Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

Paper 3 Theory (Core) **March 2017**

MARK SCHEME

Maximum Mark: 80

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(a)(i)	oxygen / O_2	**1**
1(a)(ii)	lithium / Li	**1**
1(a)(iii)	aluminium / Al	**1**
1(a)(iv)	argon / Ar	**1**
1(a)(v)	nickel / Ni	**1**
1(a)(vi)	lithium / Li	**1**
1(b)	number of electrons for Ni = 28	**1**
	number of electrons for O^{2-} = 10	**1**
	number of neutrons Ni = 34 **AND** O^{2-} = 10	**1**
	number of protons for O^{2-} = 8	**1**

Question	Answer	Marks
2(a)(i)	**A** placed either on the left hand lower tube (or on the one on the right directly opposite this)	**1**
	W placed on both or either of the tubes at the top	**1**
2(a)(ii)	the slag is above the molten iron / the iron is below the molten slag	**1**
2(b)(i)	breakdown of a substance / breakdown of a compound	**1**
	using heat / using high temperature	**1**
2(b)(ii)	CO_2	**1**
2(b)(iii)	calcium oxide reacts with silicon(IV) oxide / sand	**1**
	to form calcium silicate / slag	**1**
2(c)	apparatus correctly set up with two rods dipping into a liquid	**1**
	completed circuit with cell / power pack	**1**
	electrode(s) **AND** electrolyte correctly labelled	**1**
2(d)(i)	graphite / platinum / (pure) iron	**1**
2(d)(ii)	conducts electricity / inert	**1**
2(e)(i)	$Fe(CO)_5$ / FeC_5O_5	**1**
2(e)(ii)	carbon monoxide is poisonous / toxic	**1**

Question	Answer	Marks
2(f)(i)	water	**1**
	oxygen / air	**1**
2(f)(ii)	the lower the pH, the greater the rate / it is faster at a lower pH	**1**
	the higher the temperature, the greater the rate / it is faster at a higher temperature	**1**

Question	Answer	Marks
3(a)	nitrogen	**1**
3(b)(i)	substance containing carbon and hydrogen	**1**
	only / and no other element	**1**
3(b)(ii)	oxygen on left	**1**
	water on right	**1**
3(b)(iii)	it is a greenhouse gas / causes climate change / global warming	**1**
	ice caps melt (or rise in sea levels) / <u>increased</u> flooding / desertification / increased death of corals	**1**
3(b)(iv)	incomplete combustion (of hydrocarbon)	**1**
3(b)(v)	correct molar mass = 114 8 × 12/96 (in final column) scores [1]	**2**
3(c)(i)	increases as the number of carbon atoms increases	**1**
3(c)(ii)	pentane / C_5H_{12}	**1**
	20 °C is in between its melting and boiling points / boiling point is above 20 °C and melting point is below 20 °C	**1**
3(c)(iii)	correct structure of methane showing all four C–H bonds	**1**

Question	Answer	Marks
4(a)	reversible (reaction)	**1**
4(b)	increase plant growth / provide more nitrogen for making protein / helps plant grow faster	**1**
4(c)	ammon<u>ium</u> nitrate	**1**
4(d)(i)	neutralises (the acid) / lowers the acidity / raises pH	**1**
4(d)(ii)	plants cannot grow (well) under acidic conditions	**1**

Question	Answer	Marks
5(a)	ring around –OH	**1**
5(b)	10	**1**
5(c)(i)	double C=C bond	**1**
5(c)(ii)	(aqueous) bromine / bromine water	**1**
	turns colourless	**1**
5(d)	(E), D, A, B, C one consecutive pair reversed scores [1]	**2**
5(e)	any 3 from: • diffusion • molecules in (constant) movement / molecules collide • movement of molecules is random / in every direction • molecules spread out • molecules (spread) from higher concentration to lower concentration	**3**
5(f)(i)	on the baseline / on the starting line	**1**
5(f)(ii)	**Q**	**1**
5(f)(iii)	**Q**	**1**

Question	Answer	Marks
6(a)	hydrogen	**1**
6(b)	electron	**1**
6(c)	bonding pair correctly shown	**1**
	3 non-bonding pairs on right hand chlorine atom	**1**
6(d)	litmus (paper) / Universal Indicator paper	**1**
	bleached / goes colourless	**1**
6(e)	2 on left **AND** NaC*l* on right NaC*l* on right scores [1]	**2**
6(f)(i)	1.8 g	**1**
6(f)(ii)	315 g	**1**

Question	Answer	Marks
7(a)	physical properties [max 3], e.g.: • conduct electricity (or heat) • shiny • malleable • ductile • sonorous chemical properties [max 2], e.g.: • react with acids • react with oxygen correct word equation (general or specific) [max 1]	**5**
7(b)	nickel, zinc, magnesium, calcium one consecutive pair reversed / all reversed scores [1]	**2**
7(c)(i)	atoms with the same number of protons and different numbers of neutrons	**1**
7(c)(ii)	energy (production) / nuclear power	**1**