UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**CHEMISTRY** **0620/01**

Paper 1 Multiple Choice **May/June 2008**

**45 Minutes**

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

* 8 4 6 9 3 5 2 3 9 7 *

**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.



IB08 06_0620_01/RP
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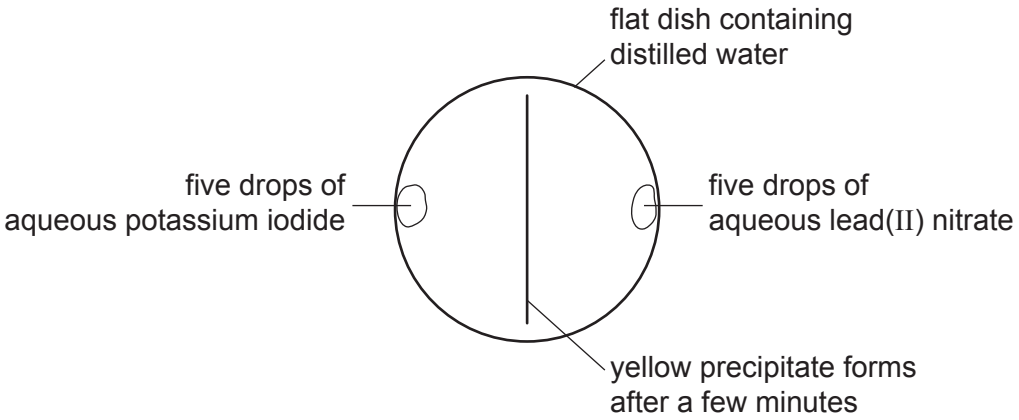
**1** A yellow precipitate is formed in the experiment shown.




How is the precipitate formed?

**A** Particles collide, diffuse and then react.

**B** Particles collide, react and then diffuse.

**C** Particles diffuse, collide and then react.

**D** Particles diffuse, react and then collide

**2** A student is asked to measure the time taken for 4.00 g of magnesium carbonate to react completely with 25.0 $cm^3$ (an excess) of dilute hydrochloric acid.

Which pieces of apparatus does the student need?

**A** balance, clock, pipette

**B** balance, clock, thermometer

**C** balance, pipette, thermometer

**D** clock, pipette, thermometer

**3** Chromatography and fractional distillation can be used to separate compounds.

In which type of separation is a thermometer needed for checking that complete separation has occurred?

**A** chromatographic separation of two colourless solids

**B** chromatographic separation of two solids of different colours

**C** fractional distillation of two colourless liquids

**D** fractional distillation of two liquids of different colours

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**4** The nucleon number and proton number of the lithium atom are shown by the symbol $^{7}_{3}\mathrm{Li}$.

What is the correct symbol for the lithium ion in lithium chloride?

**A** $^{6}_{2}\mathrm{Li}^{-}$ **B** $^{6}_{3}\mathrm{Li}^{+}$ **C** $^{7}_{3}\mathrm{Li}^{+}$ **D** $^{7}_{3}\mathrm{Li}^{-}$

**5** The table shows the numbers of particles present in the nuclei of four atoms or ions.

| | protons | neutrons | electron structure |
|---|---|---|---|
| 1 | 18 | 22 | 2,8,8 |
| 2 | 19 | 20 | 2,8,8 |
| 3 | 19 | 21 | 2,8,8,1 |
| 4 | 20 | 20 | 2,8,8,2 |

Which two particles belong to the same element?

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

**6** What are the nucleon numbers for carbon and magnesium?

| | carbon | magnesium |
|---|---|---|
| **A** | 6 | 12 |
| **B** | 6 | 24 |
| **C** | 12 | 12 |
| **D** | 12 | 24 |

**7** Which of the following can be used as a lubricant?

| | graphite | a liquid fraction from petroleum |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

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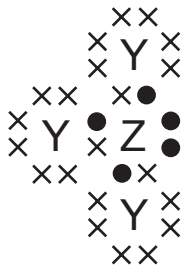
**8** The diagram shows the outer shell electron arrangement of compound J that contains the elements Y and Z.




What type of compound is J?

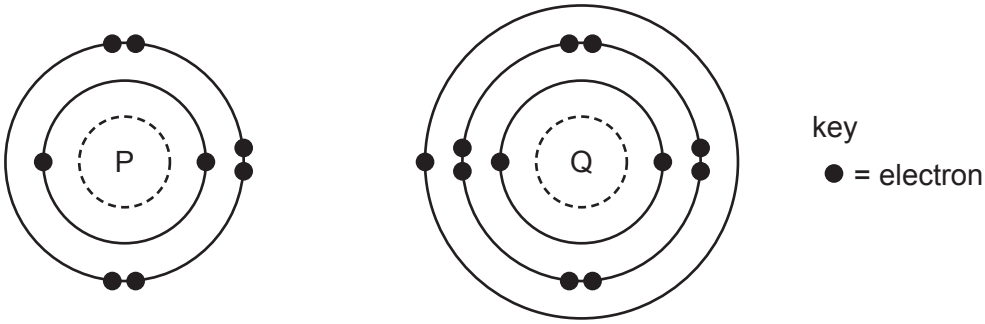
**A** an alloy

**B** a macromolecule

**C** covalent

**D** ionic

**9** The electronic structures of atoms P and Q are shown.




P and Q react to form an ionic compound.

What is the formula of this compound?

**A** $PQ_2$ **B** $P_2Q$ **C** $P_2Q_6$ **D** $P_6Q_2$

**10** For which compound is the formula correct?

| | compound | formula |
|---|---|---|
| **A** | ammonium chloride | $NH_3Cl$ |
| **B** | copper(II) sulphide | CuS |
| **C** | iron(II) sulphide | $Fe_3S$ |
| **D** | silver nitrate | $Ag_2NO_3$ |

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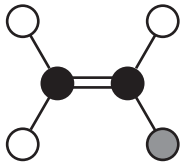
**11** The diagram shows a molecule of vinyl chloride (used to make pvc).



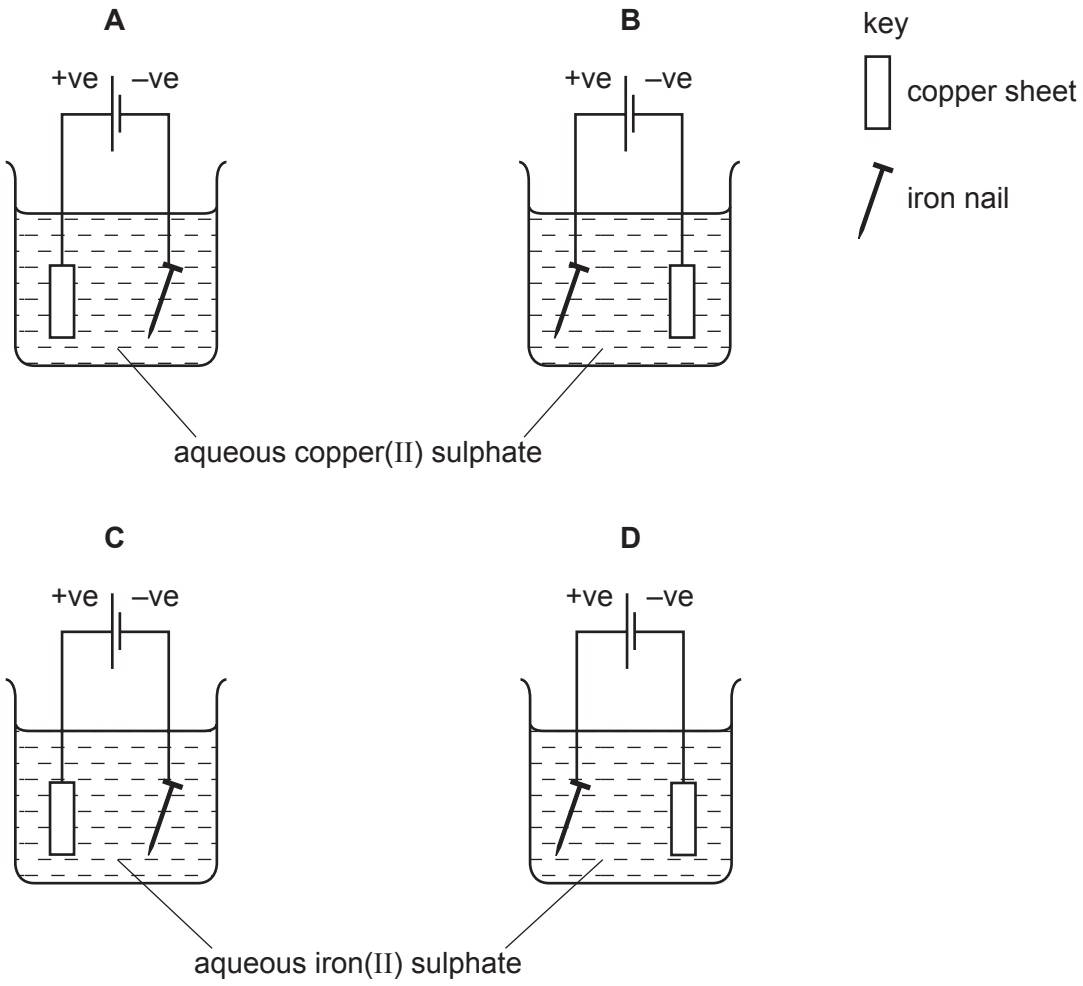
key

- a carbon atom
- a chlorine atom
- a hydrogen atom

What is the formula of vinyl chloride?

**A** $CH_2Cl_3$ **B** $CH_3Cl_2$ **C** $C_2HCl_3$ **D** $C_2H_3Cl$

**12** Which apparatus could be used to electroplate an iron nail with copper?



**13** Two elements X and Y form ionic compounds, $XBr_2$ and $Y_2O_3$. The compounds are separately melted and electricity is passed through the liquids.

What are the products at the cathodes?

**A** bromine and oxygen

**B** bromine and Y

**C** oxygen and X

**D** X and Y

**14** Which change can take place during electrolysis?

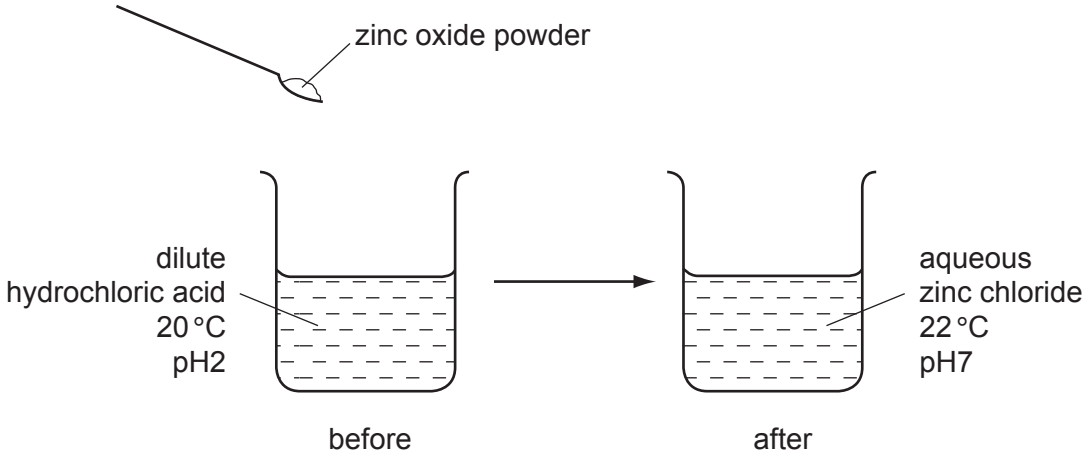
**A** lead(IV) oxide → lead(II) oxide + oxygen

**B** concentrated hydrochloric acid → hydrogen + chlorine

**C** sodium hydroxide + nitric acid → sodium nitrate + water

**D** lead(II) nitrate + sulphuric acid → lead(II) sulphate + nitric acid

**15** The diagram shows an experiment.




Which terms describe the experiment?

| | endothermic | neutralisation |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

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**16** Charcoal and uranium are used as sources of energy.

Which of them are oxidised when used in this way?

| | charcoal | uranium |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**17** Magnesium reacts with acids to produce hydrogen gas.

Under which set of conditions is hydrogen formed the most slowly?

| | magnesium | acid | temperature / °C |
|---|---|---|---|
| **A** | ribbon | concentrated | 40 |
| **B** | ribbon | dilute | 20 |
| **C** | powder | concentrated | 40 |
| **D** | powder | dilute | 20 |

**18** When written as formulae, which compound has the greatest number of oxygen atoms?

**A** calcium oxide

**B** copper(II) oxide

**C** iron(III) oxide

**D** potassium oxide

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**[Turn over**

**19** The equation explains the colour change that occurs when aqueous potassium hydroxide is added to aqueous potassium dichromate(VI).

$$\underset{\substack{\text{potassium}\\\text{dichromate(VI)}\\\text{orange}}}{K_2Cr_2O_7} + 2KOH \rightarrow \underset{\substack{\text{potassium}\\\text{chromate(VI)}\\\text{yellow}}}{2K_2CrO_4} + H_2O$$

As a result of adding an excess of aqueous potassium hydroxide to aqeous potassium dichromate(VI), what happens to the oxidation state of the chromium and the pH of the reaction mixture?

| | oxidation state of the chromium | pH of the mixture |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | stays the same | decreases |
| **D** | stays the same | increases |

**20** An oxide of element X dissolves in water to form a solution of pH 5.

Which line in the table is correct?

| | type of element | type of oxide |
|---|---|---|
| **A** | metallic | acidic |
| **B** | metallic | basic |
| **C** | non-metallic | acidic |
| **D** | non-metallic | basic |

**21** Which statement describes a test for carbon dioxide gas?

**A** It bleaches damp litmus paper.

**B** It relights a glowing splint.

**C** It turns cobalt(II) chloride paper pink.

**D** It turns limewater cloudy.

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**22** A solution of zinc sulphate can be made by adding an excess **either** of zinc carbonate **or** of zinc hydroxide to dilute sulphuric acid.

In which forms are these zinc compounds added to the acid?

| | zinc carbonate | zinc hydroxide |
|---|---|---|
| **A** | aqueous | aqueous |
| **B** | aqueous | solid |
| **C** | solid | aqueous |
| **D** | solid | solid |

**23** Which aqueous ion causes a white precipitate to form when acidified aqueous silver nitrate is added to it?

**A** chloride

**B** iodide

**C** nitrate

**D** sulphate

**24** What is the colour of gaseous chlorine and of solid sodium chloride?

| | chlorine | sodium chloride |
|---|---|---|
| **A** | colourless | yellow-green |
| **B** | colourless | white |
| **C** | yellow-green | yellow-green |
| **D** | yellow-green | white |

**25** The Group I elements lithium and potassium are tested.

Which element has the higher melting point and which element reacts more vigorously with water?

| | higher melting point | more vigorous reaction with water |
|---|---|---|
| **A** | lithium | lithium |
| **B** | lithium | potassium |
| **C** | potassium | lithium |
| **D** | potassium | potassium |

**26** The proton numbers of four elements are shown.

Which element forms a singly charged positive ion in its salts?

| element | proton number |
|---|---|
| **A** | 34 |
| **B** | 35 |
| **C** | 36 |
| **D** | 37 |

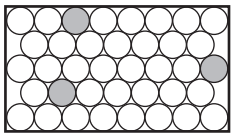
**27** The table gives information about four elements.

Which element is a transition metal?

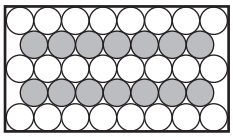
| | electrical conductivity | density $g/cm^3$ | melting point in °C |
|---|---|---|---|
| **A** | good | 0.97 | 98 |
| **B** | good | 7.86 | 1535 |
| **C** | poor | 2.33 | 1410 |
| **D** | poor | 3.12 | –7 |

**28** Which diagram best represents the structure of a solid alloy?

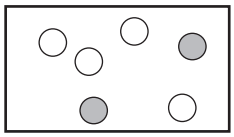
**A**



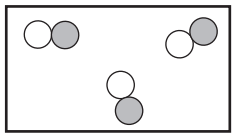
**B**



**C**



**D**



**29** Element E

- forms an alloy;
- has a basic oxide;
- is below hydrogen in the reactivity series.

What is element E?

**A** carbon

**B** copper

**C** sulphur

**D** zinc

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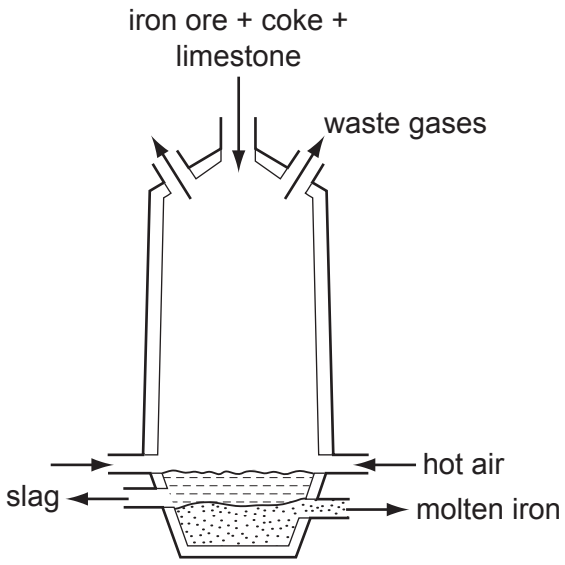
**30** The position of metal X in the reactivity series is shown.

K Na Mg Fe (H) X

Which statements about X and its oxide are correct?

| | reaction of X with dilute hydrochloric acid | reaction of oxide of X with carbon |
|---|---|---|
| **A** | hydrogen formed | no reaction |
| **B** | hydrogen formed | oxide reduced |
| **C** | no reaction | no reaction |
| **D** | no reaction | oxide reduced |

**31** The diagram shows a blast furnace used to extract iron from iron ore.




Why is limestone added to the furnace?

**A** to cause the furnace to heat up

**B** to change the ore into iron

**C** to convert impurities in the ore into slag

**D** to produce oxygen for the coke to burn

**32** Which uses of the metals shown are both correct?

| | aluminium | stainless steel |
|---|---|---|
| **A** | aircraft bodies | car bodies |
| **B** | car bodies | aircraft bodies |
| **C** | chemical plant | food containers |
| **D** | food containers | chemical plant |

**33** In which industrial process is water essential?

**A** the production of aluminium from bauxite

**B** the production of calcium oxide from limestone

**C** the production of ethanol from ethene

**D** the production of petrol from crude oil

**34** Some students are asked to suggest why acetylene, rather than ethanol, is the fuel used for welding metals.

Two suggestions are

1 acetylene is a gas but ethanol is a liquid;

2 acetylene burns with a hotter flame.

Which suggestions are correct?

| | 1 | 2 |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

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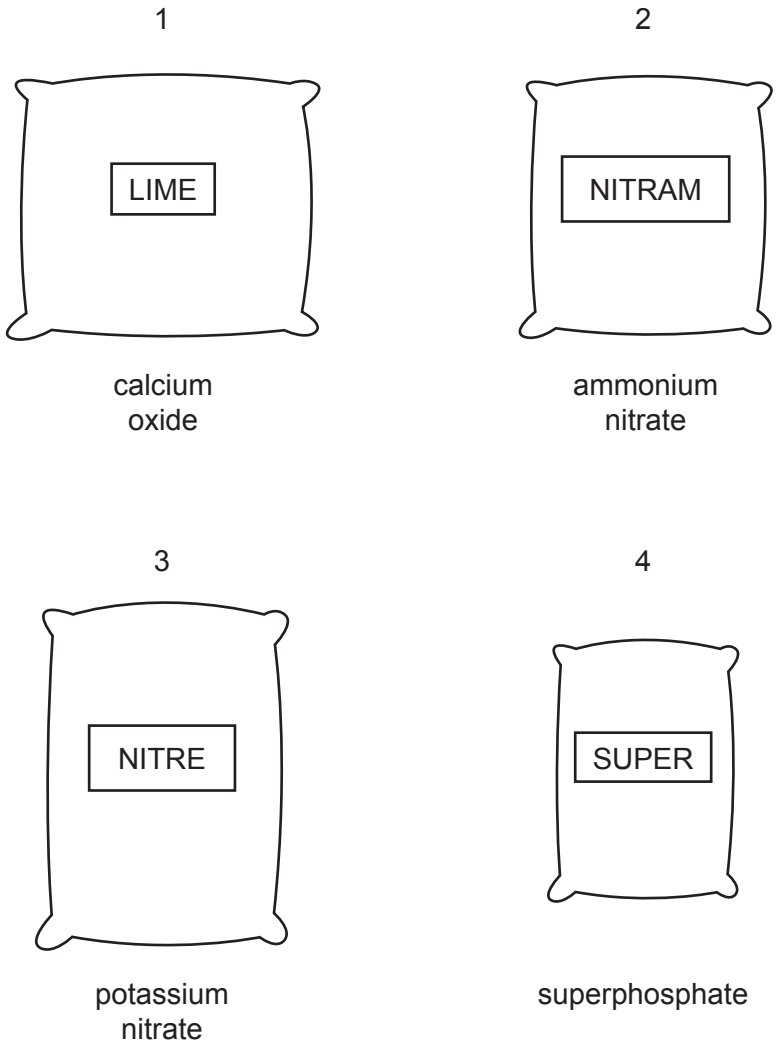
**35** The diagrams show four sacks which a farmer has in his barn.




Which sacks should be mixed to make a complete fertiliser, containing all the essential elements needed by plants?

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

**36** Which of the following does **not** produce carbon dioxide?

**A** adding hydrochloric acid to carbon

**B** adding hydrochloric acid to potassium carbonate

**C** burning coke

**D** burning petrol

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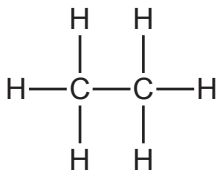
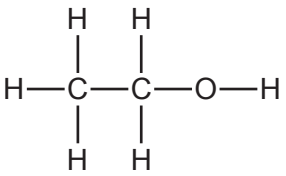
**37** Cholesterol occurs naturally in the body.

Its name indicates that it has the same functional group as

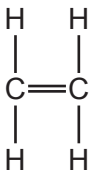
**A**



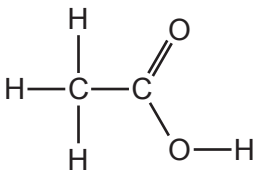
**B**



**C**



**D**



**38** Which fuel is a mixture of hydrocarbons?

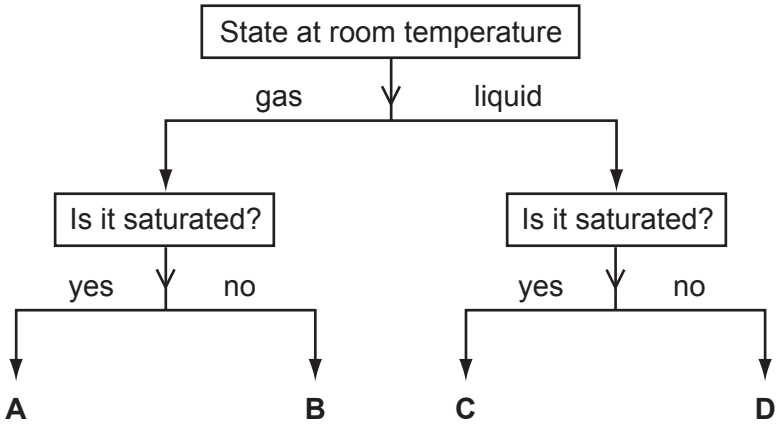
**A** coal

**B** methane

**C** petroleum

**D** wood

**39** In the diagram, which substance could be ethene?




**40** Which properties do butane, propene and ethanol **all** have?

| | burn | polymerise |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

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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 | | | | | | | | | | | |
| | 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 Sulphur 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 |
| | 226 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.).

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