts the cooling. The temperature only starts to decrease again when all the liquid has turned into solid at point C.
- $\text{WO}_3(\text{s}) + 3\text{H}_2(\text{g}) \rightarrow \text{W}(\text{s}) + 3\text{H}_2\text{O}(\text{g})$
 $A_r(\text{W}) = 183.84; M_r(\text{H}_2\text{O}) = 18.02$
Total mass of products = $183.84 + (3 \times 18.02) = 237.9 \text{ g}$
Atom economy = $183.84/237.9 \times 100 = 77.3\%$