



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**SCIENCE (PHYSICS, CHEMISTRY)**

**5124/01**

Paper 1 Multiple Choice

**October/November 2008**

**1 hour**

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.

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.

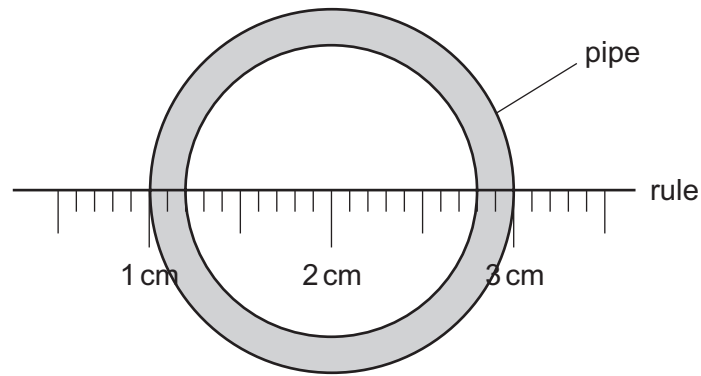
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

This document consists of **14** printed pages and **2** blank pages.

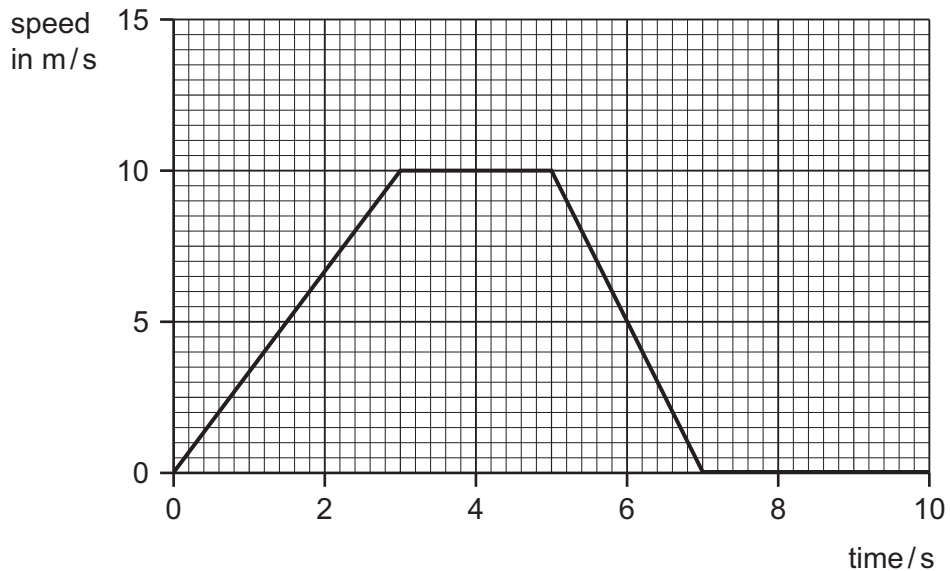


- 1 A rule is used to measure the internal diameter of a pipe.



What is the internal diameter of the pipe?

- A** 1.6 cm      **B** 1.8 cm      **C** 2.0 cm      **D** 2.6 cm
- 2 The graph shows the speed of a car over the first ten seconds of a journey.



Which statement about the acceleration of the car between 3 s and 5 s is true?

- A** The acceleration decreases.  
**B** The acceleration increases.  
**C** The acceleration is zero.  
**D** The acceleration is 10 m/s.
- 3 A container is filled with 5 kg of paint. The density of the paint is 2 g/cm<sup>3</sup>.

Which volume of container is needed?

- A** 10 cm<sup>3</sup>      **B** 400 cm<sup>3</sup>      **C** 2500 cm<sup>3</sup>      **D** 10 000 cm<sup>3</sup>

4 Which object will experience an **elastic** deformation?

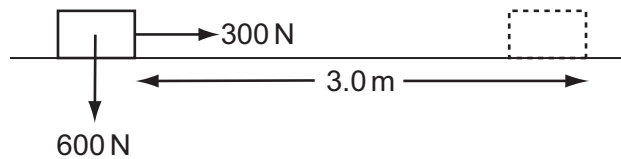
- A a car damaged in a collision
- B a football being kicked
- C a log hit by an axe
- D a target hit by an arrow

5 In a hydroelectric power station, water from a reservoir falls down a large pipe before entering the turbines. The turbines then turn the generator.

What is the **overall** energy conversion?

- A kinetic energy into chemical energy
- B kinetic energy into electrical energy
- C potential energy into chemical energy
- D potential energy into electrical energy

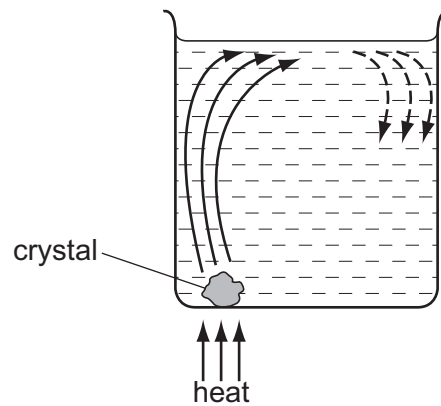
6 When a 300 N force is applied to a box weighing 600 N, the box moves 3.0 m horizontally in 20 s.



What is the average power?

- A 45 W
- B 90 W
- C 900 W
- D 1800 W

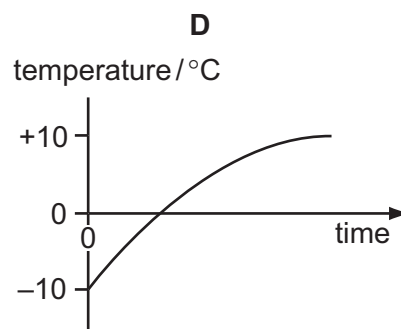
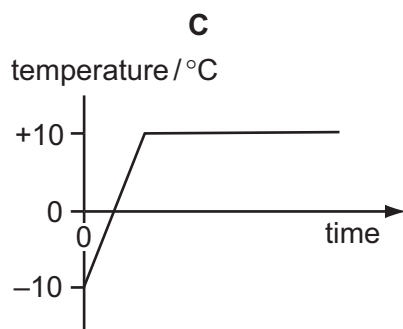
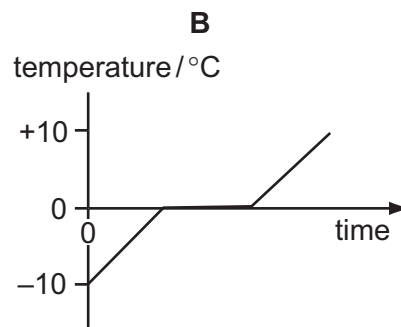
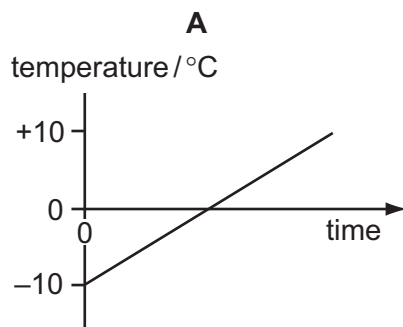
- 7 The diagram shows a coloured crystal being heated in a beaker of water. The crystal dissolves showing how the water circulates around the beaker.



What is happening to cause the water above the crystal to rise?

- A The water contracts and its density decreases.
  - B The water contracts and its density increases.
  - C The water expands and its density decreases.
  - D The water expands and its density increases.
- 8 Ice at  $-10^{\circ}\text{C}$  is heated until it is water at  $+10^{\circ}\text{C}$ .

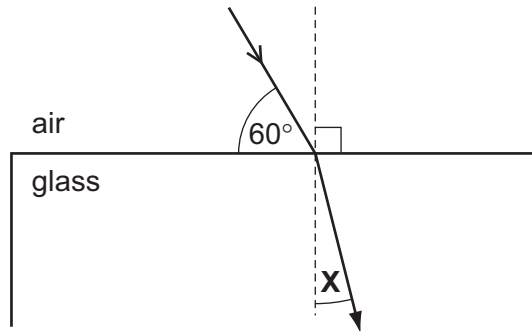
Which graph shows how the temperature changes with time?



- 9 A VHF radio station broadcasts at a frequency of 60 MHz ( $6.0 \times 10^7$  Hz). The speed of radio waves is  $3.0 \times 10^8$  m/s.

What is the wavelength of the waves broadcast by the station?

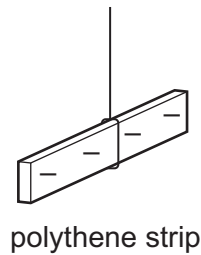
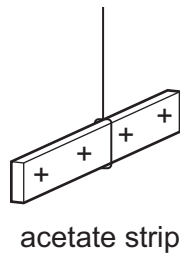
- A 5.0 m            B 2.0 m            C 0.5 m            D 0.2 m
- 10 A ray of light passes into a glass block of refractive index 1.5.



What is the value of the angle marked  $X$ ?

- A  $19.5^\circ$             B  $25.0^\circ$             C  $35.0^\circ$             D  $48.5^\circ$
- 11 Which statement is true for all electromagnetic waves?
- A They are longitudinal.  
 B They can be seen.  
 C They have the same frequency in air.  
 D They travel at the same speed in a vacuum.
- 12 What is the approximate frequency range which can be heard by the human ear?
- A 2 Hz – 20 Hz  
 B 2 Hz – 200 Hz  
 C 20 Hz – 2000 Hz  
 D 20 Hz – 20 000 Hz

- 13 The diagram shows a positively charged acetate strip and a negatively charged polythene strip that are freely suspended.



Two rods **X** and **Y** are brought up in turn to these two strips.  
 Rod **X** attracts the acetate strip but repels the polythene strip.  
 Rod **Y** does not repel either the acetate strip or the polythene strip.

Which type of charge is on each rod?

|          | rod <b>X</b> | rod <b>Y</b> |
|----------|--------------|--------------|
| <b>A</b> | negative     | positive     |
| <b>B</b> | negative     | uncharged    |
| <b>C</b> | positive     | negative     |
| <b>D</b> | positive     | uncharged    |

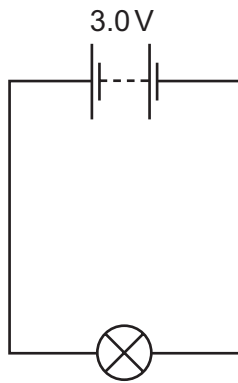
- 14 A current of 2 A flows through a lamp for 1 minute.

How much charge passes through the lamp?

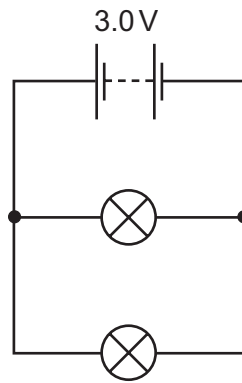
- A** 2 C                      **B** 30 C                      **C** 60 C                      **D** 120 C

- 15 Torch lamps are marked 3.0V, 0.5A.

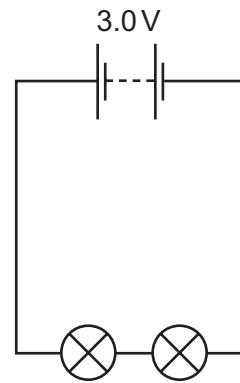
They are connected as shown in circuits X, Y and Z.



X



Y



Z

Which statement is true?

- A** The current in all three circuits will be the same.  
**B** The current in circuit X will be the greatest.  
**C** The current in circuit Y will be the greatest.  
**D** The current in circuit Z will be the greatest.
- 16 A  $24\ \Omega$  resistor is connected in series with a 12V battery.  
 What is the power loss for the resistor?  
**A** 0.5W      **B** 6W      **C** 12W      **D** 24W
- 17 Electrical equipment should **not** be used in damp conditions.  
 What is the main hazard?  
**A** The equipment becomes too hot.  
**B** The fuse keeps 'blowing'.  
**C** The insulation becomes damaged.  
**D** The risk of an electric shock.
- 18 There are 2000 turns in the secondary coil of a transformer and 500 turns in the primary coil.  
 An alternating voltage of 240V is applied across the primary coil.  
 What is the voltage across the secondary coil?  
**A** 60V      **B** 500V      **C** 960V      **D** 2000V

- 19 A nuclide of sodium contains 11 protons and 12 neutrons.

How many electrons are in a neutral atom of this sodium nuclide?

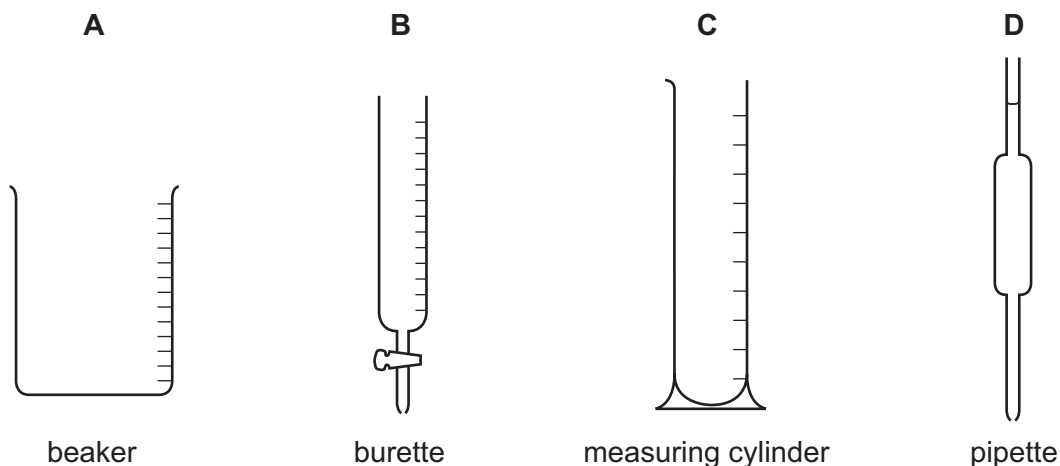
- A 1                      B 11                      C 12                      D 23

- 20 A radioactive chemical is used to investigate possible damage within a patient's body. The chemical is injected into the patient's body and the radiation detected outside.

Which source of radiation is the most suitable?

|   | radiation from source | half-life of source |
|---|-----------------------|---------------------|
| A | beta only             | long                |
| B | beta only             | short               |
| C | gamma only            | long                |
| D | gamma only            | short               |

- 21 Which piece of apparatus is used to measure **exactly** 22.5 cm<sup>3</sup> of a liquid?



- 22 An atom of element X is represented by  ${}^7_3\text{X}$ .

Which statement about this atom of X is correct?

- A It is in Group III of the Periodic Table.  
 B It is in Group VII of the Periodic Table.  
 C The total number of protons and electrons is 6.  
 D The total number of protons and neutrons is 10.



23 Element Q has 2 outer shell electrons in its atoms.

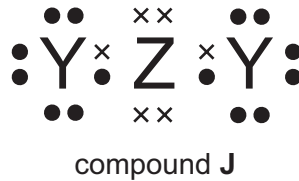
Element R has 7 outer shell electrons in its atoms.

Which ions will be present in the compound formed when Q and R react?

- A  $Q^+$  and  $R^-$       B  $Q^{2+}$  and  $R^-$       C  $Q^-$  and  $R^+$       D  $Q^{2-}$  and  $R^+$

24 The outer electronic structure of compound J is shown.

Y and Z are different elements.



Which formula could represent compound J?

- A  $Cl_2O$       B  $CO_2$       C  $H_2O$       D  $SiO_2$

25 The formula of an oxide of uranium is  $UO_2$ .

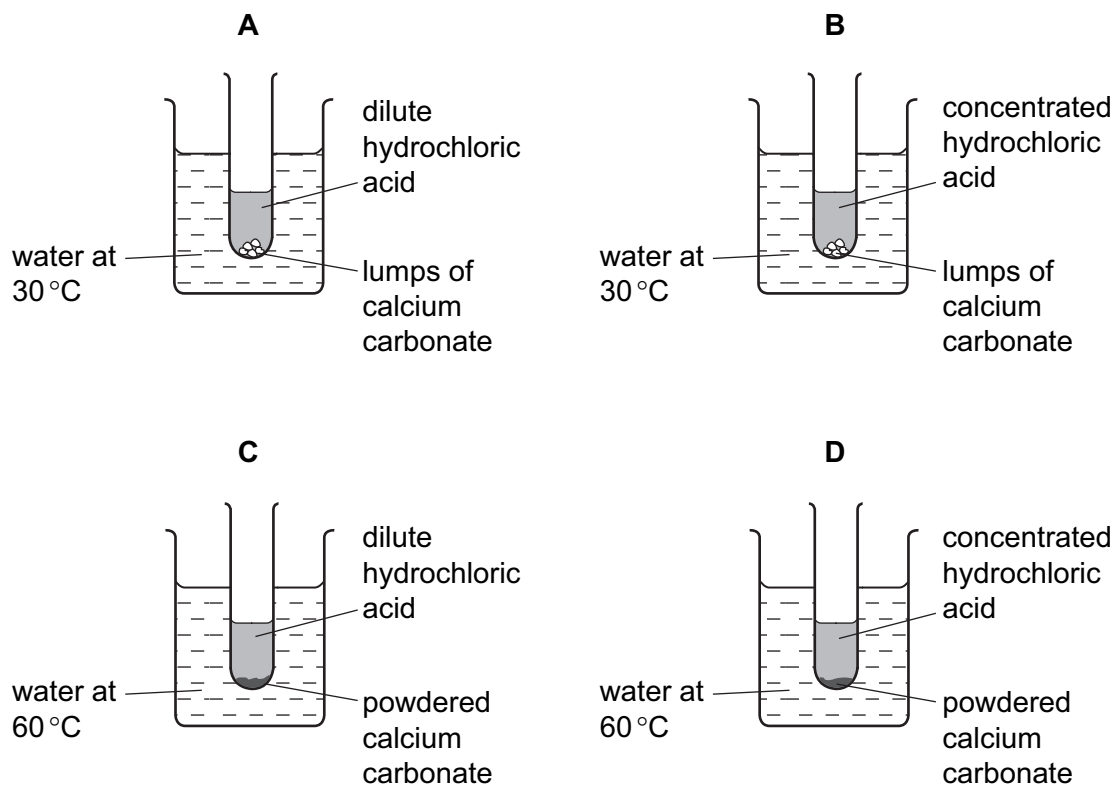
What is the formula of the corresponding chloride?

- A  $UCl_2$       B  $UCl_4$       C  $U_2Cl$       D  $U_4Cl$

26 Which process is exothermic?

- A burning petrol in a car engine  
 B cracking of oil fractions  
 C fractional distillation of oil  
 D melting bitumen for roads

27 Which reaction is the fastest?



28 Aluminium chloride dissolves in water to form a solution with a pH less than 7.

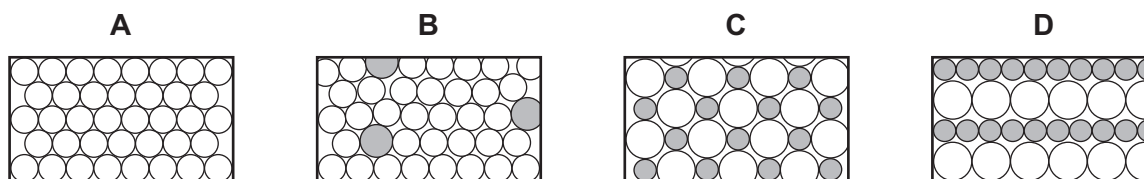
Which ion in the solution makes the solution have a pH less than 7?

- A aluminium
- B chloride
- C hydrogen
- D hydroxide

29 Which arrangement of electrons is that of a gas normally used to fill light bulbs?

- A 2
- B 2, 6
- C 2, 8, 2
- D 2, 8, 8

30 Which diagram represents the structure of an alloy?



31 The metals iron, lead and zinc can be manufactured by the reduction of their oxides with coke.

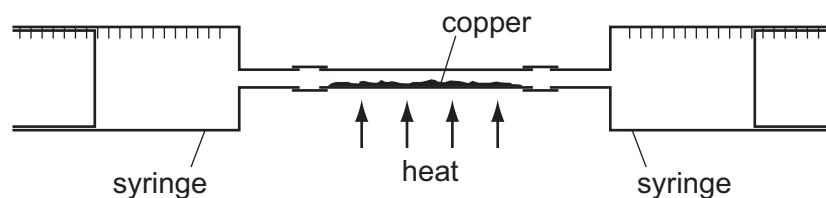
What is the correct order of the ease of reduction of the metal oxides?

|          | oxides becoming more difficult to reduce<br>→ |
|----------|---|
| <b>A</b> | iron → lead → zinc                            |
| <b>B</b> | iron → zinc → lead                            |
| <b>C</b> | lead → iron → zinc                            |
| <b>D</b> | zinc → iron → lead                            |

32 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**  $CaCO_3 + SiO_2 \rightarrow CaSiO_3 + CO_2$
- D**  $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

33 In the apparatus shown, 100 cm<sup>3</sup> of air are passed backwards and forwards between the two syringes until reaction is complete.



What is the final volume of gas after cooling to the original temperature?

- A** 20 cm<sup>3</sup>      **B** 28 cm<sup>3</sup>      **C** 32 cm<sup>3</sup>      **D** 80 cm<sup>3</sup>

34 A gas **X**

- 1 has no smell;
- 2 is not poisonous;
- 3 reacts with hydrogen under certain conditions.

What is gas **X**?

- A** carbon monoxide
- B** helium
- C** nitrogen
- D** chlorine

35 Which products are formed when limestone is heated?

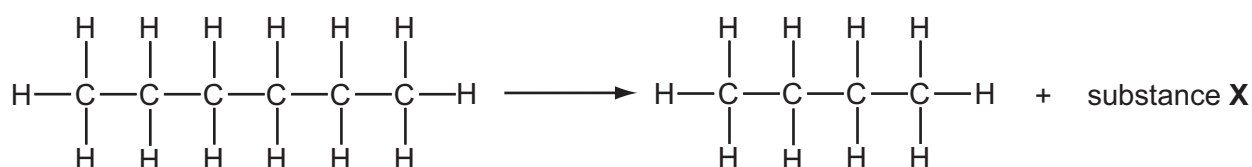
- A lime and carbon dioxide only
- B lime and water only
- C lime, carbon dioxide and water
- D slaked lime and carbon dioxide

36 The table shows the names of four fractions from petroleum and their uses.

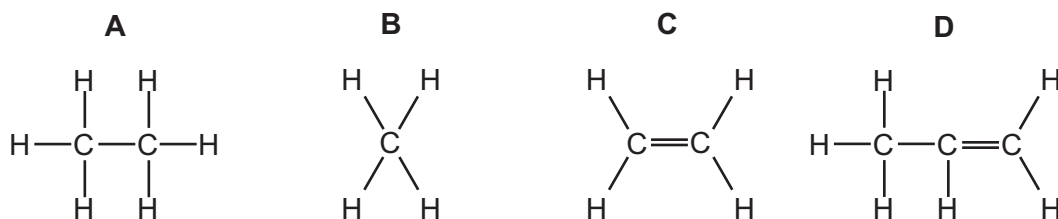
Which fraction is paired correctly with its use?

|          | fraction        | use                                 |
|----------|-----------------|-------------------------------------|
| <b>A</b> | lubricating oil | source of polishes and waxes        |
| <b>B</b> | kerosene        | lubricant                           |
| <b>C</b> | diesel          | making road surfaces                |
| <b>D</b> | gasoline        | feedstock for the chemical industry |

37 The equation shows a molecule of hexane being cracked into two smaller molecules by heating to a high temperature.



What is likely to be the structure of substance X?



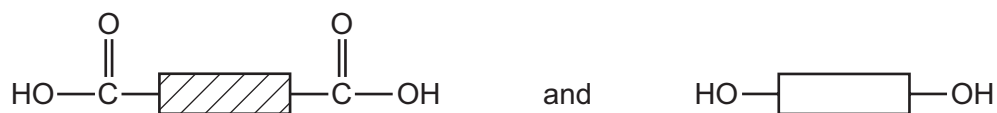
38 Which substance is used to distinguish between samples of ethane and ethene?

- A aqueous barium chloride
- B aqueous bromine
- C lime water
- D litmus solution

39 Yeast is used to convert simple sugars to

- A ethanoic acid and oxygen.
- B ethanol and carbon dioxide.
- C ethanol and oxygen.
- D starch and carbon dioxide.

40 A macromolecule is made from these two monomer molecules.



What is the macromolecule?

- A a carbohydrate
- B a polyamide
- C a polyester
- D a protein





**DATA SHEET**  
**The Periodic Table of the Elements**

|                                   |                                    | Group                               |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    |  |  |  |
|-----------------------------------|------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|------------------------------------|----------------------------------|------------------------------------|------------------------------------|------------------------------------|--|--|--|
| I                                 | II                                 | III                                 | IV                                  | V                                  | VI                                  | VII                                 | 0                                 |                                    |                                  |                                    |                                    |                                    |  |  |  |
|                                   |                                    | 1<br><b>H</b><br>Hydrogen<br>1      |                                     |                                    |                                     |                                     | 4<br><b>He</b><br>Helium<br>2     |                                    |                                  |                                    |                                    |                                    |  |  |  |
| 7<br><b>Li</b><br>Lithium<br>3    | 9<br><b>Be</b><br>Beryllium<br>4   |                                     |                                     |                                    |                                     |                                     | 20<br><b>Ne</b><br>Neon<br>10     |                                    |                                  |                                    |                                    |                                    |  |  |  |
| 23<br><b>Na</b><br>Sodium<br>11   | 24<br><b>Mg</b><br>Magnesium<br>12 | 27<br><b>Al</b><br>Aluminium<br>13  | 28<br><b>Si</b><br>Silicon<br>14    | 31<br><b>P</b><br>Phosphorus<br>15 | 32<br><b>S</b><br>Sulphur<br>16     | 35.5<br><b>Cl</b><br>Chlorine<br>17 | 40<br><b>Ar</b><br>Argon<br>18    |                                    |                                  |                                    |                                    |                                    |  |  |  |
| 39<br><b>K</b><br>Potassium<br>19 | 40<br><b>Ca</b><br>Calcium<br>20   | 56<br><b>Fe</b><br>Iron<br>26       | 55<br><b>Mn</b><br>Manganese<br>25  | 59<br><b>Co</b><br>Cobalt<br>27    | 59<br><b>Ni</b><br>Nickel<br>28     | 64<br><b>Cu</b><br>Copper<br>29     | 70<br><b>Ga</b><br>Gallium<br>31  | 73<br><b>Ge</b><br>Germanium<br>32 | 75<br><b>As</b><br>Arsenic<br>33 | 79<br><b>Se</b><br>Selenium<br>34  | 80<br><b>Br</b><br>Bromine<br>35   | 84<br><b>Kr</b><br>Krypton<br>36   |  |  |  |
| 85<br><b>Rb</b><br>Rubidium<br>37 | 88<br><b>Sr</b><br>Strontium<br>38 | 101<br><b>Ru</b><br>Ruthenium<br>44 | 101<br><b>Ru</b><br>Ruthenium<br>44 | 103<br><b>Rh</b><br>Rhodium<br>45  | 106<br><b>Pd</b><br>Palladium<br>46 | 108<br><b>Ag</b><br>Silver<br>47    | 112<br><b>Cd</b><br>Cadmium<br>48 | 115<br><b>In</b><br>Indium<br>49   | 119<br><b>Sn</b><br>Tin<br>50    | 122<br><b>Sb</b><br>Antimony<br>51 | 127<br><b>I</b><br>Iodine<br>53    | 131<br><b>Xe</b><br>Xenon<br>54    |  |  |  |
| 133<br><b>Cs</b><br>Caesium<br>55 | 137<br><b>Ba</b><br>Barium<br>56   | 186<br><b>Os</b><br>Osmium<br>76    | 186<br><b>Re</b><br>Rhenium<br>75   | 184<br><b>W</b><br>Tungsten<br>74  | 192<br><b>Ir</b><br>Iridium<br>77   | 195<br><b>Pt</b><br>Platinum<br>78  | 201<br><b>Hg</b><br>Mercury<br>80 | 204<br><b>Tl</b><br>Thallium<br>81 | 207<br><b>Pb</b><br>Lead<br>82   | 209<br><b>Bi</b><br>Bismuth<br>83  | 210<br><b>Po</b><br>Polonium<br>84 | 210<br><b>Rn</b><br>Radon<br>86    |  |  |  |
| 226<br><b>Ra</b><br>Radium<br>88  | 227<br><b>Ac</b><br>Actinium<br>89 |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    | 227<br><b>Fr</b><br>Francium<br>87 |  |  |  |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 169<br><b>Tm</b><br>Thulium<br>69      | 173<br><b>Yb</b><br>Ytterbium<br>70    | 175<br><b>Lu</b><br>Lutetium<br>71     |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 167<br><b>Er</b><br>Erbium<br>68       | 168<br><b>Fm</b><br>Fermium<br>100     | 169<br><b>Md</b><br>Mendelevium<br>101 |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 162<br><b>Dy</b><br>Dysprosium<br>66   | 165<br><b>Ho</b><br>Holmium<br>67      | 166<br><b>Es</b><br>Einsteinium<br>99  |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 159<br><b>Tb</b><br>Terbium<br>65      | 162<br><b>Cf</b><br>Californium<br>98  | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 157<br><b>Gd</b><br>Gadolinium<br>64   | 162<br><b>Cm</b><br>Curium<br>96       | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 152<br><b>Eu</b><br>Europium<br>63     | 162<br><b>Am</b><br>Americium<br>95    | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 150<br><b>Sm</b><br>Samarium<br>62     | 162<br><b>Pu</b><br>Plutonium<br>94    | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 144<br><b>Nd</b><br>Neodymium<br>60    | 162<br><b>Np</b><br>Neptunium<br>93    | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 141<br><b>Pr</b><br>Praseodymium<br>59 | 162<br><b>Pa</b><br>Protactinium<br>91 | 165<br><b>Bk</b><br>Berkelium<br>97    |
|                                   |                                    |                                     |                                     |                                    |                                     |                                     |                                   |                                    |                                  |                                    |                                    |                                    | 140<br><b>Ce</b><br>Cerium<br>58       | 162<br><b>Th</b><br>Thorium<br>90      | 165<br><b>Bk</b><br>Berkelium<br>97    |

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

|     |   |   |   |
|-----|---|---|---|
|     | a | X | a = relative atomic mass<br>X = atomic symbol<br>b = proton (atomic) number |
| Key | b | X | †   |

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

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