



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CHEMISTRY 0620/11

Paper 1 Multiple Choice October/November 2013

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.

DO NOT WRITE IN ANY BARCODES.

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.

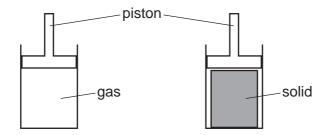
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.



1 An attempt was made to compress a gas and a solid using the apparatus shown.



Which substance would be compressed and what is the reason for this?

	substance	reason
Α	gas	the gas particles are close together
В	gas	the gas particles are far apart
С	solid	the solid particles are close together
D	solid	the solid particles are far apart

2 A student measures the rate of two reactions.

In one reaction, there is a change in mass of the reactants during the reaction.

In the second reaction, there is a change in temperature during the reaction.

Which piece of apparatus would be essential in **both** experiments?

- A balance
- **B** clock
- **C** pipette
- **D** thermometer

3 Diagram 1 shows the paper chromatogram of substance X.

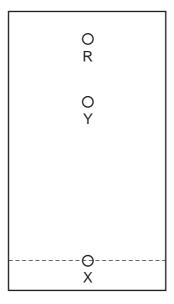
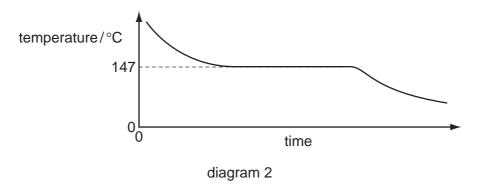


diagram 1

Diagram 2 shows the cooling curve for substance Y.



Which statement about X and Y is correct?

- **A** X is a mixture and Y is a pure substance.
- **B** X is a pure substance and Y is a mixture.
- C X and Y are mixtures.
- **D** X and Y are pure substances.

4 Element X has 7 protons.

Element Y has 8 more protons than X.

Which statement about element Y is correct?

- A Y has more electron shells than X.
- **B** Y has more electrons in its outer shell than X.
- **C** Y is in a different group of the Periodic Table from X.
- **D** Y is in the same period of the Periodic Table as X
- 5 Which statements about a sodium atom, ²³/₁₁Na, are correct?
 - 1 The number of protons and neutrons is the same.
 - 2 The number of protons and electrons is the same.
 - 3 The number of outer electrons is one.
 - **A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only
- 6 Rubidium is in Group I of the Periodic Table and bromine is in Group VII.

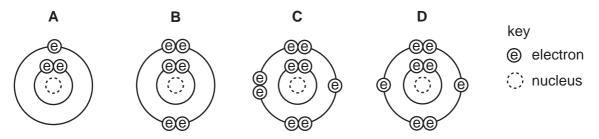
Rubidium reacts with bromine to form an ionic compound.

Which row shows the electron change taking place for rubidium and the correct formula of the rubidium ion?

	electron change	formula of ion formed	
Α	electron gained	Rb⁺	
В	electron gained	Rb⁻	
С	electron lost	Rb⁺	
D	electron lost	Rb⁻	

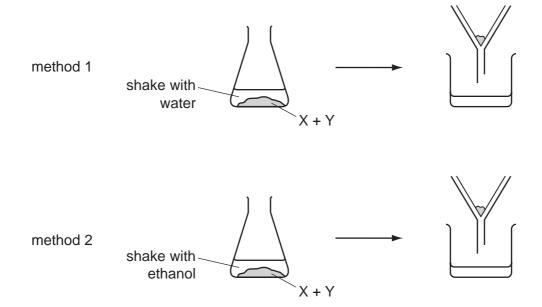
7 The diagrams show the electron arrangements in the atoms of four elements.

Which element does not form a covalent bond?



8 A solid mixture contains an ionic salt, X, and a covalent organic compound, Y.

Two students suggest methods of separating the mixture as shown.



Which methods of separation are likely to work?

	1	2
Α	✓	✓
В	✓	X
С	x	✓
D	X	X

- **9** The formulae of compounds W, X and Y are shown.
 - W CuSO₄.5H₂O
 - X MgSO₄.7H₂O
 - Y $Cu(NO_3)_2.6H_2O$

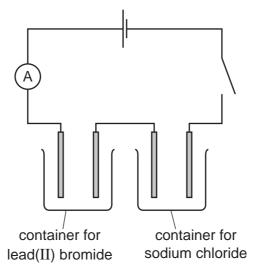
Which statement is correct?

- A W contains twice as many hydrogen atoms as oxygen atoms.
- **B** X contains the most oxygen atoms.
- **C** Y contains the most hydrogen atoms.
- **D** Y contains the same number of hydrogen and oxygen atoms.

10 Which relative molecular mass, M_r , is **not** correct for the molecule given?

	molecule	<i>M</i> _r
Α	ammonia, NH₃	17
В	carbon dioxide, CO ₂	44
С	methane, CH₄	16
D	oxygen, O ₂	16

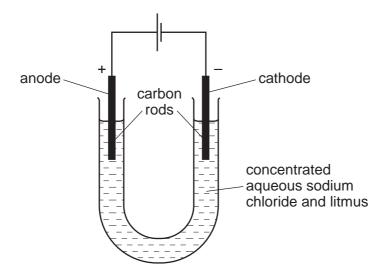
11 The diagram shows the circuit for electrolysing lead(II) bromide and sodium chloride to liberate the metal.



In what form are these salts electrolysed for liberating the metal?

	lead(II) bromide	sodium chloride	
Α	concentrated solution	concentrated solution	
В	concentrated solution	molten	
С	molten	concentrated solution	
D	molten	molten	

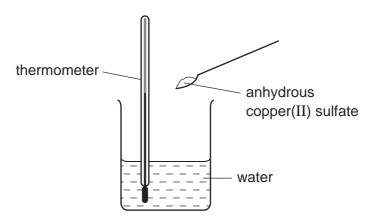
12 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



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

	colour at anode	colour at cathode	
Α	blue	red	
В	red	blue	
С	red	colourless	
D	colourless	blue	

13 When anhydrous copper(II) sulfate is added to water a solution is formed and heat is given out.

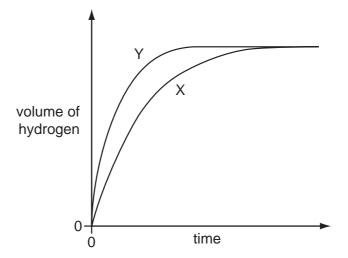


Which row correctly shows the temperature change and the type of reaction taking place?

	temperature change	type of reaction	
Α	decreases	endothermic	
В	decreases	exothermic	
С	increases	endothermic	
D	increases	exothermic	

- 14 Which fuel does not produce carbon dioxide when it burns?
 - A coal
 - **B** hydrogen
 - **C** methane
 - **D** petrol
- 15 A student investigates the rate of reaction between zinc and an excess of sulfuric acid.

The graph shows the results of two experiments, X and Y.



Which change explains the difference between X and Y?

- A A catalyst is added in Y.
- **B** A lower temperature is used in Y.
- **C** Larger pieces of zinc are used in Y.
- **D** Less concentrated acid is used in Y.
- **16** Anhydrous copper(II) sulfate can be made by heating hydrated copper(II) sulfate.

$$CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$$

What can be added to anhydrous copper(II) sulfate to turn it into hydrated copper(II) sulfate?

- A concentrated sulfuric acid
- B sodium hydroxide powder
- C sulfur dioxide
- **D** water

17 The reactions shown may occur in the air during a thunder storm.

$$N_2 + O_2 \rightarrow 2NO$$
 $2NO + O_2 \rightarrow 2NO_2$ $NO + O_3 \rightarrow NO_2 + O_2$

Which row shows what happens to the reactant molecules in each of these reactions?

	N_2	NO	O ₃
Α	oxidised	oxidised	oxidised
В	oxidised	oxidised	reduced
С	reduced	reduced	oxidised
D	reduced	reduced	reduced

- 18 Which are properties of an acid?
 - 1 reacts with ammonium sulfate to form ammonia
 - 2 turns red litmus blue

	1	2
Α	✓	✓
В	✓	x
С	x	✓
D	X	X

19 Which of the following are properties of the oxides of non-metals?

	property 1	property 2	
Α	acidic covalent		
В	acidic	ionic	
С	basic	covalent	
D	basic	ionic	

20 Compound X is tested and the results are shown in the table.

test	result
aqueous sodium hydroxide is added, then heated gently	gas given off which turns damp red litmus paper blue
dilute hydrochloric acid is added	effervescence, gas given off which turns limewater milky

Which ions are present in compound X?

- A ammonium ions and carbonate ions
- B ammonium ions and chloride ions
- C calcium ions and carbonate ions
- D calcium ions and chloride ions
- 21 Calcium, on the left of Period 4 of the Periodic Table, is more metallic than bromine on the right of this period.

Why is this?

Calcium has

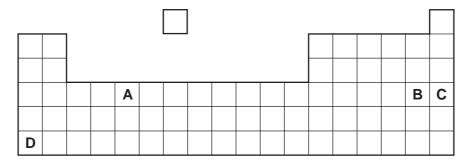
- A fewer electrons.
- **B** fewer protons.
- C fewer full shells of electrons.
- **D** fewer outer shell electrons.
- **22** The diagrams show the labels of four bottles.

Which label is **not** correct?

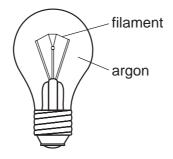
Α	В	С	D
Bromine Br ₂	lodine I ₂	Potassium K	Sodium Na
Harmful liquid. Do not spill.	Danger Avoid breathing vapour from the solid.	Danger Store under water.	Danger Store under oil.

23 An element has a melting point of 1084 °C and a density of 8.93 g/cm³. It's oxide can be used as a catalyst.

In which position in the Periodic Table is the element found?



24 The diagram shows a light bulb.



Why is argon used instead of air in the light bulb?

- A Argon is a good conductor of electricity.
- **B** Argon is more reactive than air.
- **C** The filament glows more brightly.
- **D** The filament does not react with the argon.
- **25** Some properties of four elements W, X, Y and Z are listed.
 - 1 W melts at 1410 °C and forms an acidic oxide.
 - 2 X has a high density and is easily drawn into wires.
 - 3 Y acts as a catalyst and its oxide reacts with acids.
 - 4 Z is a red-brown solid used to make alloys.

Which of the elements are metals?

A 1 and 3 **B** 2, 3 and 4 **C** 2 and 3 only **D** 2 and 4 only

26 M is a shiny silver metal. It has a melting point of 1455 °C. Many of its compounds are green.

What is metal M?

- **A** aluminium
- **B** copper
- **C** mercury
- **D** nickel
- 27 Reactions of three metals and their oxides are listed in the table.

metal	reacts with cold water	metal oxide reacts with carbon		
W	no	no		
X	no	yes		
Υ	yes	no		

What is the order of reactivity of the metals?

	least reactive		most reactive
Α	W	X	Υ
В	×	W	Υ
С	×	Υ	W
D	Y	W	X

28 Equations P and Q represent two reactions which occur inside a blast furnace.

P
$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

Q
$$CaCO_3 \rightarrow CaO + CO_2$$

Which type of reactions are P and Q?

	Р	Q			
Α	redox redox				
В	redox	thermal decomposition			
С	thermal decomposition	redox			
D	thermal decomposition	mposition thermal decomposition			

29 Which row describes the uses of mild steel and stainless steel?

	mild steel	stainless steel			
Α	car bodies, cutlery	chemical plant, machinery			
В	car bodies, machinery	chemical plant, cutlery			
С	chemical plant, cutlery	car bodies, machinery			
D	chemical plant, machinery car bodies, cutlery				

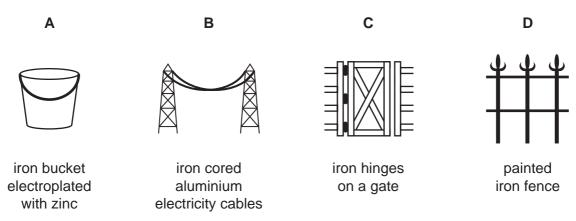
- 30 In which process is carbon dioxide not formed?
 - A burning of natural gas
 - **B** fermentation
 - **C** heating lime
 - **D** respiration
- 31 Farmers add calcium oxide (lime) and ammonium salts to their fields.

The compounds are not added at the same time because they react with each other.

Which gas is produced in this reaction?

- A ammonia
- B carbon dioxide
- C hydrogen
- **D** nitrogen
- **32** The diagrams show four uses of iron.

In which of these uses is the iron most likely to rust?

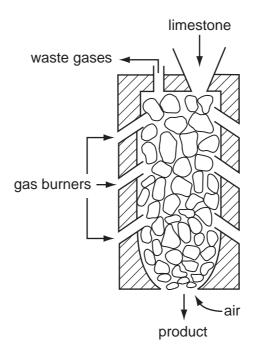


- **33** Which air pollutant is **not** made when coal burns in a power station?
 - A carbon monoxide
 - **B** lead compounds
 - C nitrogen oxides
 - **D** sulfur dioxide
- 34 In many countries river water is used for the washing of clothes.

The same water is not considered to be safe for drinking.

Why is it **not** safe for drinking?

- A because river water contains dissolved salts
- **B** because river water may contain harmful bacteria
- **C** because river water may contain small particles of sand
- **D** because river water may contain soap from washing clothes
- **35** The diagram shows a kiln used to heat limestone.

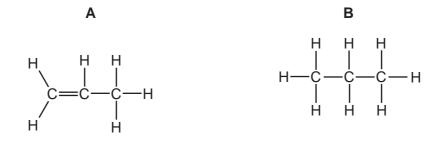


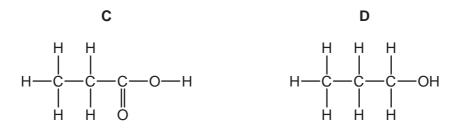
What is the product and what waste gas is formed?

	product	waste gas
Α	lime, CaO	carbon monoxide
В	lime, CaO	carbon dioxide
С	slaked lime, Ca(OH) ₂	carbon monoxide
D	slaked lime, Ca(OH) ₂	carbon dioxide

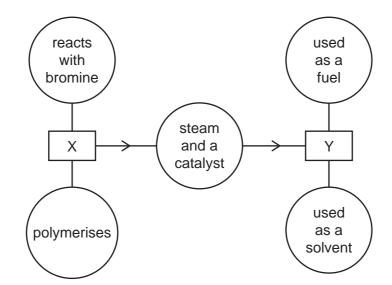
36 Three types of organic compound are alkanes, alkenes and alcohols.

Which structure does **not** belong to any of these three types of compound?





37 The diagram shows some properties of two organic compounds X and Y.



What are X and Y?

	Х	Y			
Α	ethane	e ethanoic acid			
В	ethane	ethanol			
С	ethene	ethanoic acid			
D	ethene	ethanol			

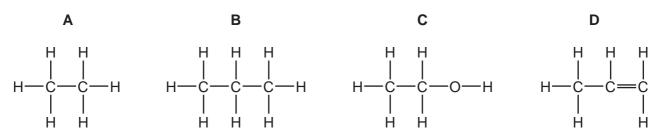
38 Petroleum is a mixture of hydrocarbons which can be separated into fractions using fractional distillation.

Which fraction is used as fuel in jet engines?

- **A** bitumen
- **B** gasoline
- C kerosene
- **D** naphtha
- **39** The diagram represents ethene.



Which compound has chemical properties similar to those of ethene?



40 A chemist carried out a cracking reaction on a hydrocarbon, X, and obtained two products, Y and Z.

The chemist then wrote the following statements in his notebook.

- A molecule of X has 7 carbon atoms.
- 2 Y is unsaturated.
- Z will decolourise bromine water.

Which statements are correct?

- **A** 3 only

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

18

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19

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

DATA SHEET
The Periodic Table of the Elements

	0	Heium 2	20 Neon 10 Ab Ar Argon	84 Kr , Krypton 36	131 Xe Xenon 54	Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103
	II/		19 Fluorine 9 35.5 C1 Chlorine	80 Br Bromine 35	127 	At Astatine 85		Yb Ytterbium	Nobelium 102
	IN		16 Oxygen 8 32 S	Selenium 34	128 Te Tellurium	Po Polonium 84		169 Tm Thulium 69	Mendelevium 101
	^		14 Nitrogen 7 31 Phosphorus 15	75 AS Arsenic 33	122 Sb Antimony 51	209 Bi Bismuth 83		167 Er Erbium 68	Fm Fermium 100
	//		12 Carbon 6 Silicon 14	73 Ge Germanium 32	Sn Tin	207 Pb Lead 82		165 Ho Holmium 67	ES Einsteinium 99
	=		11 B Boron 5 27 A1 Aluminium 13	70 Ga Gallium 31	115 n Indium 49	204 T 1 Thallium		162 Dy Dysprosium 66	Cf Californium 98
				65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury 80		159 Tb Terbium 65	BK Berkelium 97
				64 Copper 29	108 Ag Silver 47	197 Au Gold 79		157 Gd Gadolinium 64	Carium 96
Group				59 Ri Nickel	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63	Am Americium 95
Gro				59 Co Cobalt	103 Rh Rhodium 45	192 r Iridium 77		Samarium 62	Pu Plutonium
		T Hydrogen		56 Fe Iron	Ru Ruthenium 44	190 OS Osmium 76		Pm Promethium 61	Neptunium
				Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		144 Na Neodymium 60	238 U Uranium 92
				52 Cr Chromium 24	96 Mo Molybdenum 42	184 W Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91
				51 Vanadium 23	Niobium 41	181 Ta Tantalum 73		140 Ce Cerium 58	232 Th Thorium
				48 Ti tanium 22	2 r Zroznium 40	178 Hf Hafnium 72		1	nic mass bol nic) number
				Scandium 21	89 Y Yttrium	La Larthanum *	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 20	Strontium	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	в × ф
	_		7 Lithium 3 23 Na Sodium 11	39 K Potassium	Rubidium	133 CS Caesium 55	Fr Francium 87	*58-71 L	Key o

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