UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **May/June 2012**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

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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.

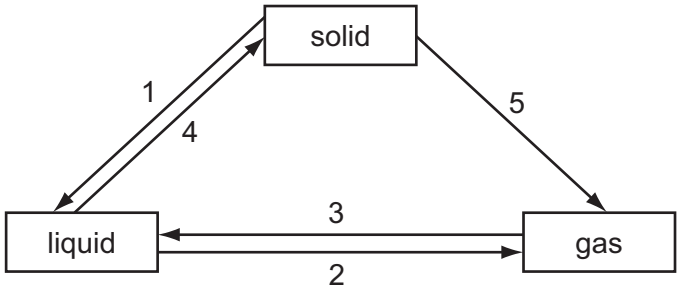
Read the instructions on the Answer Sheet very carefully.

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.

This document consists of **13** printed pages and **3** blank pages.

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1 The diagram shows some of the changes of state.



Which statement is correct?

A Although the change is not shown on the diagram, a gas can change directly to a solid.

B The changes 1 and 3 involve particles moving closer together.

C The changes 2 and 4 involve particles moving further apart.

D The changes 3, 4 and 5 all involve the release of energy.

2 Which gas is **not** obtained industrially by fractional distillation?

A ammonia

B argon

C nitrogen

D oxygen

3 When dilute hydrochloric acid is added to a white powder a gas is produced.

The solution remaining is tested separately with small volumes of both aqueous ammonia and aqueous sodium hydroxide.

A white precipitate is produced in both tests.

What is the white powder?

A aluminium oxide

B calcium oxide

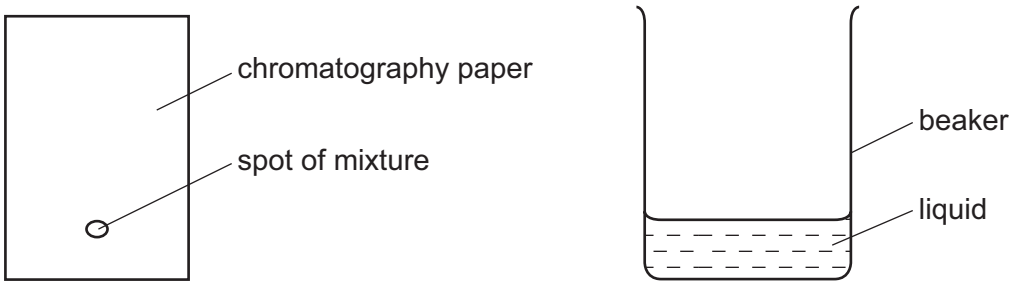
C copper(II) carbonate

D zinc carbonate

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4 A mixture of two substances is spotted onto a piece of chromatography paper.

The paper is inserted into a beaker containing a liquid.



For separation of the substances to occur the spot of mixture must

A be placed so that the spot is just below the level of the liquid.

B be soluble in the liquid.

C contain substances of the same R_f values.

D contain substances that are coloured.

5 Which reagent could be used to distinguish between dilute nitric acid and dilute hydrochloric acid?

A aqueous barium chloride

B aqueous silver nitrate

C aqueous sodium hydroxide

D copper(II) carbonate

6 What is the structure of sand?

A a macromolecule

B an ionic lattice

C a polymer

D a simple molecule

7 Pentane, C_5H_{12}, has a higher boiling point than propane, C_3H_8. Which statement explains the difference in boiling point?

A Carbon-carbon single bonds are stronger than carbon-hydrogen bonds.

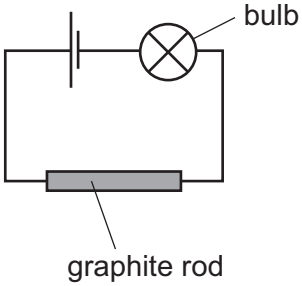
B Pentane has more covalent bonds to break.

C Pentane does not burn as easily as propane.

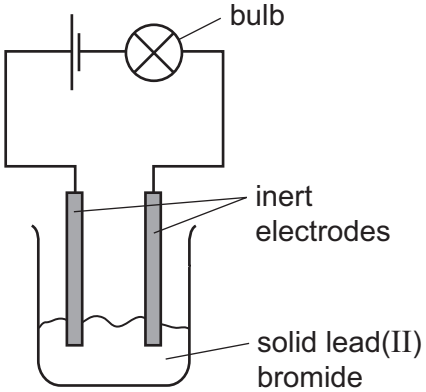
D The forces of attraction between pentane molecules are stronger than those between propane molecules

8 In which set of apparatus will the bulb be **least** bright?

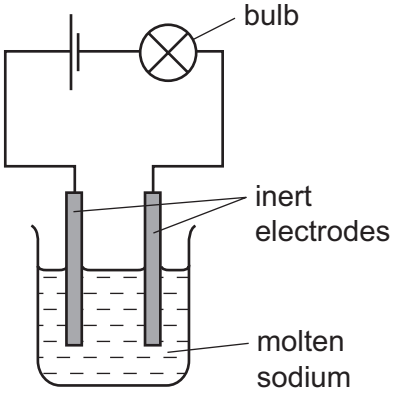
A



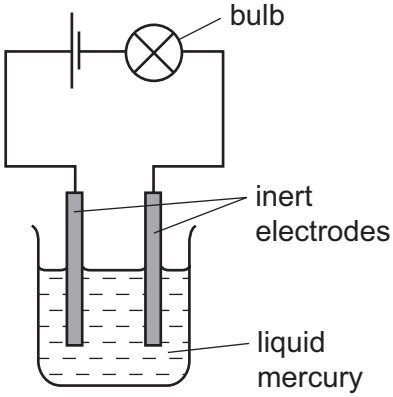
B



C



D



9 Four substances have the following electrical properties.

substance	property
W	does not conduct under any conditions
X	conducts only in aqueous solution
Y	conducts in both the molten and solid states
Z	conducts in both the molten and aqueous states

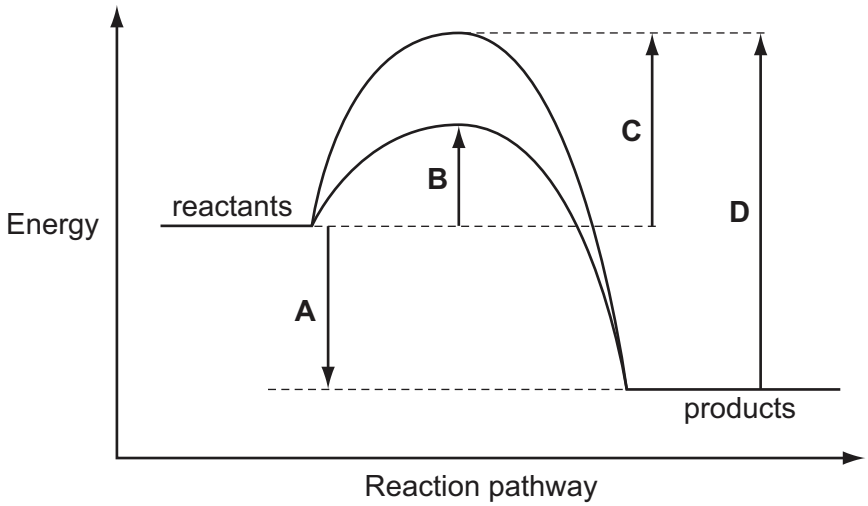
What are these four substances?

	W	X	Y	Z
A	HC*l*	S	NaC*l*	Pb
B	Pb	HC*l*	NaC*l*	S
C	S	HC*l*	Pb	NaC*l*
D	S	NaC*l*	HC*l*	Pb

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10 The energy profile diagram shows the pathways for a reaction with and without a catalyst.

Which energy change is the activation energy for the catalysed reaction?



11 Which statement about conduction of electricity is correct?

A Electricity is conducted in aqueous solution by electrons.

B Electricity is conducted in a metal wire by ions.

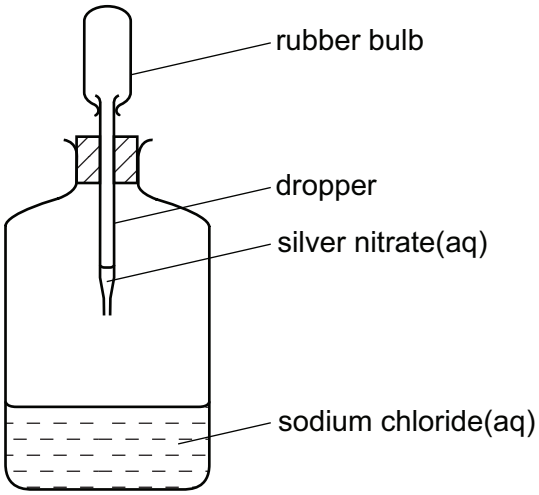
C Electricity is conducted in a molten electrolyte by electrons.

D Electricity is conducted in an acid solution by ions.

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[Turn over

12 When the rubber bulb of the dropper in the diagram is squeezed, the aqueous silver nitrate drops into the aqueous sodium chloride and a white precipitate of silver chloride is formed.



What happens to the total mass of the bottle and contents?

A It increases due to the formation of the heavy precipitate.

B It remains the same because only a physical change has taken place.

C It decreases because heat is evolved.

D It remains the same because none of the products escapes from the bottle.

13 What has the same mass as 0.25 mol of copper atoms?

A 0.5 mol of oxygen molecules

B 1 mol of sulfur dioxide molecules

C 1.5 mol of water molecules

D 2 mol of oxygen atoms

14 Which change **always** takes place when an aqueous solution of copper(II) sulfate is electrolysed?

A Copper is deposited at the negative electrode.

B Oxygen is evolved at the positive electrode.

C Sulfate ions move towards the negative electrode.

D The colour of the solution fades.

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15 Which substance will conduct electricity without being chemically changed?

A sodium chloride solution

B solid iron

C solid sodium chloride

D solid sulfur

16 A sample of air was bubbled into water. The pH of the water slowly changed from 7 to 6.

Which gas in the sample caused this change?

A carbon dioxide

B carbon monoxide

C nitrogen

D oxygen

17 The oxide Q dissolves in water to form a colourless solution. This solution reacts with sodium carbonate to produce carbon dioxide.

What is Q?

A copper(II) oxide

B sodium oxide

C sulfur dioxide

D zinc oxide

18 The following statements about dilute sulfuric acid are **all** correct.

1 Addition of Universal Indicator shows that the solution has a pH value of less than 7.0.

2 A white precipitate is formed when aqueous barium nitrate is added.

3 The solution reacts with copper(II) oxide, forming a blue solution.

4 The solution turns anhydrous copper(II) sulfate from white to blue.

Which two statements confirm the acidic nature of the solution?

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

19 Which ion reacts with aqueous ammonia to give a precipitate that dissolves in an excess of ammonia?

A $Al^{3+}(aq)$ **B** $Fe^{2+}(aq)$ **C** $Fe^{3+}(aq)$ **D** $Zn^{2+}(aq)$

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20 Which element is **most** likely to be used as an industrial catalyst?

A Li **B** Cs **C** Rh **D** Po

21 Which compound when reacted with sulfuric acid produces a product which is used as a fertiliser?

A ammonia

B calcium carbonate

C calcium hydroxide

D sodium hydroxide

22 In which reaction is the underlined substance behaving as an oxidising agent?

A $\underline{BaCl_2} + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

B $3CuO + \underline{2NH_3} \rightarrow 3Cu + N_2 + 3H_2O$

C $2FeCl_2 + \underline{Cl_2} \rightarrow 2FeCl_3$

D $O_2 + \underline{2SO_2} \rightarrow 2SO_3$

23 Which statements are true about **all** the noble gases?

1 The number of protons in their atoms equals the number of neutrons.

2 The number of protons in their atoms does not equal the number of electrons.

3 They all have eight electrons in their outer shell.

4 They do not react to form ionic compounds.

A 1, 2 and 3

B 1 and 3 only

C 3 only

D 4 only

24 How many electrons and protons are in an **ion** of an element in Group 2 of the Periodic Table?

	Number of electrons	Number of protons
A	6	4
B	10	12
C	22	20
D	139	137

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25 A metal **X** forms oxides with the formulae XO and X_2O_3.

Where is **X** in the Periodic Table?

A in Group II

B in Group III

C the second Period

D in the transition elements

26 What is a characteristic of a weak acid?

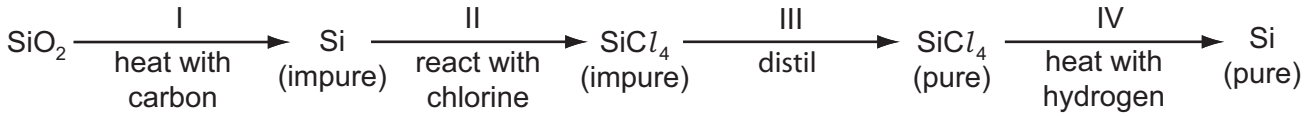
A It does not react with sodium carbonate.

B It forms an aqueous solution with a pH of 8.

C It is only partially ionised when added to water.

D It turns litmus solution blue.

27 The reaction scheme represents the process for obtaining pure silicon.



In which of the stages is the silicon reduced?

A I only **B** I and II **C** I and IV **D** II and III

28 Which metal can be obtained from its oxide using hydrogen?

A calcium

B copper

C magnesium

D zinc

29 Which substance undergoes decomposition because of the high temperature in the blast furnace?

A coke

B calcium carbonate

C calcium silicate

D slag

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30 Which reaction occurring in the blast furnace is an acid base reaction?

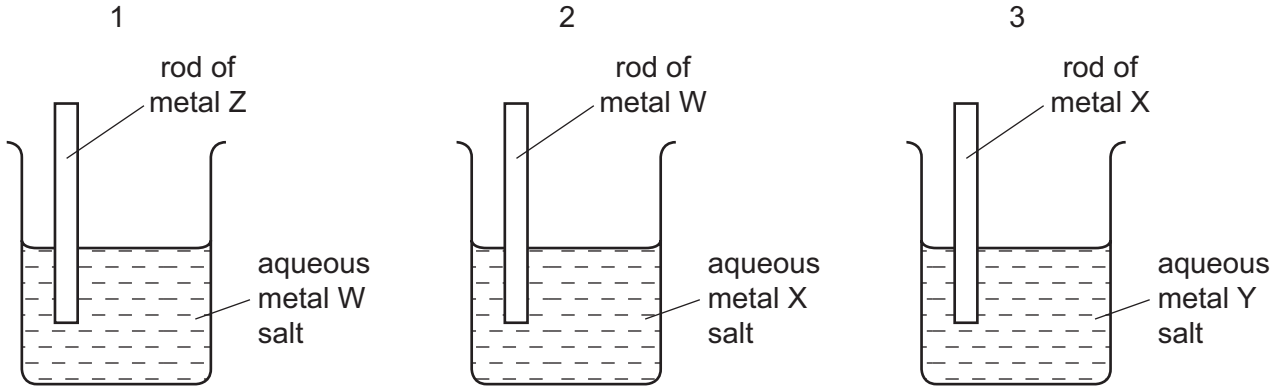
A $C + CO_2 \rightarrow 2CO$

B $C + O_2 \rightarrow CO_2$

C $CaO + SiO_2 \rightarrow CaSiO_3$

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

31 Three different beakers are set up as shown.



In beaker 1 metal W is displaced from solution.
In beaker 2 metal X is displaced from solution.
In beaker 3 metal Y is displaced from solution.

What is the order of **decreasing** reactivity of the four metals?

	most reactive →			least reactive
A	W	X	Y	Z
B	X	Y	W	Z
C	Z	W	X	Y
D	Z	X	W	Y

32 Aluminium is manufactured by the electrolysis of aluminium oxide.

Which substances are formed at the electrodes?

	positive electrode	negative electrode
A	aluminium	carbon dioxide
B	aluminium	oxygen
C	carbon dioxide	aluminium
D	oxygen	carbon dioxide

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33 The processes photosynthesis, respiration and fermentation all change the amount of carbon dioxide in the atmosphere.

Which processes increase the amount of carbon dioxide in the atmosphere?

A photosynthesis and fermentation

B photosynthesis only

C respiration and fermentation

D respiration only

34 Which process would destroy the bacteria in water?

A chlorination

B desalination

C filtration

D treatment with carbon

35 Which compound has more than two carbon atoms per molecule?

A ethanoic acid

B ethanol

C ethene

D ethyl ethanoate

36 The equations show some reactions of organic compounds.

Which is an addition reaction?

A $CH_4 + Br_2 \rightarrow CH_3Br + HBr$

B $C_2H_5OH + O_2 \rightarrow CH_3CO_2H + H_2O$

C $C_2H_5OH + CH_3CO_2H \rightarrow CH_3CO_2C_2H_5 + H_2O$

D $C_4H_4 + 2Br_2 \rightarrow C_4H_4Br_4$

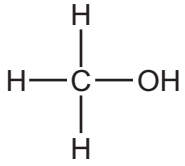
37 Which statement about methanol is correct?

A It can be oxidised to form methanoic acid.

B It is a constituent of alcoholic drinks.

C It is formed by fermentation.

D Its fully displayed structural formula is



38 A 10 cm^3 sample of a gaseous hydrocarbon is completely burnt in oxygen. The total volume of the products is 70 cm^3. All gas volumes are measured at room temperature and pressure.

Which equation represents the combustion of the hydrocarbon?

A $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$

C $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$

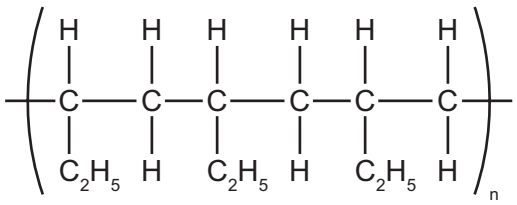
D $2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$

39 One mole of magnesium is dissolved in excess aqueous ethanoic acid, CH_3COOH.

How many moles of hydrogen, H_2, will be produced?

A 0.5 **B** 1 **C** 2 **D** 4

40 The section of a polymer chain is shown.



Which molecule would produce this polymer and by which type of polymerisation?

	molecule	type of polymerisation
A	$CH_3–CH=CH–CH_3$	condensation
B	$CH_3–CH_2–CH=CH_2$	addition
C	$CH_3–CH_2–CH_2–CH=CH_2$	condensation
D	$CH_3–CH=CH–CH_3$	addition

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0
															4 He Helium 2
					1 H Hydrogen 1						12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
7 Li Lithium 3	9 Be Beryllium 4									11 B Boron 5	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
23 Na Sodium 11	24 Mg Magnesium 12									27 Al Aluminium 13	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80							
	226 Ra Radium 88	227 Ac Actinium †															

*58-71 Lanthanoid series	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
†90-103 Actinoid series	232 Th Thorium 90	Pa Protactinium 91	238 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	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

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

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

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