

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CHEMISTRY 0620/32

Paper 3 Core Theory

October/November 2016

MARK SCHEME
Maximum Mark: 80

Published

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Page 2	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
1(a)(i)	K/potassium	1
1(a)(ii)	Cu/copper	1
1(a)(iii)	C/carbon	1
1(a)(iv)	He/helium	1
1(a)(v)	Fe/iron	1
1(b)	number of protons: 47 and 47 number of electrons: 47 and 47 number of neutrons: 60 and 62	1 1 1

Question	Answer	Mark
2(a)(i)	any 2 from: • more Cl^- in A ORA • more HCO_3^- in A ORA • more Ca^{2^+} in A ORA • more Na^+ in B ORA • more K^+ in B ORA • more $SiO_3^{2^-}$ in B ORA • more Mg^{2^+} in B ORA	2
2(a)(ii)	Ca ²⁺	1

Page 3	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
2(a)(iii)	1.5 mg = [2]	2
	$\frac{100}{1000} \times (15) = [1]$ OR $0.1 \times (15) = [1]$	
2(b)	test: add (nitric acid and) silver nitrate result: white precipitate	1
2(c)	the random movement of particles in a suspension	1
2(d)	silicon is a non-metal/silicon is on the right-hand side of the Periodic Table	1
2(e)(i)	decreases (as temperature increases)	1
2(e)(ii)	11.5 (mg/dm ³)	1
2(e)(iii)	increases because chemical reaction(s) are faster at higher temperatures / reactions with iron are faster at higher temperatures / reactions with metals are faster at higher temperatures OR decreases because less oxygen is dissolved at higher temperatures	1
2(f)	filtration treatment with chlorine/chlorination	1
2(g)(i)	any suitable source, e.g. car (exhausts)/lightning/furnaces/	1
2(g)(ii)	breathing difficulties / irritation to nose (OR lungs OR eyes OR throat or skin)	1

Page 4	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
3(a)	water (water) is losing oxygen	1 1
3(b)(i)	rock from which metal is extracted/rock containing (high proportion of) a metal (compound)	1
3(b)(ii)	to burn the coke/to form carbon monoxide	1
3(b)(iii)	calcium silicate	1
3(b)(iv)	S on or in 2nd pipe from the bottom on the right/just outside this pipe	1
3(c)	<pre>impurities named (max = [1])</pre>	4

Page 5	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
4(a)	the sample is impure	1
4(b)	any 3 from: diffusion particles move/motion of particles (movement is) random/in any direction/in all directions particles spread out/particles mix particles move from high to low concentration	3
4(c)	red	1
4(d)(i)	(metal) salt water	1 1
4(d)(ii)	filtration / filter	1
4(d)(iii)	E, B, C, A, D	2

Page 6	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
5(a)(i)	CaO CO ₂	1
5(a)(ii)	(thermal) decomposition	1
5(a)(iii)	100 = [2] A _r = 40 (Ca), 12 (C),16 (O) = [1]	2
5(b)	 any 2 from: compound has a fixed composition/mixture has not got a fixed composition (components of) compound cannot separated (by physical means) / (components of) mixture can be separated (by physical means) compound has different properties from the elements it has been made from/substances in a mixture have the same properties as those used to make the mixture 	2
5(c)	concrete is weaker/steel is stronger	1
5(d)	oxygen/air water	1

Page 7	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
6(a)(i)	 hydrocarbon: (compounds which) contain carbon and hydrogen only fraction: molecules with certain number(s) of carbon atoms/molecules with (limited) range of carbon atoms OR (limited) range of boiling points OR molecules of certain sizes/(limited) range of sizes 	1
6(a)(ii)	naphtha: making chemicals/making alkenes kerosene: fuel for planes/fuel for heating/making alkenes	1
6(b)	comment on alkenes (max = [1]) • alkenes have C=C/are unsaturated reference to homologous series (max = [3]) • family of similar carbon compounds/similar organic compounds • (same) functional group • similar chemical properties • trend in physical properties • (same) general formula/C _n H _{2n} • differ by CH ₂	4
6(c)(i)	(yes) there is general trend from propene to hexane / (yes) the numbers go up in both columns	1
6(c)(ii)	any value between 35 (°C)–85 (°C) inclusive	1

Page 8	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
6(c)(iii)	liquid60 °C is between the melting and boiling point / the melting point is lower than _60 °C but the boiling point is higher (than _60 °C)	1
6(d)	correct structure of ethane showing all of the atoms and all of the bonds	1
6(e)	C_4H_8 C_8H_{18}	1

Question	Answer	Mark
7(a)	air would react with sodium/argon is unreactive/argon makes the atmosphere inert/sodium does not react with argon	1
7(b)	D-E	1
7(c)(i)	any 2 from: • gas spreads everywhere/liquid spreads over a surface • gas has no fixed volume/liquid has fixed volume • gas has no surface/liquid has (definite) surface • gas can be compressed/liquid cannot be compressed	2
7(c)(ii)	arrangement: no (fixed) arrangement/random/irregular motion: slow/sliding over each other/slipping over each other	1

Page 9	Mark Scheme	Syllabus	Paper
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Question	Answer	Mark
7(d)(i)	any 2 from: • high melting point/high boiling point • high density • catalytic activity • has several oxidation states • forms coloured compounds • hard/strong	2
7(d)(ii)	Nb_2Cl_{10}	1
7(d)(iii)	any 2 from: does not conduct electricity/heat has a low melting point/has a low boiling point insoluble in water/soluble in organic solvent	2