



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

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)



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

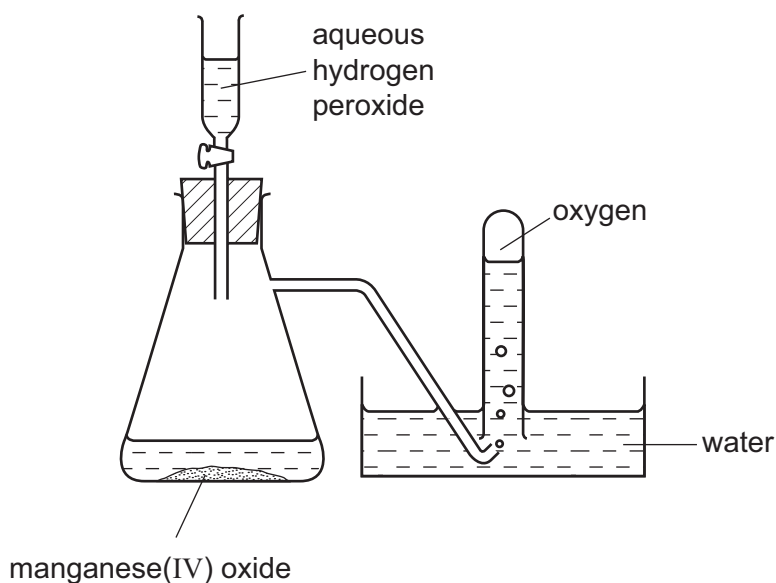
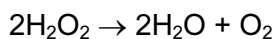
Which is the best procedure for rinsing the flask?

- 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.

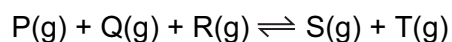
11 What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 2 g of gaseous hydrogen? [Relative atomic masses A_r (atomic weights): H, 1; Cl, 35.5]

- 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
A	chemical energy converted to heat energy	chemical energy converted to light energy
B	no catalyst needed	catalyst needed
C	oxygen used up	oxygen released
D	reaction exothermic	reaction endothermic

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

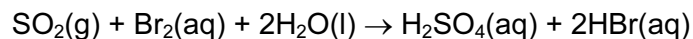


When the system has reached equilibrium, more T is added.

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**?

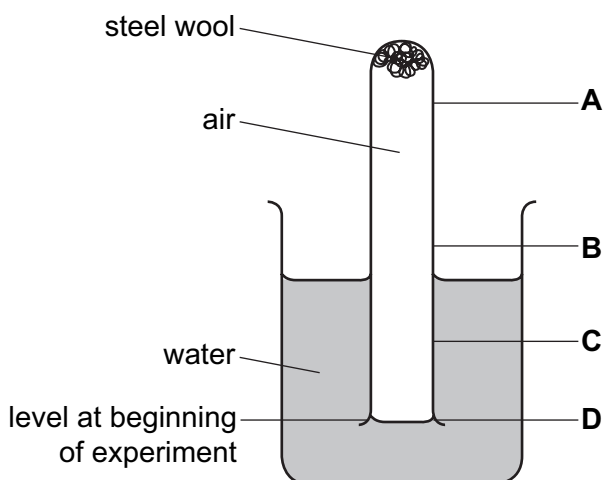
- A** calcium
B copper
C magnesium
D potassium

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?

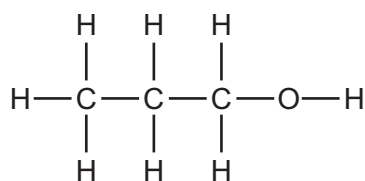
- A argon
- B helium
- C krypton
- D neon

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

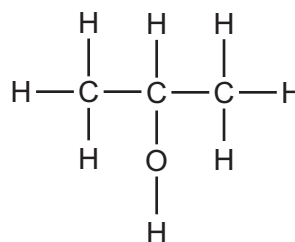
Which element forms the **most** hydrides?

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

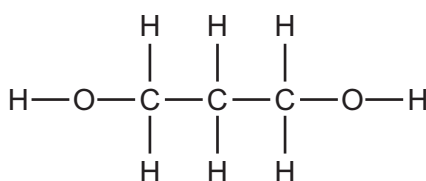
35 The structural formulae of some organic compounds are shown below.



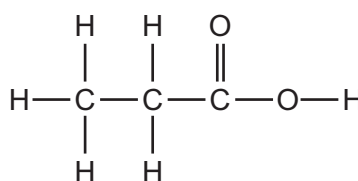
1



2



3



4

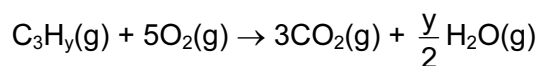
Which compounds are alcohols?

- 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 C_2H_6 B $\text{C}_2\text{H}_5\text{OH}$ C C_4H_8 D $\text{C}_4\text{H}_9\text{OH}$

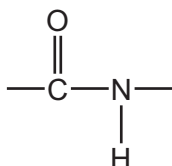
37 A hydrocarbon, C_3H_y , burns in air to form carbon dioxide and water.



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	0																									
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1											4 He Helium 2																			
23 Na Sodium 11	24 Mg Magnesium 12	5 B Boron 5	11 Al Aluminium 13	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 Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18																		
39 K Potassium 19	40 Ca Calcium 20	56 Fe Iron 26	55 Mn Manganese 25	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	85 Rb Rubidium 37	88 Sr Strontium 38	101 Ag Silver 47	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	127 I Iodine 53	131 Xe Xenon 54								
133 Cs Caesium 55	137 Ba Barium 56	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	187 Fr Francium 87	226 Ra Radium 88	204 Tl Thallium 81	201 Hg Mercury 80	197 Au Gold 79	195 Pt Platinum 78	192 Ir Iridium 77	190 Os Osmium 76	186 Re Rhenium 75	184 W Tungsten 74	209 Pb Lead 82	207 Pb Lead 82	210 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86			
227 Ac Actinium 89	232 Th Thorium 90	232 Th Thorium 90	232 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103	238 Fr Francium 87	238 Ra Radium 88	238 Ac Actinium 89	238 Th Thorium 90	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

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

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

Key

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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