

IGCSE Chemistry 0620 Paper 5 Practice

Paper (Core) - ANSWERS

Total: 40 marks · 1 hour 15 minutes · 4 questions · 20 parts

Part	Answer	Marking points	Marks
1(a)	A 25.0 cm ³ volumetric pipette. A measuring cylinder is not accurate enough for a titration.	1 mark: pipette / volumetric pipette.	1
1(b)	Rinsing removes any distilled water left in the burette. Otherwise the acid would be diluted, a larger titre would be measured and the calculated concentration would be inaccurate.	1 mark: removes leftover water / prevents dilution of the acid. 1 mark: keeps the titre and the calculated concentration accurate.	2
1(c)	13.9 cm ³ is clearly further from the others, so it is anomalous. Mean = (12.4 + 12.5 + 12.6) / 3 = 12.5 cm ³ .	1 mark: 13.9 cm ³ identified as anomalous. 1 mark: 12.5 cm ³ .	2
1(d)	Moles of NaOH = 25.0 / 1000 x 0.100 = 2.50 x 10 ⁻³ mol. The equation ratio is 1:2, so moles of H ₂ SO ₄ = 2.50 x 10 ⁻³ / 2 = 1.25 x 10 ⁻³ mol. Concentration = 1.25 x 10 ⁻³ / (12.5 / 1000) = 0.100 mol/dm ³ .	1 mark: moles of NaOH = 2.50 x 10 ⁻³ mol. 1 mark: divided by 2 gives 1.25 x 10 ⁻³ mol of H ₂ SO ₄ . 1 mark: 0.100 mol/dm ³ (with unit).	3
1(e)	Phenolphthalein. The solution is pink in alkali and the pink colour just disappears (turns colourless) at the end point.	1 mark: phenolphthalein. 1 mark: pink -> colourless.	2
2(a)	Polystyrene is a poor conductor of heat, so less heat is lost through the cup. The lid reduces heat loss by evaporation and convection, so the measured temperature rise is closer to the heat actually released.	1 mark: polystyrene insulates / reduces heat loss. 1 mark: lid reduces loss by evaporation and convection.	2
2(b)	Temperature rise = 28.4 - 25.0 = 3.4 °C. q = m c dT = 100 x 4.2 x 3.4 = 1428 J (about 1.43 kJ).	1 mark: dT = 3.4 °C. 1 mark: uses q = m c dT. 1 mark: 1428 J (or 1.43 kJ).	3
2(c)	Moles of water formed = 50.0 / 1000 x 0.500 = 0.0250 mol. dH = -1428 J / 0.0250 mol = -57 120 J/mol = about -57.1 kJ/mol. The sign is negative because heat is released.	1 mark: 0.0250 mol of water formed. 1 mark: -1428 / 0.0250 = -57 120 J/mol.	3

		1 mark: -57.1 kJ/mol (sign and unit).	
2(d)	Some heat is lost to the surroundings during mixing and temperature measurement because the cup is not perfectly insulated, so the measured temperature rise and the calculated energy are both too small.	1 mark: heat lost to the surroundings / not perfectly insulated.	1
2(e)	Wrap the polystyrene cup in insulating material such as cloth or cotton wool, replace the lid at once after mixing and read the highest temperature as quickly as possible.	1 mark: add insulation / replace the lid at once / read the highest temperature quickly.	1
3(a)	Initial rate = $30 \text{ cm}^3 / 20 \text{ s} = 1.5 \text{ cm}^3/\text{s}$.	1 mark: $30 / 20$. 1 mark: $1.5 \text{ cm}^3/\text{s}$ (with unit).	2
3(b)	Average rate = $72 \text{ cm}^3 / 60 \text{ s} = 1.2 \text{ cm}^3/\text{s}$.	1 mark: $72 / 60$. 1 mark: $1.2 \text{ cm}^3/\text{s}$.	2
3(c)	Moles of $\text{H}_2 = 72 / 24\,000 = 3.0 \times 10^{-3} \text{ mol}$. From $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ the ratio is 1:1, so moles of $\text{Mg} = 3.0 \times 10^{-3} \text{ mol}$. Mass = $3.0 \times 10^{-3} \times 24 = 0.072 \text{ g}$.	1 mark: $3.0 \times 10^{-3} \text{ mol}$ of H_2 . 1 mark: 1:1 ratio, same moles of Mg . 1 mark: 0.072 g .	3
3(d)	The concentration of hydrogen ions in the acid falls as they are used up, so particles collide less frequently and the rate falls. The surface area of the magnesium also decreases as it is used up.	1 mark: acid concentration falls / fewer collisions. 1 mark: magnesium surface area decreases.	2
3(e)	The mass and surface area of the magnesium, with the same concentration and volume of acid.	1 mark: mass / surface area of magnesium (or acid concentration and volume) kept constant.	1
4(a)	Potassium ion, K^+ . Any sodium present gives an intense yellow flame that hides the lilac, so blue cobalt glass is used to filter out the yellow light and show the lilac of K^+ clearly.	1 mark: K^+ (potassium ion). 1 mark: cobalt glass filters out the yellow sodium light / stops it hiding the lilac.	2
4(b)	Zinc ion, Zn^{2+} (or aluminium ion, Al^{3+}), because both give a white precipitate with a little sodium hydroxide that redissolves in excess sodium hydroxide.	1 mark: Zn^{2+} or Al^{3+} . 1 mark: white precipitate soluble in excess NaOH .	2
4(c)	Acidify with dilute hydrochloric acid, then add barium chloride solution. A white precipitate of barium sulfate confirms sulfate ions, SO_4^{2-} .	1 mark: add dilute hydrochloric acid, then barium chloride solution. 1 mark: white precipitate.	2
4(d)	$R_f = \text{distance moved by the spot} / \text{distance moved by the solvent front} = 4.8 / 6.0 = 0.80$.	1 mark: $4.8 / 6.0$. 1 mark: 0.80 .	2

4(e)	Pencil lead is graphite, which does not dissolve in the solvent, so it does not move up and interfere with the spots. The R _f value depends on the solvent used, the temperature and the type of paper.	1 mark: pencil (graphite) is insoluble in the solvent. 1 mark: solvent used / temperature / type of paper.	2
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