**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**CHEMISTRY** **0620/11**

Paper 1 Multiple Choice **October/November 2015**

**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, 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 20.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **17** printed pages and **3** blank pages.

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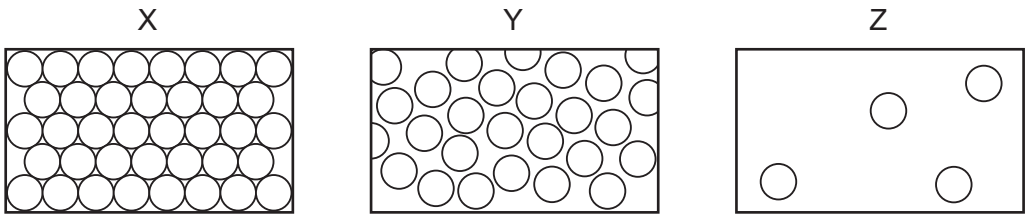
CAMBRIDGE International Examinations

**1** Diagrams X, Y and Z represent the three states of matter.

View solution

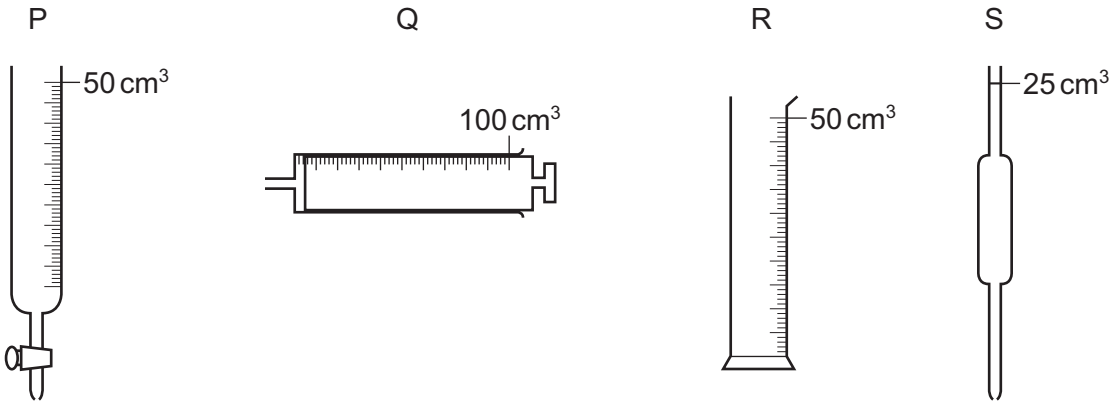



Which change occurs during boiling?

**A** X to Y **B** Y to Z **C** Z to X **D** Z to Y

View solution

**2** P, Q, R and S are pieces of apparatus.




Which row describes the correct apparatus for the measurement made?

| | apparatus | measurement made |
|---|---|---|
| **A** | P | the volume of acid added to alkali in a titration |
| **B** | Q | 1 $cm^3$ of acid to add to calcium carbonate in a rate-determining experiment |
| **C** | R | 75 $cm^3$ of a gas given off in a rate-determining experiment |
| **D** | S | 20 $cm^3$ of alkali for use in a titration |

View solution

**3** Which statement about atoms is correct?

**A** Atoms contain protons and electrons in the nucleus.

**B** Neutrons are negatively charged.

**C** Protons are positively charged.

**D** The nucleon number is the number of neutrons.

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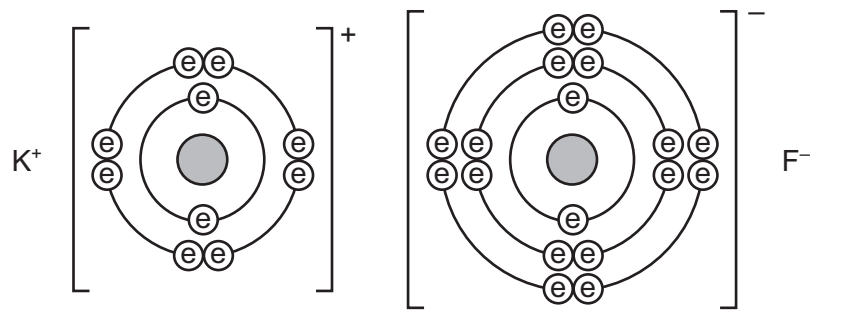
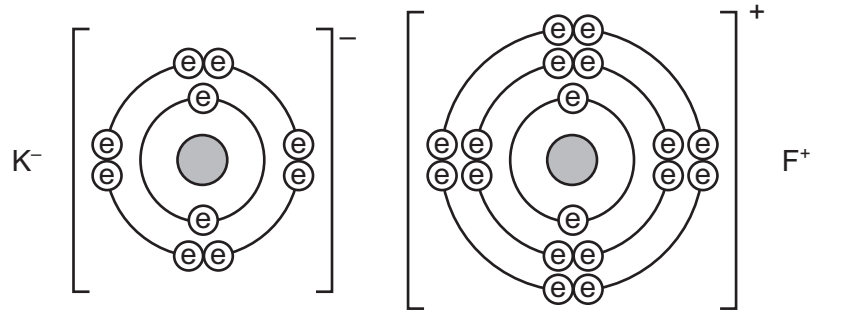
**4** Which diagram correctly shows the ions present in the compound potassium fluoride?

View solution

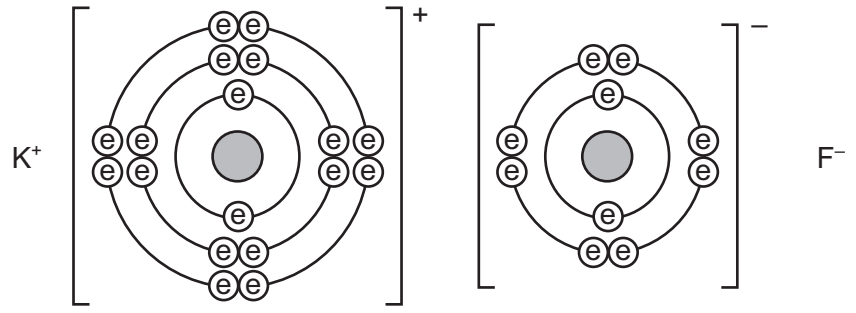
**A**



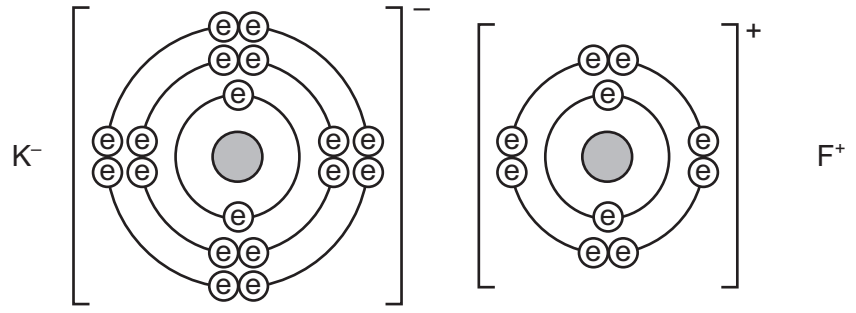

**B**




**C**




**D**




key

= nucleus

= electron

**5** What do the nuclei of $^{1}_{1}H$ hydrogen atoms contain?

View solution

**A** electrons and neutrons

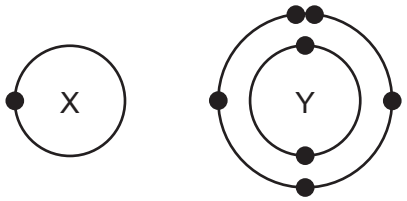
**B** electrons and protons

**C** neutrons only

**D** protons only

**6** The electronic structures of atoms X and Y are shown.

View solution




X and Y form a covalent compound.

What is its formula?

**A** $XY_5$ **B** $XY_3$ **C** XY **D** $X_3Y$

**7** Two atoms of magnesium, Mg, react with one molecule of oxygen, $O_2$.

View solution

What is the formula of the product?

**A** MgO **B** $MgO_2$ **C** $Mg_2O$ **D** $Mg_2O_2$

**8** Which row describes the electrolysis of molten potassium bromide?

View solution

| | product at anode | product at cathode |
|---|---|---|
| **A** | bromine | hydrogen |
| **B** | bromine | potassium |
| **C** | hydrogen | bromine |
| **D** | potassium | bromine |

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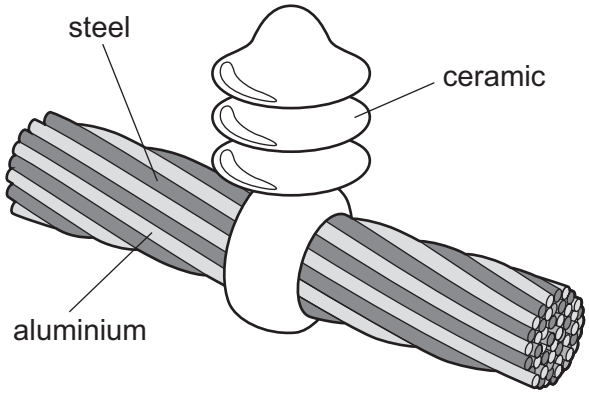
**9** The diagram shows a section of an overhead power cable.

View solution




Which statement explains why a particular substance is used?

**A** Aluminium has a low density and is a good conductor of electricity.

**B** Ceramic is a good conductor of electricity.

**C** Steel can rust in damp air.

**D** Steel is more dense than aluminium.

**10** Which reaction is endothermic?

View solution

**A** acid neutralising alkali causing a temperature increase

**B** adding magnesium to hydrochloric acid

**C** calcium carbonate decomposing when heated

**D** combustion of fossil fuels

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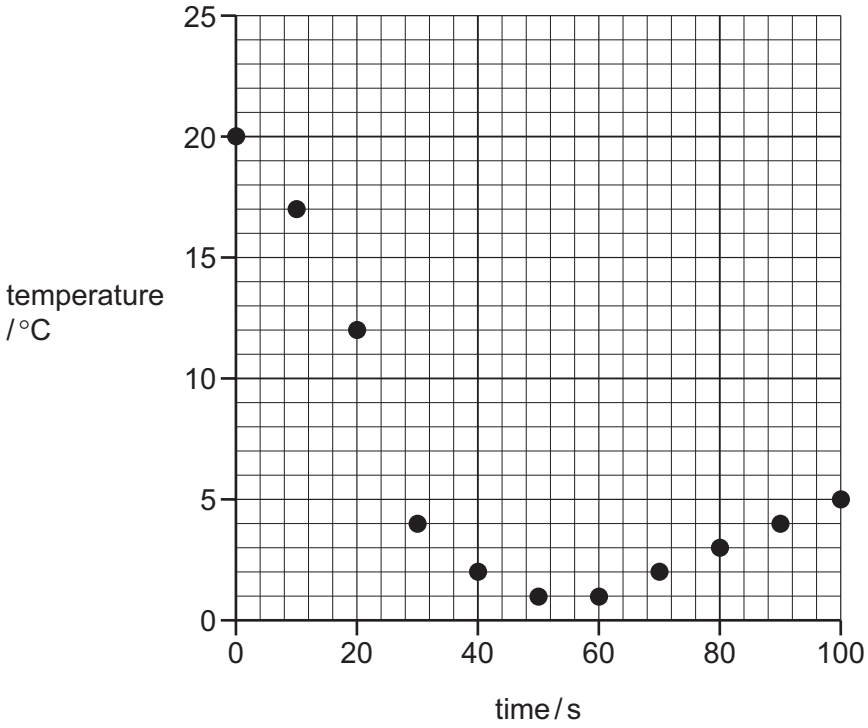
**11** Solid hydrated sodium carbonate was added to solid citric acid.

View solution

The mixture was stirred and the temperature recorded every 10 seconds.

The results are shown on the graph:




Which row describes the reaction?

| | reaction type | energy change |
|---|---|---|
| **A** | neutralisation | endothermic |
| **B** | neutralisation | exothermic |
| **C** | thermal decomposition | endothermic |
| **D** | thermal decomposition | exothermic |

**12** The effect of temperature on the rate of the reaction between marble chips and hydrochloric acid can be investigated by measuring the production of carbon dioxide.

View solution

Which item of equipment is **not** required for the investigation?

**A** condenser

**B** gas syringe

**C** stopclock

**D** thermometer

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**13** The element vanadium, V, forms several oxides.

View solution

In which change is oxidation taking place?

**A** $VO_2 \rightarrow V_2O_3$

**B** $V_2O_5 \rightarrow VO_2$

**C** $V_2O_3 \rightarrow VO$

**D** $V_2O_3 \rightarrow V_2O_5$

**14** Some crystals of hydrated cobalt(II) chloride are heated in a test-tube until no further change is observed.

View solution

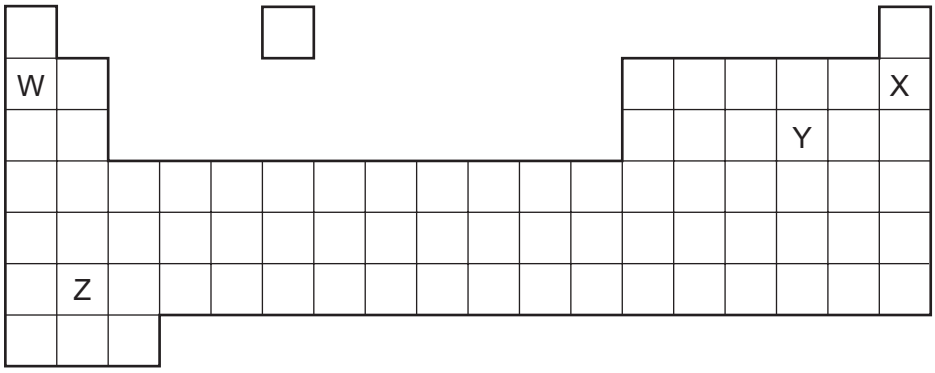
The test-tube is allowed to cool and a few drops of water are then added to the contents.

Which colours are observed?

| | before heating | after heating | after adding water |
|---|---|---|---|
| **A** | blue | pink | blue |
| **B** | blue | white | blue |
| **C** | pink | blue | pink |
| **D** | white | blue | white |

**15** The diagram shows a simplified form of the Periodic Table:

View solution




Which elements will form an acidic oxide?

**A** W and Z **B** W only **C** X and Y only **D** Y only

**16** A white solid is insoluble in water.

View solution

When it is added to hydrochloric acid, bubbles of gas are formed.

Adding aqueous ammonia to the solution formed gives a white precipitate. Adding excess aqueous ammonia causes the precipitate to re-dissolve.

What is the white solid?

**A** aluminium nitrate

**B** ammonium nitrate

**C** calcium carbonate

**D** zinc carbonate

**17** Which property is **not** characteristic of a base?

View solution

**A** It reacts with a carbonate to form carbon dioxide.

**B** It reacts with an acid to form a salt.

**C** It reacts with an ammonium salt to form ammonia.

**D** It turns universal indicator paper blue.

**18** Four stages in the preparation of a salt from an acid and a solid metal oxide are listed.

View solution

1 Add excess solid.

2 Evaporate half the solution and leave to cool.

3 Filter to remove unwanted solid.

4 Heat the acid.

In which order should the stages be carried out?

**A** $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$

**B** $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

**C** $4 \rightarrow 1 \rightarrow 3 \rightarrow 2$

**D** $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

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**19** Which statements about Group I and Group VII elements are correct?

View solution

1 In Group I, lithium is more reactive than potassium.

2 In Group VII, chlorine is more reactive than fluorine.

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

**20** The Periodic Table lists all the known elements.

View solution

Elements are arranged in order of .....1..... number.

The melting points of Group I elements .....2..... down the group.

The melting points of Group VII elements .....3..... down the group.

Which words correctly complete the gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|---|---|---|---|
| **A** | nucleon | decrease | increase |
| **B** | nucleon | increase | decrease |
| **C** | proton | decrease | increase |
| **D** | proton | increase | decrease |

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

View solution

Which element is a transition metal?

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

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**22** The Group 0 elements are unreactive.

View solution

The gas used to fill balloons is .....X..... .

This gas is unreactive because it has .....Y..... electrons in its outermost shell.

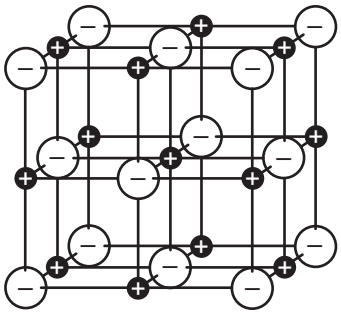
Which words correctly complete gaps X and Y?

| | X | Y |
|---|---|---|
| **A** | argon | eight |
| **B** | argon | two |
| **C** | helium | eight |
| **D** | helium | two |

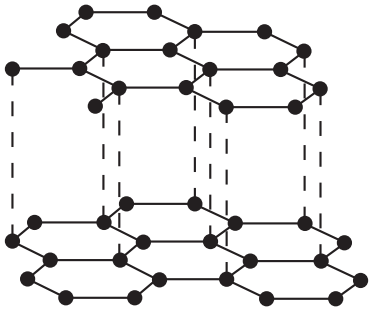
**23** Which diagram shows the structure of an alloy?

View solution

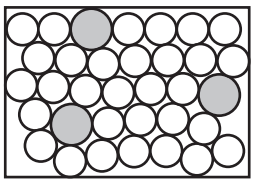
**A**



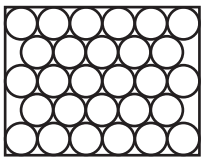
**B**



**C**



**D**



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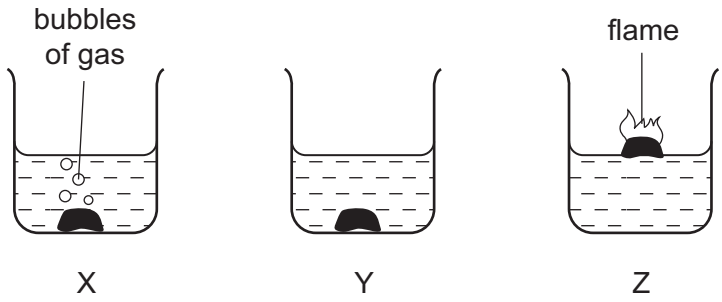
**24** The diagrams show what happens when three different metals are added to water.

View solution




What are X, Y and Z?

| | X | Y | Z |
|---|---|---|---|
| **A** | calcium | copper | potassium |
| **B** | copper | calcium | potassium |
| **C** | potassium | calcium | copper |
| **D** | potassium | copper | calcium |

**25** Which metal would be suitable for all of the following uses?

View solution

- making aircraft bodies
- making food containers
- making overhead power cables

**A** aluminium

**B** brass

**C** mild steel

**D** pure iron

**26** Iron is extracted from its ore (hematite) in the blast furnace.

View solution

Which gas is produced as a waste product?

**A** carbon dioxide

**B** hydrogen

**C** nitrogen

**D** oxygen

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**27** Which statements about water are correct?

View solution

1 Household water may contain salts in solution.

2 Water for household use is filtered to remove soluble impurities.

3 Water is treated with chlorine to kill bacteria.

4 Water is used in industry for cooling.

**A** 1, 2, 3 and 4

**B** 1, 2 and 3 only

**C** 1, 3 and 4 only

**D** 2, 3 and 4 only

**28** Which is a use of oxygen?

View solution

**A** as the gas in a lamp

**B** to react with ethene to form ethanol

**C** to react with methane in a Bunsen burner

**D** to react with hematite to form iron

**29** Carbon monoxide is an air pollutant produced when petrol is burned in a car engine.

View solution

Why is carbon monoxide considered to be an air pollutant?

**A** It causes climate change.

**B** It causes the corrosion of buildings.

**C** It is a significant greenhouse gas.

**D** It is poisonous.

**30** Fertilisers are mixtures of different compounds used to increase the growth of crops.

View solution

Which pair of substances contains the three essential elements for plant growth?

**A** ammonium nitrate and calcium phosphate

**B** ammonium nitrate and potassium chloride

**C** ammonium phosphate and potassium chloride

**D** potassium nitrate and calcium carbonate

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

View solution

**A** complete combustion of a fossil fuel

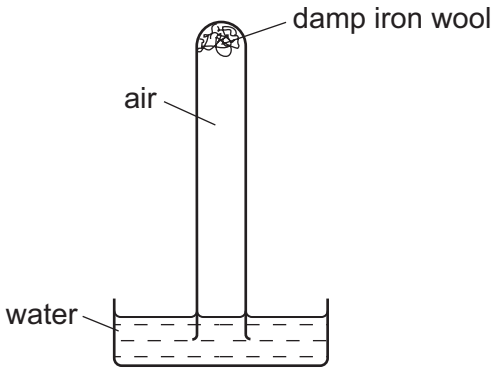
**B** fermentation

**C** reaction of an alkali with a carbonate

**D** respiration

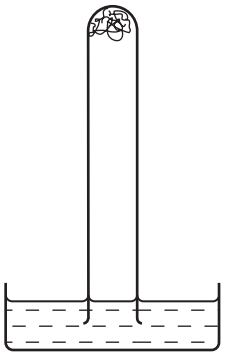
**32** The apparatus shown is set up and left for a week.

View solution

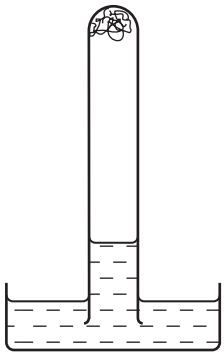



Which diagram shows the level of the water at the end of the week?

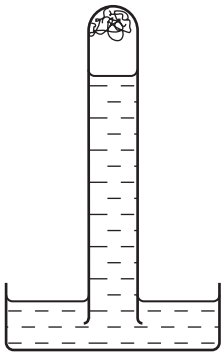
**A**



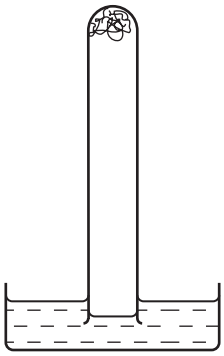
**B**



**C**



**D**



**33** Carbon dioxide and methane both contribute to climate change.

View solution

Which process produces both gases?

**A** complete combustion of natural gas

**B** farming cattle

**C** heating calcium carbonate

**D** respiration

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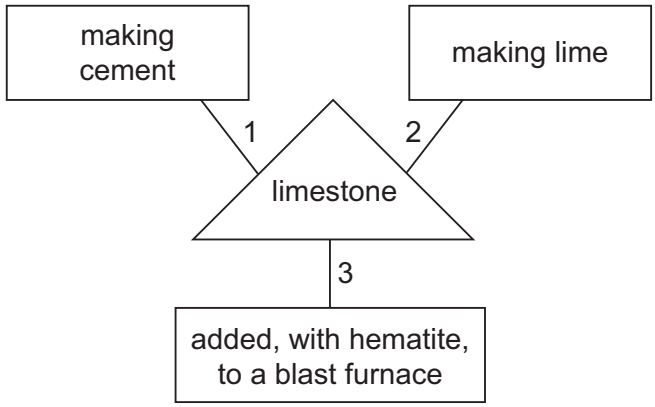
**34** A student is asked to draw a diagram showing the uses of limestone.

View solution




Which numbered lines show a correct use of limestone?

**A** 1, 2 and 3

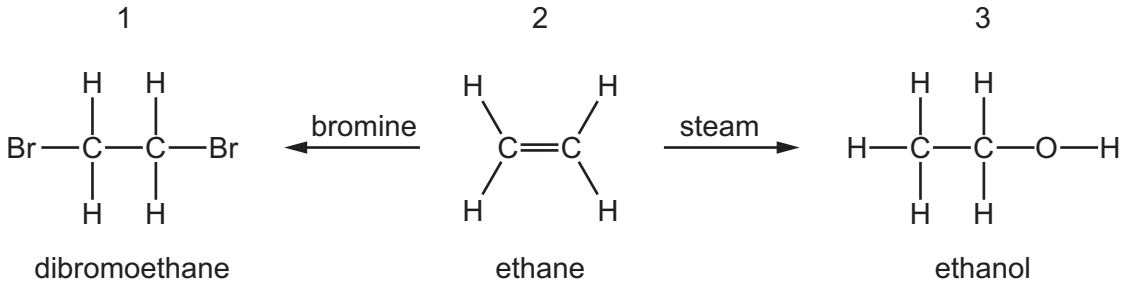
**B** 1 and 2 only

**C** 1 and 3 only

**D** 2 and 3 only

**35** The diagram shows the structure of a simple hydrocarbon and the products of two of its reactions.

View solution




Which structures are named correctly?

| | structure | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| **A** | ✓ | ✓ | ✗ |
| **B** | ✓ | ✗ | ✓ |
| **C** | ✗ | ✓ | ✓ |
| **D** | ✗ | ✓ | ✗ |

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**36** Which row describes the formation of a polymer?

View solution

| | monomer | polymer |
|---|---|---|
| **A** | ethane | poly(ethane) |
| **B** | ethane | poly(ethene) |
| **C** | ethene | poly(ethane) |
| **D** | ethene | poly(ethene) |

**37** What is **not** the correct use for the fraction named?

View solution

| | name of fraction | use |
|---|---|---|
| **A** | fuel oil | making waxes |
| **B** | gas oil | diesel engines |
| **C** | kerosene | jet fuel |
| **D** | naphtha fraction | making chemicals |

**38** Ethanol can be formed by

View solution

1 fermentation

2 reaction between steam and ethene

Which of these processes uses a catalyst?

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

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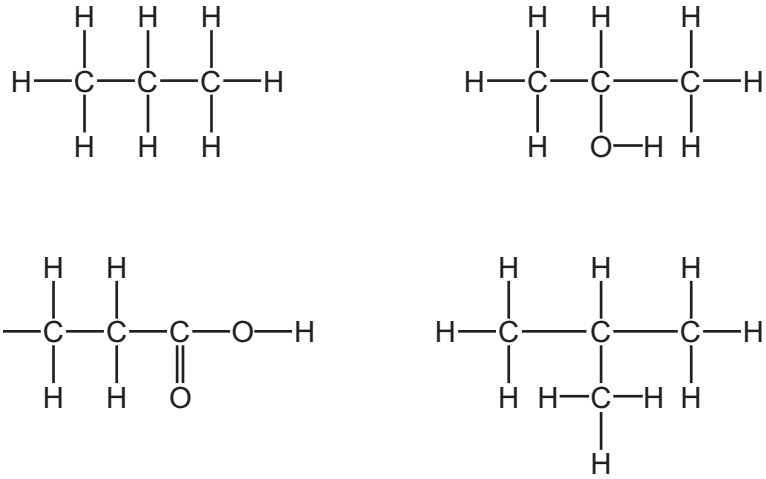
**39** Which homologous series is **not** represented in the compounds shown below?

View solution



**A** alcohols

**B** alkanes

**C** alkenes

**D** carboxylic acids

**40** Alkenes are manufactured by cracking hydrocarbons obtained from petroleum.

View solution

hydrocarbon P obtained from petroleum $\xrightarrow{\text{cracking}}$ hydrocarbon Q

Which row describes the size of the molecules in hydrocarbons P and Q and the effect of Q on aqueous bromine?

| | size of P molecules | size of Q molecules | effect of Q on aqueous bromine |
|---|---|---|---|
| **A** | large | small | decolourises |
| **B** | large | small | no effect |
| **C** | small | large | decolourises |
| **D** | small | large | no effect |

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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 | | |
| | | | | | | | | | | 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 | | |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | 70 Ga Gallium 31 | 73 Ge Germanium 32 | 75 As Arsenic 33 | 79 Se Selenium 34 | 80 Br Bromine 35 | 84 Kr Krypton 36 | | |
| 23 Na Sodium 11 | 24 Mg Magnesium 12 | | | | | | | | | 115 In Indium 49 | 119 Sn Tin 50 | 122 Sb Antimony 51 | 128 Te Tellurium 52 | 127 I Iodine 53 | 131 Xe Xenon 54 | | |
| 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 | 112 Cd Cadmium 48 | 201 Hg Mercury 80 | 204 Tl Thallium 81 | 207 Pb Lead 82 | 209 Bi Bismuth 83 | 209 Po Polonium 84 | 209 At Astatine 85 | 209 Rn Radon 86 |
| 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 | 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 | 209 Po Polonium 84 | 209 At Astatine 85 | 209 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 | 144 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 | 238 Pa Protactinium 91 | 238 U Uranium 92 | 238 Np Neptunium 93 | 238 Pu Plutonium 94 | 238 Am Americium 95 | 238 Cm Curium 96 | 238 Bk Berkelium 97 | 238 Cf Californium 98 | 238 Es Einsteinium 99 | 238 Fm Fermium 100 | 238 Md Mendelevium 101 | 238 No Nobelium 102 | 238 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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