

2025 Secondary 4NA Science Chemistry Preliminary Examination Mark Scheme

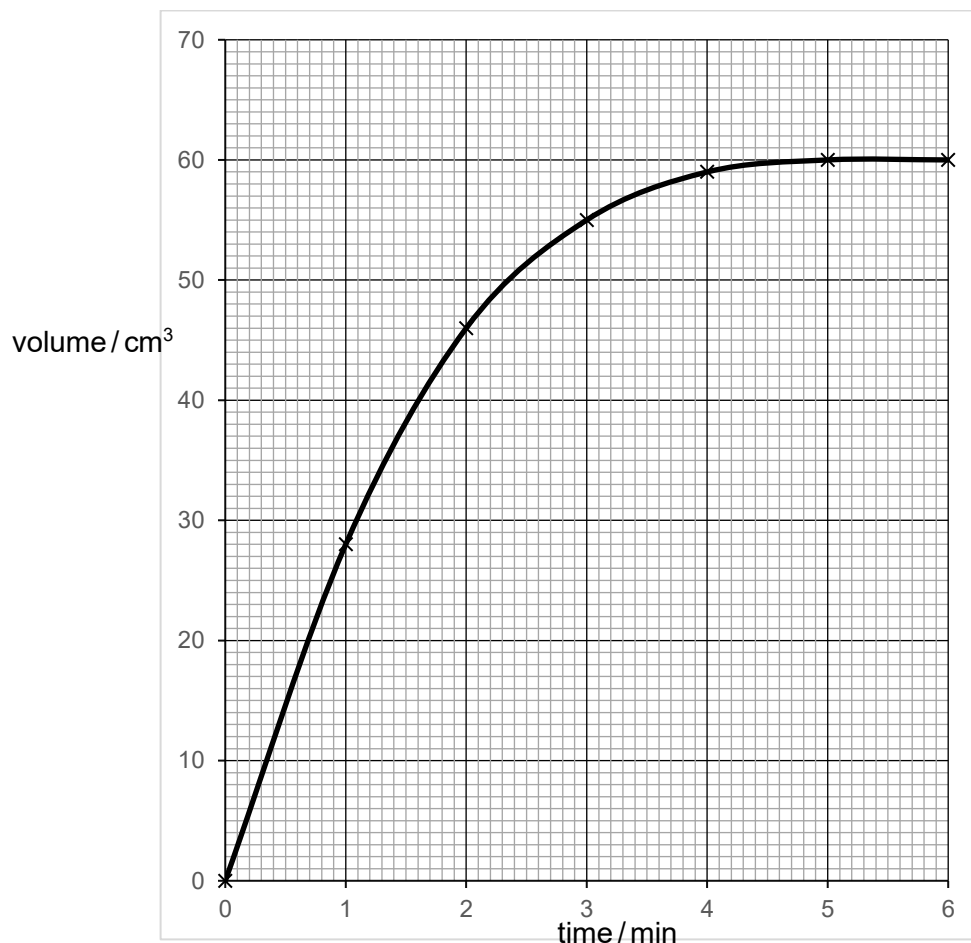
PAPER 3 [1m for each correct answer; max. 20m]

1	2	3	4	5	6	7	8	9	10
C	C	B	B	D	D	B	B	C	B
11	12	13	14	15	16	17	18	19	20
A	D	B	B	A	A	B	A	D	A

**PAPER 4
SECTION A [max. 22m]**

- 1 [1m for each correct; max. 5m] [5]**
 (a) oxygen (b) zinc chloride (c) hydrogen (d) brass (e) calcium hydroxide
- 2 (a) [1m for each correct; max. 2m] [2]**
 argon; nitrogen; carbon dioxide
- (b) 21 mm [1]**
- (c) green to red / green to orange / green to yellow [1]**
- 3 (a) Alkanes [1]**
- (b) Fractional distillation. [1]**
reject: distillation
- (c) White precipitate formed when carbon dioxide is bubbled through limewater. [1]**
- (d) (i) Bioethanol / Biodiesel [1]**
- (ii) Bioethanol is produced from crops like sugarcane or corn that absorb carbon dioxide via photosynthesis, offsetting emissions released during combustion. [1]**
reject: bioethanol produces less carbon dioxide when combusted.
- 4 (a) Water / H₂O [1]**
- (b) Explanation: Ammonia gas is soluble in water and cannot be collected using the water displacement method. [1]**
 Correction: A **gas syringe** **OR** an **upward delivery method** could be used to collect the gas instead. [1]
- (c) (i) $3 \text{ CuO} + 2 \text{ NH}_3 \rightarrow 3 \text{ Cu} + 3 \text{ H}_2\text{O} + 1 \text{ N}_2$ [1]**
- (ii) 46 cm³ [1]**

- (iii) [1m for all correct plotted points, 1m for smooth curve; max. 2m] [2]



- (iv) 4.5 min $\pm$ 0.1 (show working with dotted lines) [1]

SECTION B [max. 8m]

[Only mark the first question if student attempts both questions in this section.]

- 5 (a) A diatomic molecule has **two atoms** that are **chemically combined/bonded**. [1]
 (b) Group 17. [1]
 (c) Accept: any value ranging between 0.00290 to 3.10. [1]
 (d) (i) Liquid [1]
 (ii) Bromine [1]
 (e) In aqueous state, NaX has **mobile ions** to conduct electricity. [1]
 In solid state, the **ions** in NaX are **held in fixed positions** and cannot move to conduct electricity. [1]
 (f) Element **W** is more **reactive** than **iodine** and **can displace iodine** from the potassium iodide solution. [1]

6 (a) [1 mark for each correct column; max 2 marks]

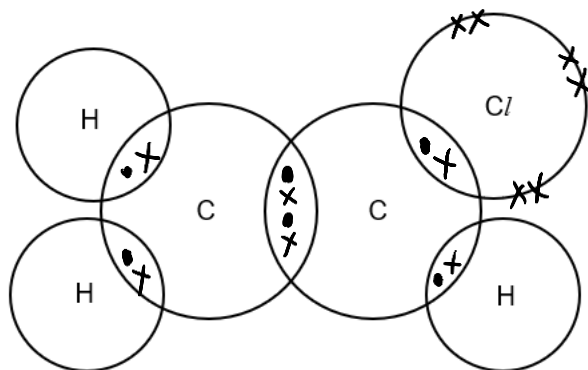
[2]

	reaction 1	reaction 2
name of reaction	substitution	addition / hydrogenation
name of reactants	chlorine	hydrogen

(b) [1 mark for correct sharing of electrons]

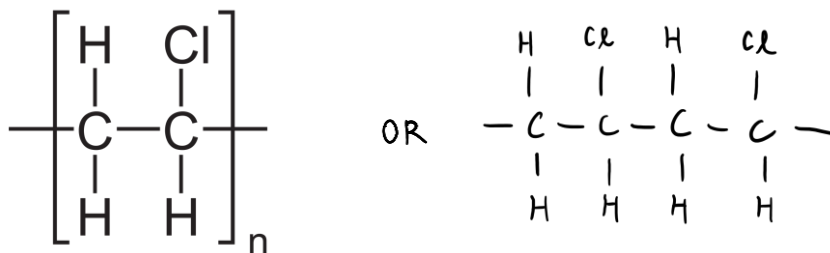
[2]

[1 mark for correct number of unshared electrons]



(c)

[1]

(d) (i) H^+

[1]

(ii) Acid in acid rain reacts away the carbonate to form **salt, water and carbon dioxide.**

[1]

(iii) [1 mark for each logical answer to do with either land or water pollution]

As non-biodegradable plastics take a long time to decompose, they can **accumulate in landfills for long periods**, causing **land pollution.**

OR

Non-biodegradable plastics can end up in **waterways** and **water bodies**, causing harm to marine life.