Sample Mark Scheme

Paper 1C

Question number	Answer	Notes	Marks
1 (a)	B		1
(b)	A		1
(c)	D		1
(d)	C		1
(e)	A		1
			Total: 5

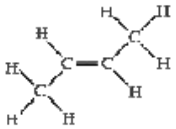
Question number	Answer	Notes	Marks
2 (a)	melting		1
(b)	An explanation linking the following : • heat with electric heater / in water bath / sand bath • because wax may catch fire / prevent liquid wax boiling over or spitting	ACCEPT • use test tube holder / clamp • to prevent being burned by hot test tube	2
(c)	A description including the following: • (becomes) regular arrangement / pattern (of particles) • particles slow down / vibrate (in fixed positions) • particles lose (kinetic) energy	ACCEPT closer together ACCEPT stop moving around (freely)	3
			Total: 6

Question number	Answer	Notes	Marks
3 (a) (i)	A = proton(s) B = neutron(s)	Award 1 mark for two correct particles in the wrong order	2
(ii)	atomic number = 5 mass number = 11	No mark for two numbers transposed	2
(b) (i)	boron		1
(ii)	2, 3	ACCEPT any other punctuation marks, such as '.' '/' '-' or no punctuation	1
			Total: 6

© Edexcel Limited 2011

Question number	Answer	Notes	Marks
4 (a)	carbon dioxide	ALLOW CO_2	1
(b)	copper(II) / copper (carbonate) (because) limewater turned milky in **least** time / **most** quickly		2
(c)	(sodium carbonate / it) does not decompose	ALLOW no carbon dioxide / gas given off	1
(d)	Any **two** from: • same volume / concentration of limewater • same flame e.g. "always roaring flame" • same amount of solid • same distance of flame to tube • same form / state of division of solid e.g. "all powders"	ACCEPT: • same amount of limewater • same temperature / Bunsen setting • same mass of solid	max 2
			Total: 6

Question number	Answer	Notes	Marks
5 (a)	compounds / substances containing hydrogen and carbon <u>only</u>	DO NOT ACCEPT atoms/elements in place of compounds/substances	2
(b) (i)	refinery gases		1
(ii)	bitumen		1
(c)	An explanation linking any **four** of the following: • crude oil / vapour rises through the (fractionating) column • idea of temperature gradient in column e.g. hotter at the bottom than the top • different fractions have different boiling point • condense when they get to part of the column that has lower temperature than their boiling point • vapour passes through bubble caps / one-way valves OR idea that liquid fractions cannot trickle back down because of bubble caps	ALLOW vaporising point / condensing temperature	max 4
			Total: 8

Question number	Answer	Notes	Marks
6 (a) (i)	 but-2-ene	1 mark for formula 1 mark for name	2
(ii)	no double bond / saturated		1
(iii)	cyclobutane: no change / remains orange but-1-ene: (bromine) turns (from orange to) colourless / decolourised	 IGNORE starting colour of bromine	2
(b)	An explanation linking the following points: • crude oil contains too many long chain hydrocarbons • which are economically less useful / need converting to more economically useful smaller hydrocarbons	ACCEPT • alkenes need in polymer industry • to make useful plastics	2
(c) (i)	$C_{10}H_{22} \rightarrow C_8H_{18} + C_2H_4$ 1 mark for correct formula for alkane 1 mark for balanced equation	ALLOW equations which finish: $\rightarrow C_6H_{14} + 2C_2H_4$ $\rightarrow C_4H_{10} + 3C_2H_4$ $\rightarrow C_2H_6 + 4C_2H_4$	2
(ii)	An explanation linking the following points: • toxic / poisonous • (because) it restricts blood carrying oxygen	ACCEPT comments about binding to haemoglobin / forming carboxyhaemoglobin	2
			Total: 11

Question number	Answer	Notes	Marks
7 (a)	An explanation linking the following points: • green colour spreads throughout liquid • (because of) diffusion	ACCEPT dark green at bottom and light green at top	2
(b)	Anode = copper Cathode = chlorine	Award 1 mark for both correct products, but at incorrect electrodes	2
(c)	$2Cl^- \rightarrow Cl_2 + 2e$ 1 mark for correct species 1 mark for balance	ALLOW $2Cl^- - 2e \rightarrow Cl_2$	2
			Total: 6

Question number	Answer	Notes	Marks
8 (a)	extra decimal place / trailing zero / to 0.01 g		1
(b)	$Mg + CuSO_4 \rightarrow MgSO_4 + Cu$	1 mark for reactants 1 mark for products	2
(c) (i)	gains (two) electrons		1
(ii)	reduction		1
(iii)	Any **two** from: • (blue) colour of solution fades /solution turns colourless • brown/pink/pink(y)-brown solid forms • gets warm/hot	NOT solution turns clear ALLOW precipitate ALLOW fizzing / bubbles	max 2
			Total: 7

Question number	Answer	Notes	Marks
9 (a) (i)	2 (cm^3)		1
(ii)	An explanation linking the following points: • reaction rate slows down • (because there are) fewer **hydrogen peroxide** particles • (therefore) less **frequent** collisions/fewer collisions **per second**	ACCEPT hydrogen peroxide is less concentrated	3
(iii)	35 (minutes)	ACCEPT any number **between** 30 and 35	1
(b)	catalyst		1
(c) (i)	C		1
(ii)	E		1
(iii)	A		1
			Total: 9

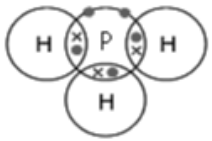
Question number	Answer	Notes	Marks
10 (a)	An explanation linking the following points: • more precipitate as more lead(II) nitrate present (to react with potassium iodide) • but eventually all potassium iodide used up / lead(II) nitrate becomes in excess / the reaction finishes		2
(b) (i)	correct point circled (at 12cm^3 of lead(II) nitrate added)	ACCEPT any way in which this point is indicated	1
(ii)	Any **two** of the following pairs of statements: • not left long enough • therefore precipitate / solid not fully settled **OR** • too much potassium iodide added • so more precipitate made **OR** • tube not vertical when precipitate was settling • so precipitate not level in the tube	ACCEPT reasonable alternatives, as long as they explain why the height is **too high**	max 4
(c) (i)	1.5 ± 0.1 (cm)	ACCEPT 0.8 cm (for candidates who use their own ruler)	1
(ii)	3.7 - 3.8 (cm^3)	ALLOW consequential on answer to (c)(i)	1
			Total: 9

Question number	Answer	Notes	Marks
11 (a)	An explanation linking the following points: • 8 electrons in **outer(most)** shell • does not **easily/readily** gain or lose electrons	ACCEPT full **outer(most)** shell ACCEPT argument based on energy required	2
(b)	8 electrons in middle shell 7 electrons in outer shell	ACCEPT dots, circles, crosses or e to represent electrons	2
(c) (i)	2(I^-) and 2 Cl^- + I_2	1 mark - correct formulae 1 mark - correct balancing	2
(ii)	displacement / redox	ACCEPT oxidation **and** reduction	1
(iii)	iodine (formed, and it is brown in solution)	I_2	1
(d)	calculation of % O = 45.1 dividing by A_r values: Na 21.6/23 Cl = 33.3/35.5 O = 45.1/16 simplest whole number ratio = 1:1:3 translating this ratio to a formula = $NaClO_3$	If division by atomic number, neither 2nd nor 3rd mark can be scored - although 4th mark can (probably $NaClO_3$ or $Na_8Cl_8O_{23}$) Final answer consequential on slips in calculation above	4
			Total: 12

Question number	Answer	Notes	Marks
12 (a)	An explanation linking the following points: • reaction rate is faster • (therefore) counting bubbles is more difficult / bubbles may form continuous stream	ACCEPT: • bubbles may be different size • so not valid / poor comparison with first experiment	2
(b)	A description linking the following points: • measure the volume of gas produced • using a graduated test-tube / gas syringe / inverted measuring cylinder	ACCEPT: answers which lead to decreased rate to allow bubble counting to work e.g. • reduced concentration of acid / larger pieces of zinc • to slow rate / make bubbles smaller	2
(c)	measure the boiling point / freezing point 100°C / 0°C	boils at 100°C OR freezes at 0°C are worth 2 marks	2
(d)	any named **gas** that burns in oxygen to form water as a product e.g. methane, ethane	ACCEPT correct formula for gas	1
			Total: 7

© Edexcel Limited 2011

Question number	Answer	Notes	Marks
13 (a)	to speed up the reaction **OR** to allow a lower temperature to be used but still have a reasonably / acceptably fast reaction	ACCEPT to lower the activation energy / achieve a better balance of yield and rate	1
(b)	forward and reverse reactions **are** occurring at same rate/speed	ACCEPT amounts of reactants / products / macroscopic properties remain constant	2
(c)	An explanation linking **four** of the following points: • increased pressure favours forward reaction / increases yield • increased pressure also increases rate • decreased temperature favours forward reaction / increases yield • decreased temperature decreases rate • concluding comment e.g. greater yield, but probably at reduced rate / increase in rate due to pressure cancels decrease in rate due to temperature change **Concluding comment must be present to score full 4 marks, but can be agreement or disagreement with scientist's idea.**	ACCEPT moves equilibrium to right ACCEPT moves equilibrium to right ACCEPT good idea but increased pressure increases cost	max 4
(d) (i)	An explanation linking the following points: • ammonia has low boiling point / liquefies • (therefore) mixture is cooled		2
(ii)	recirculated / recycled / re-used / returned to reaction chamber / used to make more ammonia		1
(e)	$NH_3 + HNO_3 \rightarrow NH_4NO_3$		1
(f)	A description linking the following points: • add aqueous sodium hydroxide (and warm) • gas / ammonia (given off) • turns (damp) red litmus blue	ACCEPT forms white smoke with HCl	3
			Total: 14

Question number	Answer	Notes	Marks
14 (a) (i)	P^{3-}	ACCEPT P^{-3}	1
(ii)	An explanation linking the following points: • ions are not free to move in solid (IGNORE ref to electrons) • (however) ions are free to move when molten	REJECT any mention of electron movement	2
(b)	(65 × 3) + (31 × 2) = 257	Award 1 mark for correct use of Mr of Zn and P	2
(c) (i)	• moles phosphine = 51400 / 257 • moles water = moles phosphine × 6 • mass water = moles water × 18 = 21600 g / 21.6 kg **OR** • 6 × 18 = 108 • 257 / 108 = 51.4 / mass water • mass water = 21.6 kg	Mark consequentially on (b) ACCEPT answer in g or kg, as long as unit matches value	3
(ii)	low / small		1
(iii)	exothermic, because it burst into flames	NOT just 'exothermic'	1
(d) (i)		1 mark for 3 bonding pairs 1 mark for non-bonding pair	2
(ii)	An explanation linking any **two** of the following points: • small molecules • weak (attractive) forces between molecules • (therefore) little energy required to overcome forces / separate molecules	ACCEPT "weak bonds", but not "weak <u>covalent</u> bonds"	max 2
			Total: 14

© Edexcel Limited 2011