

IGCSE Chemistry 0620 Paper 3 Practice

Paper (Core) - ANSWERS

Total: 80 marks · 1 hour 15 minutes · 6 questions · 33 parts

Part	Answer	Marking points	Marks
1a)	melting; condensation.	1 mark: melting. 1 mark: condensation.	2
1b)	Particles move randomly and continuously; perfume particles move from a region of higher concentration to lower concentration (net movement); at higher temperature the average kinetic energy of particles is greater, so they move faster and collide more often, making diffusion faster.	1 mark: particles move randomly/continuously. 1 mark: net movement from high to low concentration. 1 mark: higher temperature gives greater kinetic energy, so faster motion (more frequent collisions).	3
1c)	Add water to dissolve the salt; filter to remove the insoluble sand; evaporate the filtrate to crystallisation (then dry the crystals).	1 mark: add water to dissolve the salt. 1 mark: filter off the insoluble sand. 1 mark: evaporate/crystallise the filtrate.	3
1d)	$18.0 / 25.0 \times 100\% = 72.0\%$	1 mark: $18.0 / 25.0 (= 0.72)$. 1 mark: $\times 100\%$ giving 72.0%.	2
1e)	sodium chloride = $250 \times 0.120 = 30.0$ g; water = $250 - 30.0 = 220$ g	1 mark: 30.0 g of sodium chloride. 1 mark: 220 g of water.	2
1f)	A pure substance melts at a sharp, fixed temperature; an impure substance melts at a lower temperature over a wider range.	1 mark: pure substance melts at a fixed temperature (narrow range). 1 mark: impurities lower the melting point and widen the range.	2
2a)	Proton number is the number of protons in the nucleus; mass number is the number of protons plus neutrons; isotopes are atoms of the same element with the same proton number but different numbers of neutrons.	1 mark: proton number = number of protons. 1 mark: mass number = protons + neutrons. 1 mark: isotopes = same protons, different neutrons.	3

2b)	neutrons = 35 - 17 = 18 and 37 - 17 = 20; both have 17 protons and therefore the same electron arrangement, so their chemical properties are the same.	1 mark: 18 neutrons. 1 mark: 20 neutrons. 1 mark: identical electron arrangement, so identical chemical properties.	3
2c)	$(0.75 \times 35) + (0.25 \times 37) = 26.25 + 9.25 = 35.5$	1 mark: 26.25. 1 mark: 9.25. 1 mark: total 35.5 (no unit).	3
2d)	electron arrangement 2,8,7; group 7 (VII), period 3.	1 mark: 2,8,7. 1 mark: group 7, period 3.	2
2e)	a chlorine atom gains one electron to form Cl ⁻ , arrangement 2,8,8 (same as argon), charge -1.	1 mark: gains one electron, arrangement 2,8,8. 1 mark: Cl ⁻ with a charge of -1.	2
3a)	a sodium atom loses one electron to form Na ⁺ (2,8); a chlorine atom gains that electron to form Cl ⁻ (2,8,8); the electrostatic attraction between Na ⁺ and Cl ⁻ is the ionic bond.	1 mark: Na loses one electron to form Na ⁺ . 1 mark: Cl gains one electron to form Cl ⁻ . 1 mark: electrostatic attraction between oppositely charged ions.	3
3b)	strong electrostatic attraction between ions means much energy is needed to break the lattice; in the solid the ions are held in fixed positions, but when molten or dissolved the ions are free to move.	1 mark: strong ionic attraction gives a high melting point. 1 mark: ions fixed in solid, free to move when molten or aqueous.	2
3c)	$\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$	1 mark: correct reactants (2HCl). 1 mark: all three products. 1 mark: all state symbols correct.	3
3d)	$n(\text{CaCO}_3) = 10.0 / 100 = 0.100 \text{ mol}$; $n(\text{CO}_2) = 0.100 \text{ mol}$; $m = 0.100 \times 44 = 4.40 \text{ g}$	1 mark: 0.100 mol CaCO ₃ (1:1 ratio). 1 mark: 4.40 g of CO ₂ .	2
3e)	$0.100 \times 24 = 2.4 \text{ dm}^3$ (2,400 cm ³)	1 mark: 0.100 x 24. 1 mark: 2.4 dm ³ .	2
3f)	potassium nitrate (KNO ₃); with universal indicator the colour turns green at pH 7, showing exact neutralisation.	1 mark: potassium nitrate, KNO ₃ . 1 mark: indicator turns green at pH 7.	2
4a)	raise the temperature; crush the marble chips to increase surface area (or use more concentrated acid).	1 mark: higher temperature. 1 mark: larger surface area (or higher concentration).	2

4b)	crushing increases the surface area in contact with the acid; more collisions per second; more of these collisions have energy at least equal to the activation energy, so the rate increases.	1 mark: larger surface area. 1 mark: more collisions per second. 1 mark: more collisions exceed the activation energy, so rate rises.	3
4c)	overall: $120 / 40 = 3.0 \text{ cm}^3 \text{ s}^{-1}$; first 20 s: $80 / 20 = 4.0 \text{ cm}^3 \text{ s}^{-1}$	1 mark: $3.0 \text{ cm}^3 \text{ s}^{-1}$. 1 mark: $4.0 \text{ cm}^3 \text{ s}^{-1}$. 1 mark: correct units on both answers.	3
4d)	the thermometer reading rises (the mixture gets hotter); ΔH is negative.	1 mark: temperature rises. 1 mark: ΔH is negative.	2
4e)	$0.050 \times 890 = 44.5 \text{ kJ}$	1 mark: 0.050×890 . 1 mark: 44.5 kJ .	2
4f)	a catalyst provides an alternative route of lower activation energy, so the rate increases; its mass and chemical properties are unchanged at the end (it is not used up).	1 mark: lower activation energy route, faster rate. 1 mark: unchanged in mass and chemical properties at the end.	2
5a)	alkanes: $\text{C}_n\text{H}_{2n+2}$; butane: C_4H_{10} ; ethene belongs to the alkenes, C_2H_4 .	1 mark: $\text{C}_n\text{H}_{2n+2}$. 1 mark: C_4H_{10} . 1 mark: alkene, C_2H_4 .	3
5b)	$\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$	1 mark: $\text{C}_3\text{H}_8 + 5\text{O}_2$. 1 mark: $3\text{CO}_2 + 4\text{H}_2\text{O}$. 1 mark: all atoms balanced.	3
5c)	volume ratio = mole ratio = 1 : 3, so $2.0 \times 3 = 6.0 \text{ dm}^3$	1 mark: volume ratio 1:3. 1 mark: 6.0 dm^3 .	2
5d)	addition polymerisation; repeat unit $-\text{CH}_2-\text{CH}_2-$; conditions: high pressure (about 200 atm), about 200 C, with a catalyst.	1 mark: addition polymerisation. 1 mark: repeat unit $-\text{CH}_2-\text{CH}_2-$. 1 mark: high pressure and a catalyst (about 200 C).	3
5e)	bubble each gas through orange bromine water: ethene decolourises it (addition reaction), ethane does not.	1 mark: ethene decolourises bromine water. 1 mark: ethane leaves it orange.	2
6a)	nitrogen about 78%; oxygen about 21%.	1 mark: nitrogen 78%. 1 mark: oxygen 21%.	2
6b)	cathode: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ (red-brown copper deposited); anode: oxygen gas; the blue colour fades as Cu^{2+} is removed.	1 mark: cathode $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$. 1 mark: oxygen at the anode. 1 mark: blue colour fades.	3

6c)	$0.50 \times 63.5 = 31.75 \text{ g}$	1 mark: 0.50×63.5 . 1 mark: 31.75 g.	2
6d)	fossil fuels contain sulfur compounds and hot engines also oxidise nitrogen: burning produces SO_2 and NO_x ; SO_2 dissolves in rain to form sulfurous/sulfuric acid, giving rain with pH below 5.6; acid rain corrodes limestone and metal structures (or acidifies lakes and damages trees).	1 mark: burning produces SO_2 (and NO_x). 1 mark: SO_2 dissolves in rain to form acid. 1 mark: one specific effect (corrosion, acidified lakes, damaged trees).	3
6e)	carbon dioxide turns limewater milky/cloudy; water vapour turns white anhydrous copper(II) sulfate blue.	1 mark: limewater turns milky. 1 mark: anhydrous copper(II) sulfate turns from white to blue.	2