

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CHEMISTRY 0620/13

Paper 1 Multiple Choice May/June 2010

45 Minutes

Additional Materials: Multiple Choice Answer Sheet

Soft clean eraser

Soft pencil (type B or HB is 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 16.

You may use a calculator.

This document consists of 15 printed pages and 1 blank page.



1 The diagram shows a cup of tea.



Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	moving faster	closer together
Α	✓	✓
В	✓	×
С	X	✓
D	X	X

2 Which row shows the change that takes place when element X gains the new particle shown?

	particle gained	change
Α	electron	an isotope of element X is formed
В	electron	the element one place to the right of X in the Periodic Table is formed
С	proton	an isotope of element X is formed
D	proton	the element one place to the right of X in the Periodic Table is formed

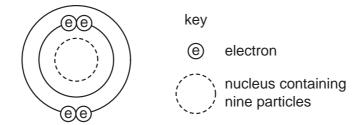
3 The symbols of two atoms may be written as shown.

Which statement about these atoms is correct?

- A They are different elements because they have different numbers of neutrons.
- **B** They are different elements because they have different numbers of protons.
- **C** They are isotopes of the same element because they have the same nucleon number.
- **D** They are isotopes of the same element because they have the same proton number.

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4 The diagram shows an atom.



What is the proton number and neutron number of the atom?

	proton number	neutron number
Α	4	5
В	4	9
С	5	4
D	5	9

5 A fruit drink coloured orange contains a dissolved mixture of red and yellow colouring agents. One of these colouring agents is suspected of being illegal.

Which method could be used to show the presence of this illegal colouring agent?

- **A** chromatography
- **B** distillation
- **C** evaporation
- **D** filtration
- A student carries out an experiment to find how fast 3 cm pieces of magnesium ribbon dissolve in 10 cm³ samples of sulfuric acid at different temperatures.

Which piece of apparatus does the student not need?

- A balance
- **B** measuring cylinder
- C stop-clock
- **D** thermometer

7 Three electrolysis cells are set up. Each cell has inert electrodes.

The electrolytes are listed below.

cell 1 aqueous sodium chloride

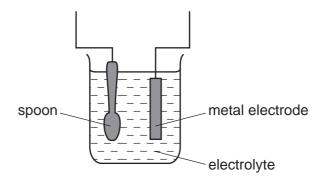
cell 2 concentrated hydrochloric acid

cell 3 molten lead(II) bromide

In which cells is a gas formed at both electrodes?

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

8 The diagram shows apparatus for plating a spoon with silver.



Which statement is **not** correct?

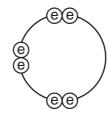
- A Silver would stick to the spoon because it is a very reactive metal.
- **B** The electrolyte would be a silver salt dissolved in water.
- **C** The metal electrode would be made from silver.
- **D** The spoon would be connected to the negative of the power supply.
- **9** Aqueous copper(II) sulfate solution is electrolysed using inert electrodes.

Copper(II) ions (Cu^{2^+}), hydrogen ions (H^+), hydroxide ions (OH^-) and sulfate ions ($SO_4^{\ 2^-}$) are present in the solution.

To which electrodes are the ions attracted during this electrolysis?

	attracted to anode	attracted to cathode
Α	Cu²⁺ and H⁺	OH ⁻ and SO ₄ ²⁻
В	Cu^{2^+} and $\mathrm{SO_4}^{2^-}$	H ⁺ and OH [−]
С	H⁺ and OH⁻	Cu ²⁺ and SO ₄ ²⁻
D	$OH^{\scriptscriptstyle{-}}$ and $SO_4^{^{2}}$	Cu²⁺ and H⁺

- **10** In which compounds are pairs of electrons shared between atoms?
 - 1 sodium chloride
 - 2 methane
 - 3 lead bromide
 - A 1 only
- **B** 2 only
- **C** 1 and 3
- **D** 1, 2 and 3
- **11** Element X has six electrons in its outer shell.



key

(e) = electron

How could the element react?

- A by gaining two electrons to form a positive ion
- **B** by losing six electrons to form a negative ion
- C by sharing two electrons with two electrons from another element to form two covalent bonds
- D by sharing two electrons with two electrons from another element to form four covalent bonds
- 12 Hydrogen and chlorine react as shown.

What is the equation for this reaction?

- **A** $2H + 2Cl \rightarrow 2HCl$
- **B** $2H + 2Cl \rightarrow H_2Cl_2$
- **C** $H_2 + Cl_2 \rightarrow 2HCl$
- **D** $H_2 + Cl_2 \rightarrow H_2Cl_2$
- 13 Which name is given to mixtures of metals?
 - A alloys
 - **B** compounds
 - C ores
 - **D** salts

14 Iron is extracted from iron oxide using carbon monoxide as shown in the equation.

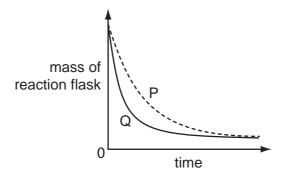
iron oxide + carbon monoxide → iron + carbon dioxide

What does the equation show?

- A Carbon monoxide is oxidised to carbon dioxide.
- **B** Carbon monoxide is reduced to carbon dioxide.
- **C** Iron is oxidised to iron oxide.
- **D** Iron oxide is oxidised to iron.
- **15** A student investigates the rate of reaction between marble chips and hydrochloric acid.

The loss in mass of the reaction flask is measured.

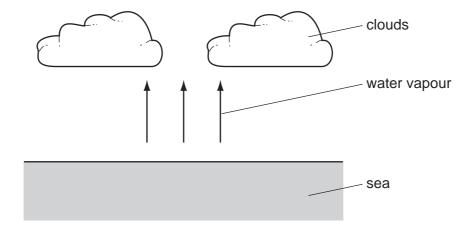
The graph shows the results of two experiments, P and Q.



Which change explains the difference between P and Q?

- A A catalyst is added in P.
- **B** A higher temperature is used in P.
- **C** Bigger marble chips are used in Q.
- **D** Hydrochloric acid is more concentrated in Q.

16 Clouds are formed when water vapour evaporates from the sea.



What is the energy change and what name is given to the type of change when water evaporates?

	energy change	type of change
Α	energy given out	endothermic
В	energy given out	exothermic
С	energy taken in	endothermic
D	energy taken in	exothermic

- 17 Which process is **not** exothermic?
 - A burning a fossil fuel
 - **B** obtaining lime from limestone
 - C radioactive decay of ²³⁵U
 - **D** reacting hydrogen with oxygen
- 18 When pink cobalt(II) sulfate crystals are heated, they form steam and a blue solid.

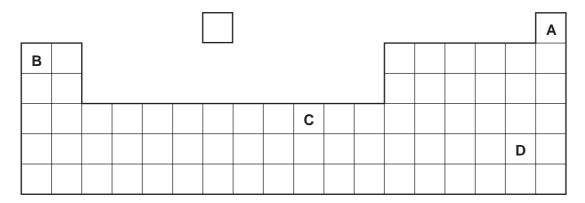
When water is added to the blue solid, it turns pink and becomes hot.

Which terms describe the pink cobalt(II) sulfate crystals and the reactions?

	pink cobalt sulfate	reactions
Α	aqueous	irreversible
В	aqueous	reversible
С	hydrated	irreversible
D	hydrated	reversible

19 An element melts at 1455 °C, has a density of 8.90 g/cm³ and forms a green chloride.

Where in the Periodic Table is this element found?



20 An excess of copper(II) oxide is added to dilute sulfuric acid to make crystals of hydrated copper(II) sulfate.

The processes listed may be used to obtain crystals of hydrated copper(II) sulfate.

- 1 concentrate the resulting solution
- 2 filter
- 3 heat the crystals
- 4 wash the crystals

Which processes are needed and in which order?

- **A** 1, 2, 3 and 4
- **B** 1, 2, 4 and 3
- **C** 2, 1, 2 and 3
- **D** 2, 1, 2 and 4
- 21 Which is **not** a property of Group I metals?
 - A They are soft and can be cut with a knife.
 - **B** They corrode rapidly when exposed to oxygen in the air.
 - **C** They produce an acidic solution when they react with water.
 - **D** They react rapidly with water producing hydrogen gas.

22 Aqueous sodium hydroxide is added to a solid, X, and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

- **A** NH_{Δ}^{+} and Fe^{2+}
- $\textbf{B} \quad \text{NH}_{4}^{\ +} \text{ and Fe}^{3+}$
- C OH⁻ and Fe²⁺
- **D** OH⁻ and Fe³⁺
- 23 An aqueous solution of the organic compound methylamine has a pH greater than 7.

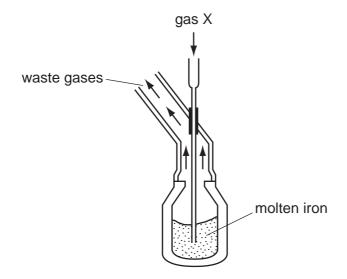
Which statement about methylamine is correct?

- **A** It neutralises an aqueous solution of sodium hydroxide.
- **B** It reacts with copper(II) carbonate to give carbon dioxide.
- **C** It reacts with hydrochloric acid to form a salt.
- **D** It turns blue litmus red.
- **24** The positions in the Periodic Table of four elements are shown.

Which element is **most** likely to form an acidic oxide?

Α										
	В									
									С	
										D

25 The diagram shows the manufacture of steel.



What is gas X?

- A carbon dioxide
- **B** chlorine
- C hydrogen
- **D** oxygen
- 26 A student added dilute hydrochloric acid to four metals and recorded the results.

Not all of the results are correct.

	results				
	metal gas given off				
1	copper	yes			
2	iron	yes			
3	magnesium	no			
4	zinc	yes			

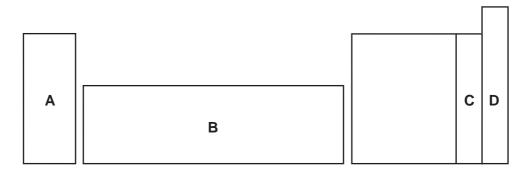
D 2 and 4

Which two results are correct?

A 1 and 3 **B** 1 and 4 **C** 2 and 3

27 An element does not conduct electricity and exists as diatomic molecules.

In which area of the Periodic Table is the element to be found?



28 Copper, iron and zinc are all used as pure metals.

Which of these three metals are also used in alloys?

	copper	iron	zinc
Α	✓	✓	✓
В	✓	✓	X
С	X	✓	✓
D	X	X	✓

29 Solutions of a halogen and a sodium halide are mixed.

Which mixture darkens in colour because a reaction occurs?

- A bromine and sodium chloride
- B bromine and sodium fluoride
- C chlorine and sodium fluoride
- D chlorine and sodium iodide
- **30** Some properties of four elements are shown in the table.

Which element is a metal?

	melting point/°C	electrical conductivity when liquid	electrical conductivity when solid
Α	–7	low	low
В	801	high	low
С	1535	high	high
D	3550	low	low

31 The diagram shows three types of item.



Which method of rust prevention can be used for all three types of item?

- A coating with plastic
- B covering with grease
- **C** galvanising
- D using stainless steel
- **32** Aluminium is an important metal with many uses.

Some of its properties are listed.

- 1 It is a good conductor of heat.
- 2 It is a reactive metal.
- 3 It has a low density.
- 4 It has an oxide layer that prevents corrosion.

Which set of properties help to explain the use of aluminium for cooking and storing food?

- **A** 1, 2 and 3
- **B** 1, 2 and 4
- **C** 1, 3 and 4
- **D** 2, 3 and 4
- 33 To grow roses, a fertiliser containing nitrogen, phosphorus and potassium is needed.

For the best flowers, the fertiliser should contain a high proportion of potassium.

Which fertiliser is best for roses?

fertiliser	proportion by mass				
	N	Р	K		
Α	9	0	25		
В	13	13	20		
С	29	5	0		
D	29	15	5		

34	\//hich	etatamente	about water	are correct	2
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- 1 Water is treated with chlorine to kill bacteria.
- 2 Household water may contain salts in solution.
- 3 Water is used in industry for cooling.
- 4 Water for household use is filtered to remove soluble impurities.
- **A** 1, 2 and 3 **B** 1 and 4 **C** 2, 3 and 4 **D** 1, 2, 3 and 4
- 35 Which statement about methane is **not** correct?
 - A It is a liquid produced by distilling petroleum.
 - **B** It is produced as vegetation decomposes.
 - **C** It is produced by animals such as cows.
 - **D** It is used as a fuel.
- 36 Which compound in polluted air can damage stonework and kill trees?
 - A carbon dioxide
 - B carbon monoxide
 - **C** lead compounds
 - **D** sulfur dioxide
- 37 Diesel, petrol and bitumen are all
 - A fuels.
 - B hydrocarbons.
 - C lubricants.
 - D waxes.

38 A macromolecule is a very large molecule.

Macromolecules can be made by joining smaller molecules together. This is called polymerisation.

Which row in the table describes the formation of a polymer?

	monomer	polymer			
Α	ethane	ne poly(ethane)			
В	ethene	poly(ethene)			
С	ethane	poly(ethene)			
D	ethene	poly(ethane)			

39 Which structure shows a compound that belongs to a different homologous series to propane?

40 Which structure is incorrect?

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DATA SHEET
The Periodic Table of the Elements

Group	0	4 He Helium	20 Neon 10 Ar Argon	84 Krypton 36	131 Xe Xenon	Rn Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103						
	II /		19 Fluorine 9 35.5 C 1	80 Br Bromine 35		At Astatine 85		Yb Ytterbium	Nobelium						
	IN		16 Oxygen 8 32 S Sulfur	Selenium 34		Po Polonium 84		169 Tm Thulium	Md Mendelevium 101						
	>		14 Nitrogen 7 31 9 Phosphorus 15	75 AS Arsenic	Sb Antimony 51			167 Er Erbium 68	Fm Fermium						
	≥								12 Carbon 6 28 Si Silicon 14	73 Ge Germanium	Sn Tin 50	207 Pb Lead 82		165 Ho Holmium 67	
	≡		11 B Boron 5 27 A1 Aluminium	70 Ga Gallium	115 In Indium	204 T t Thallium		162 Dy Dysprosium 66	Cf Californium 98						
				65 Zn Zinc 30	Cd Cadmium 48	Hg Mercury 80		159 Tb Terbium 65	BK Berkelium 97						
				64 Copper 29	108 Ag Silver	197 Au Gold		157 Gd Gadolinium 64	Cm Curium 96						
				59 Nickel	106 Pd Palladium 46	195 Pt Patinum 78		152 Eu Europium 63	Am Americium						
				59 Co Cobalt 27	103 Rh Rhodium 45	192 I r Iridium		Samarium 62	Pu Plutonium 94						
		Hydrogen 1		56 Fe Iron	101 Ru Ruthenium	190 Os Osmium 76		Pm Promethium 61	Neptunium						
				Manganese	Tc Technetium	186 Re Rhenium 75		144 Nd Neodymium 60	238 U Uranium 92						
				Cr Chromium 24	Molybdenum	184 W Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91						
				51 Vanadium 23	93 Nb Niobium 41	181 Ta Tantalum 73		140 Ce Cerium	232 Th Thorium						
				48 T Itanium	2r Zrconium 40	178 # Hafnium 72			nic mass bol nic) number						
				Scandium 21	89 ×	139 La Lanthanum 57 *	227 AC Actinium 89	d series series	a = relative atomic massX = atomic symbolb = proton (atomic) number						
	=		Be Beryllium 4 24 Magnesium 12	40 Ca Calcium	Strontium	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	« × ¬						
	_		Lithium 3 23 8 8 8 8 8 11	39 Potassium	Rb Rubidium 37	133 Cs Caesium 55	Fr Francium 87	*58-71 L	Key						

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

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