

2.1 Groups and the air

Name: _____ Class: _____ Date: _____

Total: 23 marks

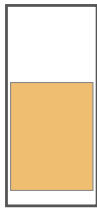
Objective

Cover Group 1, Group 7 and the air (2.1–2.14): water and air reactions of the alkali metals, halogen displacement, air composition and oxygen-percentage practicals, combustion and thermal decomposition. Original IGCSE-level practice.

1 Key knowledge and worked examples

■ Two families, two trends

the more reactive halogen displaces the less reactive one

 KBr solution	Cl ₂ added: turns orange	 KI solution	Cl ₂ added: turns brown	 KCl solution	Br ₂ added: no change
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Group 1 (Li, Na, K) with water: hydroxide + hydrogen, increasingly vigorous – lithium fizzes, sodium melts and darts, potassium ignites with a lilac flame. (C) The outer electron is lost more easily further down. Group 7: Cl₂ pale green gas, Br₂ orange liquid, I₂ dark solid; a more reactive halogen displaces a less reactive one from its salt.

■ Air and what burns in it

78 % N₂, 21 % O₂, 0.96 % Ar, 0.04 % CO₂. Oxygen percentage by rusting iron or burning phosphorus over water: the water rises ~one-fifth. Combustion: Mg → white MgO; H₂ → steam with a pop; S → SO₂ with a blue flame. CuCO₃ → CuO + CO₂ on heating.

2 Practice

2.1 Write the word equation for sodium reacting with water, and name the gas. [2]

2.2 Describe the trend in reactivity down Group 1, with the observations for potassium as evidence. [2]

2.3 State the colours and physical states of chlorine, bromine and iodine at room temperature. [3]

2.4 Give the percentages by volume of nitrogen and oxygen in dry air. [2]

2.5 Write the balanced equation for the thermal decomposition of copper(II) carbonate. [2]

3 Exam-style questions

3.1 Explain how damp iron wool in a measuring cylinder over water measures the percentage of oxygen in air, including the expected result. [3]

3.2 Chlorine is bubbled into potassium bromide solution. State what is seen and explain it as a displacement reaction, writing the ionic equation. [4]

3.3 (C) Explain, in terms of electronic configuration, why reactivity decreases down Group 7. [2]

3.4 In an experiment, 100 cm^3 of air is passed over heated copper and the final gas volume is 79 cm^3 . Calculate the percentage of oxygen in the air sample, and state one reason the answer may be slightly low. [3]
