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Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/11**

Paper 1 Multiple Choice **October/November 2015**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB recommended)

9311707505

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

This document consists of **14** printed pages and **2** blank pages.

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1 Which process is used in the preparation of soluble salts?

A electrolysis

B evaporation

C melting

D precipitation

2 Which positive ions are present in aqueous copper(II) sulfate?

A copper ions only

B copper ions and hydrogen ions

C sulfate ions only

D sulfate ions and hydroxide ions

3 In a titration between an acid (in the burette) and an alkali, you may need to re-use the same titration flask.

Which is the best procedure for rinsing the flask?

A Rinse with distilled water and then with the alkali.

B Rinse with tap water and then with distilled water.

C Rinse with tap water and then with the acid.

D Rinse with the alkali.

4 Two containers, one of methane and one of butane, are placed at the same distance from a naked flame.

Both gases are released at the same time. The methane gas reaches the flame and catches fire before the butane gas reaches the flame.

Which statement explains this?

A Each methane molecule has a higher proportion of hydrogen than each butane molecule.

B Methane does not have isomers, butane does have isomers.

C Methane has a higher boiling point than butane.

D Methane molecules have a smaller mass than butane molecules.

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5 Metal *X* oxidises in air. The formula of the oxide is *X*O.

X displaces zinc from aqueous zinc nitrate.

Which could be *X*?

A aluminium

B lead

C magnesium

D sodium

6 Which is a compound?

A air

B carbon

C oxygen

D steam

7 How is a calcium ion, Ca^{2+}, formed from a calcium atom?

A by gaining two electrons

B by gaining two protons

C by losing two electrons

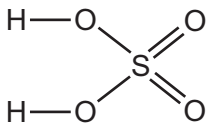
D by losing two protons

8 An oxygen atom contains 8 electrons, 8 protons and 10 neutrons.

What is the nucleon number of this atom?

A 8 **B** 10 **C** 16 **D** 18

9 A molecule of sulfuric acid has the structural formula shown.



How many electrons are involved in forming all the covalent bonds in one molecule?

A 6 **B** 8 **C** 12 **D** 16

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10 A metal consists of a lattice of positive ions in a 'sea of electrons'.

What happens to the electrons and positive ions in a metal wire when an electric current is passed through it?

	electrons	positive ions
A	replaced by new electrons	replaced by new ions
B	replaced by new electrons	unchanged
C	unchanged	replaced by new ions
D	unchanged	unchanged

11 The equation shown represents the neutralisation of aqueous sodium hydroxide with dilute sulfuric acid.

$$2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$$

How much sulfuric acid is required to neutralise 100 cm^3 of 1.0 mol / dm^3 NaOH?

A 50 cm^3 of 2.0 mol / dm^3 sulfuric acid

B 100 cm^3 of 1.0 mol / dm^3 sulfuric acid

C 25 cm^3 of 0.5 mol / dm^3 sulfuric acid

D 50 cm^3 of 1.0 mol / dm^3 sulfuric acid

12 Which change in conditions increases the energy of particles in a reaction?

A increase in concentration

B increase in pressure

C increase in temperature

D presence of a catalyst

13 Which change is endothermic?

A $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

B $H(g) + Cl(g) \rightarrow HCl(g)$

C $H_2O(g) \rightarrow 2H(g) + O(g)$

D $H_2O(l) \rightarrow H_2O(s)$

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14 The enthalpy changes when methane, butane and octane are burned completely in oxygen are shown below.

	enthalpy change (kJ / mol)
methane, CH_4	–890
butane, C_4H_{10}	–2877
octane, C_8H_{18}	–5512

Which are the enthalpy changes when propane and pentane are burned completely in oxygen?

	propane, C_3H_8 (kJ / mol)	pentane, C_5H_{12} (kJ / mol)
A	–2220	–4210
B	–2220	–3530
C	–1560	–4210
D	–1560	–3530

15 In the ionic solid zinc phosphide, Zn_3P_2, what is the formula of the phosphide ion?

A P^{3-} **B** P^{3+} **C** P^{4-} **D** P^{2+}

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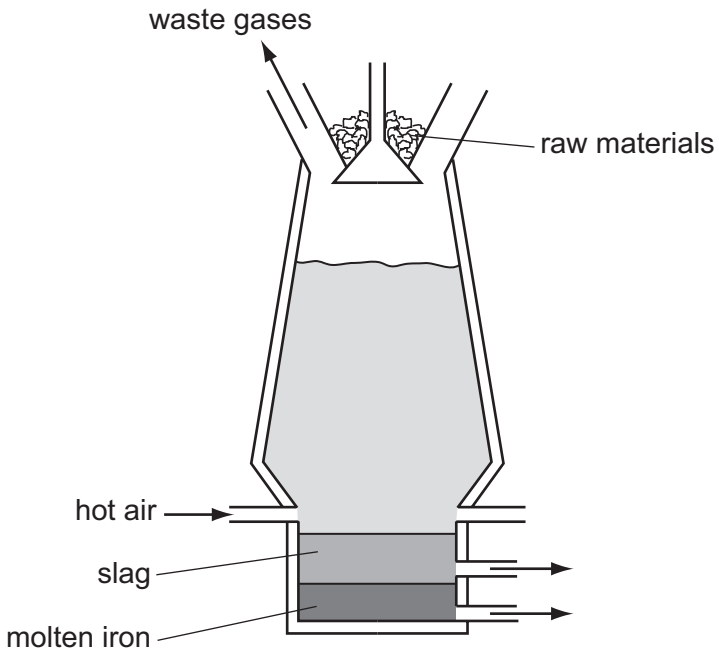
16 Iron is produced in the blast furnace.



Which statement about this process is correct?

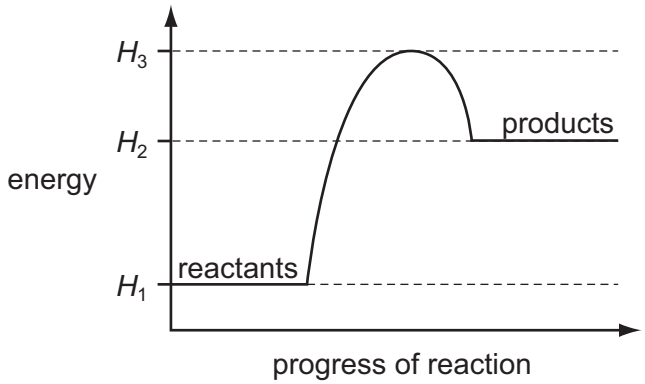
A Carbon is oxidised to carbon dioxide.

B Carbon monoxide is produced by the thermal decomposition of calcium carbonate.

C Haematite is reduced by calcium carbonate.

D Impurities are removed by the hot air blast.

17 The energy profile diagram for a reaction is shown.



Which statement is correct?

A The activation energy of the reaction is ($H_3 - H_1$).

B The activation energy of the reaction is ($H_3 - H_2$).

C ΔH is ($H_1 - H_2$).

D ΔH is ($H_1 - H_3$).

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18 In which reaction is nitric acid acting as an oxidising agent?

A $Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2H_2O + 2NO_2$

B $CuO + 2HNO_3 \rightarrow Cu(NO_3)_2 + H_2O$

C $Na_2CO_3 + 2HNO_3 \rightarrow 2NaNO_3 + H_2O + CO_2$

D $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$

19 Which occurs during the electrolysis of dilute sulfuric acid?

A Hydrogen and oxygen are formed in the ratio two volumes of oxygen to one volume of hydrogen.

B Hydrogen is formed at the positive electrode.

C Oxide ions are oxidised to oxygen.

D The dilute sulfuric acid becomes more concentrated.

20 Methanol is made in industry by a reaction between carbon monoxide and hydrogen.

$$CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g) \qquad \Delta H = -90\,kJ/mol$$

The process is usually carried out at a temperature of 400 °C.

Which row correctly shows the effect on both the position of the equilibrium and on the rate of the reaction of increasing the temperature to above 400 °C?

	position of equilibrium	rate of reaction
A	moves to left	decreases
B	moves to left	increases
C	moves to right	decreases
D	moves to right	increases

21 Which statement about graphite is **not** correct?

A It burns to form carbon dioxide.

B It is a carbon compound.

C It is a giant molecular substance.

D It is used as a lubricant.

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22 Ammonium nitrate, NH_4NO_3, is an artificial fertiliser produced from ammonia.

What is an advantage of using ammonium nitrate as a fertiliser?

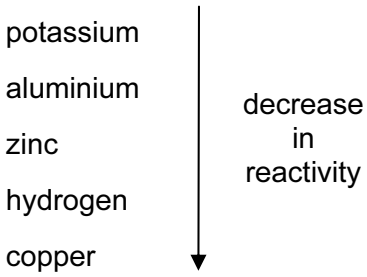
A It contains a large percentage by mass of nitrogen.

B It gives off ammonia gas.

C Nitrates are insoluble.

D Nitrates can cause eutrophication.

23 Four metals and hydrogen are arranged in order of decreasing reactivity.



Which statement about these elements is correct?

A Aluminium is formed when aluminium oxide is heated with hydrogen.

B Copper displaces zinc from zinc sulfate solution.

C Copper is formed when copper(II) oxide is heated with hydrogen.

D When added to water, aluminium forms positive ions more readily than potassium.

24 Which pair of substances reacts to form a salt and water only?

A aqueous sodium chloride and aqueous silver nitrate

B aqueous sodium hydroxide and dilute ethanoic acid

C aqueous sodium carbonate and dilute sulfuric acid

D zinc and dilute hydrochloric acid

25 An element is burned in an excess of oxygen.

Which statement about the oxide formed is always correct?

A The mass of oxide formed is greater than the mass of element burned.

B The oxide formed is a crystalline solid.

C The oxide formed is soluble in water.

D The oxide formed is white in colour.

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26 Which reaction does **not** involve neutralisation?

A $H_2SO_4(aq) + 2NH_3(aq) \rightarrow (NH_4)_2SO_4(aq)$

B $H_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2HCl(aq)$

C $H_2SO_4(aq) + CuO(s) \rightarrow CuSO_4(aq) + H_2O(l)$

D $H_2SO_4(aq) + 2NaOH(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

27 Which element described in the table is a transition metal?

	number of oxidation states	coloured compounds	melting point	density
A	one	no	high	low
B	two	no	low	high
C	two	yes	high	high
D	two	yes	low	low

28 Three different elements react by losing electrons. The ions formed all have the electronic configuration 2,8.

Which statement about these elements is correct?

A They are in the same group.

B They are in the same period.

C They are noble gases.

D They are transition elements.

29 An alloy of aluminium is used in the construction of aircraft.

Why is pure aluminium never used?

A Pure aluminium cannot be manufactured.

B Pure aluminium conducts electricity.

C Pure aluminium is less dense than its alloys.

D Pure aluminium is too malleable.

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30 What happens when a strip of silver is immersed in an aqueous solution of copper(II) sulfate?

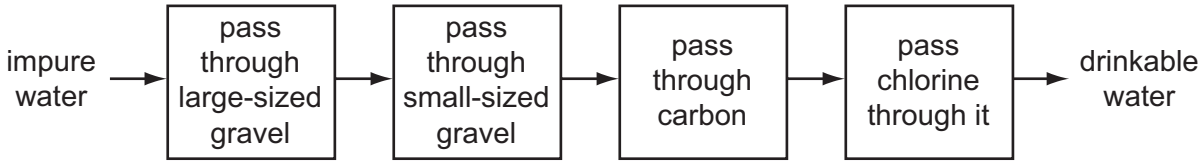
A Bubbles of gas will appear.

B No reaction occurs.

C Pink copper will be deposited on the silver strip.

D The silver strip will start to dissolve.

31 The flow chart shows how impure water can be treated to produce drinkable water.



What is **not** removed from the water by this process?

A clay particles

B microbes

C nitrates

D odours

32 Which property of a liquid ester can be used to check its purity before use as a food flavouring?

A boiling point

B colour

C smell

D solubility in water

33 Which alcohol will, on oxidation, produce $CH_3CH_2CO_2H$?

A CH_3OH

B CH_3CH_2OH

C $CH_3CH_2CH_2OH$

D $HOCH_2CH_2CH_2OH$

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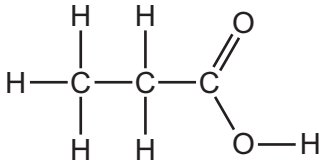
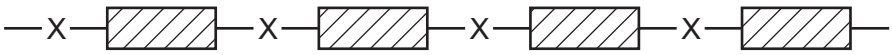
34 The diagram shows the structure of an organic acid.



Which row is correct?

	name of acid	reacts with aqueous sodium carbonate to produce carbon dioxide
A	butanoic acid	no
B	butanoic acid	yes
C	propanoic acid	no
D	propanoic acid	yes

35 A carbohydrate such as starch can be represented as shown.



What is X?

A carbon

B hydrogen

C nitrogen

D oxygen

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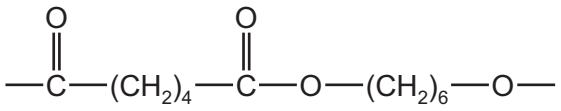
36 **P** is a polymer that

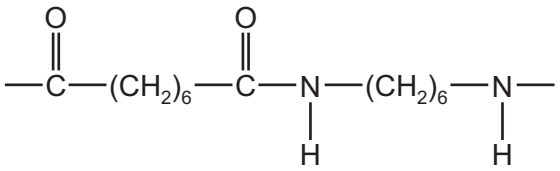
- has six carbon atoms in each of the monomers from which it was formed,
- is **not** a polyester,
- was formed using condensation polymerisation.

What is the partial structure of **P**?

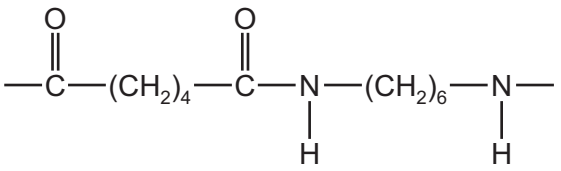
A



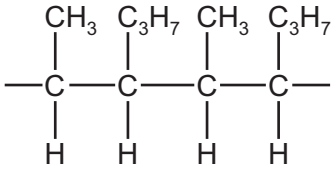
B



C



D



37 What are the products of photosynthesis?

A carbon dioxide and oxygen

B carbon dioxide and water

C glucose and water

D glucose and oxygen

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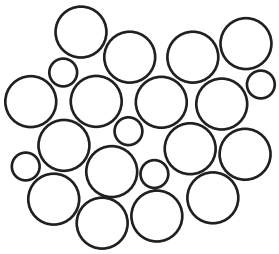
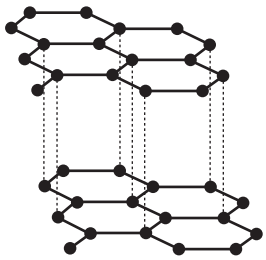
38 Which diagram shows the structure of an alloy?

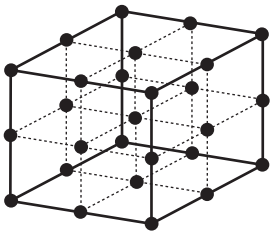
A



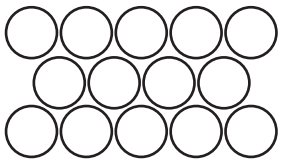
B



C



D



39 Hydrogen and nitrogen react to form ammonia.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Which statement is correct?

A Ammonia is made in industry by the Contact process.

B Ammonia is used in industry to make hydrogen and nitrogen.

C Hydrogen, for the forward reaction, is obtained from cracking oil.

D Weed killers are manufactured from ammonia.

40 Which statement about the hydrocarbon C_2H_4 is **not** correct?

A It contains a double bond.

B It decolourises bromine water.

C It forms a condensation polymer.

D It forms an alcohol when reacted with steam.

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DATA SHEET
The Periodic Table of the Elements

Group																		
I	II										III	IV	V	VI	VII	0
																4 He Helium 2
				1 H Hydrogen 1							11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
7 Li Lithium 3	9 Be Beryllium 4										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
23 Na Sodium 11	24 Mg Magnesium 12										70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80						
	226 Ra Radium 88	227 Ac Actinium †															

*58-71 Lanthanoid series	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
†90-103 Actinoid series	232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

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