Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/11**

Paper 1 Multiple Choice **May/June 2015**

1 hour

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

6370193137

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.

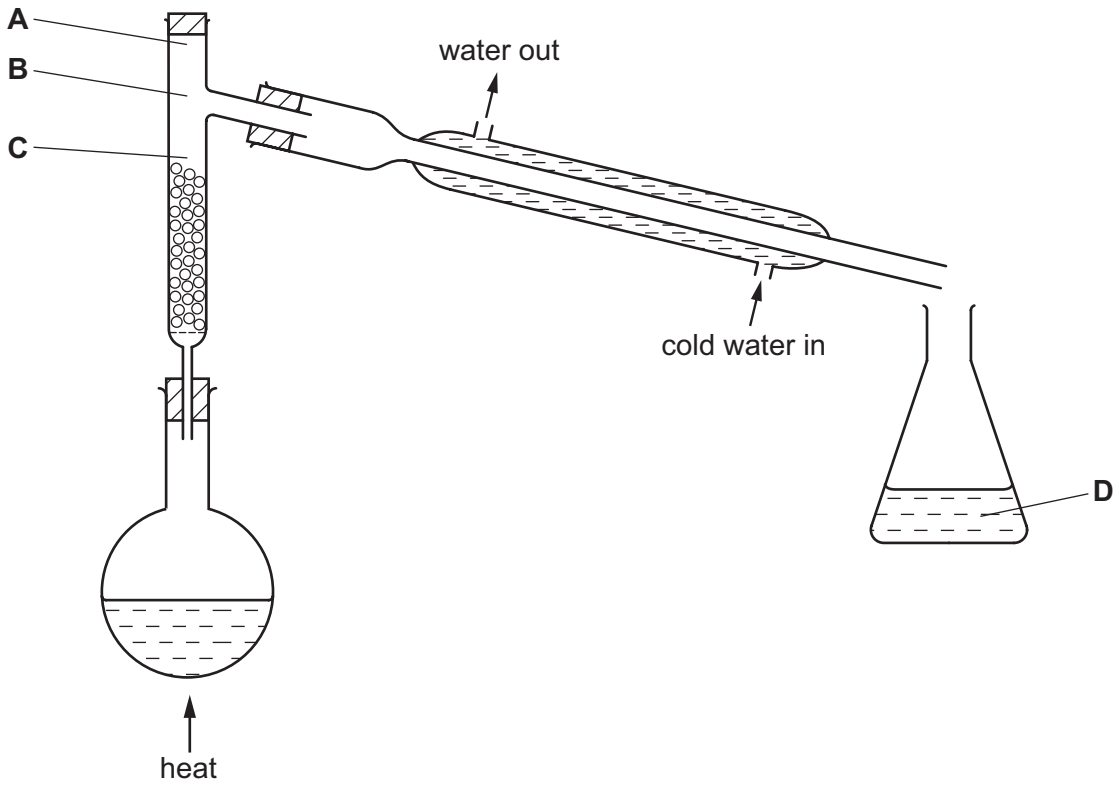
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

This document consists of **13** printed pages and **3** blank pages.

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1 The fractional distillation apparatus shown is being used to separate a mixture of two liquids. A thermometer is missing from the apparatus.

Where should the bulb of the thermometer be placed?



2 The table shows the results of two reactions of an aqueous solution of a salt.

reagents	final observation
excess aqueous sodium hydroxide	white precipitate
dilute nitric acid and aqueous silver nitrate	yellow precipitate

What is the name of the salt?

A calcium chloride

B calcium iodide

C zinc nitrate

D zinc sulfate

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3 Limestone reacts with hydrochloric acid.

Changing which reaction condition does **not** affect the rate of reaction?

A concentration of the acid

B limestone particle size

C pressure

D temperature

4 A particle contains 34 protons, 45 neutrons and 36 electrons.

Which symbol is correct for this particle?

A $^{79}_{34}Se$ **B** $^{79}_{34}Se^{-}$ **C** $^{79}_{34}Se^{2-}$ **D** $^{79}_{34}Se^{2+}$

5 Which molecule contains **three** shared pairs of electrons between two of its atoms?

A CO_2 **B** C_2H_4 **C** H_2O **D** N_2

6 What happens when sodium chloride melts?

A Covalent bonds in a giant lattice are broken.

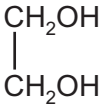
B Electrons are released from atoms.

C Electrostatic forces of attraction between ions are overcome.

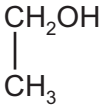
D Molecules are separated into ions.

7 Which compound contains only eight covalent bonds?

A



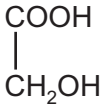
B



C



D



8 Which substance has metallic bonding?

	conducts electricity		state of product formed on reaction with oxygen
	when solid	when liquid	
A	✓	✓	solid
B	✓	✓	gas
C	✗	✓	no reaction
D	✗	✗	solid

9 A gas cylinder is placed in each of the four corners of a square room. Each cylinder contains a different gas stored under the same pressure. The gases are released at exactly the same time.

Which gas will reach the centre of the room first?

A ammonia, NH_3

B argon, Ar

C carbon monoxide, CO

D chlorine, Cl_2

10 Powdered calcium carbonate reacts with dilute hydrochloric acid to produce calcium chloride, water and carbon dioxide.

Which is the correct ionic equation, including state symbols, for this reaction?

A $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$

B $Ca^{2+}(aq) + CO_3^{2-}(aq) + 2H^+(aq) \rightarrow Ca^{2+}(aq) + H_2O(l) + CO_2(g)$

C $CO_3^{2-}(aq) + 2H^+(aq) \rightarrow H_2O(l) + CO_2(g)$

D $CaCO_3(s) + 2H^+(aq) \rightarrow Ca^{2+}(aq) + H_2O(l) + CO_2(g)$

11 What is the relative molecular mass, M_r, of $CuSO_4.5H_2O$?

A 127 **B** 160 **C** 178 **D** 250

12 1.00 dm^3 of ammonia gas is passed over heated copper(II) oxide.

$$3CuO(s) + 2NH_3(g) \rightarrow 3Cu(s) + N_2(g) + 3H_2O(l)$$

What is the volume of nitrogen formed when measured at the same temperature and pressure as the ammonia?

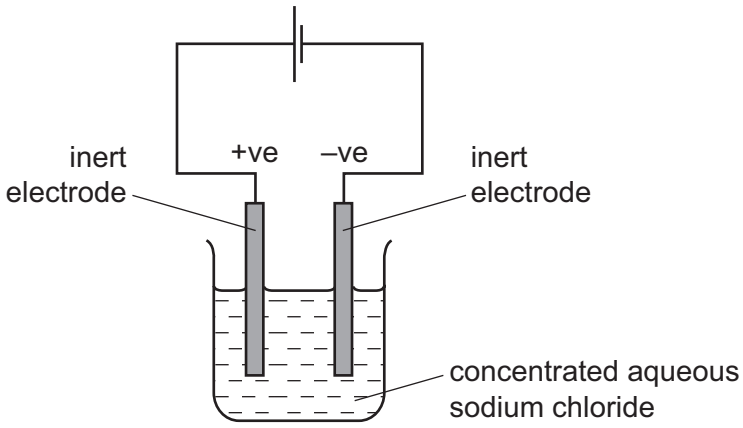
A 0.25 dm^3 **B** 0.50 dm^3 **C** 1.00 dm^3 **D** 2.00 dm^3

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13 What are the correct anode (positive electrode) and cathode (negative electrode) products when aqueous copper(II) sulfate is electrolysed using copper electrodes?

	anode product	cathode product
A	aqueous copper(II) ions	copper metal
B	aqueous copper(II) ions	hydrogen gas
C	oxygen gas	copper metal
D	oxygen gas	hydrogen gas

14 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.



Which statement about this electrolysis is correct?

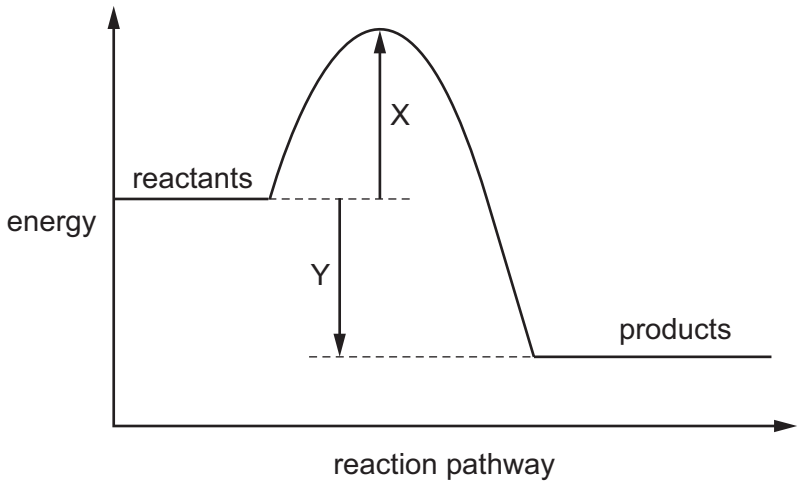
A Chloride ions travel through the solution to the negative electrode.

B Electrons travel through the solution to the sodium ions.

C Gases are given off at both electrodes.

D Sodium is formed at the negative electrode.

15 The diagram shows the energy profile of a chemical reaction. Two energy changes are labelled X and Y.



Which statement about the reaction is correct?

A The activation energy of the reaction is X + Y.

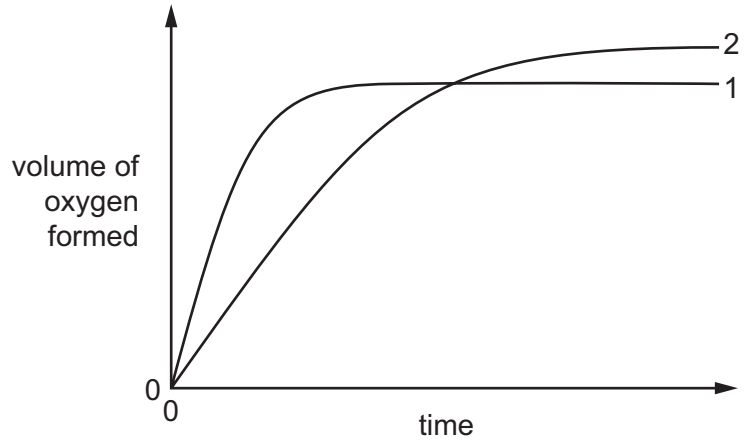
B The enthalpy change of the reaction is X.

C The enthalpy change of the reaction is X + Y.

D The reaction is exothermic.

16 In the graph, curve 1 was obtained by observing the decomposition of 100 cm^3 of 1.0 mol/dm^3 hydrogen peroxide solution, catalysed by manganese(IV) oxide.

$$2H_2O_2 \rightarrow 2H_2O + O_2$$



Which alteration to the original experimental conditions would produce curve 2?

A adding some 0.1 mol/dm^3 hydrogen peroxide solution

B lowering the temperature

C using less manganese(IV) oxide

D using a different catalyst

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17 The equation shows a redox reaction between iron(II) chloride and chlorine gas.

$$2FeCl_2 + Cl_2 \rightarrow 2FeCl_3$$

Which equation describes the reduction process in this reaction?

A $2Cl^- \rightarrow Cl_2 + 2e^-$

B $Cl_2 + 2e^- \rightarrow 2Cl^-$

C $Fe^{2+} \rightarrow Fe^{3+} + e^-$

D $Fe^{3+} + e^- \rightarrow Fe^{2+}$

18 Which row correctly describes the oxides?

	Al_2O_3	K_2O	MgO	SO_2
A	basic	acidic	acidic	amphoteric
B	acidic	basic	amphoteric	acidic
C	amphoteric	basic	amphoteric	acidic
D	amphoteric	basic	basic	acidic

19 Which substance is insoluble in water?

A ammonium carbonate

B ammonium nitrate

C calcium carbonate

D calcium nitrate

20 In which of these equilibria is the forward reaction favoured by an increase in pressure?

A $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$

B $N_2O_4(g) \rightleftharpoons 2NO_2(g)$

C $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$

D $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

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21 The Contact process, the Haber process and the hydrogenation of fats all involve the use of a catalyst.

Which row correctly describes whether the catalyst used in each process is an element or a compound?

	Contact process	Haber process	hydrogenation of fats
A	compound	compound	compound
B	compound	element	element
C	element	element	compound
D	element	element	element

22 Which element is sodium?

	melting point in °C	electrical conduction	density in g / cm^3
A	1535	good	7.86
B	1083	good	8.92
C	113	poor	2.07
D	98	good	0.97

23 A non-metal element forms oxides of the type XO_2 and XO_3.

What is *X*?

A aluminium

B carbon

C hydrogen

D sulfur

24 Aluminium reacts with chromium(III) oxide as shown.

aluminium + chromium(III) oxide $\rightarrow$ chromium + aluminium oxide

Which statements are correct?

1 Aluminium is more reactive than chromium.

2 A similar reaction would also take place between aluminium and iron(III) oxide.

3 Iron(III) oxide is reduced by another metal in the blast furnace.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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25 Using the Periodic Table for the relative atomic masses, which has the least mass?

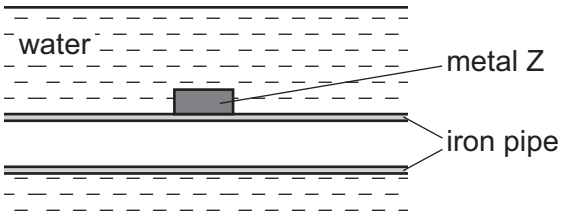
A 0.1 moles of silicon dioxide, SiO_2

B 0.5 moles of oxygen, O_2

C 0.5 moles of lithium, Li

D 1.0 moles of ammonia, NH_3

26 The diagram shows how an underwater iron pipe can be protected from rusting.



Metal Z can be .....1..... because it is .....2..... reactive than iron.

Which words correctly complete gaps 1 and 2?

	1	2
A	copper	less
B	copper	more
C	magnesium	less
D	magnesium	more

27 Brass is an alloy.

Which statement about brass is correct?

A It contains a sea of electrons.

B It contains positive and negative ions which are free to move.

C It is a compound of a metal and a non-metal.

D It is a compound of two or more metals.

28 Which item is made from mild steel?

A a car body

B a container to store gas in a chemical plant

C a scalpel for use in an operating theatre

D a set of cutlery

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[Turn over

29 The table shows the composition of exhaust gases from an internal combustion engine.

gas	% of the gas in the exhaust fumes
gas **Y**	71
carbon dioxide	14
water vapour	13
carbon monoxide	1
hydrocarbons	0.3
nitrogen oxides	0.2
sulfur dioxide	less than 0.003

What is gas **Y**?

A ammonia

B argon

C chlorine

D nitrogen

30 Which two gases do **not** damage limestone buildings?

A nitrogen and carbon monoxide

B nitrogen dioxide and carbon monoxide

C nitrogen dioxide and carbon dioxide

D sulfur dioxide and carbon dioxide

31 Iron(III) oxide can be reduced to iron by carbon.

Which other element can reduce iron(III) oxide to iron?

A copper

B lead

C magnesium

D silver

32 An ammonium salt was added to excess hot aqueous sodium hydroxide. Ammonia gas was evolved. When no more ammonia was evolved, aluminium was added to the solution remaining and more ammonia gas was given off.

What was the ammonium salt?

A NH_4Cl **B** NH_4NO_3 **C** $(NH_4)_2CO_3$ **D** $(NH_4)_2SO_4$

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33 Two esters have the same molecular formula, $C_3H_6O_2$.

What are the names of these two esters?

1 methyl ethanoate

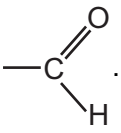
2 ethyl propanoate

3 ethyl methanoate

4 propyl methanoate

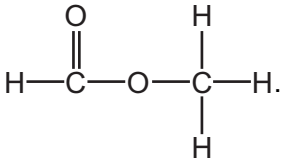
A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

34 Which statement is correct?

A Carboxylic acids contain the functional group .

B Ethanoic acid will react and fizz when copper is added.

C Ethanol will decolourise acidified potassium manganate(VII).

D The structure of ethyl ethanoate is .

35 When cracked, one mole of a compound, **X**, produces one mole of propene and one mole of hydrogen.

$$\mathbf{X} \rightarrow C_3H_6 + H_2$$

What type of compound is **X**?

A an alcohol

B an alkane

C an alkene

D a carboxylic acid

36 Which is a correct definition of isomers?

A atoms with the same relative atomic mass and different structures

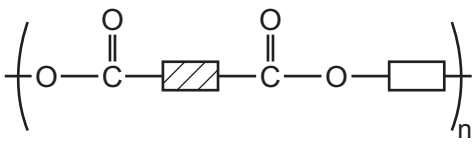
B compounds with the same molecular formula and different structures

C compounds with the same molecular mass and different structures

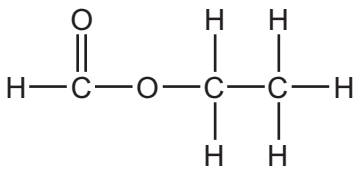
D elements with the same molecular mass and the same structures

37 Which of the following has **not** been prepared by reacting a carboxylic acid with an alcohol?

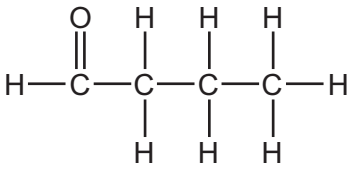
A



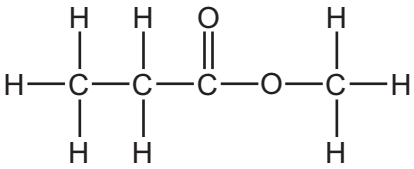
B



C



D



38 Which of these polymers is a protein?

A $(C_2H_3Cl)_n$ **B** $(C_5H_8O_2)_n$ **C** $(C_6H_{10}O_5)_n$ **D** $(C_2H_3NO)_n$

39 In the addition polymer poly(propene), what is the simplest ratio of carbon atoms to hydrogen atoms?

	carbon atoms	hydrogen atoms
A	1	2
B	2	1
C	2	4
D	3	6

40 Which statement about vegetable oil and the margarine made from it is correct?

A Both are liquids at room temperature.

B Both occur naturally.

C Margarine has the higher melting point.

D Vegetable oil has fewer carbon-carbon double bonds than margarine.

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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						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									11 B Boron 5	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									27 Al Aluminium 13	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	70 Ga Gallium 31	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 89 †															

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
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

*58-71 Lanthanoid series
†90-103 Actinoid series

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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