UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/01**

Paper 1 Multiple Choice **October/November 2007**

1 hour

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

1678689021

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, 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.

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.

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

1 A test-tube containing a liquid **X** is placed in a beaker of boiling water. The liquid **X** starts to boil immediately.

What is the boiling point of liquid **X**?

A 100 °C

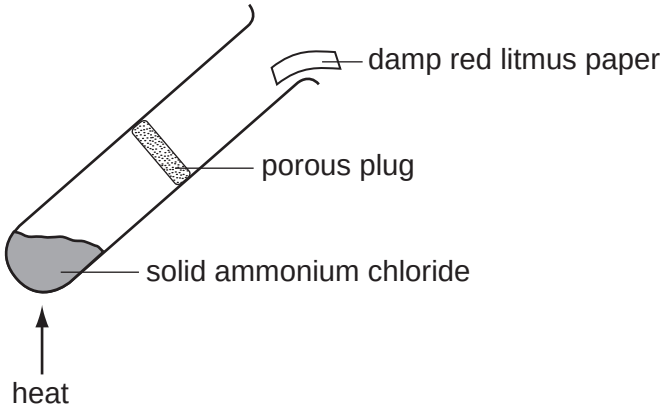
B above 100 °C

C between 0 °C and room temperature

D between room temperature and 100 °C

2 Solid ammonium chloride decomposes on heating according to the following equation.

$$NH_4Cl(s) \rightarrow NH_3(g) + HCl(g)$$



Which change occurs to the damp red litmus paper in the experiment above?

A remains red

B turns blue and is then bleached

C turns blue and remains blue

D turns blue and then turns red

3 Compound **X** reacts with some metals to liberate hydrogen and is used to make fertilisers.

It gives a white precipitate when added to aqueous barium nitrate.

What is **X**?

A ammonium sulphate

B hydrochloric acid

C potassium nitrate

D sulphuric acid

4 An aqueous solution of zinc chloride is tested with various reagents.

Which observation is correct?

A Acidified barium nitrate solution gives a white precipitate.

B Aqueous ammonia gives a white precipitate soluble in excess of the reagent.

C Copper turnings precipitate zinc.

D Sodium hydroxide solution gives a white precipitate insoluble in excess of the reagent.

5 What correctly describes the molecules in **very dilute** sugar solution at room temperature?

	sugar molecules	water molecules
A	widely separated, moving at random	close together, moving at random
B	widely separated, moving at random	close together, not moving
C	widely separated, not moving	widely separated, moving at random
D	close together, moving at random	close together, moving at random

6 Which statement is correct about sulphur, atomic number 16?

A Sulphur can form the ion S^{2-}.

B Sulphur dissolves in water to form sulphuric acid.

C Sulphur forms ionic oxides.

D Sulphur will react with metals to produce S^{6+} ions.

7 A researcher notices that atoms of an element **X** are releasing energy.

Why does this happen?

A The atoms are absorbing light.

B The atoms are radioactive.

C The atoms react with argon in the air.

D The atoms are evaporating.

8 Which material has the highest melting point?

A ammonia

B methane

C sodium chloride

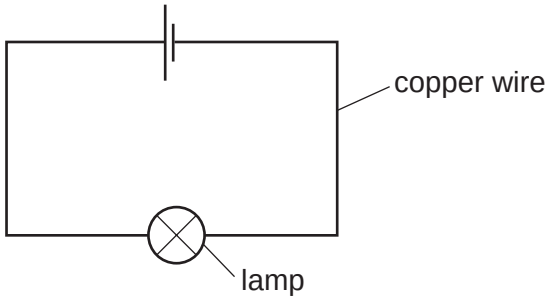
D water

9 The table shows some properties of diamond and graphite.

For which property is the reason correct?

	property	reason
A	diamond cuts glass	the bonds in glass are stronger than those in diamond
B	diamond is a hard substance	there are many ionic bonds in diamond
C	graphite is a lubricant	there are weak bonds between graphite layers
D	graphite conducts electricity	graphite contains freely moving ions

10 An electrical circuit is set up using copper wire.



Which process takes place in the copper wire?

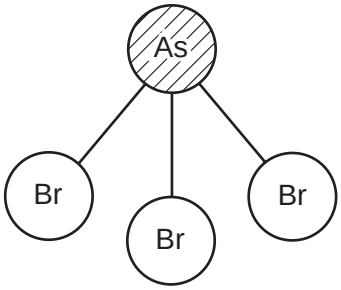
A Electrons move along the wire to the negative terminal, positive ions stay in position.

B Electrons move along the wire to the positive terminal, positive ions move to the negative terminal.

C Electrons move along the wire to the positive terminal, positive ions stay in position.

D Negative ions move along the wire to the positive terminal, positive ions move to the negative terminal.

11 A molecule of arsenic bromide, $AsBr_3$, has the structure shown.



Which properties could be correct for arsenic bromide?

	melting point / °C	electrical conductivity at room temperature
A	28	does not conduct
B	39	conducts
C	650	conducts
D	755	does not conduct

12 The equation represents the action of dilute nitric acid on copper.

$$x\text{Cu} + y\text{HNO}_3 \rightarrow x\text{Cu(NO}_3)_2 + 4\text{H}_2\text{O} + 2\text{NO}$$

What are the values of x and y?

A $x = 1$, $y = 4$

B $x = 1$, $y = 8$

C $x = 3$, $y = 4$

D $x = 3$, $y = 8$

13 Which statement about the substance formed when a given mass of an element burns in excess oxygen is **always** correct?

The substance formed is

A denser than the element.

B greater in mass than the element.

C soluble in water.

D white in colour.

14 Which statement is correct about the electrolysis of an aqueous solution of copper(II) sulphate with platinum electrodes?

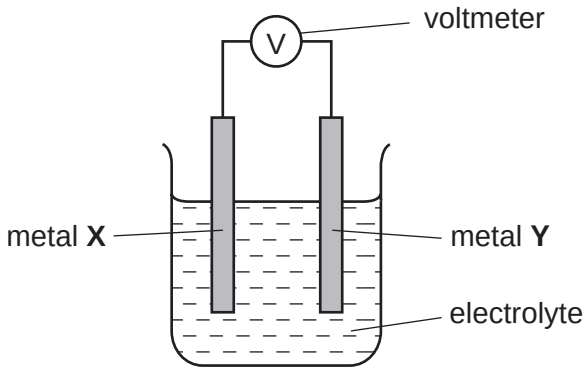
A Oxygen is given off at the positive electrode.

B The mass of the negative electrode remains constant.

C The mass of the positive electrode decreases.

D There is no change in the colour of the solution.

15 The diagram shows a simple cell.



Which two metals produce the highest reading on the voltmeter?

	X	Y
A	magnesium	copper
B	magnesium	iron
C	zinc	copper
D	zinc	iron

16 In which process is energy released?

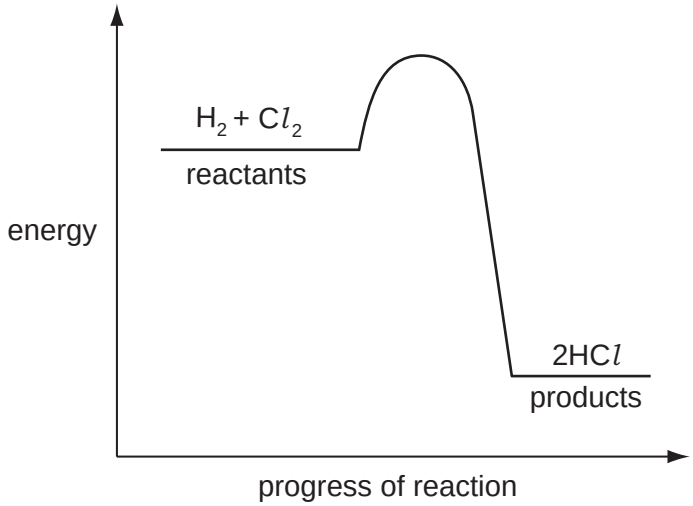
A electrolysis of water to form hydrogen and oxygen

B forming a hydrogen molecule from two hydrogen atoms

C fractional distillation of crude oil

D photosynthesis

17 The energy profile diagram for the reaction between hydrogen and chlorine is shown.



What information about this reaction does the diagram show?

	type of reaction	sign of enthalpy change, ΔH
A	endothermic	negative
B	endothermic	positive
C	exothermic	negative
D	exothermic	positive

18 Carbon dioxide was produced when a given mass of zinc carbonate reacted with excess hydrochloric acid.

Which result shows what would happen if the reaction were repeated at a higher temperature?

	volume of carbon dioxide	rate of reaction
A	same	faster
B	same	slower
C	greater	same
D	greater	faster

[Turn over

19 The reaction between hydrogen sulphide and sulphur dioxide is represented by the equation shown.

$$2H_2S(g) + SO_2(g) \rightarrow 2H_2O(l) + 3S(s)$$

reactants products

What occurs in this reaction?

A Both reactants are reduced.

B The two reactants are neither oxidised nor reduced.

C Hydrogen sulphide is oxidised and sulphur dioxide is reduced.

D Sulphur dioxide is oxidised and hydrogen sulphide is reduced.

20 In which compound does the element *X* have the highest oxidation state?

A X_2O **B** X_4O **C** XO_2 **D** XO_4

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

A sodium chloride solution and silver nitrate solution

B sodium hydroxide solution and dilute ethanoic acid

C sodium carbonate solution and dilute sulphuric acid

D zinc and dilute hydrochloric acid

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

23 The table gives information about the solubilities of the hydroxides, carbonates and sulphates of calcium, sodium and zinc.

	hydroxide	carbonate	sulphate
calcium	slightly soluble	insoluble	slightly soluble
sodium	soluble	soluble	soluble
zinc	insoluble	insoluble	soluble

What is the best way of making zinc carbonate?

A Shake aqueous zinc sulphate with aqueous sodium carbonate.

B Shake aqueous zinc sulphate with solid calcium hydroxide and bubble in carbon dioxide.

C Shake solid zinc hydroxide with aqueous sodium hydroxide and bubble in carbon dioxide.

D Shake solid zinc sulphate and solid calcium carbonate with water.

24 In the Periodic Table, how many periods are needed to accommodate the elements of atomic numbers 1-18?

A 2 **B** 3 **C** 4 **D** 8

25 Which pair of properties are **both** correct for a typical transition element?

	property 1	property 2
A	forms coloured compounds	soluble in water
B	high density	has variable oxidation states
C	low melting point	can act as a catalyst
D	low density	high melting point

26 Sodium, aluminium and sulphur are in the same period of the Periodic Table.

Which trend in types of oxide occurs across this period?

	left ⟶		right
A	acidic	amphoteric	basic
B	amphoteric	basic	acidic
C	basic	acidic	amphoteric
D	basic	amphoteric	acidic

[Turn over

27 Which substance leaves a black solid when heated?

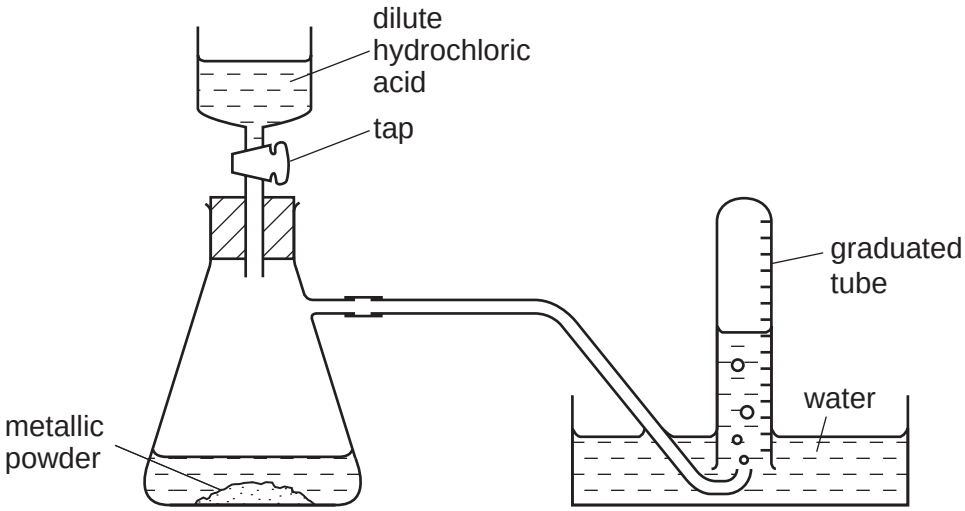
A calcium carbonate

B copper(II) carbonate

C potassium carbonate

D zinc carbonate

28 The diagram shows apparatus for measuring the volume of hydrogen given off when an excess of dilute hydrochloric acid is added to powdered metal. The volume of gas is measured at room temperature and pressure.



The experiment is carried out three times, using the same mass of powder each time but with different powders:

- pure magnesium
- pure zinc
- a mixture of magnesium and zinc

Which powder gives the greatest volume of hydrogen and which the least volume?

	greatest volume of H_2	least volume of H_2
A	magnesium	zinc
B	magnesium	the mixture
C	zinc	magnesium
D	zinc	the mixture

29 Which metal can react rapidly with steam, but reacts only **very slowly** with cold water?

A calcium

B copper

C iron

D potassium

30 Which statement about the extraction of aluminium from aluminium oxide is correct?

A Aluminium is extracted by heating its oxide with carbon.

B Aluminium is extracted using electrolysis and is collected at the anode (positive electrode).

C Aluminium is extracted using platinum electrodes and direct current.

D Molten cryolite is used as a solvent for aluminium oxide.

31 All ammonium salts on heating with sodium hydroxide produce ammonia gas.

From which ammonium salt can the greatest mass of ammonia be obtained?

A 0.5 mol $(NH_4)_3PO_4$

B 0.5 mol $(NH_4)_2SO_4$

C 1.0 mol NH_4Cl

D 1.0 mol NH_4NO_3

32 Which is a use of sulphuric acid?

A as a bleach

B in the manufacture of ammonia

C in the manufacture of fertilisers

D in the manufacture of sulphur trioxide

33 Why are catalytic converters fitted to car exhausts?

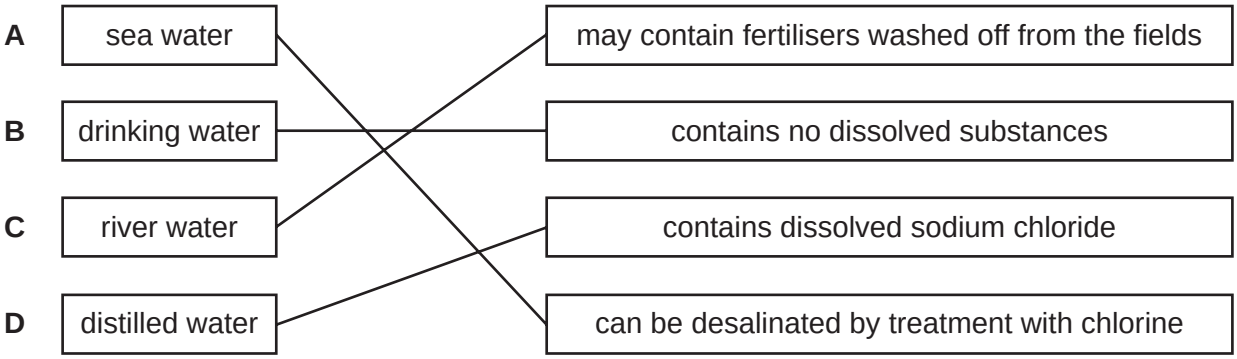
A to decrease the amount of carbon dioxide emitted

B to decrease the amount of nitrogen oxides emitted

C to improve energy conservation

D to reduce global warming

34 Which type of water in the left hand column is linked correctly to a statement in the right hand column?



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 When ethanol is left standing in the air for some time it becomes acidic.

Which equation represents this change?

A $CH_3CH_2OH + CO \rightarrow CH_3CH_2CO_2H$

B $CH_3CH_2OH + O_2 \rightarrow CH_3CO_2H + H_2O$

C $CH_3CH_2OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

D $2CH_3CH_2OH + O_2 \rightarrow 2CH_3CO_2H + 2H_2$

37 A 10 cm^3 sample of a gaseous hydrocarbon is completely burnt in oxygen. The total volume of the products is 70 cm^3.

Which equation represents the combustion of the hydrocarbon?

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

B $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$

C $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$

D $2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$

38 What is produced when proteins are hydrolysed?

A alcohols

B amides

C amino acids

D sugars

39 Methane is the first member of the alkane series of hydrocarbons. The second member is ethane which

1 has the formula C_2H_4.

2 has a higher boiling point than that of methane.

3 has the same empirical formula as methane.

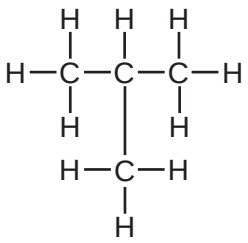
4 has chemical properties very similar to those of methane.

Which statements are correct?

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

40 The diagrams show four structures.

1



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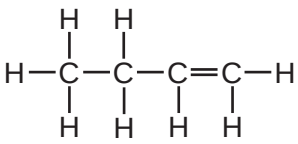

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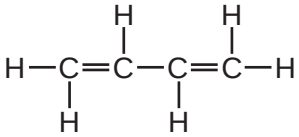

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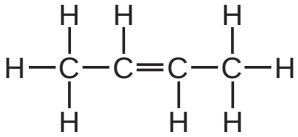

Which structures are isomeric butenes?

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

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DATA SHEET
The Periodic Table of the Elements

																	4 He Helium 2
											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
											70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
											115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
											204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86

I	II																
7 Li Lithium 3	9 Be Beryllium 4																
23 Na Sodium 11	24 Mg Magnesium 12																
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						
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48						
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 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60		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	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	247 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	257 Fm Fermium 100	258 Md Mendelevium 101	259 No Nobelium 102	262 Lr Lawrencium 103

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

Key

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

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