



CHEMISTRY

0620/32

Paper 3 Theory (Core)

March 2017

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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 ₅ O 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 $8 \times 12/96$ (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
	$20^\circ C$ is in between its melting and boiling points / boiling point is above $20^\circ C$ and melting point is below $20^\circ C$	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)	<u>ammonium</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: <ul style="list-style-type: none"> • 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 NaCl on right NaCl 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.: <ul style="list-style-type: none"> • conduct electricity (or heat) • shiny • malleable • ductile • sonorous chemical properties [max 2], e.g.: <ul style="list-style-type: none"> • 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)	<u>atoms</u> with the same number of protons and different numbers of neutrons	1
7(c)(ii)	energy (production) / nuclear power	1