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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0620 CHEMISTRY

0620/23 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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Question	Answer	Marks
1(a)(i)	**B** / Cl_2 / chlorine;	**1**
1(a)(ii)	**C** / N_2 / nitrogen;	**1**
1(a)(iii)	**E** / Ar / argon;	**1**
1(a)(iv)	**A** / ethene / C_2H_4;	**1**
1(a)(v)	**A** / ethene / C_2H_4;	**1**
1(a)(vi)	**F** / CO_2 / carbon dioxide;	**1**
1(b)	substance containing (two or more) different atoms bonded / substance containing (two or more) different atoms combined;	**1**
1(c)	in light bulbs / as an inert atmosphere / welding;	**1**
1(d)	3 (Mg) <u>and</u> N_2;	**1**

Question	Answer	Marks
2(a)(i)	plastics;	**1**
2(b)	third box ticked / exothermic;	**1**
2(c)	4;	**1**
2(d)(i)	speed up the reaction / increase reaction rate;	**1**
2(d)(ii)	carbon dioxide; water;	**1** **1**
2(e)	any two from: • sulfur (oxidises / burns) to form sulfur dioxide; • acid rain / acidic gas formed; • effect of acid rain, e.g. kills animals in ponds (or lakes) / kills plants / soil demineralisation / erodes limestone buildings / iron structures corroded;	**2**
2(f)(i)	alkane(s);	**1**
2(f)(ii)	colourless / liquid at room temperature / low melting point;	**1**

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Question	Answer	Marks
2(f)(iii)	O ‖ C – O – H;	1

Question	Answer	Marks
3(a)	flask; Bunsen burner / Bunsen / burner;	1 1
3(b)	sodium sulfate;	1
3(c)(i)	3 correctly labelled = [2] 1 or 2 correctly labelled = [1];	2
3(c)(ii)	**X** = chlorine / Cl_2; **Y** = hydrogen / H_2;	1 1
3(c)(iii)	calcium chloride; carbon dioxide; water;	3
3(d)(i)	1.6;	1
3(d)(ii)	idea that pH increases slowly at first ; idea of sudden increase at around 18 cm^3 ; idea of pH increasing at a slower rate in the more alkaline region;	1 1 1

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Question	Answer	Marks
4(a)	measure the volume of gas; in a (measuring) cylinder; at different times;	1 1 1
4(b)(i)	increases then decreases; comment on the curve, e.g. rate not constant at first / peak (or maximum) at 60 hours / rate of decrease less than rate of increase (around the maximum);	1 1
4(b)(ii)	0.29 (cm^3 CO_2 per hour);	1
4(b)(iii)	any two from: • higher temperature (**R**: temperatures above 40 °C); • increase concentration of glucose; • increase amount of yeast;	2
4(c)	**M1** correct method, e.g. add litmus / add sodium hydroxide / add sodium carbonate / measure pH; **M2** correct outcome, e.g. litmus turns red with acid / no change of litmus with ethanol / pH below 7 with acid / pH 7 with ethanol / acid reacts with sodium hydroxide or sodium carbonate / ethanol does not react with sodium hydroxide or sodium carbonate;	1 1

Question	Answer	Marks
5(a)	any four from: • particles in the liquid slide over each other / move slowly / restricted movement; • particles in the liquid not regularly arranged / randomly arranged; • particles close together in liquid; • in the gas particles arranged randomly / are anywhere; • in the gas particles move from place to place / move freely / move fast; • particles far apart in the gas;	4
5(b)(i)	liquid; temperature above melting point but below boiling point;	1 1
5(b)(ii)	copper **and** iron; both have high melting points;	1 1

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Question	Answer	Marks
5(b)(iii)	resistant to corrosion;	**1**
5(c)(i)	oxygen / air; water;	**1** **1**
5(c)(ii)	idea of layer stopping air or water getting to the surface / idea of blocking reaction with the surface of the iron, e.g. stops air or oxygen getting to surface / blocks water or moisture getting to the iron;	**1**
5(d)(i)	iron chloride / iron(II) chloride; hydrogen;	**1** **1**
5(d)(ii)	**M1** (aqueous) sodium hydroxide / (aqueous) ammonia; **M2** green precipitate / grey-green precipitate;	**1** **1**
5(e)	any suitable use, e.g. cutlery / chemical plant / surgical instruments / saucepans;	**1**

Question	Answer	Marks
6(a)	fractional distillation / fractionation / fractionating; differences in boiling point(s);	**1** **1**
6(b)(i)	refinery gas;	**1**
6(b)(ii)	kerosene / paraffin;	**1**
6(c)(i)	B **and** C / ethene **and** propene;	**1**
6(c)(ii)	H_2; C_3H_6;	**1** **1**
6(d)(i)	copper;	**1**
6(d)(ii)	it is cooler / temperature lower;	**1**

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Question	Answer	Marks
7(a)	any five from: • 17 protons; • 18 neutrons; • 17 electrons; • protons positively charged; • neutrons no charge • electrons negatively charged; • electrons outside the nucleus in shells; • nucleus contains protons and neutrons; • electron arrangement 2, 8, 7 / 7 electrons in the outer shell;	**5**
7(b)	sodium atoms each lose an electron / sodium has one more proton than electrons; chlorine atoms each gain an electron / chlorine has one more electron than protons;	**1** **1**
7(c)(i)	iodine formed;	**1**
7(c)(ii)	chlorine is more reactive than iodine / chlorine is higher in the reactivity series than iodine;	**1**
7(d)(i)	C_2ClF_5;	**1**

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