

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.

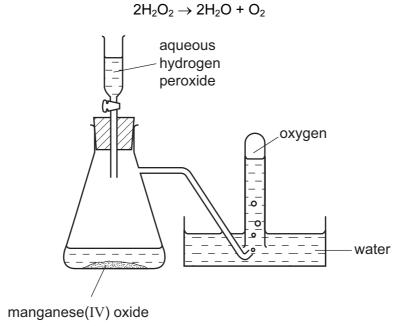
Which is the best procedure for rinsing the flask?

- 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?

 Cl_2

 H_2

HC1

N₂

 O_2

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 re	esearche	r notices th	at atoms of	an elem	ent are re	eleasing e	enei	rgy.
	Wh	y are the	atoms rele	asing energ	y?				
	Α	The ato	ms are abs	orbing light.					
	В	The ato	ms are eva	porating.					
	С	The ato	ms are radi	ioactive.					
	D	The ato	ms react w	ith argon in t	the air.				
8	Wh	at happe	ns when so	odium chloric	de melts	?			
	Α	Covaler	nt bonds in	a giant lattic	e are bro	oken.			
	В	Electror	ns are relea	sed from ato	oms.				
	С	Electros	static forces	of attraction	n betwee	n ions ar	e overcor	me.	
	D	Molecu	es are sepa	arated into id	ons.				
9	Wh	ich comp	oound conta	ains three ele	ements?				
	Α	alumini	um chloride						
	В	iron(III)	oxide						
	С	potassii	um oxide						
	D	sodium	carbonate						
10	Bel	ow are tv	vo stateme	nts about me	etals.				
		1	Metals co	ntain a lattic	e of nega	ative ions	in a 'sea	of	electrons'.
		2	The electr	rical conduct	tivity of r	netals is	related to	o th	e mobility of the electrons in the
	Wh	ich is coi							
	Α	Both sta	atements ar	e correct an	d statem	nent 1 exi	olains stat	ten	nent 2.
	В					•			n statement 2.
	С			ect and stat			•		
	D	Stateme	ent 2 is corr	ect and stat	ement 1	is incorre	ect.		
11		lecules i							eous chlorine to the number of es A_r (atomic weights): H, 1: Cl ,
	Α	1:1	В	1:2	С	2:1	Ι	D	71:2

- 12 What is the relative molecular mass M_r of CuSO₄.5H₂O?
 - **A** 160
- **B** 178
- **C** 186
- **D** 250

- 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 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
Α	chemical energy converted to heat energy	chemical energy converted to light energy
В	no catalyst needed	catalyst needed
С	oxygen used up	oxygen released
D	reaction exothermic	reaction endothermic

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

$$P(g) + Q(g) + R(g) \rightleftharpoons S(g) + T(g)$$

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.

$$SO_2(g) + Br_2(aq) + 2H_2O(I) \rightarrow H_2SO_4(aq) + 2HBr(aq)$$

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
Α	decrease	5
В	decrease	7
С	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
Α	ammonium sulfate	ammonia
В	ammonium sulfate	sulfur dioxide
С	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	CuC1

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

|--|

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

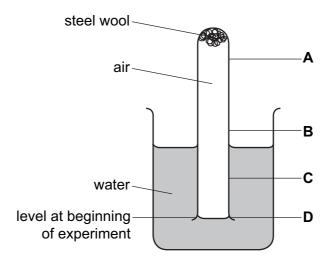
During its reaction with water, **X** floats and melts.

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
Α	copper	zinc	iron
В	iron	copper	zinc
С	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 $2MgO + C \rightarrow CO_2 + Mg$
 - **B** MgO + Cu \rightarrow CuO + Mg
 - C PbO + Zn \rightarrow ZnO + Pb
 - **D** $ZnO + H_2 \rightarrow H_2O + Zn$
- 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.

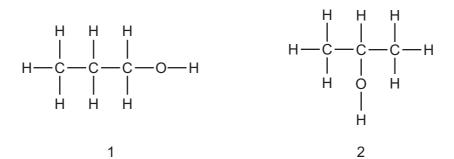
What does this show about the tap water?

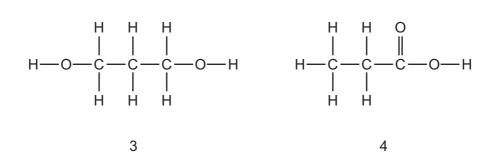
- A It contained chloride.
- **B** It contained harmful microbes.
- C It contained nitrates.
- **D** It had not been filtered.

- 33 Which noble gas is present in the largest percentage by volume in air?
 - Α argon
 - В 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?

- carbon
- В chlorine
- C nitrogen
- D oxygen
- 35 The structural formulae of some organic compounds are shown below.





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** C_2H_5OH **C** C_4H_8 **D** C_4H_9OH

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

$$C_3H_y(g) + 5O_2(g) \rightarrow 3CO_2(g) + \frac{y}{2}H_2O(g)$$

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** $C_2H_4Cl_2$
- \mathbf{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

1		=							ອັ	Group			≡	≥	>	>	5	C
Handbard		=						-					=	2	>	•	=) 4
1								Hydrogen										Helium
1								-										2
Till		6											1	12	14	16	19	20
Till		Be											Ω	ပ	Z	0	ш	Ne
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1		Magnesiu 12	wn										Aluminium 13	ilicon	Phosphorus 15	Sulfur 16	Chlorine 17	2
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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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