



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

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**CHEMISTRY**

**0620/32**

Paper 3 Core Theory

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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This document consists of **7** printed pages.

Question	Answer	Marks
1(a)(i)	A	1
1(a)(ii)	C	1
1(a)(iii)	D	1
1(a)(iv)	D	1
1(a)(v)	E	1
1(b)	any 3 from: <ul style="list-style-type: none"> <li>• metals conduct electricity / heat <b>ORA</b></li> <li>• metals are malleable <b>ORA</b></li> <li>• metals are ductile <b>ORA</b></li> <li>• metals are sonorous / ring when hit <b>ORA</b></li> <li>• metals are shiny / lustrous <b>ORA</b></li> </ul>	3
1(c)	substance contain two (or more different) <u>elements</u> which are bonded together / which are chemically combined	1

Question	Answer	Marks
2(a)	any 3 from: <ul style="list-style-type: none"> <li>• greater percentage of helium (on Saturn) / less helium on Earth</li> <li>• greater percentage of hydrogen (on Saturn) / little hydrogen on Earth</li> <li>• no oxygen on Saturn / oxygen on Earth / Earth has 1/5 oxygen</li> <li>• lower percentage of other gases (on Saturn) / more of other gases on Earth</li> <li>• greater percentage of argon on Earth / less argon on Saturn</li> <li>• no <b>OR</b> very little nitrogen on Saturn / Earth has about 80% nitrogen / Earth has a lot of nitrogen</li> </ul>	3
2(b)(i)	hydrogen is less dense than helium	1
2(b)(ii)	gas	1
	–250 °C is above the boiling point	1

Question	Answer	Marks
2(c)(i)	(damp) <u>red</u> litmus	1
	turns blue	1
2(c)(ii)	labels 'N' and 'H' in the correct circles	1
	one pair of electrons in each overlap area and no non-bonding electrons or extra bonding electrons added	1
2(d)	51 IF full credit is not awarded, allow 1 mark for (S =) 32, (N =) 14 and (H =) 1	2
2(e)(i)	carbon dioxide / CO <sub>2</sub>	1
2(e)(ii)	global warming / effect of global warming, e.g. melting ice caps / desertification / more extreme weather / death of corals / more risk of flooding	1

Question	Answer	Marks
3(a)(i)	functional group shown as –COOH / –CO <sub>2</sub> H or displayed formula	1
3(a)(ii)	pH 4	1
3(a)(iii)	neutralisation	1
3(a)(iv)	releases heat / heat given out	1
3(b)	C <sub>3</sub> H <sub>8</sub> O <sub>3</sub>	1
3(c)	2 (CO)	1
	3 (H <sub>2</sub> O)	1

Question	Answer	Marks
3(d)(i)	distillation	1
	water is the distillate / water collects in the condenser / sodium chloride remains in the flask	1
	idea of different boiling points (of water and sodium chloride)	1
3(d)(ii)	boiling <u>point</u> / melting <u>point</u>	1
3(d)(iii)	(aqueous) silver nitrate (acidified with nitric acid)	1
	white precipitate	1

Question	Answer	Marks
4(a)	electrical conductivity of zinc: conducts	1
	solubility in water of sodium chloride: soluble	1
4(b)	low boiling point / does not conduct when solid or molten	1
4(c)	does not conduct when solid but conducts when molten IF full credit is not awarded, allow 1 mark for conducts when molten	2
4(d)	positive electrode (anode): iodine	1
	negative electrode (cathode): calcium	1
4(e)	number of protons: 15	1
	number of neutrons: 16	1
4(f)	acidic because phosphorus is a non-metal	1
4(g)	goes (directly) from solid to vapour / gas (without liquid state being formed)	1

Question	Answer	Marks
5(a)	nickel(II) oxide loses oxygen / oxidation number of nickel decreases / nickel gains electrons	1
5(b)	reversible reaction	1
5(c)(i)	carbon monoxide is a gas / carbon monoxide escapes from the mixture	1
5(c)(ii)	toxic / poisonous	1
5(d)(i)	any 2 from: <ul style="list-style-type: none"> <li>• nickel has a high melting / boiling point <b>ORA</b></li> <li>• nickel has a high density <b>ORA</b></li> <li>• nickel is hard / strong <b>ORA</b></li> </ul>	2
5(d)(ii)	nickel(II) chloride is coloured <b>ORA</b> / nickel(II) chloride can be a catalyst <b>ORA</b>	1
5(e)(i)	boiling point: any value between 680–750 °C inclusive	1
	relative reactivity of rubidium with water: reacts explosively / bigger flame (than potassium) / forms bubbles extremely rapidly / faster than potassium but slower than caesium / rapidly bursts into flame	1
5(e)(ii)	density increases down the group <b>ORA</b>	1

Question	Answer	Marks
6(a)	any 5 from:  <i>from ethene:</i> <ul style="list-style-type: none"> <li>• steam</li> <li>• high temperature</li> <li>• catalyst</li> </ul> <i>by fermentation:</i> <ul style="list-style-type: none"> <li>• yeast / zymase / enzymes</li> <li>• absence of oxygen / anaerobic</li> <li>• water / aqueous (suspension)</li> <li>• suitable temperature quoted (10–40 °C)</li> </ul>	5
6(b)(i)	saturated hydrocarbon: no change / aqueous bromine remains orange	1
	unsaturated hydrocarbon: aqueous bromine decolourised	1
6(b)(ii)	a large molecule formed from many monomers	1
6(b)(iii)	clothing / named article of clothing	1

Question	Answer	Marks
7(a)	any 3 from: <ul style="list-style-type: none"> <li>• diffusion</li> <li>• molecules move (from place to place)</li> <li>• (molecules move) randomly</li> <li>• molecules collide</li> <li>• molecules spread out / mix up</li> <li>• (bulk) movement of molecules from areas of where they are at higher concentration to where they are at lower concentration</li> </ul>	3

Question	Answer	Marks
7(b)	$Cl_2$	1
	2 ( $SCl_2$ )	1
7(c)	P: freezing	1
	Q: condensing / condensation	1

Question	Answer	Marks
8(a)	89.6 (g)	1
8(b)(i)	220 (cm <sup>3</sup> )	1
8(b)(ii)	49 (min)	1
8(b)(iii)	goes faster / increases (rate)	1
8(c)(i)	16%	1
8(c)(ii)	any 2 from: <ul style="list-style-type: none"> <li>• neutralise soil</li> <li>• reduce acidity of soils</li> <li>• so plants grow properly / so plants grow well</li> </ul>	2