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CHEMISTRY

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Paper Theory (Core)

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MARK SCHEME

Maximum Mark: 80

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This document consists of **8** printed pages.

Question	Answer	Marks
1(a)(i)	A	1
1(a)(ii)	B	1
1(a)(iii)	B	1
1(a)(iv)	E	1
1(a)(v)	C	1
1(b)	number of electrons in O^{2-} ion = 10	1
	number of neutrons in S = 18	1
	number of protons in S = 16 AND in O^{2-} ion = 8	1

Question	Answer	Marks
2(a)(i)	chloride	1
2(a)(ii)	sodium / Na ⁺	1
2(a)(iii)	0.4 (mg)	1
2(a)(iv)	34 (mg)	1
2(a)(v)	sodium hydrogencarbonate	1
2(b)	flame test	1
	lilac colour	1
2(c)	KNO ₃	1
2(d)	negative electrode: potassium / K	1
	positive electrode: bromine / Br	1

Question	Answer	Marks
3(a)	any 5 of: X has ionic bonding/ionic X particles are regularly arranged/lattice/in rows/uniformly arranged X particles (only) vibrate/do not move from place to place Y has covalent bonding Y has irregular arrangement of particles/random arrangement Y particles are sliding over each other/moving slowly Z has covalent bonding Z particles are randomly arranged/irregularly arranged Z particles moving randomly/moving rapidly/moving freely/moving quickly/moving fast	5
3(b)	volume increases/volume gets larger	1
	particles get further apart	1
3(c)	white	1
	to blue	1
3(d)	it has (two different types of) <u>atoms bonded/joined</u>	1

Question	Answer	Marks
4(a)(i)	bauxite	1
4(a)(ii)	it is (very) reactive / too reactive / above carbon in the reactivity series / more reactive than carbon	1
4(b)(i)	hydrogen/ H ₂	1
4(b)(ii)	gas syringe <u>connected to a flask</u> OR this described in words	1
	closed apparatus / workable apparatus OR this described in words	1
	timer or stopwatch OR this described in words	1
4(c)	for aircraft / car bodies	1
	low density	1
4(d)	any 2 advantages: <ul style="list-style-type: none"> • saves energy • saves mining of ore • saves other finite resources • saves transport costs of bringing ore to factory • reduces pollution (due to dust or exhaust fumes etc.) 	2
4(e)(i)	(zinc oxide) loses oxygen	1
4(e)(ii)	reactant level below product level / reactants have less energy than products / products have more energy than reactants	1

Question	Answer	Marks
5(a)(i)	circle around carboxylic acid group	1
5(a)(ii)	alcohol	1
5(b)	$C_3H_6O_3$	1
5(c)	alcohol group shown as O–H	1
	rest of the structure correct	1
5(d)(i)	how easily it evaporates/boils	1
5(d)(ii)	butanol	1
5(d)(iii)	any value between 65 and 98 ($^{\circ}C$) (exclusive of these values)	1
5(d)(iv)	gas/vapour	1
	<u>120$^{\circ}C$</u> is above the boiling point	1
5(e)(i)	2 (H_2O)	1
	O_2	1
5(e)(ii)	32 IF full credit is not awarded, allow 1 mark for (C =) 12, (O =) 16 and (H =) 1	2

Question	Answer	Marks
6(a)	M	
	(good) resistance to corrosion	1
	high(est) relative strength	1
6(b)	Q	1
6(c)	any 3 from: <ul style="list-style-type: none"> • high melting point/high boiling point • high density • forms coloured compounds/compounds are coloured/ions are coloured • has more than one oxidation state/forms ions with different charges • forms complex ions • catalyst • hard/strong • sonorous/rings (when hit) 	3
6(d)	2 (HCl)	1
	H ₂	1
6(e)	gold < copper < iron < potassium IF full credit is not awarded, allow 1 mark for either a correct sequence apart from a consecutive pair reversed OR for the whole sequence reversed	2
6(f)(i)	the higher the concentration the faster the rate/the lower the concentration the slower the rate/as the concentration increases the rate of reaction increases	1
6(f)(ii)	phosphoric	1
6(f)(iii)	any value between 45 and 102 hours (exclusive of these values)	1
6(f)(iv)	pH 2	1

Question	Answer	Marks
7(a)	(substance containing) only one type of atom	1
7(b)	underground / volcanoes / crude oil / petroleum	1
	suitable use, e.g. (making) sulfuric acid / making SO ₂ / dusting plants / vulcanising rubber	1
7(c)	sublimation / subliming / sublime	1
7(d)	<p>any 2 sources:</p> <ul style="list-style-type: none"> • sulfur dioxide: from volcanoes / burning fossil fuels • oxides of nitrogen: from car <u>exhausts</u> / high temperature furnaces / lightning <p>any 3 effects:</p> <ul style="list-style-type: none"> • sulfur dioxide: acid rain / named effects of acid rain • sulfur dioxide: irritates eyes or skin • oxides of nitrogen: acid rain / named effect of acid rain • oxides of nitrogen: breathing difficulties / breathing problems / irritates eyes / skin / photochemical smog 	5
7(e)	add hydrochloric acid to the mixture	1
	filter off the <u>sulfur</u> / <u>sulfur</u> on filter paper	1
	wash sulfur (with water or other solvent) AND dry in an oven / air dry / leave to dry (in air)	1