UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice **May/June 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.

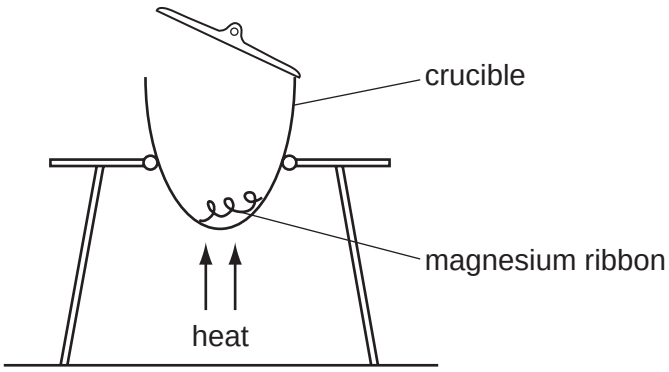
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

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
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

2 The diagram shows an experiment to find the formula of magnesium oxide.



Which piece of apparatus would be needed in addition to those shown?

A a balance

B a measuring cylinder

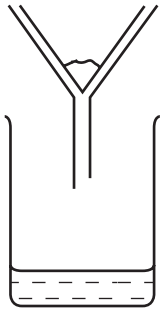
C a spatula

D a thermometer

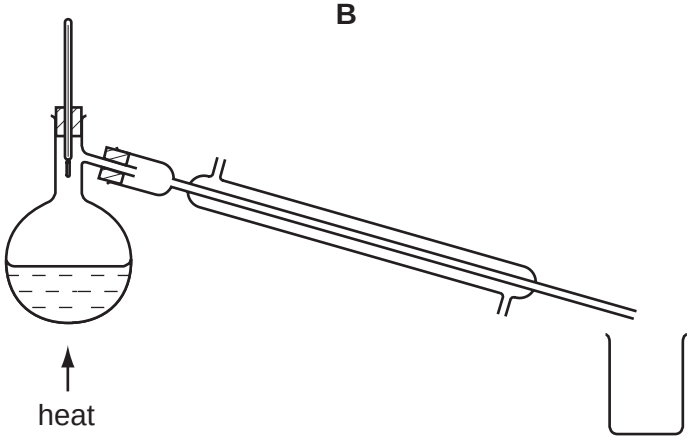
3 Methanol, CH_3OH, and ethanol, C_2H_5OH, are miscible liquids.

Which diagram shows apparatus that is used to obtain methanol from a mixture of ethanol and methanol?

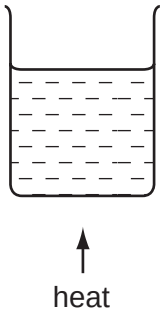
A



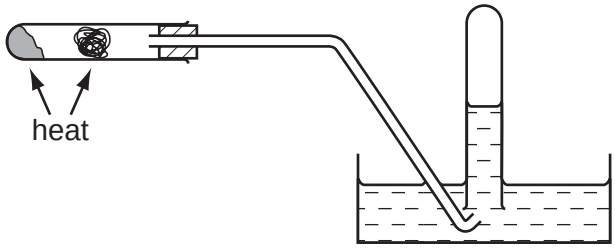
B



C

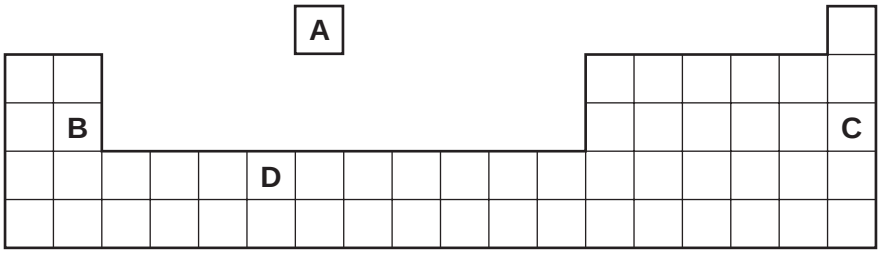


D

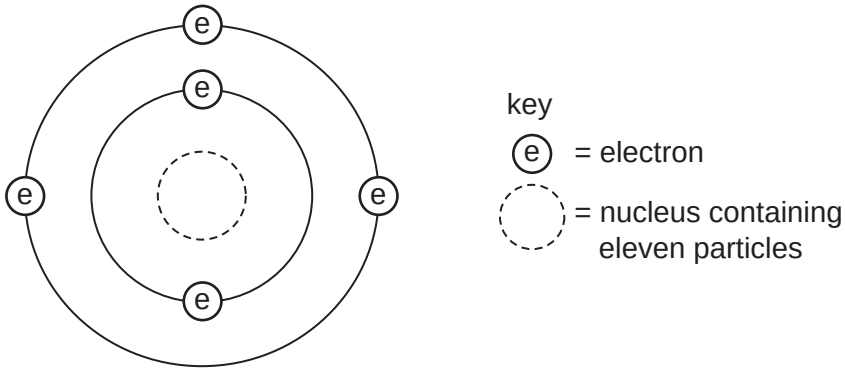


4 The positions of four elements are shown on the outline of the Periodic Table.

Which element forms a coloured oxide?



5 The diagram shows an atom of an element.



How many protons and neutrons are in the nucleus of the atom and in which group and period of the Periodic Table is the element found?

	number of protons	number of neutrons	group number	period number
A	5	6	3	2
B	5	11	2	3
C	6	5	3	2
D	6	11	2	3

6 Electrons from each element are shared by both of the elements in a compound.

Which compound matches this description?

A lead bromide

B sodium chloride

C water

D zinc oxide

7 The equation shows the reaction between magnesium and sulfuric acid.

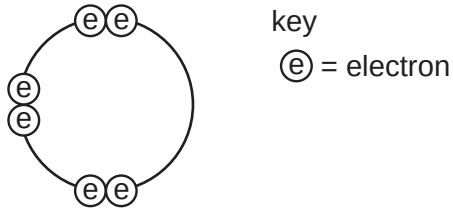
$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

(Mg = 24, H = 1, S = 32, O = 16)

In this reaction, what mass of magnesium sulfate will be formed when 6 g of magnesium reacts with excess sulfuric acid?

A 8 **B** 24 **C** 30 **D** 60

8 Element X has six electrons in its outer shell.



How could the element react?

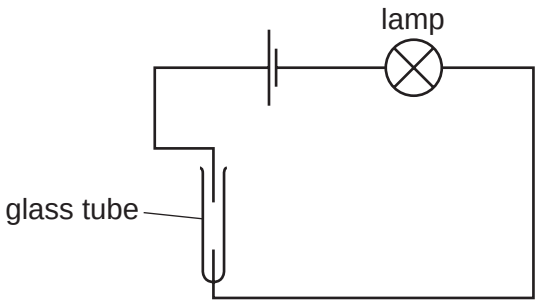
A by gaining two electrons to form a positive ion

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

9 The diagram shows an incomplete circuit.



Which substance causes the lamp to light when added to the glass tube?

A aqueous sodium chloride

B aqueous sugar

C solid sodium chloride

D solid sugar

10 What is the balanced chemical equation for the reaction between calcium and water?

A $Ca + H_2O \rightarrow CaOH + H_2$

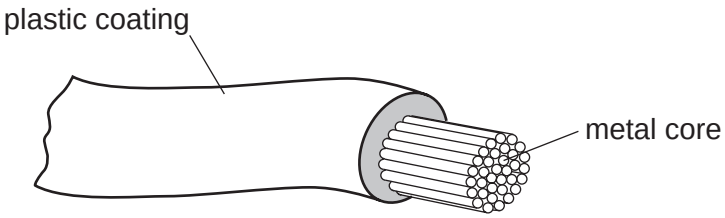
B $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$

C $Ca + 2H_2O \rightarrow CaOH + H_2$

D $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

[Turn over

11 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.

12 Statement 1 Hydrogen is used as a fuel.

Statement 2 When hydrogen burns in the air to form water, heat energy is produced.

Which is correct?

A Both statements are correct and statement 2 explains statement 1.

B Both statements are correct but statement 2 does not explain statement 1.

C Statement 1 is correct but statement 2 is incorrect.

D Statement 2 is correct but statement 1 is incorrect.

13 Which substance does **not** require oxygen in order to produce energy?

A coal

B hydrogen

C natural gas

D ^{235}U

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

A $3\underline{CO} + Fe_2O_3 \rightarrow 2Fe + 3CO_2$

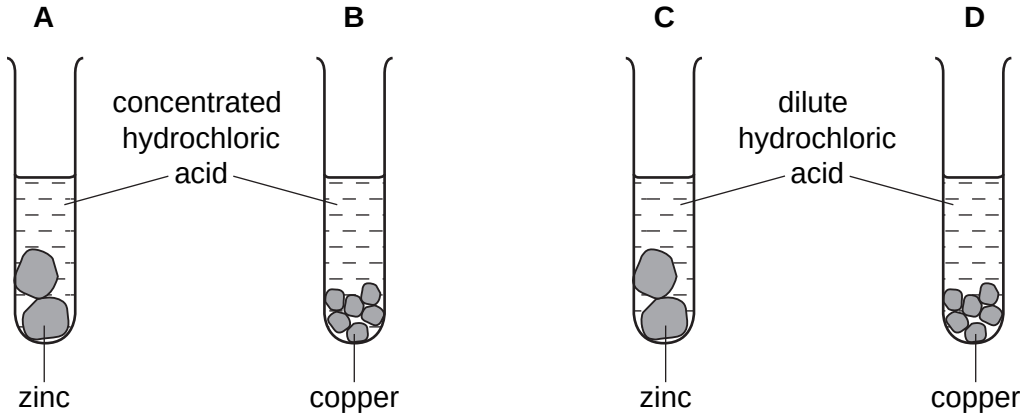
B $\underline{CO_2} + C \rightarrow 2CO$

C $\underline{CuO} + H_2 \rightarrow Cu + H_2O$

D $\underline{CaO} + H_2O \rightarrow Ca(OH)_2$

15 The diagram shows an experiment to compare the rate of reaction when a metal is added to hydrochloric acid.

In which test-tube is the reaction fastest?



16 Two oxides, X and Y, are added separately to dilute sulfuric acid and dilute sodium hydroxide.

X reacts with dilute sulfuric acid but Y does not react.

Y reacts with aqueous sodium hydroxide but X does not react.

Which type of oxide are X and Y?

	acidic oxide	basic oxide	metallic oxide
A	X	Y	X
B	X	Y	Y
C	Y	X	X
D	Y	X	Y

17 Heating pink cobalt(II) chloride crystals forms a blue solid and steam.

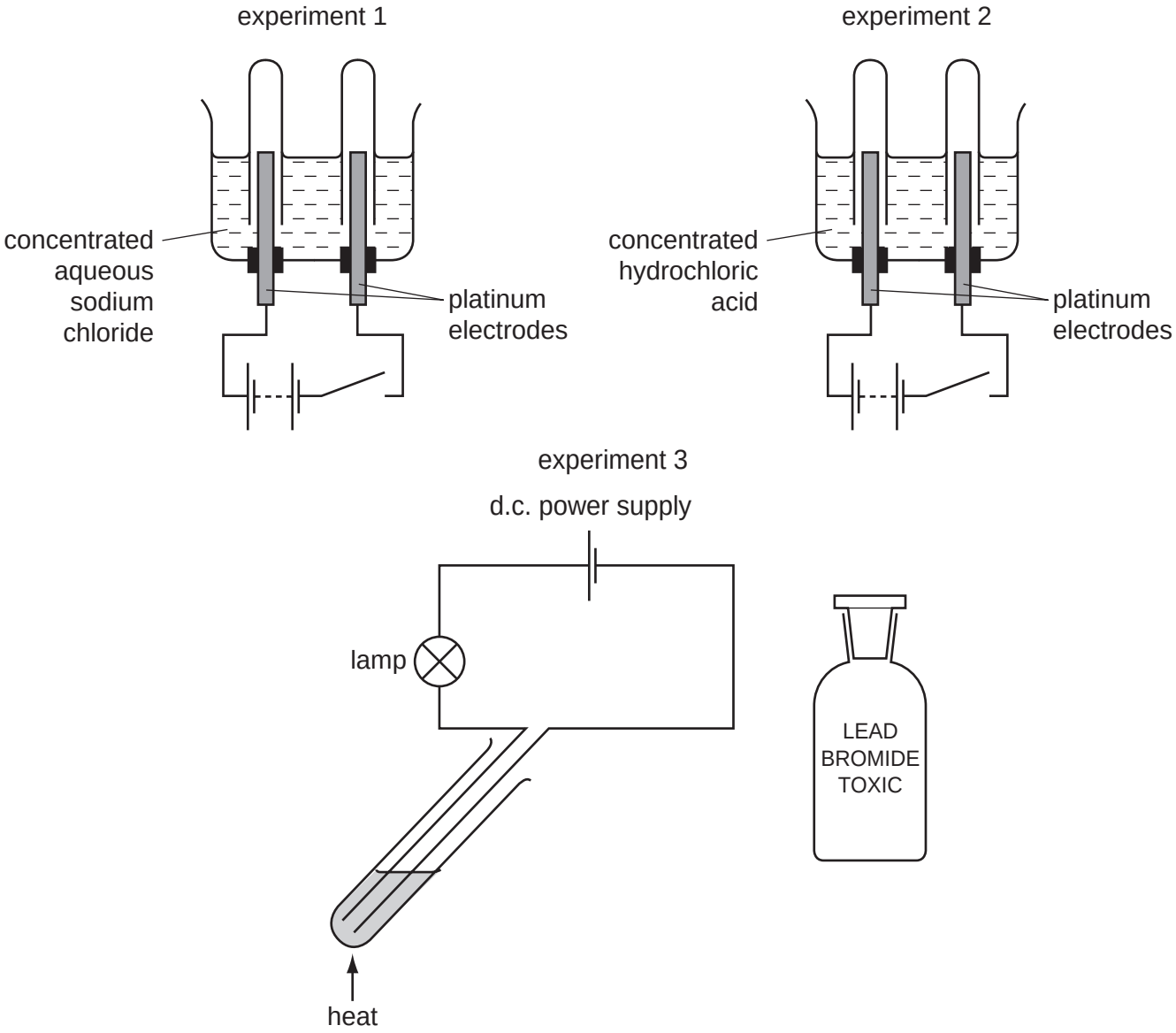
The blue solid turns pink when water is added.

Which terms describe the pink cobalt(II) chloride and the reaction?

	pink cobalt(II) chloride is	the reaction is reversible
A	anhydrous	yes
B	anhydrous	no
C	hydrated	yes
D	hydrated	no

[Turn over

18 Concentrated aqueous sodium chloride, concentrated hydrochloric acid and molten lead bromide were separately electrolysed in experiments 1, 2 and 3.



Which statement about the electrode products is correct?

A Gases were given off at the anode in experiments 2 and 3 only.

B Gases were given off at the cathode in experiments 1 and 2 only.

C Metals were formed at the anode in experiments 1 and 3 only.

D Metals were formed at the cathode in experiments 1 and 3 only.

19 Which statement about the reaction of acids is correct?

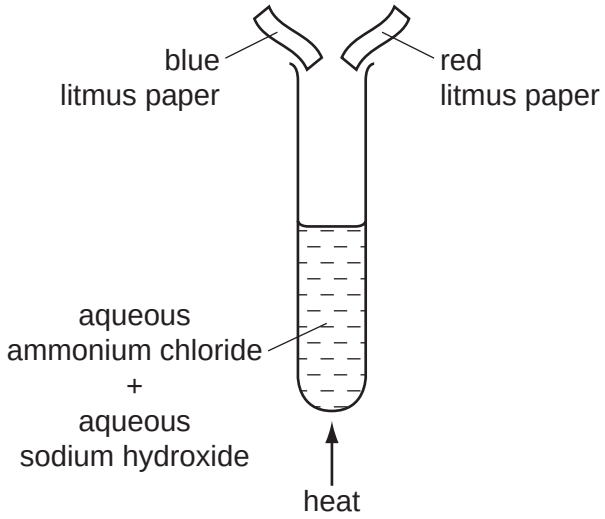
A They react with ammonium salts to form a salt and ammonia only.

B They react with metal carbonates to give a salt and carbon dioxide only.

C They react with metal hydroxides to give a salt and water only.

D They react with metals to give a salt, hydrogen and water only.

20 The diagram shows an experiment.



What happens to the pieces of litmus paper?

	blue litmus paper	red litmus paper
A	changes colour	changes colour
B	changes colour	no colour change
C	no colour change	changes colour
D	no colour change	no colour change

21 Two indicators, bromophenol blue and Congo red, show the following colours in acidic solutions and in alkaline solutions.

indicator	acid	alkali
bromophenol blue	yellow	blue
Congo red	violet	red

A few drops of each indicator are added to separate samples of a solution of pH 2.

What are the colours of the indicators in this solution?

	in a solution of pH 2	
	bromophenol blue is	Congo red is
A	blue	red
B	blue	violet
C	yellow	red
D	yellow	violet

[Turn over

22 W, X, Y and Z are elements in the same period in the Periodic Table.

W and Y are metals. X and Z are non-metals.

Which shows the correct order of these elements across the period?

A	W		X		Y		Z	
B	X	Z				W		Y
C	Y					W	X	Z
D	W		Y				X	Z

23 Platinum is a transition metal.

Which statement about platinum is correct?

A It does not catalyse reactions.

B It forms coloured compounds.

C It has a low density.

D It has a low melting point.

24 Which element will be less reactive than the other members of its group in the Periodic Table?

A astatine

B caesium

C fluorine

D rubidium

25 Bromine is in Group VII on the Periodic Table.

Which describes the appearance of bromine at room temperature?

A grey solid

B purple fumes

C red-brown liquid

D yellow gas

26 A substance, X, has the following properties.

1 It has a high melting point.

2 It conducts electricity in the solid and liquid states.

3 It is malleable.

4 It had a high density.

What is X?

A a ceramic

B copper

C graphite

D sodium chloride

27 Why is aluminium used to make food containers?

A It has a low density.

B It is strong.

C It keeps the food hot.

D It resists corrosion.

28 Which statement is incorrect?

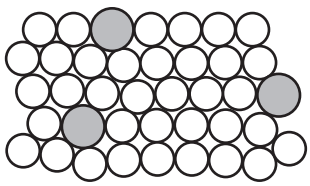
A Carbon dioxide is a waste product in the extraction of iron.

B Carbon monoxide is a reducing agent.

C The extraction of iron from hematite involves reduction.

D When iron is converted into steel, oxygen is used to oxidise the iron.

29 The diagram represents the structure of substance S.



What is S?

A an alloy

B an ionic solid

C a macromolecule

D a pure metal

[Turn over

30 Q, R, S and T are four metals.

Q is found naturally as the metal.

R reacts with steam but not with cold water.

S reacts violently with cold water.

The oxide of T is reduced to T by heating with carbon.

What is the order of reactivity of the four metals, starting with the most reactive first?

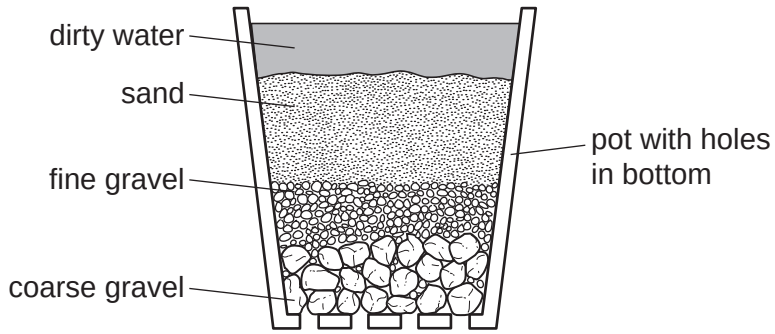
A Q → R → T → S

B Q → T → R → S

C S → R → Q → T

D S → R → T → Q

31 The diagram shows a stage in the purification of dirty water.



Which process does this apparatus show?

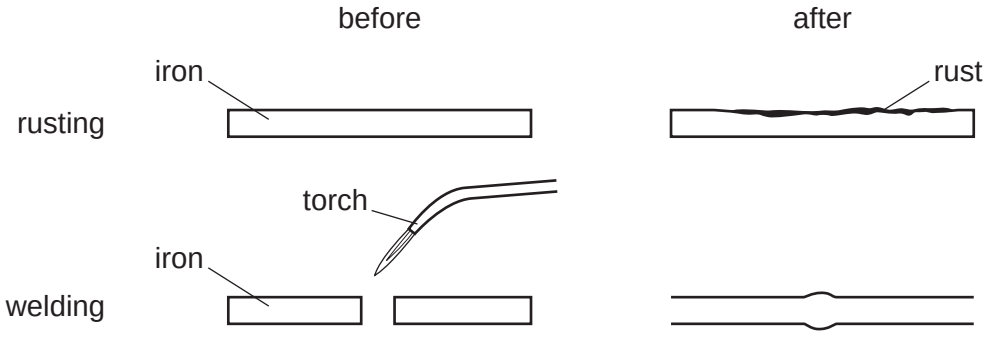
A chlorination

B condensation

C distillation

D filtration

32 The diagrams show two processes.



For which processes is oxygen involved?

	rusting	welding
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

33 Which substance would make the best general fertiliser?

	relative amount			solubility in water
	P	K	N	
A	5	0	5	soluble
B	5	5	20	insoluble
C	5	10	15	soluble
D	10	5	10	insoluble

34 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

key
✓ = true
✗ = false

35 Which process does **not** produce carbon dioxide?

A fermentation

B respiration

C the production of lime from limestone

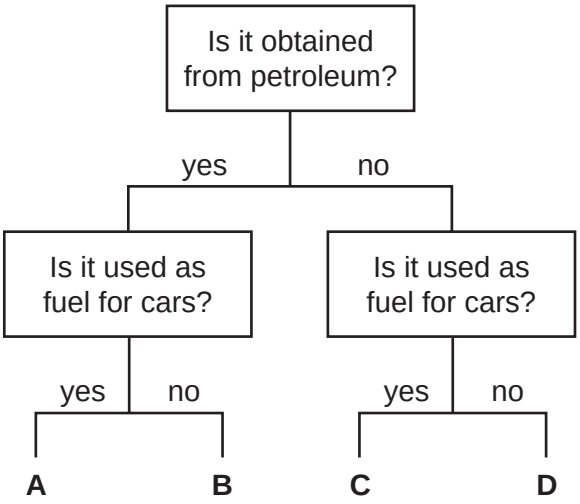
D the treatment of acidic soil with lime

36 Organic compounds may have names ending in -ane, -ene, -ol or -oic acid.

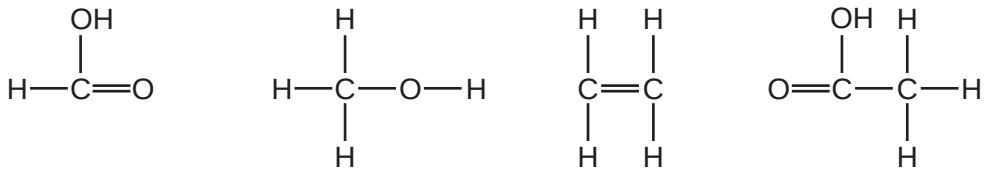
How many of these endings indicate the compounds contain double bonds in their molecules?

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

37 In the flow chart, which fuel could be gasoline?



38 The structures of four molecules are shown.



Which two molecules belong to the same homologous series?

A P and Q **B** P and S **C** Q and R **D** R and S

39 Which columns describe the hydrocarbons ethane and ethene?

	1	2	3	4
state at room temperature	gas	gas	liquid	liquid
reaction with oxygen	burns	burns	burns	burns
reaction with aqueous bromine	no reaction	decolourises bromine	no reaction	decolourises bromine

A 1 (ethane) and 2 (ethene)

B 1 (ethane) and 4 (ethene)

C 2 (ethene) and 3 (ethane)

D 3 (ethane) and 4 (ethene)

40 Which process is **not** used during the production of ethanol?

A addition of steam to ethene

B fermentation

C fractional distillation

D reacting ethane with oxygen

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										
7 Li Lithium 3	9 Be Beryllium 4									11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12									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
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	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
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	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
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	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	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.).