

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2015 series****0620 CHEMISTRY****0620/22**

Paper 2 (Core Theory), maximum raw mark 80

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**Abbreviations used in the Mark Scheme**

- ; separates marking points
- / separates alternatives within a marking point
- () the word or phrase in brackets is not required but sets the context
- **A** accept (a less than ideal answer which should be marked correct)
- **I** ignore (mark as if this material were not present)
- **R** reject
- ecf credit a correct statement that follows a previous wrong response
- ora or reverse argument
- owtte or words to that effect (accept other ways of expressing the same idea)

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)(i)	<b>E</b> / NO <sub>2</sub> / nitrogen dioxide;	<b>1</b>
1(a) (ii)	<b>B</b> ;	<b>1</b>
1(a)(iii)	<b>C</b> / NaI / sodium iodide;	<b>1</b>
1(a)(iv)	<b>E</b> / NO <sub>2</sub> / nitrogen dioxide;	<b>1</b>
1(a)(v)	<b>D</b> / F <sub>2</sub> / fluorine;	<b>1</b>
1(a)(vi)	<b>C</b> / NaI / sodium iodide;	<b>1</b>
1(b)	substance containing only one type of atom / substance which cannot be broken down further by chemical means;	<b>1</b>
1(c)	O <sub>2</sub> ; 4 (HF);	<b>1</b> <b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(a)	any two from: <ul style="list-style-type: none"> <li>• (same) volume of water;</li> <li>• (same) distance of flame from beaker;</li> <li>• (same) height of flame;</li> </ul>	<b>2</b>
2(b)	exothermic and heat released / heat given out;	<b>1</b>
2(c)(i)	hexane;	<b>1</b>
2(c)(ii)	hexane;	<b>1</b>
2(d)(i)	correct structure of methane;	<b>1</b>
2(d)(ii)	natural gas;	<b>1</b>
2(e)(i)	both end in –ane;	<b>1</b>
2(e)(ii)	compounds; properties; functional;	<b>3</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3(a)(i)	gives off bubbles rapidly / fast / many bubbles; disappears quickly;	1 1
3(a)(ii)	zinc;	1
3(a)(iii)	too reactive / high in the electrochemical / reactivity series;	1
3(b)	oxygen removed from barium oxide / it loses oxygen;	1
3(c)(i)	use pH meter <b>and</b> pH above 7 / (red) litmus turns blue;	1
3(c)(ii)	barium chloride; water;	1 1
3(d)(i)	burette;	1
3(d)(ii)	any two from: <ul style="list-style-type: none"> <li>• starts off at high / alkaline pH / pH above 7;</li> <li>• pH decreases / gets more acidic / less alkaline / becomes neutral;</li> <li>• ends up at acidic pH / pH below 7;</li> </ul>	2
3(e)	two electrodes dipping into the electrolyte; electrodes correctly connected to battery / power supply; correct labels for electrodes and power supply battery;	1 1 1

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)(i)	measure volume of gas / measure amount of gas; gas collected in the measuring cylinder; at different times / use of stopclock to measure time;	1 1 1
4(a)(ii)	faster reaction / rate increases;	1
4(b)(i)	same concentration of acid; same mass of iron; same size of iron pieces;	1 1 1

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(b)(ii)	rate increases with increase in temperature rate increases with temperature = [1]	<b>2</b>
4(c)	any three from: <ul style="list-style-type: none"> <li>• filter (off the iron);</li> <li>• evaporate water / heat gently;</li> <li>• to crystallisation point / leave to cool (after heating);</li> <li>• filter off / pick out crystals;</li> <li>• dry crystal between filter papers;</li> </ul>	<b>3</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(a)	any four from: <ul style="list-style-type: none"> <li>• in solid particles regularly arranged;</li> <li>• in solid particles arranged in fixed position / cannot move or vibrate;</li> <li>• particles close together in solid;</li> <li>• particles in liquid slide over each other / move;</li> <li>• particles in liquid not regularly arranged;</li> <li>• particles close together in liquid;</li> </ul>	<b>4</b>
5(b)(i)	any two from: <ul style="list-style-type: none"> <li>• fossil fuels contain sulfur / named fossil fuel contains sulfur;</li> <li>• burning fossil fuel;</li> <li>• sulfur reacts with oxygen / sulfur reacts with air;</li> <li>• sulfur dioxide is a gas (so escapes into air);</li> </ul>	<b>2</b>
5(b)(ii)	acidic / acid;	<b>1</b>
5(b)(iii)	calcium oxide / calcium carbonate; reacts with (moist) sulfur dioxide / reacts with acidic gas / forms calcium sulfite;	<b>1</b> <b>1</b>
5(b)(iv)	2 (H <sub>2</sub> O) on right; 2 (H <sub>2</sub> SO <sub>4</sub> ) on left;	<b>1</b> <b>1</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(c)	any two from: <ul style="list-style-type: none"> <li>• conducts heat / conducts electricity;</li> <li>• malleable;</li> <li>• ductile;</li> <li>• lustrous / shiny surface;</li> </ul>	<b>2</b>
5(d)(i)	aluminium is good conductor; steel is strong / core is strong;	<b>1</b> <b>1</b>
5(d)(ii)	copper is cheap(er) (than silver) / silver is (more) expensive;	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(a)(i)	ring around OH group;	<b>1</b>
6(a)(ii)	unsaturated <b>and</b> has double bonds;	<b>1</b>
6(b)(i)	condenser;	<b>1</b>
6(b)(ii)	any characteristic of a mixture, e.g. can be separated by physical means / has variable composition / properties are the average of those of the components;	<b>1</b>
6(b)(iii)	geraniol floats on top of the water;	<b>1</b>
6(c)(i)	structure of ethanol drawn correctly with all atoms and bonds;	<b>1</b>
6(c)(ii)	carbon dioxide; water;	<b>1</b> <b>1</b>
6(d)	21%;	<b>1</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
7(a)	any five from: <ul style="list-style-type: none"> <li>• four electrons;</li> <li>• electrons negatively charged;</li> <li>• electrons outside nucleus in shells;</li> <li>• nucleus contains protons and neutrons;</li> <li>• protons positively charged;</li> <li>• neutrons no charge;</li> <li>• four protons;</li> <li>• five neutrons;</li> <li>• electron arrangement [2,2]/two electrons in outer shell;</li> </ul>	<b>5</b>
7(b)	$\text{BeCl}_2$ ;	<b>1</b>
7(c)(i)	43 correct atomic masses only = [1]	<b>2</b>
7(c)(ii)	global warming / greenhouse effect / effect of global warming, e.g. rise in sea level / desertification / more extreme weather / climate change;	<b>1</b>