

- (c) The reaction between coke/carbon and the incoming hot air is highly exothermic (2 marks)
- (d) Slag is immiscible with molten iron (1 mark)
- (e) Nitrogen (IV) oxide forms acid rain which corrodes metallic materials and destroys vegetation in the environment, aquatic life) (2 marks)
 Or
 NO₂ is toxic/poisonous – causes bronchitis, respiratory diseases
- (f) (i) By passing or throwing in oxygen through molten iron which converts carbon into carbon (IV) oxide (2 marks)
- (ii) To increase the tensile strength of the iron produced (1 mark)
- Or
 Make the material more brittle
- Or
 Makes it more ductile, malleable (any one of the three)

30.6.3 Chemistry Paper 3 (233/3)

1. Table 1

	I	II	III
Final burette reading	22.20	21.50	22.50
Initial burette reading	0.00	0.00	1.00
Volume of solution C used (cm ³)	22.20	21.50	21.50

(4 marks)

- (a) (i) Average volume of solution C used
- $$= \frac{21.50 + 21.50}{2} = 21.50$$
- (1 mark)
- (ii) Moles of sodium hydroxide in the average volume of solution C used.
 1000 cm³ of sodium contains 0.3 moles of NaOH.
 $\therefore 21.50\text{cm}^3$ of solution contains $\frac{0.3 \times 21.5}{1000}$
- $$= 0.00645 \text{ moles}$$
- (1 mark)
- (iii) Moles of hydrochloric acid in 25.0 cm³ of solution D.
 $= 0.00645 \text{ moles}$ (1 mark)
- (iv) Molarity of hydrochloric acid in solution D.
 25cm³ of solution contains 0.00645 moles HCl
 $\therefore 1000 \text{ cm}^3$ of solution contains $\frac{0.00645 \times 1000}{25}$
- $$= 0.258\text{M}$$
- (1 mark)

Table 2

	I	II	III
Final burette reading	21.50	20.90	20.90
Initial burette reading	0.00	0.00	0.00
Volume of solution D used (cm ³)	21.50	20.90	20.90

(4 marks)

- (b) (i) Average volume of solution D used

$$\frac{20.90 + 20.90}{2} = 20.90 \text{ cm}^3$$

(1 mark)

- (ii) Moles of hydrochloric acid in average volume of solution D used
1000cm³ of solution contains 0.258 moles HCl

$$\therefore 20.90 \text{ cm}^3 \text{ of solution contains } \frac{0.258 \times 20.90}{1000} \text{ Moles}$$

$$= 0.0054 \text{ moles} \quad (1 \text{ mark})$$

- (iii) Moles of the metal carbonate, solid A in 25.0cm³ of solution A.
Mole ratio of acid to carbonate 2:1

(1 mark)

$$\frac{1}{2} \times 0.0054$$

$$= 0.0027 \text{ moles.} \quad (1 \text{ mark})$$

- (iv) The solubility of the metal carbonate in g/100g of solution

$$\begin{aligned} \text{Mass of carbonate} &= 0.0027 \times 74 \\ \text{In } 25.0 \text{ cm}^3 \text{ of solution} &= 0.1998 \text{ g.} \end{aligned}$$

(1 mark)

$$\therefore 100 \text{ g of solution will contain } \frac{0.1998 \times 100 \text{ g}}{25} \text{ of carbonate}$$

$$= 0.7992 \text{ g/100g of solution} \quad (1 \text{ mark})$$

Observations

Inferences

2. (a) - A colourless liquid condenses on the cooler parts of test tube
- Gas produced forms white fumes with HCl.
(2 marks)

- Hydrated salt/compound
- Ammonia gas
(1 mark)

Observations

Inferences

- (b) (i) White ppt. insoluble in excess
(1 mark)

- Pb²⁺ or Al³⁺ present
(1 mark)

Observations

Inferences

(ii) No white ppt No effervescence (1 mark)	Pb ²⁺ absent or Al ³⁺ present CO ₃ ²⁻ absent (2 marks)
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Observations	Inferences
(iii) White ppt. (1 mark)	SO ₄ ²⁻ present (1 mark)

Observations	Inferences
3. (a) White Solid dissolves to form a Colourless solution (1 mark)	A non polar compound present. (1 mark)

Observations	Inferences
(i) P ^H = 7 (1 mark)	Neutral solution. (1 mark)

Observations	Inferences
(ii) No effervescence (1 mark)	Solution not acidic (1 mark)

Observations	Inferences
(b) - Effervescence giving off a colourless gas. - Colourless solution formed. (1 mark)	Carboxylic/alkanoic acid present Or - COOH present (1 mark)

Observations	Inferences
(ii) Does not turn green (1 mark)	Alcohol absent OH - absent (1 mark)

Observations	Inferences
(iii) Not decolourized (1 mark)	(1 mark)