Edexcel IGCSE Chemistry

Topic 2: Inorganic chemistry

Gases in the atmosphere

Notes

2.9 know the approximate percentages by volume of the four most abundant gases in dry air

- 78% nitrogen, 21% oxygen, 0.9% argon and 0.037% carbon dioxide

2.10 understand how to determine the percentage by volume of oxygen in air using experiments involving the reactions of metals (e.g. iron) and non-metals (e.g. phosphorus) with air

example using copper:

- 100 cm^3 of air passed from side to side over copper that was being heated with a Bunsen burner
- All oxygen in air will react with copper
- It's a closed system – therefore, no air could get in or out
- As it is passed, the volume of air will decrease
- Continued until the volume stops decreasing, then record the volume of remaining air
- There would be about 79cm^3 left, showing that 21cm^3 of the original 100cm^3 of air was oxygen
- The reaction happening in this case (with copper) is:
  copper + oxygen -> copper (II) oxide // 2Cu (s) + O_2 (g) -> CuO (s)
    - Would notice black copper oxide forming

2.11 describe the combustion of elements in oxygen, including magnesium, hydrogen and sulfur

- Combustion is an example of oxidation
    - In an oxidation reaction, a substance gains oxygen
    - Metals and non-metals can take part in these reactions
- E.g. magnesium + oxygen -> magnesium oxide
    - 2Mg + O_2 -> 2MgO
- E.g. sulfur + oxygen -> sulfur dioxide
    - S + O_2 -> SO_2
- E.g. hydrogen + oxygen -> water
    - $2H_2$ + O_2 -> $2H_2O$

2.12 describe the formation of carbon dioxide from the thermal decomposition of metal carbonates, including copper (II) carbonate

- Metal carbonate –(heat)-> metal oxide + carbon dioxide
- E.g. copper (II) carbonate –(heat)-> copper (II) oxide + carbon dioxide
    - Or: $CuCO_3$ -> CuO + CO_2

2.13 know that carbon dioxide is a greenhouse gas and that increasing amounts in the atmosphere may contribute to climate change

- Greenhouse gas effect maintains temperatures on Earth high enough to support life
- Greenhouse gases include: water vapour, CO_2 & CH_4
- Explanation of the greenhouse gas effect:
    - Electromagnetic radiation at most wavelengths from the sun passes through the Earth's atmosphere
    - The Earth absorbs some radiation and thus warms up (essential for life on Earth). But some heat is radiated from the Earth as infrared radiation.
    - Some of this IR radiation is absorbed by greenhouse gases in the atmosphere
    - Atmosphere warms up leading to the greenhouse effect and global warming
- Global warming is an 'enhanced greenhouse effect'
- An increase in average global temperature is a major cause of climate change

2.14 practical: determine the approximate percentage by volume of oxygen in air using a metal or non-metal

- see 2.10