

### Chemistry 3 - Common questions

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
7	1	(a)		1	hydrogen	H <sub>2</sub>	H	
		(b)		2	iron (1)  speeds up the reaction / increases the rate of the reaction (1)			
		(c)		2	recycled / returned into reactor (1)  basic qualification required e.g. reduces cost of process / less waste of raw materials (1)	fed back in re-used	more efficient / reacted again / more yield / saves time	
		(d)		2	lower yield with higher temperature (1)  higher yield with a higher pressure (1)	vice versa		
		(e)		3	N <sub>2</sub> + H <sub>2</sub> (1)  NH <sub>3</sub> (1)  (1), 3, 2 (1)  formulae must be correct to award balancing mark			

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FT	HT								
8	2	(a)			1	significantly different/ long way out when compared to other two readings		not the same / 6 or 8 out etc.	
		(b)			2	all points plotted correctly (2) 4 points correct (1)  curve not needed so ignore if drawn			
		(c)			2	volume / rate increases with temperature up to an optimum (1)  then volume / rate goes back down (1)	up to maximum / up to 40 °C		
		(d)			2	glucose (1)  ethanol + carbon dioxide (1)	$C_6H_{12}O_6$  $C_2H_5OH + CO_2$		+ yeast
		(e)			1	enzyme	zymase	biological	

Question Number		Mark	Answer
FT	HT		
9	3	6 QWC	<p><b>Indicative content</b></p> <ul style="list-style-type: none"> <li>• heat required to turn limestone into quicklime; water added to turn quicklime into slaked lime</li> <li>• limestone glows and becomes crumbly when heated; sizzling/ steam being released when water is added</li> <li>• thermal decomposition causes calcium carbonate to decompose forming carbon dioxide gas and calcium oxide; water reacts with calcium oxide to form calcium hydroxide</li> <li>• <math>\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2</math> ; <math>\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2</math></li> </ul> <p><b>5-6 marks:</b> The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p><b>3-4 marks:</b> The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p><b>1-2 marks:</b> The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p><b>0 marks:</b> The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

### Chemistry 3 - Higher tier only questions

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	(a)	(i)						
	4		(i)		1	air			
			(ii)		2	dissolve sulfur trioxide in concentrated sulfuric acid (1)  dilute with water to produce concentrated sulfuric acid (1)		add to oleum	
			(iii)		1	vanadium pentoxide	V <sub>2</sub> O <sub>5</sub>		
		(b)			2	acid dehydrates the sugar removing the <b>elements of water / hydrogen and oxygen</b> (1)  carbon remains (1)	C		

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	5	(a)		2	alcohols (1) alkenes (1)			
		(b)		2	add bromine water (1) stays brown/orange/no reaction with <b>C</b> and <b>E</b> turns from brown/orange to colourless (1)	add bromine		red
		(c)	(i)	1	same molecular formula but different structure	same type and number of atoms but arranged differently	same atoms	same compound
			(ii)	1	$  \begin{array}{ccccc}  & \text{H} & & \text{H} & & \text{H} \\  &   & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\  &   & & & &   \\  & \text{H} & & & & \text{H} \\  & & & & &   \\  & & & & & \text{H} - \text{C} - \text{H} \\  & & & & &   \\  & & & & & \text{H}  \end{array}  $			
		(d)		2	<b>D</b> (1) $  \begin{array}{ccccc}  & \text{H} & & \text{OH} & & \text{H} \\  &   & &   & &   \\  \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\  &   & &   & &   \\  & \text{H} & & \text{H} & & \text{H}  \end{array}  $ (1)	ether isomer of <b>B</b> or <b>D</b>		

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	6	(a)	(i)	1	sodium chloride / sodium carbonate			
			(ii)	1	sodium carbonate / lithium carbonate			
		(b)		3	add silver nitrate solution (1)  white <b>precipitate</b> with potassium chloride (1)  yellow <b>precipitate</b> with potassium iodide (1)  allow (1) for <b>both</b> colours correct if precipitate not used in either case	answer based on displacement reaction – bromine water; description of colour changes	add HNO <sub>3</sub> flame test	
		(c)		2	ammonia (1)  turns (damp) red litmus blue (1)			
		(d)		3	Fe <sup>3+</sup> + 3OH <sup>-</sup> (1) Fe(OH) <sub>3</sub> (1) correct state symbols (1)			

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
	7	(a)			2	number of moles = 0.05 (1) concentration = 0.2 (1)  follow through error (ft) cao (2)			
		(b)			4	calculation of mean $22.5 \text{ cm}^3$ (1)  $0.2 \times 0.0225$ (1)  $0.0045 / 0.025$ (1)  0.18 (1)  follow through error (ft) cao (4)	mean of $22.65 \text{ cm}^3$		0.2 without workings

Question Number		Mark	Answer
FT	HT		
	8	6 QWC	<p><b>Indicative content</b></p> <ul style="list-style-type: none"> <li>• observations made when both acids react with metals, carbonates and bases e.g. temperature rise, liberation of gas, time to dissolve</li> <li>• difference in rate of reaction and explanation in terms of strong/weak acid</li> <li>• salts formed</li> <li>• word / chemical equations</li> </ul> <p><b>5-6 marks:</b> The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p><b>3-4 marks:</b> The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p><b>1-2 marks:</b> The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p><b>0 marks:</b> The candidate does not make any attempt or give a relevant answer worthy of credit.</p>