



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

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**CHEMISTRY**

**5070/11**

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)

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**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.

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



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

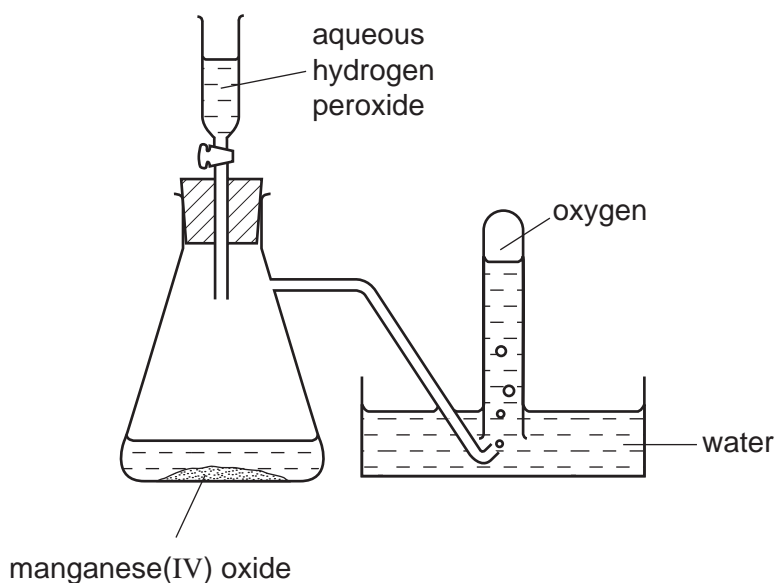
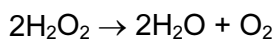
Which is the best procedure for rinsing the flask?

- 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.
- 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 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.
- 4 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+

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



- A** 2                      **B** 3                      **C** 4                      **D** 5

- 6 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

- 7 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.
- 8 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.
- 9 Which compound contains three elements?
- A aluminium chloride
  - B iron(III) oxide
  - C potassium oxide
  - D sodium carbonate

- 10 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.

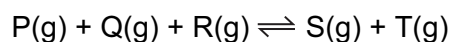
Which is correct?

- 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.
- 11 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

- 12 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
- 13 How can sodium be manufactured?
- A by electrolysis aqueous sodium chloride  
 B by electrolysis aqueous sodium hydroxide  
 C by electrolysis molten sodium chloride  
 D by heating sodium oxide with carbon
- 14 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.
- 15 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

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

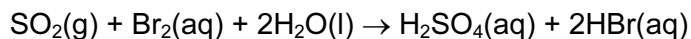


When the system has reached equilibrium, more T is added.

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



Which element has been oxidised?

- A bromine
  - B hydrogen
  - C oxygen
  - D sulfur
- 18 An excess of calcium hydroxide is added to an acidic soil.

What happens to the pH of the soil?

	change in pH	final pH
A	decrease	5
B	decrease	7
C	increase	7
D	increase	10

- 19 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

- 20 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
A	ammonium sulfate	ammonia
B	ammonium sulfate	sulfur dioxide
C	potassium sulfate	ammonia
D	potassium sulfate	sulfur dioxide

21 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

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

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

What is X?

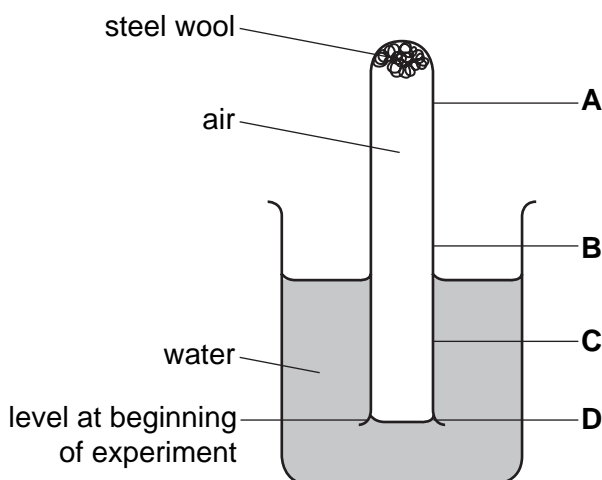
- A** calcium  
**B** copper  
**C** magnesium  
**D** potassium

23 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.

- 24 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?



- 25 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

- 26 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.

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

	most active	→	least active
A	copper		zinc iron
B	iron		copper zinc
C	iron		zinc copper
D	zinc		iron copper



- 28 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
- 29 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  $\text{ZnO} + \text{H}_2 \rightarrow \text{H}_2\text{O} + \text{Zn}$
- 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 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.
- 32 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.

33 Which noble gas is present in the largest percentage by volume in air?

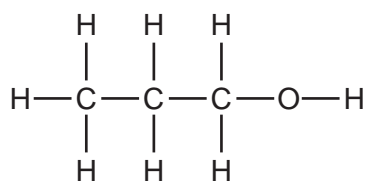
- A argon
- B helium
- C krypton
- D neon

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

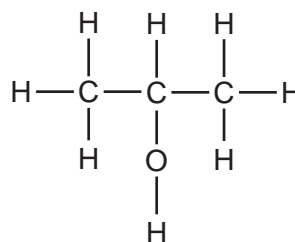
Which element forms the **most** hydrides?

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

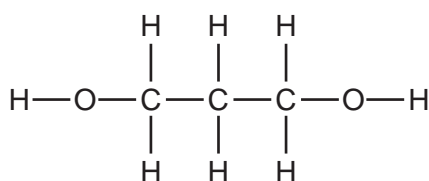
35 The structural formulae of some organic compounds are shown below.



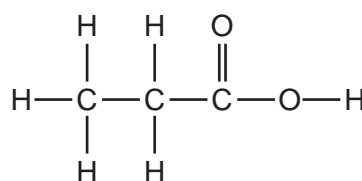
1



2



3



4

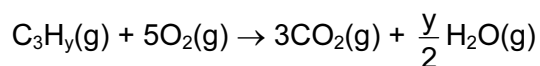
Which compounds are alcohols?

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

36 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  $\text{C}_4\text{H}_9\text{OH}$

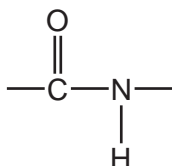
37 A hydrocarbon,  $C_3H_y$ , burns in air to form carbon dioxide and water.



What is the value of  $y$ ?

- A 4                      B 6                      C 7                      D 8

38 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

39 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  $C_2H_5Cl$               B  $C_2H_4Cl_2$               C  $C_2H_2Cl_4$               D  $CH_2Cl_2$

40 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

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

		Group														
I	II	III	IV	V	VI	VII	O					O				
		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	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9					35.5 <b>Cl</b> Chlorine 17					
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16					79 <b>Se</b> Selenium 34	84 <b>Kr</b> Krypton 36					
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34					127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54					
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	65 <b>Zn</b> Zinc 30	64 <b>Cu</b> Copper 29	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47					207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83					
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	59 <b>Ni</b> Nickel 28	59 <b>Co</b> Cobalt 27	103 <b>Rh</b> Rhodium 45	101 <b>Ru</b> Ruthenium 44	190 <b>Os</b> Osmium 76	186 <b>Re</b> Rhenium 75	184 <b>W</b> Tungsten 74	181 <b>Ta</b> Tantalum 73	178 <b>Hf</b> Hafnium 72						
<p>*58-71 Lanthanoid series †90-103 Actinoid series</p>																
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	146 <b>Pm</b> Promethium 61	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>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92		
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			100 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103		
<p><b>Key</b></p> <table style="display: inline-table; border: 1px solid black; padding: 5px;"> <tr> <td style="padding: 2px 5px;">a</td> <td style="padding: 2px 5px;"><b>X</b></td> </tr> <tr> <td style="padding: 2px 5px;">b</td> <td style="padding: 2px 5px;"></td> </tr> </table> <p>a = relative atomic mass X = atomic symbol b = proton (atomic) number</p>													a	<b>X</b>	b	
a	<b>X</b>															
b																

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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