UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CHEMISTRY **5070/11**

Paper 1 Multiple Choice **October/November 2012**

1 hour

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

2931853253

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 It is suspected that a lollipop contains traces of a poisonous green dye (boiling point 73 °C) as well as two harmless orange and red dyes (boiling points 69 °C and 73 °C respectively).

What is the best method by which the green dye may be detected?

A filtration

B fractional distillation

C paper chromatography

D recrystallisation

2 Element X does not conduct electricity and has a low melting point.

Which could be element X?

A carbon (graphite)

B iodine

C mercury

D sodium

3 Substance Q is a soluble salt.

An aqueous solution of Q is tested as shown.

test	observation
warm Q with aqueous sodium hydroxide	alkaline gas given off, no precipitate formed
to Q add dilute nitric acid and barium nitrate solution	white precipitate forms

What is Q?

A ammonium chloride

B ammonium sulfate

C zinc chloride

D zinc sulfate

4 Which statement explains why the gases propane, C_3H_8, and carbon dioxide, CO_2, diffuse at the same rate at room temperature and pressure?

A Both are denser than air.

B Both compounds contain carbon.

C Both molecules contain covalent bonds.

D They have the same relative molecular mass, M_r.

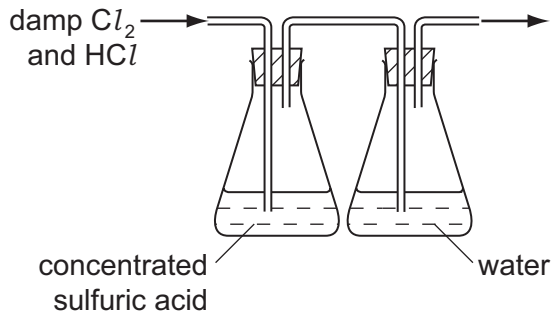
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5 Hydrogen chloride is very soluble in water, whereas chlorine is only slightly soluble in water.

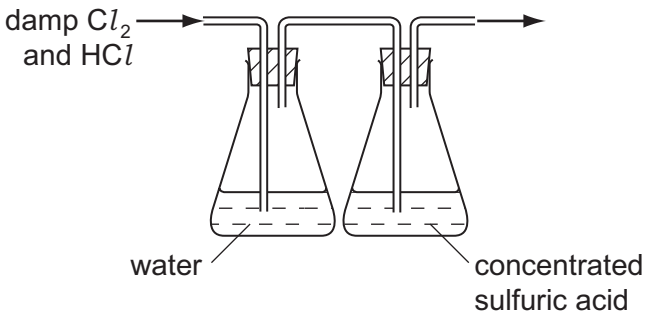
Both gases can be dried using concentrated sulfuric acid.

Which diagram represents the correct method of obtaining pure dry chlorine from damp chlorine containing a small amount of hydrogen chloride?

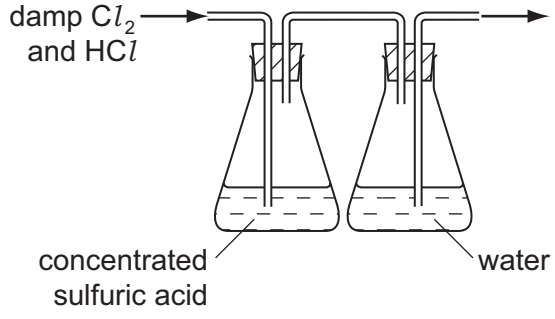
A



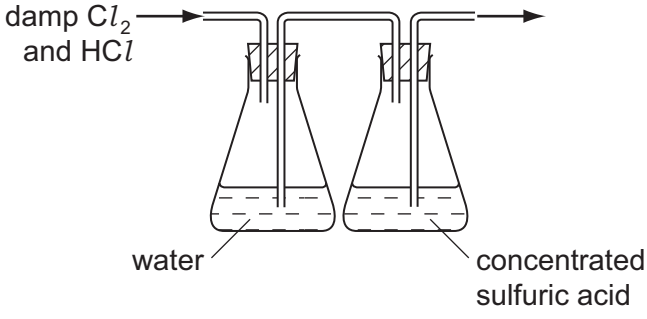
B



C



D



6 Which of the following is **not** a mixture?

A ethanol

B petrol

C steel

D tap water

7 The table gives the arrangements of electrons in the atoms of four different elements.

Which element does not form an ionic compound with chlorine?

	arrangement of electrons
A	2.1
B	2.4
C	2.8.1
D	2.8.2

8 A compound Y is the only substance formed when two volumes of dry ammonia gas react with one volume of dry carbon dioxide (both volumes measured at s.t.p.).

What is the most likely formula of Y?

A $(NH_4)_2CO_3$

B NH_2COONH_4

C $(NH_2)_2CO$

D NH_4COONH_4

9 For which compound is the type of bonding correct?

	compound	bonding
A	ammonia	ionic
B	carbon dioxide	covalent
C	sodium chloride	covalent
D	water	ionic

10 Why do graphite and diamond have different physical properties?

A Diamond has a giant molecular structure but graphite has not.

B Diamond occurs naturally but graphite is made artificially.

C Graphite is ionic whereas diamond is covalent.

D They contain carbon atoms covalently bonded to different numbers of other carbon atoms.

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11 Which statement about the particles O^{2-}, F^{-}, Ne, Na^{+} and Mg^{2+} is true?

They all

A contain more electrons than protons.

B contain more neutrons than protons.

C contain the same number of electrons.

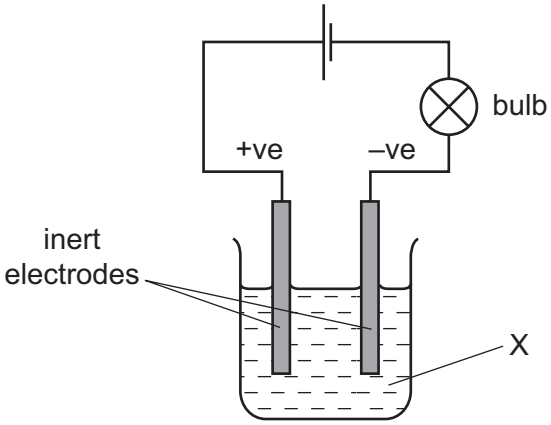
D contain the same number of neutrons.

12 The M_r of oxygen, O_2, is 32 and the M_r of sulfur is 256.

What is the formula of a molecule of sulfur?

A S_2 **B** S_4 **C** S_8 **D** S_{16}

13 In the experiment shown in the diagram, the bulb lights and a gas is produced at each electrode.



What is X?

A aqueous copper(II) sulfate

B concentrated aqueous sodium chloride

C ethanol

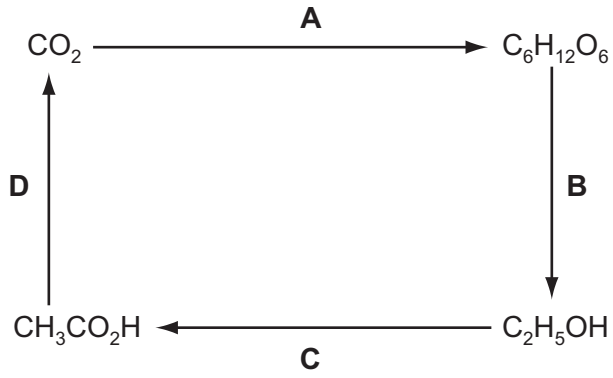
D molten lead bromide

14 Which element in the table is an alkali metal?

	melting point °C	density g / cm^3
A	–39	13.60
B	–7	3.10
C	98	0.97
D	1083	8.92

15 The diagram shows the steps by which carbon dioxide can be converted into organic products and finally returned to the atmosphere.

Which step is endothermic?



16 Which industrial reaction does **not** involve a catalyst?

A the cracking of hydrocarbons

B the extraction of iron from haematite in a blast furnace

C the production of ammonia from nitrogen and hydrogen

D the redox reaction involving the removal of combustion pollutants from car exhausts

17 Salts containing which of the following anions are always soluble in water?

A carbonates

B chlorides

C nitrates

D sulfates

18 What is a property of the hydroxide, OH^-, ion?

A It combines with hydrogen to form water.

B It is present in water.

C It readily breaks down into hydrogen ions and oxide ions.

D It travels to the cathode in electrolysis of an aqueous solution.

19 Which method of preparation of magnesium sulfate is an example of a redox reaction?

A $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

B $MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O$

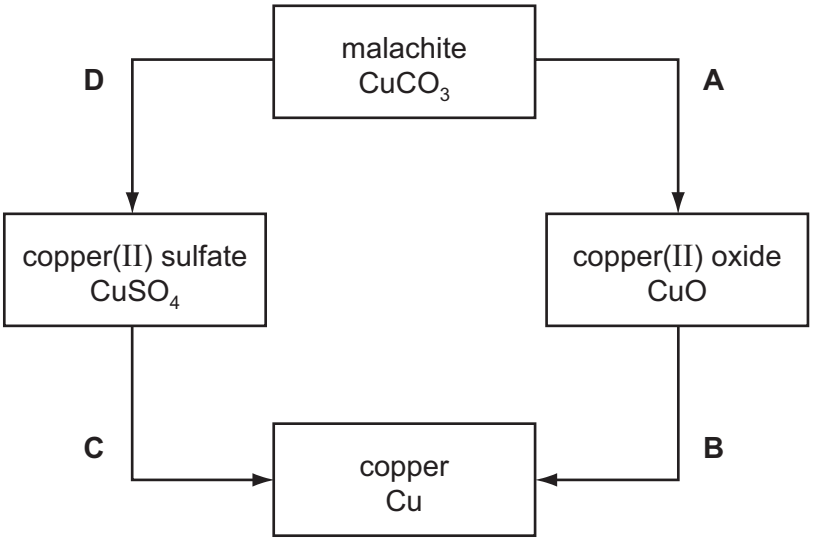
C $Mg(OH)_2 + H_2SO_4 \rightarrow MgSO_4 + 2H_2O$

D $MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2$

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20 The diagram shows some reactions of copper compounds.

Which change is made by adding an acid?



21 Which process is a renewable energy source?

A combustion of coal

B electrolysis of aluminium oxide

C fractional distillation of petroleum

D photosynthesis

22 An element X forms an ion X^{3-}.

In which group of the Periodic Table will this element be found?

A Group I

B Group III

C Group V

D Group VII

23 Which two gases do not damage limestone buildings?

A nitrogen and carbon monoxide

B nitrogen dioxide and carbon monoxide

C nitrogen dioxide and carbon dioxide

D sulfur dioxide and carbon dioxide

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24 A metal, X, has a low melting point, reacts with water, forms only one oxide and is extracted from its ore by electrolysis.

What is the identity of X?

A aluminium

B copper

C iron

D sodium

25 Metallic objects may be decorated by having very thin layers of gold applied to them.

Which properties of gold make it suitable for this use?

	it conducts electricity	it is malleable	it is unreactive
A	✗	✓	✓
B	✓	✗	✓
C	✓	✓	✗
D	✓	✓	✓

26 Iron pipes corrode rapidly when exposed to sea water.

Which metal, when attached to the iron, would **not** offer protection against corrosion?

A aluminium

B copper

C magnesium

D zinc

27 Metal **M** will displace copper from aqueous copper(II) sulfate solution, but will not displace iron from aqueous iron(II) sulfate solution. **M** is extracted from its oxide by heating the oxide with carbon.

What is the order of reactivity of these four metals?

	least reactive ⟶			most reactive
A	sodium	metal **M**	iron	copper
B	sodium	iron	metal **M**	copper
C	copper	iron	metal **M**	sodium
D	copper	metal **M**	iron	sodium

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28 Which gas **can** be removed from the exhaust gases of a petrol-powered car by its catalytic converter?

A carbon monoxide

B carbon dioxide

C nitrogen

D steam

29 What is the function of silica, SiO_2, in the equation shown below?

$$CaO + SiO_2 \rightarrow CaSiO_3$$

A a basic oxide

B a reducing agent

C an acidic oxide

D an oxidising agent

30 A mixture of two gases has no effect on either damp blue litmus paper or damp red litmus paper.

Which gases are present in the mixture?

A ammonia and oxygen

B carbon dioxide and sulfur dioxide

C chlorine and hydrogen

D hydrogen and oxygen

31 Which contains the greatest mass of nitrogen?

A 0.5 moles $(NH_4)_2SO_4$

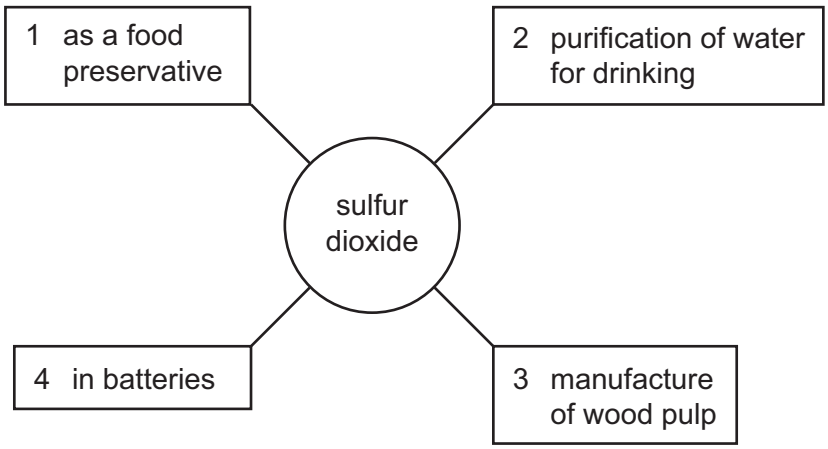
B 1 mole NH_4NO_3

C 1.5 moles $(NH_4)_3PO_4$

D 2 moles $CO(NH_2)_2$

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32 The diagram shows some of the uses of sulfur dioxide.



Which two of the numbered boxes are correct?

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

33 Which statement about macromolecules is correct?

A Nylon and *Terylene* are both polyesters.

B Proteins and nylon have the same monomer units.

C Proteins have the same amide linkages as nylon.

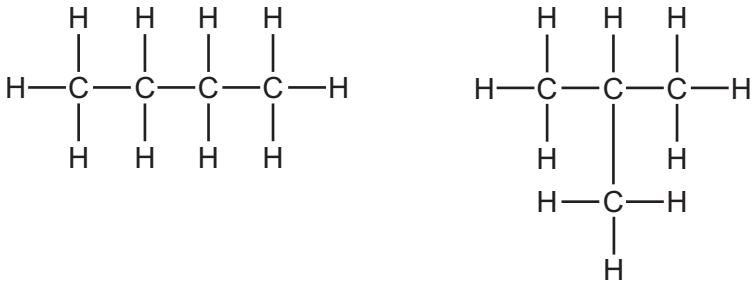
D *Terylene* and fats are esters but with different linkages.

34 Which row shows both the correct source and the correct effect of the named pollutant?

	pollutant	source	effect
A	carbon monoxide	incomplete combustion of carbon-containing materials	global warming
B	oxides of nitrogen	decaying vegetable matter	global warming
C	ozone	photochemical reactions	acid rain
D	sulfur dioxide	volcanoes	acid rain

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35 The diagram shows two compounds.



It can be predicted from their formulae that the compounds have the same

A boiling point.

B composition by mass.

C melting point.

D structural formula.

36 Which statement concerning isomers is true?

A Diamond and graphite are isomers of each other.

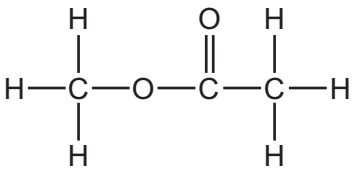
B Isomers have the general formula C_nH_{2n+2}.

C Isomers have the same molecular formula.

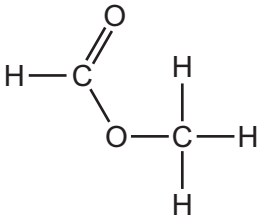
D Macromolecules are isomers of the small molecules from which they are made.

37 Which compound will react with ethanol to form an ester?

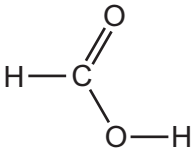
A



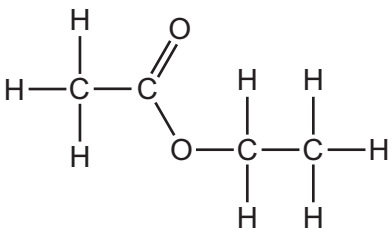
B



C



D



38 In the purification of water, what is the purpose of carbon?

A to desalinate

B to disinfect

C to remove odours

D to remove solids

39 Four conversions are listed.

1 amino acids to proteins

2 ethene to poly(ethene)

3 proteins to amino acids

4 starch to glucose

Which two conversions are **not** examples of hydrolysis?

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

40 What is the name of the ester $CH_3COOC_2H_5$?

A ethyl ethanoate

B ethyl methanoate

C methyl ethanoate

D methyl methanoate

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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												
										11 B Boron 5	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									27 Al Aluminium 13	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									70 Ga Gallium 31	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	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	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	101 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	209 At Astatine 85	209 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 89 †															

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
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

*58-71 Lanthanoid series
†90-103 Actinoid series

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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