Chemistry 2 – Common questions

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	**1**	(a)			3	*mass number* 7 (1) *atomic number* 6 (1) *number of neutrons* 12 (1)			
		(b)	(i)		1	2,8			
			(ii)		2	two shells (containing electrons) outer shell is full / can't accept any more electrons		 8 in outer shell	
		(c)			2	**B** and **C** (1) same number of protons but different numbers of neutrons / same atomic number but different mass number (1) [marks linked i.e. second mark cannot be awarded if first is not given]		 reference to electrons	

Question Number								
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8	**2**	(a)			2	graphite and nanotube (1) both have **free moving** / **delocalised** electrons (1)	 mark independently		
		(b)			2	graphite (1) weak bonds **between** layers / **layers** able to slide over each other (1) [marks linked i.e. second mark cannot be awarded if first is not given]			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
9	**3**	(a)			1	chlorine gas is toxic / poisonous		harmful / dangerous / kills any reference to $FeCl_3$	
		(b)			2	$Fe + Cl_2$ (1) balancing 2,3,2 (1) [balancing mark only awarded if correct formulae included]			
		(c)			3	$M_r(FeCl_3) = 162.5$ [or $3 \times A_r(Cl) = 106.5$] (1) $106.5 / 162.5 \times 100$ (1) 65.5% (1) cao – 3 marks	allow 66		

Question Number			
FT	HT	Mark	Answer
10	**4**	6 QWC	**Indicative content** Materials that change their properties reversibly according to conditions; thermochromic pigments change colour according to temperature; photochromic pigments change colour according to light intensity; shape memory alloys can regain shape by heating / spring back in to shape (NITINOL) Uses: thermochromic pigments – forehead thermometers, baby spoons etc. photochromic pigments – lenses for sunglasses; UV marker pens etc. shape memory alloys – spectacle frames; stents in veins etc. **5–6 marks** 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. **3–4 marks** 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. **1–2 marks** 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. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.

Chemistry 2 – Higher Tier only questions

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	5	(a)	(i)		2	manganese dioxide is most effective / little effect with zinc oxide (1) full description of correct order of effect (2) more oxygen produced as time progresses / reaction slows down as time goes on (1) (2 max)			reference to one oxide being more '**reactive**' than another
			(ii)		2	same concentration of hydrogen peroxide same volume of hydrogen peroxide same mass/amount of metal oxide same temperature / specified temperature same particle size for each oxide any 3 for 2 marks; any 2 for 1 mark	 room temperature	same amount of hydrogen peroxide ignore time	
		(b)			2	two linked points required for 2 marks e.g. allows lower temperature to be used (1) which saves energy / improves efficiency / reduces costs (1) more product in the same time (1) which increases profitability / makes it more economical (1)	other relevant linked points		

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)			1	*lithium* 2,1 *chlorine* 2,8,7 - **both** needed for 1 mark			
		(b)			3	lithium loses 1 electron (1) chlorine gains 1 electron (1) forms Na^+ and Cl^- (1) diagram clearly shows transfer with no ambiguity e.g. electron(s) not in two places at the same time			
		(c)			2	sharing 2 pairs of electrons (1) full octet around both oxygen (1)			
		(d)			3	lithium chloride is ionic **and** oxygen is covalent (1) strong bonds between <u>ions</u> in lithium chloride result in high melting point (1) weak bonds between <u>molecules</u> in oxygen result in low boiling point (1)	(1) only if 'particles' used instead of 'ions' and 'molecules'		

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)			3	**A** – potassium chloride (1) **B** – sodium iodide (1) **C** – lithium bromide (1)	KCl NaI LiBr	ions identified	
		(b)	(i)		1	chlorine is more reactive than bromine **and** displaces it from its halide			
			(ii)		3	reactants $KBr + Cl_2$ (1) products $KCl + Br_2$ (1) balancing 2,1,2,1 (1) [balancing mark only awarded if correct formulae included]			

Question Number									
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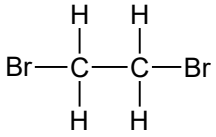
	8	(a)	(i)		1				
			(ii)		1	(bromine) turns colourless	decolourises	colour change ‘goes clear’	
		(b)			2	*Reaction* **A** addition (1) *Reaction* **B** polymerisation (1)	hydrogenation / reduction addition polymerisation	 additional	additional / polymerisation

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)			3	1:2 ratio from equation (1) 12 tonnes C would produce 128 tonnes of copper (1) 1.5 tonnes C would produce 1.5/12 × 128 = 16 tonnes of copper (1) cao – 3 marks alternative method using moles moles C = 0.125 (1) moles Cu = 0.25 (1) mass Cu = 0.25 × 64 = 16 (1)	15.9 (3 marks)		
		(b)			1	75%	consequential		

Question Number			
FT	HT	Mark	Answer
	10	6 QWC	**Indicative content:** **Ion exchange:** beads containing sodium ions; calcium / magnesium ions in hard water are exchanged for sodium ions; column can be recharged by passing sodium chloride solution through it. Advantages – works on both permanent and temporary hardness; continuous. Disadvantages – cost of column; need to recharge; waste water from recharging can cause limescale in sewage works; increased sodium levels in softened water. **Boiling:** boiling causes hydrogencarbonate ions to decompose forming scale on heating element. Advantages – no need for expensive equipment. Disadvantages – forms limescale; does not work on permanent hardness. Only effective with small volumes of water. **Washing soda:** reacts with calcium and magnesium ions to produce insoluble salts but produces scum. Effective with both permanent and temporary. **5–6 marks** 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. **3–4 marks** 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. **1–2 marks** 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. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.