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**CHEMISTRY**

**0620/32**

Paper Theory (Core)

**May/June 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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

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

Question	Answer	Marks
2(a)(i)	chloride	1
2(a)(ii)	sodium / Na <sup>+</sup>	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 <sub>3</sub>	1
2(d)	negative electrode: potassium / K	1
	positive electrode: bromine / Br	1

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

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 <sub>2</sub>	1
4(b)(ii)	gas syringe <u>connected to a flask</u> <b>OR</b> this described in words	1
	closed apparatus / workable apparatus <b>OR</b> this described in words	1
	timer or stopwatch <b>OR</b> 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"> <li>• saves energy</li> <li>• saves mining of ore</li> <li>• saves other finite resources</li> <li>• saves transport costs of bringing ore to factory</li> <li>• reduces pollution(due to dust or exhaust fumes etc.)</li> </ul>	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<math>^{\circ}C</math></u> is above the boiling point	1
5(e)(i)	2 ( $H_2O$ )	1
	$O_2$	1
5(e)(ii)	32 <b>IF</b> full credit is not awarded, allow 1 mark for (C =) 12, (O =) 16 and (H =) 1	2

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

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 <sub>2</sub> / dusting plants / vulcanising rubber	1
7(c)	sublimation / subliming / sublime	1
7(d)	<p>any 2 sources:</p> <ul style="list-style-type: none"> <li>• sulfur dioxide: from volcanoes / burning fossil fuels</li> <li>• oxides of nitrogen: from car <u>exhausts</u> / high temperature furnaces / lightning</li> </ul> <p>any 3 effects:</p> <ul style="list-style-type: none"> <li>• sulfur dioxide: acid rain / named effects of acid rain</li> <li>• sulfur dioxide: irritates eyes or skin</li> <li>• oxides of nitrogen: acid rain / named effect of acid rain</li> <li>• oxides of nitrogen: breathing difficulties / breathing problems / irritates eyes / skin / photochemical smog</li> </ul>	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) <b>AND</b> dry in an oven / air dry / leave to dry (in air)	1