



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.

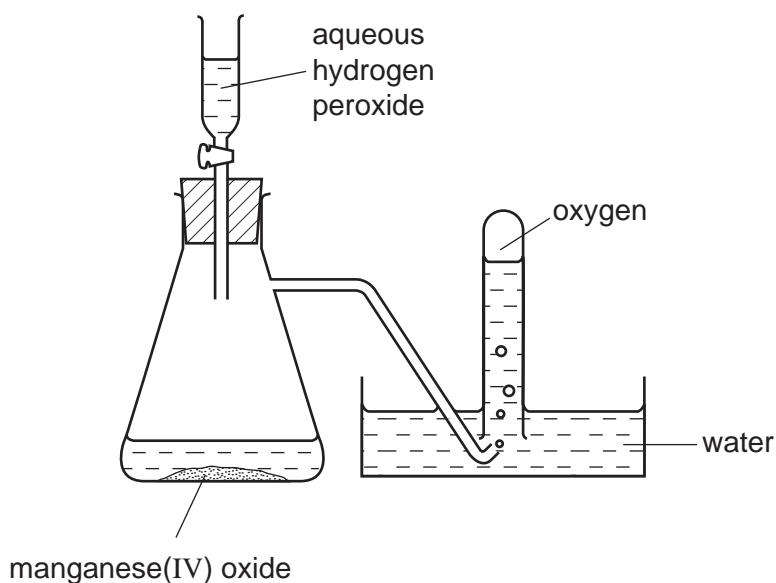
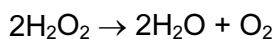
Which is the best procedure for rinsing the flask?

- 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.

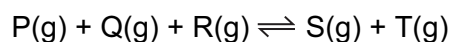
11 What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 2 g of gaseous hydrogen? [Relative atomic masses A_r (atomic weights): H, 1; Cl, 35.5]

- 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.

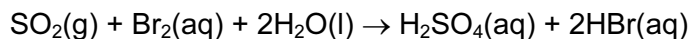


When the system has reached equilibrium, more T is added.

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**?

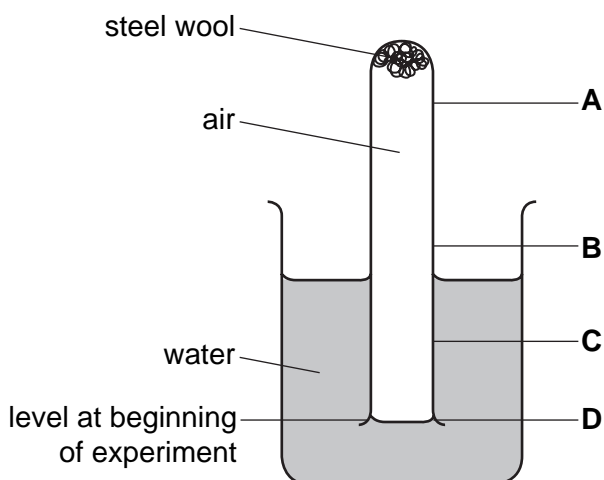
- A** calcium
B copper
C magnesium
D potassium

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?

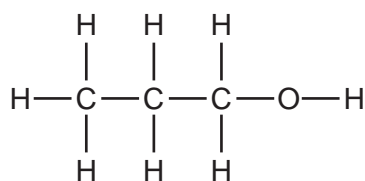
- A argon
- B helium
- C krypton
- D neon

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

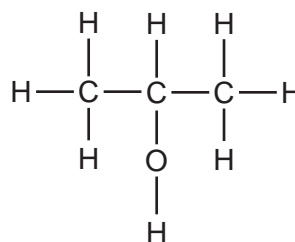
Which element forms the **most** hydrides?

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

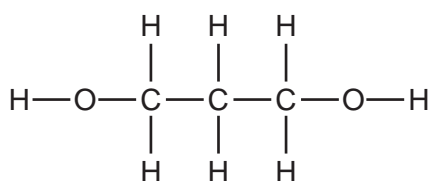
35 The structural formulae of some organic compounds are shown below.



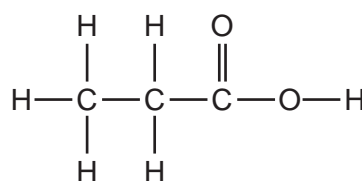
1



2



3



4

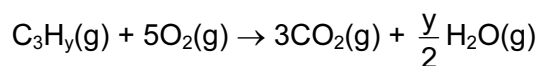
Which compounds are alcohols?

- 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 C₂H₆ B C₂H₅OH C C₄H₈ D C₄H₉OH

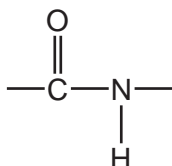
37 A hydrocarbon, C_3H_y , burns in air to form carbon dioxide and water.



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	VIII	IX	X	O	
		1 H Hydrogen 1											
7	9												
Li Lithium 3	Be Beryllium 4												
23	24												
Na Sodium 11	Mg Magnesium 12												
39	40												
K Potassium 19	Ca Calcium 20	45	48	51	52	55	56	59	59	64	65	70	
		Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	Ga Gallium 31	
85	88	89	91	93	96	101	101	103	106	108	112	115	
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48	In Indium 49	Sn Tin 50	
133	137	139	178	181	184	190	190	192	195	197	201	204	
Cs Caesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80	Tl Thallium 81	Pb Lead 82	
226	227												
Fr Francium 87	Ra Radium 88	Ac Actinium 89											
*58-71 Lanthanoid series †90-103 Actinoid series													
		140	141	144	150	152	157	159	162	165	167	169	
		Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Pm Promethium 61	Sm Samarium 62	Eu Europium 63	Gd Gadolinium 64	Tb Terbium 65	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	
		232	238	238	238	238	238	238	238	238	238	238	
		Th Thorium 90	Pa Protactinium 91	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	
		173	173	173	173	173	173	173	173	173	173	173	
		Yb Ytterbium 70	Lu Lutetium 71	Lr Lawrencium 103	No Nobelium 102	Md Mendelevium 101	Fm Fermium 100	Er Erbium 68	Tm Thulium 69	Yb Ytterbium 70	Lu Lutetium 71	Lr Lawrencium 103	

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

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

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