



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**CHEMISTRY**

**5070/12**

Paper 1 Multiple Choice

**October/November 2011**

**1 hour**

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



**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.

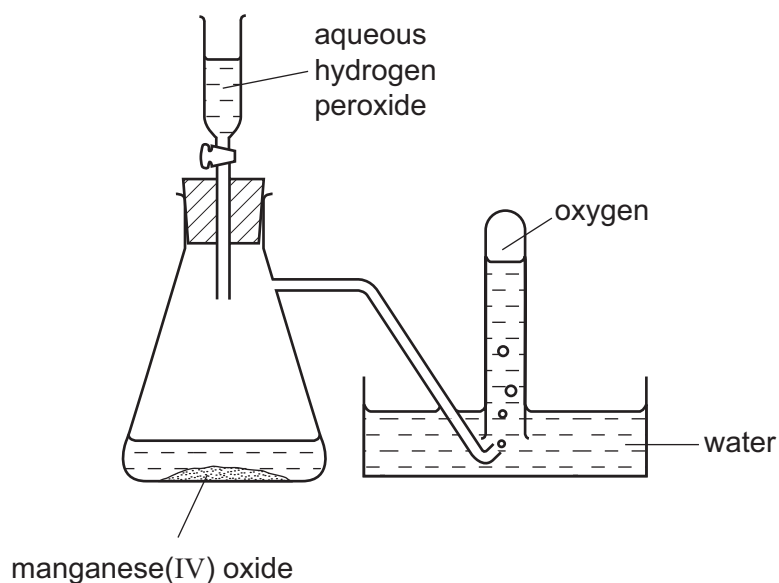
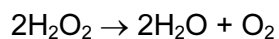
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 12.

This document consists of **12** printed pages.



- 1 Oxygen was prepared from hydrogen peroxide, with manganese(IV) oxide as catalyst. The oxygen was collected as shown in the diagram.



The first few tubes of gas were rejected because the gas was contaminated by

- A hydrogen.
  - B hydrogen peroxide.
  - C nitrogen.
  - D water vapour.
- 2 The labels fell off two bottles each containing a colourless solution, one of which was sodium carbonate solution and the other was sodium chloride solution.

The addition of which solution to a sample from each bottle would **most** readily enable the bottles to be correctly relabelled?

- A ammonia
- B hydrochloric acid
- C lead(II) nitrate
- D sodium hydroxide

- 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 In which pair is each substance a mixture?
- A air and water  
B limewater and water  
C quicklime and limewater  
D sea water and air
- 5 A researcher notices that atoms of an element are releasing energy.

Why are the atoms releasing energy?

- A The atoms are absorbing light.  
B The atoms are evaporating.  
C The atoms are radioactive.  
D The atoms react with argon in the air.
- 6 Radium (Ra) is in the same group of the Periodic Table as magnesium.

What is the charge on a radium ion?

- A 2-                      B 1-                      C 1+                      D 2+

- 7 How many of the molecules shown contain only one covalent bond?

$Cl_2$                        $H_2$                        $HCl$                        $N_2$                        $O_2$

- A 2                      B 3                      C 4                      D 5

8 Below are two statements about metals.

- 1 Metals contain a lattice of negative ions in a 'sea of electrons'.
- 2 The electrical conductivity of metals is related to the mobility of the electrons in the structure.

Which is correct?

- A Both statements are correct and statement 1 explains statement 2.
  - B Both statements are correct but statement 1 does not explain statement 2.
  - C Statement 1 is correct and statement 2 is incorrect.
  - D Statement 2 is correct and statement 1 is incorrect.
- 9 Which compound contains three elements?
- A aluminium chloride
  - B iron(III) oxide
  - C potassium oxide
  - D sodium carbonate
- 10 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.

11 What is the relative molecular mass  $M_r$  of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ?

- A 160                      B 178                      C 186                      D 250

12 What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 2 g of gaseous hydrogen? [Relative atomic masses  $A_r$  (atomic weights): H, 1; Cl, 35.5]

- A 1:1                      B 1:2                      C 2:1                      D 71:2

13 How can sodium be manufactured?

- A by electrolysing aqueous sodium chloride
- B by electrolysing aqueous sodium hydroxide
- C by electrolysing molten sodium chloride
- D by heating sodium oxide with carbon

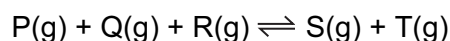
14 Which pair of statements about the combustion of a carbohydrate and its formation by photosynthesis is **not** correct?

	combustion	photosynthesis
<b>A</b>	chemical energy converted to heat energy	chemical energy converted to light energy
<b>B</b>	no catalyst needed	catalyst needed
<b>C</b>	oxygen used up	oxygen released
<b>D</b>	reaction exothermic	reaction endothermic

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

- 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.

16 The following reversible reaction takes place in a closed vessel at constant temperature.



When the system has reached equilibrium, more T is added.

Which increases in concentration occur?

- A P, Q, R and S
- B P and Q only
- C P, Q and R only
- D S only

17 An excess of calcium hydroxide is added to an acidic soil.

What happens to the pH of the soil?

	change in pH	final pH
<b>A</b>	decrease	5
<b>B</b>	decrease	7
<b>C</b>	increase	7
<b>D</b>	increase	10

18 A lump of element **X** can be cut by a knife.

During its reaction with water, **X** floats and melts.

What is X?

- A** calcium
- B** copper
- C** magnesium
- D** potassium

19 The table gives the formulae of the catalysts used in some industrial processes.

process	catalyst
Haber process	Fe + Mo
Contact process	$V_2O_5$
cracking of alkanes	$Al_2O_3 + SiO_2$
polymerisation of ethene	$Al(C_2H_5)_3 + TiCl_4$
manufacture of silicones	$CuCl$

How many different transition metals are included, as elements or as compounds, in the list of catalysts?

- A** 3
- B** 4
- C** 5
- D** 6

20 Which statement about the elements chlorine, bromine and iodine is correct?

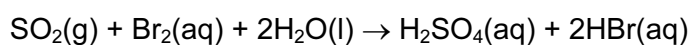
- A** They are all gases at room temperature and pressure.
- B** They are in the same period of the Periodic Table.
- C** They become darker in colour from chlorine to bromine to iodine.
- D** They possess one electron in the outermost shell.

- 21 Ammonium sulfate and potassium sulfate are salts which can be found in fertilisers. A sample of a fertiliser is warmed with aqueous sodium hydroxide and a gas with pH10 is given off.

Which salt must be in the fertiliser and which gas is given off?

	salt in fertiliser	name of gas
<b>A</b>	ammonium sulfate	ammonia
<b>B</b>	ammonium sulfate	sulfur dioxide
<b>C</b>	potassium sulfate	ammonia
<b>D</b>	potassium sulfate	sulfur dioxide

- 22 Sulfur dioxide reacts with aqueous bromine according to the following equation.



Which element has been oxidised?

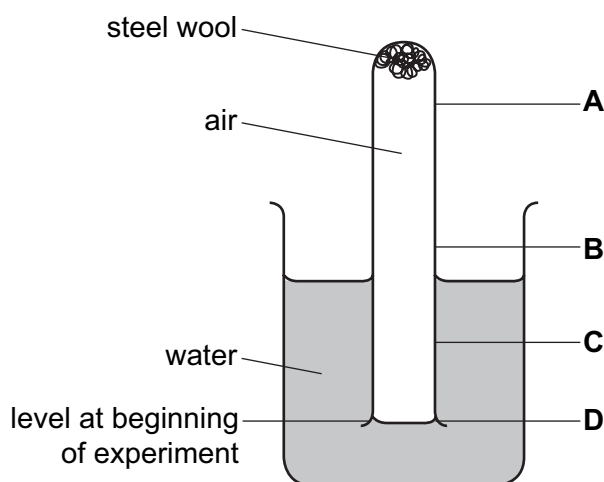
- A** bromine
  - B** hydrogen
  - C** oxygen
  - D** sulfur
- 23 Which substance would **not** be used for preparing a pure sample of crystalline magnesium sulfate by reaction with dilute sulfuric acid?
- A** magnesium carbonate
  - B** magnesium hydroxide
  - C** magnesium nitrate
  - D** magnesium oxide
- 24 Which carbonate decomposes on heating to give a black solid and a colourless gas?
- A** calcium carbonate
  - B** copper(II) carbonate
  - C** sodium carbonate
  - D** zinc carbonate

25 Which row shows the three metals in the correct order of decreasing reactivity?

	most active	—————>	least active
<b>A</b>	copper	zinc	iron
<b>B</b>	iron	copper	zinc
<b>C</b>	iron	zinc	copper
<b>D</b>	zinc	iron	copper

26 The diagram shows steel wool inside a test-tube. The test-tube is inverted in water, trapping air inside.

What will be the water level inside the tube after several days?



27 Iron is manufactured in the blast furnace.

Which statement about iron and its manufacture is **not** true?

- A** Iron ore is readily abundant.
- B** It is a continuous process.
- C** Pure iron is produced.
- D** The reducing agent is cheap.

28 Which equation shows a reaction that would actually take place?

- A**  $2\text{MgO} + \text{C} \rightarrow \text{CO}_2 + \text{Mg}$
- B**  $\text{MgO} + \text{Cu} \rightarrow \text{CuO} + \text{Mg}$
- C**  $\text{PbO} + \text{Zn} \rightarrow \text{ZnO} + \text{Pb}$
- D**  $\text{ZnO} + \text{H}_2 \rightarrow \text{H}_2\text{O} + \text{Zn}$



- 29 Which gas **cannot** be removed from the exhaust gases of a petrol-powered car by its catalytic converter?
- A carbon dioxide
  - B carbon monoxide
  - C hydrocarbons
  - D nitrogen dioxide
- 30 Which statement shows that diamond and graphite are different forms of the element carbon?
- A Both have giant molecular structures.
  - B Complete combustion of equal masses of each produces equal masses of carbon dioxide as the only product.
  - C Graphite conducts electricity, whereas diamond does not.
  - D Under suitable conditions, graphite can be converted into diamond.
- 31 A sample of tap water gave a white precipitate with acidified silver nitrate.
- What does this show about the tap water?
- A It contained chloride.
  - B It contained harmful microbes.
  - C It contained nitrates.
  - D It had not been filtered.
- 32 Which noble gas is present in the largest percentage by volume in air?
- A argon
  - B helium
  - C krypton
  - D neon
- 33 What is the purpose of vanadium(V) oxide in the Contact Process?
- A It oxidises sulfur to sulfur dioxide.
  - B It oxidises sulfur to sulfur trioxide.
  - C It speeds up the conversion of sulfur dioxide into sulfur trioxide.
  - D It speeds up the conversion of sulfur trioxide into sulfuric acid.

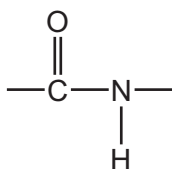
34 Shown below are some properties of compound X.

- reacts with potassium carbonate to produce carbon dioxide
- reacts with ethanol to produce a sweet-smelling liquid
- reacts with sodium hydroxide to produce a salt

What is X?

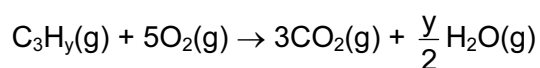
- A ethanol
- B ethanoic acid
- C ethyl ethanoate
- D ethyl methanoate

35 Which pair of macromolecules both contain the linkage shown?



- A fats and proteins
- B nylon and proteins
- C starch and sugars
- D *Terylene* and sugars

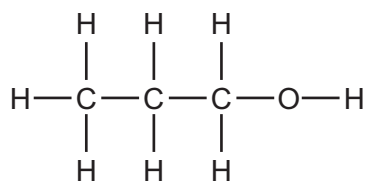
36 A hydrocarbon,  $\text{C}_3\text{H}_y$ , burns in air to form carbon dioxide and water.



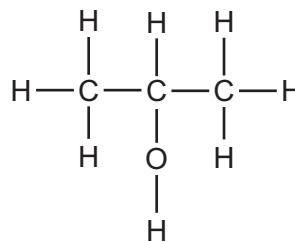
What is the value of  $y$ ?

- A 4
- B 6
- C 7
- D 8

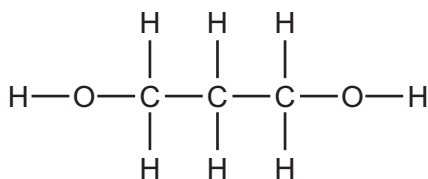
37 The structural formulae of some organic compounds are shown below.



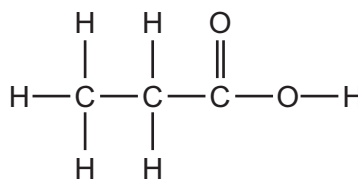
1



2



3



4

Which compounds are alcohols?

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

38 A hydride is a compound containing only two elements, one of which is hydrogen.

Which element forms the **most** hydrides?

- A** carbon  
**B** chlorine  
**C** nitrogen  
**D** oxygen

39 Which compound is manufactured by reacting ethene with steam in the presence of a heated catalyst?

- A**  $\text{C}_2\text{H}_6$             **B**  $\text{C}_2\text{H}_5\text{OH}$             **C**  $\text{C}_4\text{H}_8$             **D**  $\text{C}_4\text{H}_9\text{OH}$

40 Under certain conditions 1 mole of ethane reacts with 2 moles of chlorine in a substitution reaction.

What is the formula of the organic product in this reaction?

- A**  $\text{C}_2\text{H}_5\text{Cl}$             **B**  $\text{C}_2\text{H}_4\text{Cl}_2$             **C**  $\text{C}_2\text{H}_2\text{Cl}_4$             **D**  $\text{CH}_2\text{Cl}_2$

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group											
I	II	III	IV	V	VI	VII	0						
		1 <b>H</b> Hydrogen 1											4 <b>He</b> Helium 2
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											20 <b>Ne</b> Neon 10	
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18						84 <b>Kr</b> Krypton 36
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	131 <b>Xe</b> Xenon 54
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	101 <b>Ru</b> Ruthenium 44	101 <b>Tc</b> Technetium 43	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	209 <b>Po</b> Polonium 84
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	186 <b>Os</b> Osmium 76	186 <b>Re</b> Rhenium 75	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86
226 <b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89											

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

	a	<b>X</b>	b	
<b>Key</b>	a = relative atomic mass	X = atomic symbol	b = proton (atomic) number	

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

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

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