Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/33**

Paper 3 Theory (Core) **May/June 2017**

MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	**E**	**1**
1(a)(ii)	**C**	**1**
1(a)(iii)	**C**	**1**
1(a)(iv)	**D**	**1**
1(a)(v)	**A**	**1**
1(b)	number of electrons in Ca^{2+} = 18	**1**
	number of neutrons in Mg = 14	**1**
	number of protons in Mg = 12 **AND** number of protons in Ca^{2+} = 20	**1**

Question	Answer	Marks
2(a)(i)	8 (mg)	**1**
2(a)(ii)	hydrogencarbonate / HCO_3^-	**1**
2(a)(iii)	nitrate	**1**
2(a)(iv)	12.5 (mg)	**1**
2(b)	(damp) red litmus paper	**1**
	turns blue	**1**
2(c)	$CaBr_2$	**1**
2(d)(i)	negative electrode: calcium / Ca	**1**
	positive electrode: bromine / Br_2	**1**
2(d)(ii)	platinum / Pt	**1**

Question	Answer	Marks
3(a)	any 5 of: **P** has ionic bonding / ionic **P** particles are regularly arranged / lattice / in rows / uniformly arranged **P** particles (only) vibrating / not moving from place to place **Q** has covalent bonding **Q** has irregular arrangement of particles / random arrangement **Q** particles moving slowly / moving randomly / sliding over each other **R** no bonding (between atoms) / weak bonding between atoms / weak attractive forces between atoms **R** has irregular arrangement of particles / random arrangement **R** particles moving randomly / moving rapidly / freely moving / randomly (moving) / irregular (movement)	**5**
3(b)	volume increases	**1**
	particles get further apart	**1**
3(c)	**C** / boils (at 1330 °C)	**1**
	D / dissolves (readily in water)	**1**
	the change can be reversed by altering the conditions	**1**
3(d)	pencil (leads) / lubricant	**1**
	layers move **OR** slide over each other	**1**

Question	Answer	Marks
4(a)(i)	hematite / any other ore of iron	**1**
4(a)(ii)	from the reaction of carbon dioxide	**1**
	with carbon / coke	**1**
	OR	
	reaction of carbon / coke	**1**
	with insufficient oxygen for compete combustion / idea of oxygen not in excess or not limiting	**1**
4(a)(iii)	2 (Fe)	**1**
	3 (CO_2)	**1**
4(a)(iv)	iron(III) oxide loses oxygen / iron(III) oxide loses oxygen	**1**
4(a)(v)	160 **IF** full credit is not awarded, allow 1 mark for (Fe =) 56 and (O =16)	**2**
4(b)(i)	hydrogen / H_2	**1**
4(b)(ii)	gas syringe connected to flask **OR** this described in words	**1**
	closed apparatus / workable apparatus **OR** this described in words	**1**
	timer / stop-watch **OR** this described in words	**1**
4(c)	(aqueous) sodium hydroxide / aqueous ammonia	**1**
	green precipitate	**1**
4(d)	any 2 advantages from: saves energy / saves mining of ore / saves other finite resources / saves transport costs of bringing ore to factory / reduces dust pollution / exhaust gas pollution	**2**

Question	Answer	Marks
5(a)	circle drawn around the COOH group	**1**
5(b)	$C_2H_4O_3$	**1**
5(c)	grind up the (sugar) cane / crush the plant	**1**
	with a solvent	**1**
	filter (off the solution)	**1**
5(d)	addition of oxygen / loss of electrons / increase in oxidation number	**1**
5(e)(i)	decreases with an increasing number of carbon atoms **ORA**	**1**
5(e)(ii)	any value between 118 and 164 (°C) (exclusive of these values)	**1**
5(e)(iii)	solid	**1**
	–10 (°C) is below the melting point / melting point is higher than –10 (°C)	**1**

Question	Answer	Marks
6(a)(i)	**J**	
	it is (very) strong / it is the strongest	**1**
	it is cheap	**1**
6(a)(ii)	**M** because it is the hardest	**1**
6(a)(iii)	**K** because its density is the lowest	**1**
6(b)(i)	line at a steeper gradient than **W**	**1**
	ends up at same mass loss	**1**
6(b)(ii)	**Y**	**1**
6(b)(iii)	1.05 days	**1**
6(b)(iv)	increasing temperature increases rate	**1**
	increasing concentration increases rate	**1**
6(c)	pH 12	**1**

Question	Answer	Marks
7(a)	pair of electrons in overlap area between O atom and **both** H atoms	**1**
7(b)	electrical conductivity	**1**
	melting point / boiling point	**1**
7(c)	iron < magnesium < cerium < lithium **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**
7(d)(i)	water	**1**
	air / oxygen	**1**
7(d)(ii)	any 2 methods from: greasing / covering with plastic / galvanising / painting / (electro)plating	**2**
7(e)	evaporate to crystallisation point / leave in a warm place until crystals form	**1**
	filter off crystals / pick out crystals **AND** dry on filter paper / heat in drying oven	**1**
7(f)	4 (CO_2)	**1**
	4(H_2O)	**1**