Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

Paper 3 Theory (Core) **May/June 2016**

MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	B and D;	**1**
1(a)(ii)	C; has only one type of atom;	**2** 1 1
1(a)(iii)	Na_3P;	**1**
1(b)(i)	16;	**1**
1(b)(ii)	5;	**1**
1(b)(iii)	60;	**1**
1(c)	acidic; because phosphorus is a non-metal / it is a non-metal oxide / it would react with bases / neutralises bases / phosphorus is on the right-hand side of the Periodic Table;	**2** 1 1

Question	Answer	Marks
2(a)	lead < nickel < zinc < titanium; (1 mark if one pair reversed)	**2**
2(b)	positive electrode: oxygen / O_2; negative electrode: aluminium / A*l*;	**2** 1 1
2(c)	test: (aqueous) sodium hydroxide / (aqueous) ammonia; result: (grey-) green precipitate / solid;	**2** 1 1
2(d)(i)	oxygen / air; water;	**2** 1 1
2(d)(ii)	idea of covering surface with tin / zinc / other suitable metal / plastic / grease / oil / paint / galvanising; prevents oxygen / air or water / moisture / steam from getting to the surface;	**2** 1 1

Question	Answer	Marks
3(a)	reversible reaction / equilibrium;	**1**
3(b)	exothermic **and** products have less energy than reactants;	**1**
3(c)(i)	percentage yield decreases as temperature increases;	**1**
3(c)(ii)	91%;	**1**
3(d)	test: (acidified) potassium manganate(VII) / potassium permanganate; result: (pink solution) turns colourless;	**2** 1 1
3(e)	any suitable use, e.g. food preservation / manufacture of sulfuric acid;	**1**
3(f)	sulfur dioxide; (sulfur dioxide) loses oxygen;	**2** 1 1
3(g)	3 (H_2O);	**1**

Question	Answer	Marks
4(a)	any 2 from: • family / group of similar chemicals; • with same functional group; • trend in physical properties; • same general formula; • same / similar chemical reaction; • successive members differ by CH_2;	**2**
4(b)(i)	F and G; contain <u>only</u> carbon and hydrogen; have <u>only</u> single bonds / no double bonds;	**3** 1 1 1
4(b)(ii)	F / methane / CH_4;	**1**
4(b)(iii)	H; J;	**2** 1 1
4(b)(iv)	contain oxygen;	**1**
4(c)(i)	ethanol;	**1**
4(c)(ii)	yes **and** because there is a general increase in the numbers / the numbers go up steadily; **OR** no **and** because the numbers go down then up again;	**1**
4(c)(iii)	65°C;	**1**
4(d)(i)	2 (CO); 3 (H_2O);	**2** 1 1
4(d)(ii)	poisonous / toxic;	**1**

Question	Answer	Marks
5(a)	liquid; 6°C is higher than the melting point and lower than the boiling point / 6 °C is between the melting point and boiling point;	**2** 1 1
5(b)(i)	potassium chloride; iodine;	**2** 1 1
5(b)(ii)	iodine is less reactive than bromine / bromine is more reactive than iodine;	**1**
5(c)	357 (1 mark for 1 correct row, e.g. (4 × 16 =) 64 or (2 × 35.5) = 71)	**2**
5(d)(i)	cross shown on baseline;	**1**
5(d)(ii)	ethanol / other organic solvent;	**1**
5(d)(iii)	dyes move up the paper and separate;	**1**

Question	Answer	Marks
6(a)	any 5 from: • conducts electricity / conducts heat; • soft; • solid; • shiny (when cut); • malleable / ductile; • reacts with water to produce hydrogen; • bubbles / fizzes in water; • vigorous reaction with water; • floats on water / low density; • forms an alkaline solution with water; • reacts with oxygen / air to form an oxide; • reacts with chlorine to form a chloride; • suitable word equations (maximum two equations);	**5**
6(b)	test: put the sodium compound on nichrome / platinum wire (on the edge of a blue Bunsen burner flame); result: flame goes yellow;	**2** 1 1
6(c)(i)	pH 13;	**1**
6(c)(ii)	add (red) litmus to sodium hydroxide / dip (red) litmus into sodium hydroxide; turns blue;	**2** 1 1
6(d)	sulfur dioxide produced / SO_2 formed; causes breathing difficulties / harmful to eyes / coughing / damages lungs / irritates eyes / sore throat / skin burns / difficulty swallowing / headache / vomiting;	**2** 1 1

Question	Answer	Marks
7(a)	flask; (gas) syringe;	**2** 1 1
7(b)(i)	1.0 (mol / dm^3) because the initial gradient is steeper / initial slope is steeper;	**1**
7(b)(ii)	steeper gradient than curve for 1.0 mol / dm^3; same final volume;	**2** 1 1
7(c)	any suitable use, e.g. fuel / reducing agent / making margarine / making ammonia / Haber process / fuel cells;	**1**
7(d)	dust has a (very) high surface area;	**1**

Question	Answer	Marks
8(a)	mixture of 2 or more metals / mixture of a metal and a non-metal;	1
8(b)	any alloy, e.g. brass, bronze etc.;	1
8(c)	any 4 from: • solder has melted; • atoms in solid (only) vibrate; • atoms in solid are regularly arranged / touching / close to each other; • atoms start to vibrate more; • atoms in liquid are irregularly arranged / close together / touching; • atoms in liquids slide over each other / atoms in liquids move slowly; • atoms move more during melting; • atoms become less regularly arranged during melting;	4
8(d)	vapour spreads everywhere / vapour does not stay in one place;	1