

**CHEMISTRY**

**5070/12**

Paper 1 Multiple Choice

**October/November 2015**

**1 hour**

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

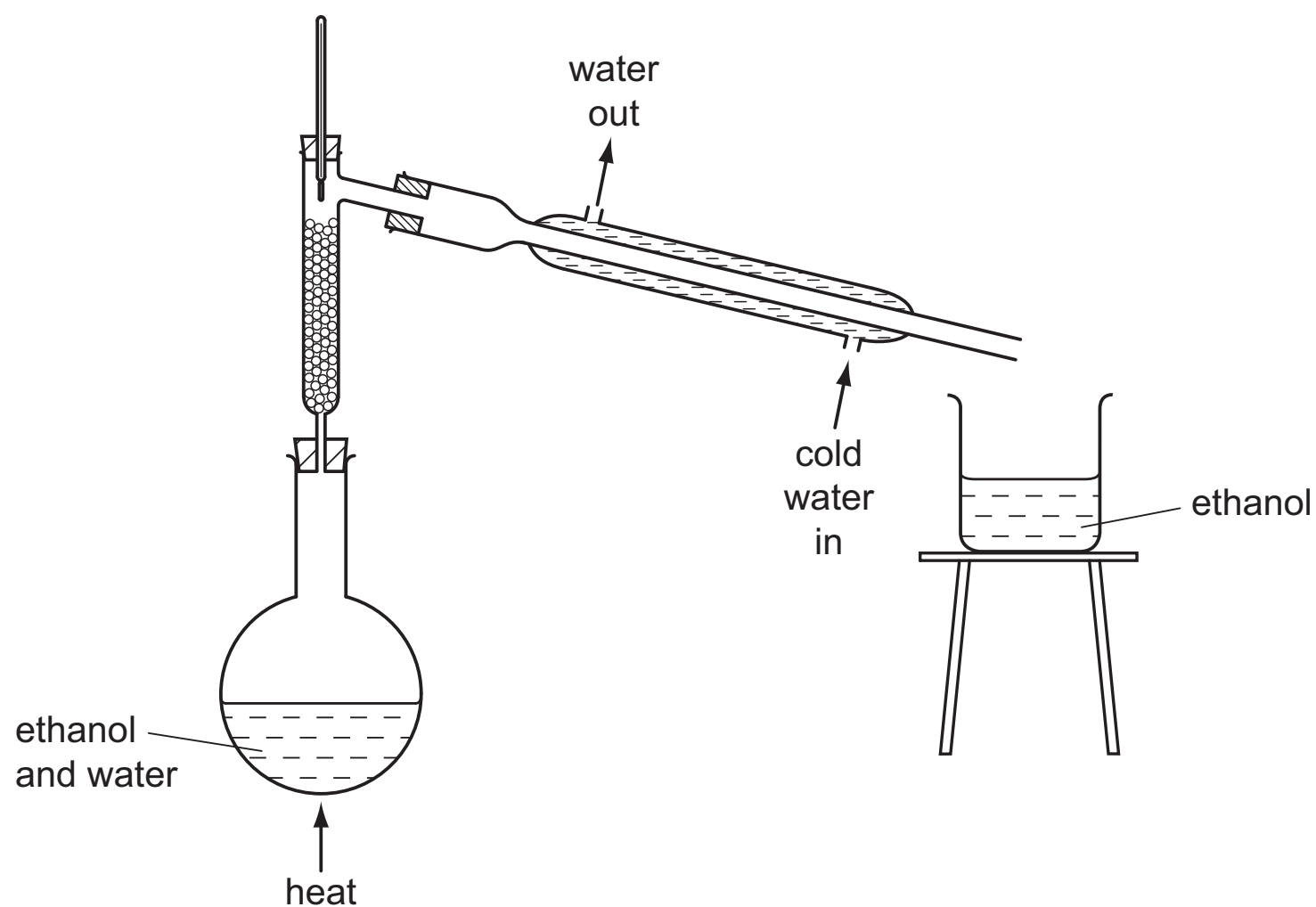
Any rough working should be done in this booklet.

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

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

- 1 The diagram shows the fractional distillation of an aqueous solution of ethanol.



Which statement explains why ethanol is collected as the distillate?

- A Ethanol has a higher boiling point than water.
  - B Ethanol has a higher melting point than water.
  - C Ethanol has a lower boiling point than water.
  - D Ethanol has a lower melting point than water.
- 2 In a titration between an acid (in the burette) and an alkali, you may need to re-use the same titration flask.

Which is the best procedure for rinsing the flask?

- A Rinse with distilled water and then with the alkali.
- B Rinse with tap water and then with distilled water.
- C Rinse with tap water and then with the acid.
- D Rinse with the alkali.

3 Which statements are correct?

- 1 The volume of a gas at constant pressure increases as the temperature increases.
- 2 The rate of diffusion of a gas increases as the temperature increases.
- 3 The pressure of a gas at constant volume decreases as the temperature increases.

- A** 1 and 2 only  
**B** 1 and 3 only  
**C** 2 and 3 only  
**D** 1, 2 and 3

4 A colourless solution is known to contain a sodium salt.

Tests were carried out to determine the identity of the anion in the solution.

test	observation
dilute hydrochloric acid	no reaction
dilute nitric acid followed by aqueous silver nitrate	no precipitate
dilute nitric acid followed by aqueous barium nitrate	no precipitate

Which anion could the solution contain?

- A** carbonate  
**B** chloride  
**C** nitrate  
**D** sulfate

5 Which physical changes are both exothermic?

- A** condensation and evaporation  
**B** evaporation and melting  
**C** freezing and condensation  
**D** melting and freezing

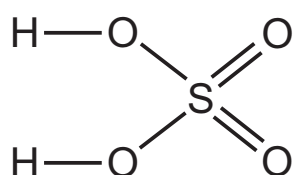
6 The following data may refer to the atom or to the ion of the same element.

- electronic configuration 2,8,8
- nucleon number 40
- proton number 20

Which element is described by these data?

- A** argon  
**B** calcium  
**C** chlorine  
**D** neon

7 A molecule of sulfuric acid has the structural formula shown.



How many electrons are involved in forming all the covalent bonds in one molecule?

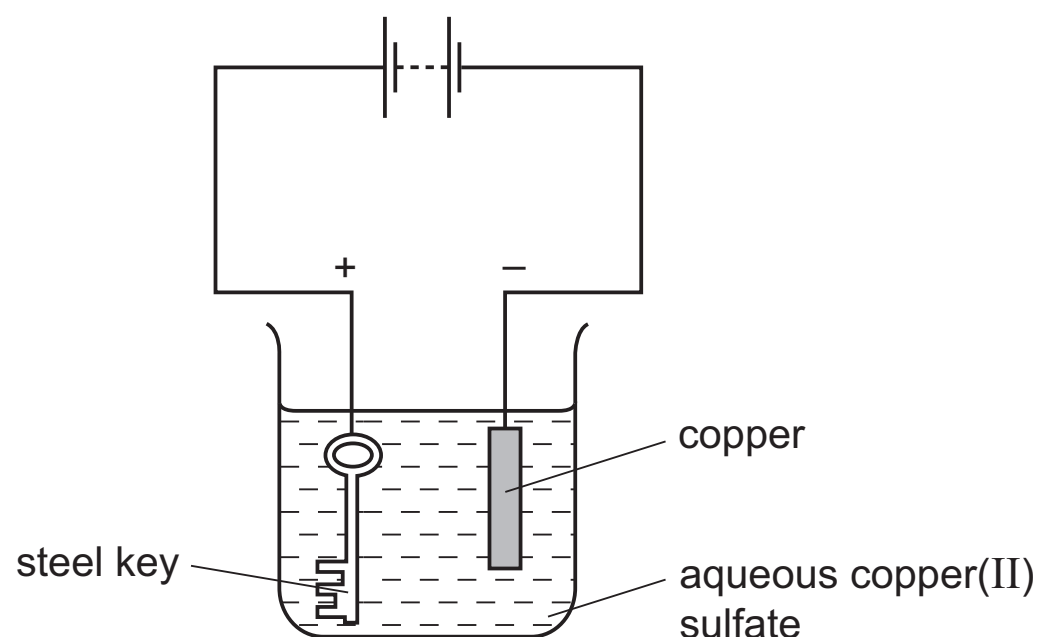
- A** 6                      **B** 8                      **C** 12                      **D** 16

8 A metal consists of a lattice of positive ions in a 'sea of electrons'.

What happens to the electrons and positive ions in a metal wire when an electric current is passed through it?

	electrons	positive ions
<b>A</b>	replaced by new electrons	replaced by new ions
<b>B</b>	replaced by new electrons	unchanged
<b>C</b>	unchanged	replaced by new ions
<b>D</b>	unchanged	unchanged

- 9 The apparatus shown is set up to plate a steel key with copper.

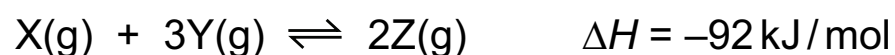


The key does not get coated with copper.

Which change needs to be made to plate the key?

- A** Increase the concentration of the aqueous copper(II) sulfate.
- B** Increase the voltage.
- C** Replace the solution with dilute sulfuric acid.
- D** Reverse the electrical connections.
- 10 What is the number of moles of hydrogen atoms in 3.2 g of methane?
- A** 0.02                      **B** 0.2                      **C** 0.4                      **D** 0.8
- 11 The formula of the gas ozone is  $O_3$ .
- What is the volume of 48 g of ozone at r.t.p.?
- A**  $16 \text{ dm}^3$                       **B**  $24 \text{ dm}^3$                       **C**  $36 \text{ dm}^3$                       **D**  $72 \text{ dm}^3$
- 12 Which substance, when added to pure water, will produce a solution which conducts electricity?
- A** calcium chloride
- B** graphite
- C** iron
- D** sugar

13 Two gases, X and Y, react together to form a gas Z, as shown.



Which change in condition will both increase the rate of reaction and increase the equilibrium yield of Z?

- A decrease concentration of X
- B increase pressure
- C increase temperature
- D use a catalyst

14 A solution of sodium carbonate was added to tap water.

A white precipitate formed.

Which ion present in the tap water caused the precipitate to form?

- A chloride
- B magnesium
- C potassium
- D sulfate

15 In which reaction is nitric acid acting as an oxidising agent?

- A  $\text{Cu} + 4\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{H}_2\text{O} + 2\text{NO}_2$
- B  $\text{CuO} + 2\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- C  $\text{Na}_2\text{CO}_3 + 2\text{HNO}_3 \rightarrow 2\text{NaNO}_3 + \text{H}_2\text{O} + \text{CO}_2$
- D  $\text{NaOH} + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}$

16 Which reaction does **not** involve neutralisation?

- A  $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NH}_3(\text{aq}) \rightarrow (\text{NH}_4)_2\text{SO}_4(\text{aq})$
- B  $\text{H}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{HCl}(\text{aq})$
- C  $\text{H}_2\text{SO}_4(\text{aq}) + \text{CuO}(\text{s}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- D  $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$

17 Which pair of substances reacts to form a salt and water only?

- A aqueous sodium chloride and aqueous silver nitrate
- B aqueous sodium hydroxide and dilute ethanoic acid
- C aqueous sodium carbonate and dilute sulfuric acid
- D zinc and dilute hydrochloric acid

18 Iron is obtained in the blast furnace from the ore haematite.

Which reaction takes place in the blast furnace?

- A Calcium carbonate is used to remove acidic impurities.
- B Coke is reduced to carbon dioxide.
- C Haematite is oxidised by carbon monoxide.
- D Haematite undergoes thermal decomposition.

19 Aluminium is manufactured from aluminium oxide by electrolysis. The compound cryolite is used in this process.

Which statement about cryolite is correct?

- A It is the common name for aluminium oxide.
- B It is used to dissolve the aluminium oxide.
- C It is used to make the positive electrode.
- D It is used to make the negative electrode.

20 An element is burned in an excess of oxygen.

Which statement about the oxide formed is always correct?

- A The mass of oxide formed is greater than the mass of element burned.
- B The oxide formed is a crystalline solid.
- C The oxide formed is soluble in water.
- D The oxide formed is white in colour.

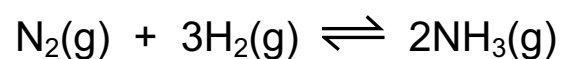
21 Which statement about the Periodic Table is correct?

- A Elements are arranged in order of decreasing proton number.
- B Group number is the number of electron shells in atoms of the elements in the group.
- C Group numbers can be used to predict the charges of ions.
- D Metallic character increases left to right across a period.

22 Which negative ions are present in aqueous copper(II) sulfate?

- A copper(II) ions and hydrogen ions
- B copper(II) ions only
- C sulfate ions and hydroxide ions
- D sulfate ions only

23 The reaction shown for the Haber process can reach equilibrium.



Which row shows the gases present at equilibrium?

	nitrogen	hydrogen	ammonia
<b>A</b>	no	no	yes
<b>B</b>	no	yes	yes
<b>C</b>	yes	no	yes
<b>D</b>	yes	yes	yes

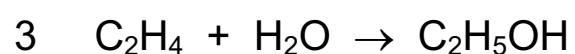
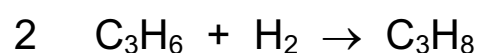
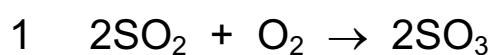
24 Which statement about graphite is **not** correct?

- A It burns to form carbon dioxide.
- B It is a carbon compound.
- C It is a giant molecular substance.
- D It is used as a lubricant.





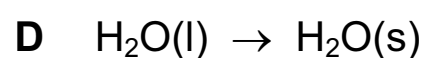
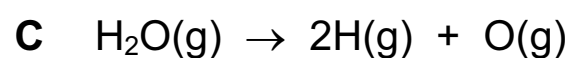
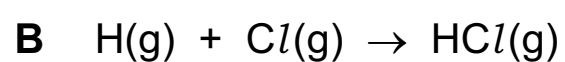
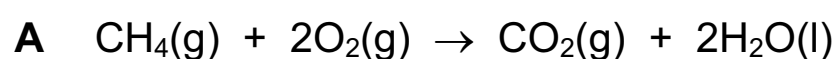
28 Some reactions are shown.



Which of these reactions use a catalyst when carried out industrially?

- A** 1 only      **B** 1 and 2 only      **C** 2 and 3 only      **D** 1, 2 and 3

29 Which change is endothermic?



30 Which two elements are the major constituents of brass?

- A** Br and As      **B** Cu and Sn      **C** Cu and Zn      **D** Sn and Zn

31 Two statements about copper are given.

1 Copper is below hydrogen in the reactivity series.

2 Copper can be obtained by heating its oxide with carbon.

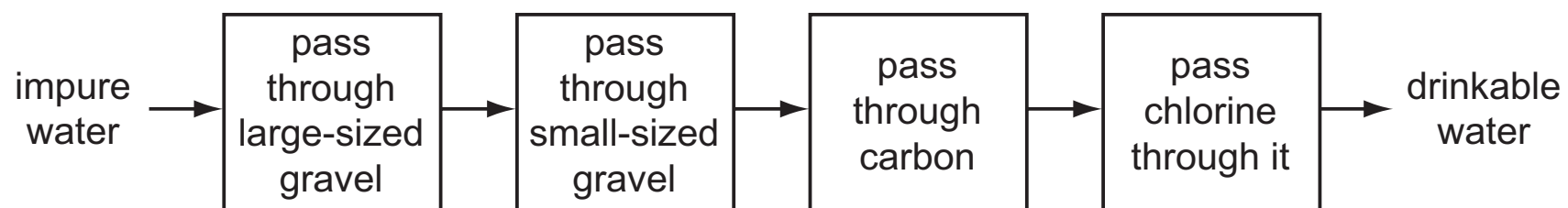
Which statements are correct?

- A** both 1 and 2  
**B** 1 only  
**C** 2 only  
**D** neither 1 nor 2

32 What is the order of reactivity of the halogens?

	most reactive	—————→	least reactive
<b>A</b>	bromine	chlorine	iodine
<b>B</b>	chlorine	bromine	iodine
<b>C</b>	iodine	bromine	chlorine
<b>D</b>	iodine	chlorine	bromine

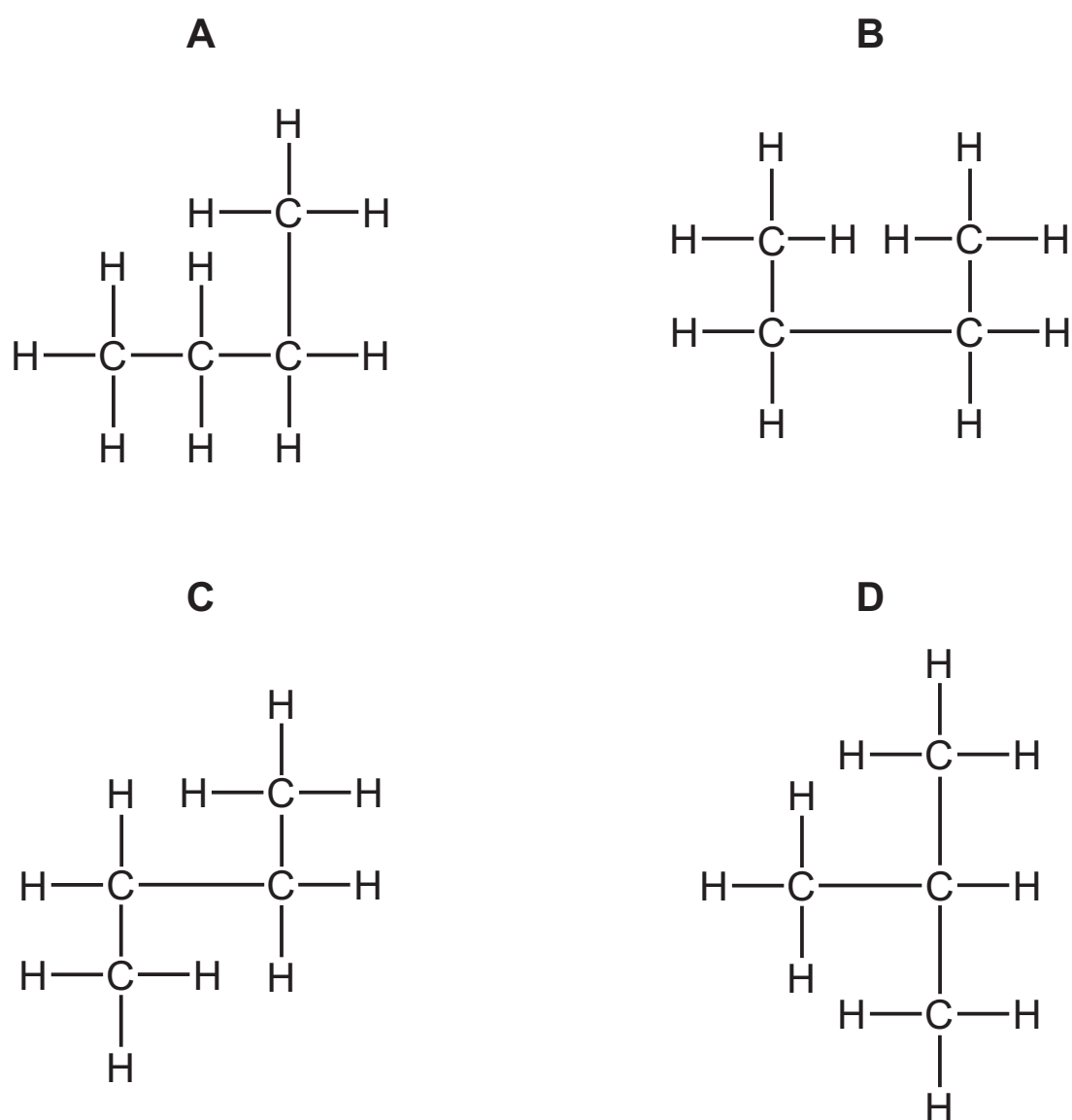
33 The flow chart shows how impure water can be treated to produce drinkable water.



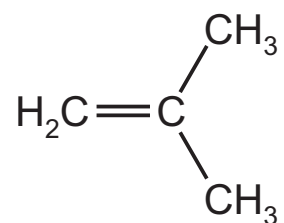
What is **not** removed from the water by this process?

- A clay particles
- B microbes
- C nitrates
- D odours

34 Which diagram shows the isomer of butane?

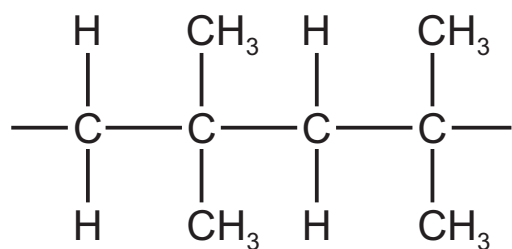


35 The diagram shows the structure of a monomer used to make a polymer.

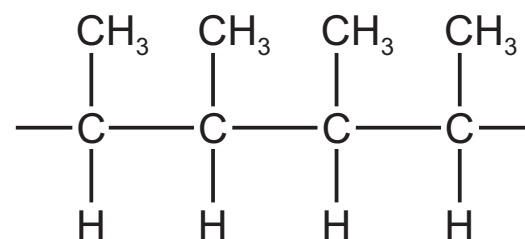


What is the structure of the polymer?

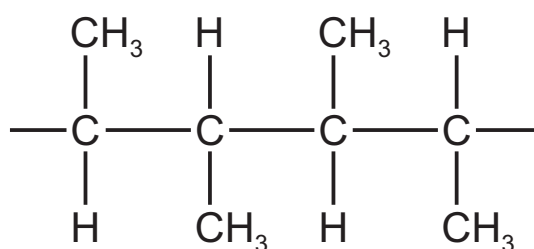
**A**



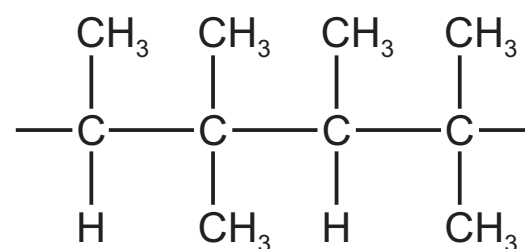
**B**



**C**



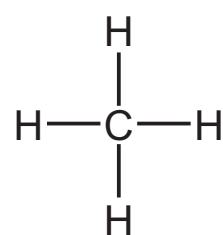
**D**



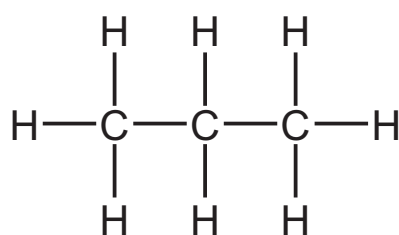
36 Which property of a liquid ester can be used to check its purity before use as a food flavouring?

- A** boiling point
- B** colour
- C** smell
- D** solubility in water

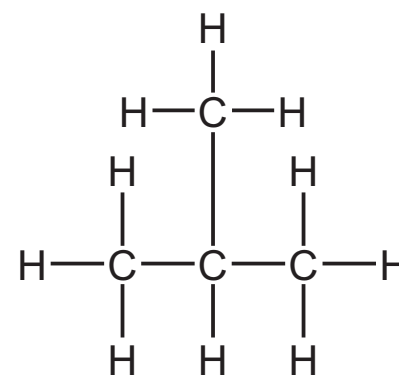
37 The structures of three hydrocarbons from the same homologous series are shown.



W



X



Y

Which statement is correct?

- A All three molecules are unsaturated hydrocarbons.
- B All three molecules have the same empirical formula.
- C W has the lowest boiling point.
- D X is an isomer of Y.

38 How many of the following statements about ethanol are correct?

- 1 molecular formula is  $\text{C}_2\text{H}_6\text{O}$
- 2 manufactured from ethane and steam
- 3 oxidises to ethanoic acid
- 4 produced by the fermentation of glucose
- 5 used as a fuel
- 6 used as a solvent

A 3

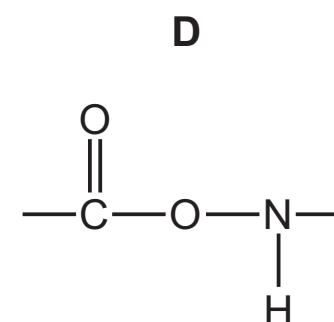
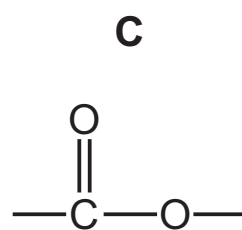
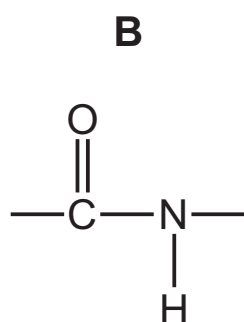
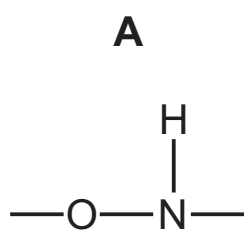
B 4

C 5

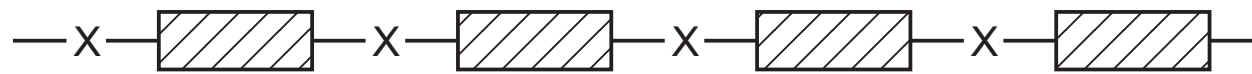
D 6

39 Proteins and nylon both possess the same amide linkages.

Which arrangement of atoms represents an amide linkage?



40 A carbohydrate such as starch can be represented as shown.



What is X?

- A carbon
- B hydrogen
- C nitrogen
- D oxygen



