

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CHEMISTRY 0620/12

Paper 1 Multiple Choice October/November 2009

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.

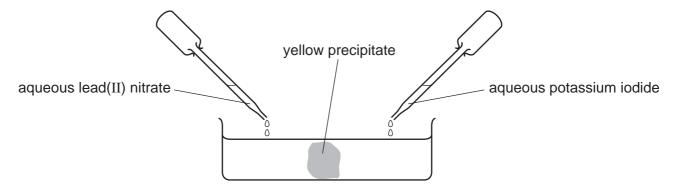
This document consists of **16** printed pages.



1 A student separates salt from a mixture of salt and sand.

What is the correct order of steps for the student to take?

- **A** filter \rightarrow evaporate \rightarrow shake with water
- **B** filter \rightarrow shake with water \rightarrow evaporate
- **C** shake with water \rightarrow evaporate \rightarrow filter
- **D** shake with water \rightarrow filter \rightarrow evaporate
- 2 Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.



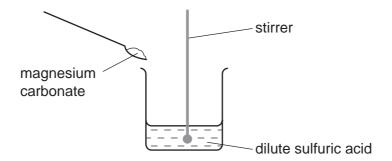
A yellow precipitate forms after a few minutes.

Which process occurs before the precipitate forms?

- **A** diffusion
- **B** distillation
- **C** fermentation
- **D** filtration

3 A student carries out an experiment to prepare pure magnesium sulfate crystals.

The diagram shows the first stage of the preparation.



He adds magnesium carbonate until no more reacts.

Which process should he use for the next stage?

- A crystallisation
- **B** evaporation
- **C** filtration
- **D** neutralisation
- **4** Which change to an atom occurs when it forms a positive ion?
 - **A** It gains electrons.
 - **B** It gains protons.
 - **C** It loses electrons.
 - **D** It loses protons.
- 5 Statements 1, 2 and 3 are about diamond and graphite.
 - 1 They are different solid forms of the same element.
 - 2 They each conduct electricity.
 - 3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

6 Covalent bonds are formed when electrons are1..... Covalent compounds have2..... electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
Α	shared	high
В	shared	low
С	transferred	high
D	transferred	low

7 Atom X has 8 more electrons than atom Y.

Student 1 says they are in the same group.

Student 2 says they are unreactive.

Which students can be correct?

	student 1 student 2	
Α	✓	✓
В	✓	x
С	X	✓
D	X	X

- 8 Which number is different for isotopes of the same element?
 - A number of electrons
 - B number of full shells
 - C number of nucleons
 - **D** number of protons
- 9 Which atom has two more electrons than an atom of a noble gas?
 - **A** aluminium
 - **B** bromine
 - C calcium
 - **D** rubidium

10 For each atom of carbon present in a molecule, there is an equal number of atoms of oxygen but twice as many atoms of hydrogen.

What is the formula of the molecule?

 $A C_2H_2O_2$

 $\mathbf{B} \quad C_2H_2O_4$

 \mathbf{C} $C_2H_4O_2$

 $D C_2H_6O$

11 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.

What mass of oxygen combines with 2g of hydrogen?

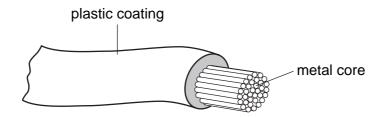
A 12g

B 16 g

C 96 g

D 144 g

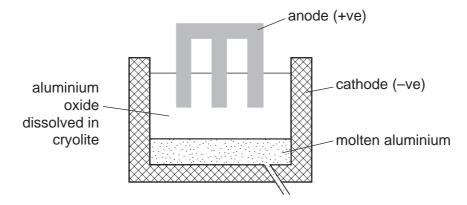
12 The diagram shows an electrical cable.



Which statement about the substances used is correct?

- A The coating is plastic because it conducts electricity well.
- **B** The core is copper because it conducts electricity well.
- **C** The core is copper because it is cheap and strong.
- **D** The core is iron because it is cheap and strong.

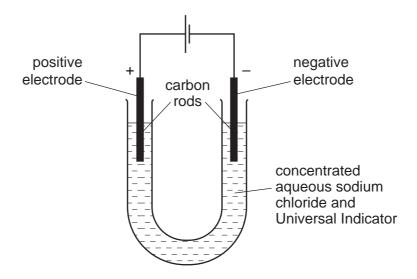
13 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode cathode		
Α	aluminium	aluminium	
В	aluminium	graphite	
С	graphite	aluminium	
D	graphite	graphite	

14 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the Universal Indicator at each electrode after five minutes?

	colour at anode (+ electrode)	colour at cathode (– electrode)	
Α	blue/purple	red	
В	red	blue/purple	
С	red	colourless	
D	colourless	blue/purple	

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15 When an acid is added to an alkali the temperature rises.

Which words describe this reaction?

- **A** decomposition and endothermic
- **B** decomposition and exothermic
- **C** neutralisation and endothermic
- **D** neutralisation and exothermic
- **16** Substance X requires oxygen in order to produce energy.

It does **not** form carbon dioxide as a result of this energy production.

What is substance X?

- A hydrogen
- B natural gas
- **C** petrol
- **D** 235U
- **17** Which change does **not** increase the speed of reaction between zinc and hydrochloric acid?
 - A adding a catalyst
 - **B** decreasing the temperature
 - **C** decreasing the particle size of the zinc
 - **D** using more concentrated acid
- **18** When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reaction	
Α	a mixture	can be reversed	
В	a mixture	cannot be reversed	
С	hydrated	can be reversed	
D	hydrated	cannot be reversed	

19 The equations represent redox reactions.

In which equation is the underlined substance acting as a reducing agent?

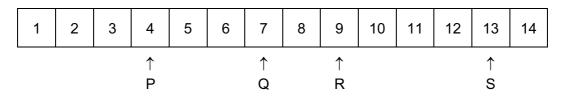
- A CaO + $H_2O \rightarrow Ca(OH)_2$
- **B** $\underline{CO}_2 + C \rightarrow 2CO$
- $C \quad \underline{CuO} + H_2 \rightarrow Cu + H_2O$
- **D** $3\underline{CO} + Fe_2O_3 \rightarrow 2Fe + 3CO_2$
- **20** An aqueous solution Y contains both barium ions and silver ions.

In separate experiments, dilute sulfuric acid and dilute hydrochloric acid are added to solution Y.

Which of these acids causes a precipitate to form in solution Y?

	dilute sulfuric acid	dilute hydrochloric acid
Α	✓	✓
В	✓	x
С	X	✓
D	x	X

21 The diagram shows the pH values of four solutions.



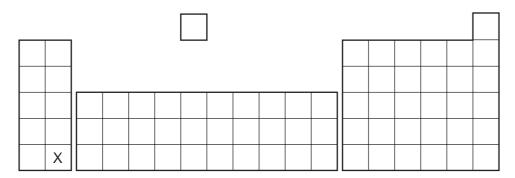
Which of these solutions are alkaline?

- A Ponly
- B P and Q only
- C Q, R and S only
- **D** R and S only

- 22 Salts can be prepared by reacting a dilute acid
 - 1 with a metal;
 - 2 with a base;
 - 3 with a carbonate.

Which methods could be used to prepare copper(II) chloride?

- A 1 and 2 only
- **B** 1 and 3 only
- C 2 and 3 only
- **D** 1, 2 and 3
- 23 The diagram shows the position of an element X in the Periodic Table.



What is the correct classification of element X and its oxide?

	X	oxide of X
Α	metal	acidic
В	metal	basic
С	non-metal	acidic
D	non-metal	basic

24 Elements in Group 0 of the Periodic Table have uses.

These noble gases are1..... and this explains why argon2..... be used in lamps.

Which words correctly complete gaps 1 and 2?

	1	2	
Α	reactive	can	
В	reactive	cannot	
С	unreactive	can	
D	unreactive	cannot	

25 Astatine is an element in Group VII of the Periodic Table. It has only ever been produced in very small amounts.

What is the best description of its likely properties?

	colour	state	reaction with aqueous potassium iodide
Α	black	solid	no reaction
В	dark brown	gas	brown colour
С	green	solid	no reaction
D	yellow	liquid	brown colour

- 26 Which property do all metals have?
 - A They are soluble in water.
 - B They conduct electricity.
 - **C** They have high melting points.
 - **D** They react with dilute sulfuric acid.
- **27** The table gives information about four elements.

Which element is a transition metal?

	colour of element	electrical conductivity of element	colour of oxide
Α	black	high	colourless
В	colourless	low	white
С	grey	high	red
D	yellow	low	colourless

28 Some reactions of three metals are listed in the table.

metal reacts with dilute hydrochloric acid		metal oxide is reduced by carbon	
Р	yes	yes	
Q	no	yes	
R	yes	no	

What is the order of reactivity of the metals?

	most reactive		least reactive
Α	Р	R	Q
В	R	Р	Q
С	R	Q	Р
D	Q	Р	R

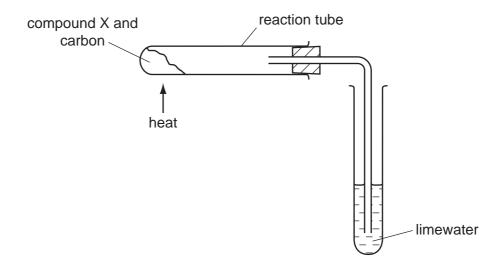
29 Which object is least likely to contain aluminium?

- A a bicycle frame
- B a hammer
- C a saucepan
- **D** an aeroplane body

30 Which statement about alloys is **not** correct?

- **A** Alloys are more expensive than the metals they are made from.
- **B** Alloys are mixtures of different metals.
- **C** Alloys are not as strong as the metals they are made from.
- D Alloys conduct electricity well.

31 Compound X is heated with carbon using the apparatus shown.



A brown solid is formed in the reaction tube and the limewater turns cloudy.

What is compound X?

- A calcium oxide
- B copper(II) oxide
- C magnesium oxide
- **D** sodium oxide
- **32** Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and bacteria?

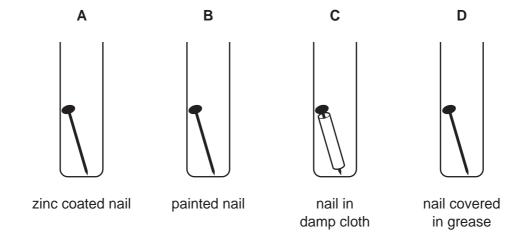
	to remove solid impurities	to remove bacteria		
Α	chlorination	chlorination		
В	chlorination	filtration		
С	filtration	ation chlorination		
D	filtration	filtration		

- A newspaper article claims that carbon dioxide is formed as follows.
 - 1 during respiration
 - 2 when calcium carbonate reacts with hydrochloric acid
 - 3 when methane burns in air

Which statements are correct?

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

34 Which iron nail rusts?

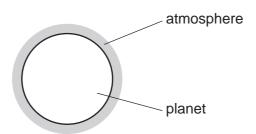


35 Fertilisers are used to provide three of the elements needed for plant growth.

Which two compounds would give a fertiliser containing all three of these elements?

- A $Ca(NO_3)_2$ and $(NH_4)_2SO_4$
- **B** $Ca(NO_3)_2$ and $(NH_4)_3PO_4$
- C KNO₃ and (NH₄)₂SO₄
- **D** KNO₃ and (NH₄)₃PO₄

36 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of the atmosphere.

gas	percentage by volume			
carbon dioxide	4			
nitrogen	72			
oxygen	24			

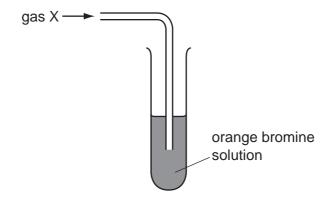
Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

- A carbon dioxide and oxygen
- **B** carbon dioxide only
- C nitrogen and oxygen
- **D** nitrogen only
- **37** Butene and hexene belong to the same homologous series.

What is the same for butene and hexene?

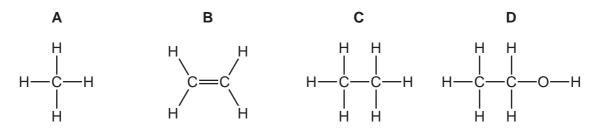
- A boiling point
- **B** functional group
- C number of hydrogen atoms per molecule
- **D** relative molecular mass
- 38 Which statement about petroleum is **not** correct?
 - **A** It can be separated into useful substances by fractional distillation.
 - **B** It consists mainly of hydrocarbons.
 - **C** It is found underground in many parts of the world.
 - **D** Its main use is for making lubricants and polishes.

39 The apparatus shows an experiment used to test gas X.



The bromine solution quickly becomes colourless.

What is the structure of gas X?



40 The table shows the formulae of members of the alkane series.

name of compound	formula		
methane	CH₄		
ethane	C_2H_6		
propane	?		
butane	C_4H_{10}		
pentane	C ₅ H ₁₂		

What is the formula of propane?

 $A C_2H_8$

B C_3H_7 **C** C_3H_8 **D** C_3H_9

DATA SHEET
The Periodic Table of the Elements

	0	4 He Helium	20 Neon 10 A40 Ar Argan	84 Kr Krypton 36	131 Xe Xenon 54	Rn Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103		
_	IIA		19 Fluorine 9 35.5 C1 Chlorine	80 Br Bromine 35	127 I lodine 53	At Astatine 85		173 Yb Ytterbium 70	Nobelium 102		
			16 Oxygen 8 32 Sulfur 16 Sulfur 16	Selenium	128 Te Tellurium 52	Po Polonium 84		169 Tm Thullum	Md Mendelevium 101		
	٨			14 Nitrogen 7 31 31 Phosphorus 15	75 AS Arsenic 33	122 Sb Antimony 51	209 Bi Bismuth 83		167 Er Erbium 68	Fm Fermium 100	
	IV				12 Carbon 6 Silicon 14 Silicon 14	73 Ge Germanium 32	Sn Tin 50	207 Pb Lead 82		165 Ho Holmium 67	ES Einsteinium 99
	=					11 B Boron 5 27 All Muminium	70 Ga Gallium 31	115 In Indium 49	204 T <i>t</i> Thallium		162 Dy Dysprosium 66
				65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury 80		159 Tb Terbium 65	Bk Berkelium 97		
				64 Cu Copper 29	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64	Curium 96		
				59 Nickei 28	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63	Am Americium 95		
				59 Co	103 Rh Rhodium 45	192 Ir Iridium 77		Sm Samarium 62	Pu Plutonium 94		
		1 H Hydrogen 1		56 Fe Iron	Ruthenium 44	190 Os Osmium 76		Pm Promethium 61	Neptunium		
				Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		Neodymium 60	238 U Uranium 92		
				52 Cr Chromium 24	96 Mo Molybdenum 42	184 W Tungsten 74		141 Pr Praseodymium 59	Pa Protactinium 91		
				51 Vanadium 23	Niobium 41	181 Ta Tantalum 73		140 Ce Cerium	232 Th Thorium 90		
				48 T Trtanium 22	91 Zr Zirconium 40	178 Hf Hafnium 72			nic mass bol nic) number		
				Scandium 21	89 × Yttrium 39	139 La Lanthanum 57 *	227 Ac Actinium 89	l series eries	a = relative atomic mass X = atomic symbol b = proton (atomic) number		
	=		Beryllium 4 24 Magnesium 12	40 Ca Calcium	Sr Strontium	137 Ba Barium 56	226 Ra Radium	*58-71 Lanthanoid series	« × °		
	_		7	39 K	Rubidium 37	133 Cs Caesium 55	Francium 87	*58-71 L:	Key		

The volume of one mole of any gas is $24 \, dm^3$ at room temperature and pressure (r.t.p.).

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