

CHEMISTRY

5070/12

Paper 1 Multiple Choice

October/November 2014

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.

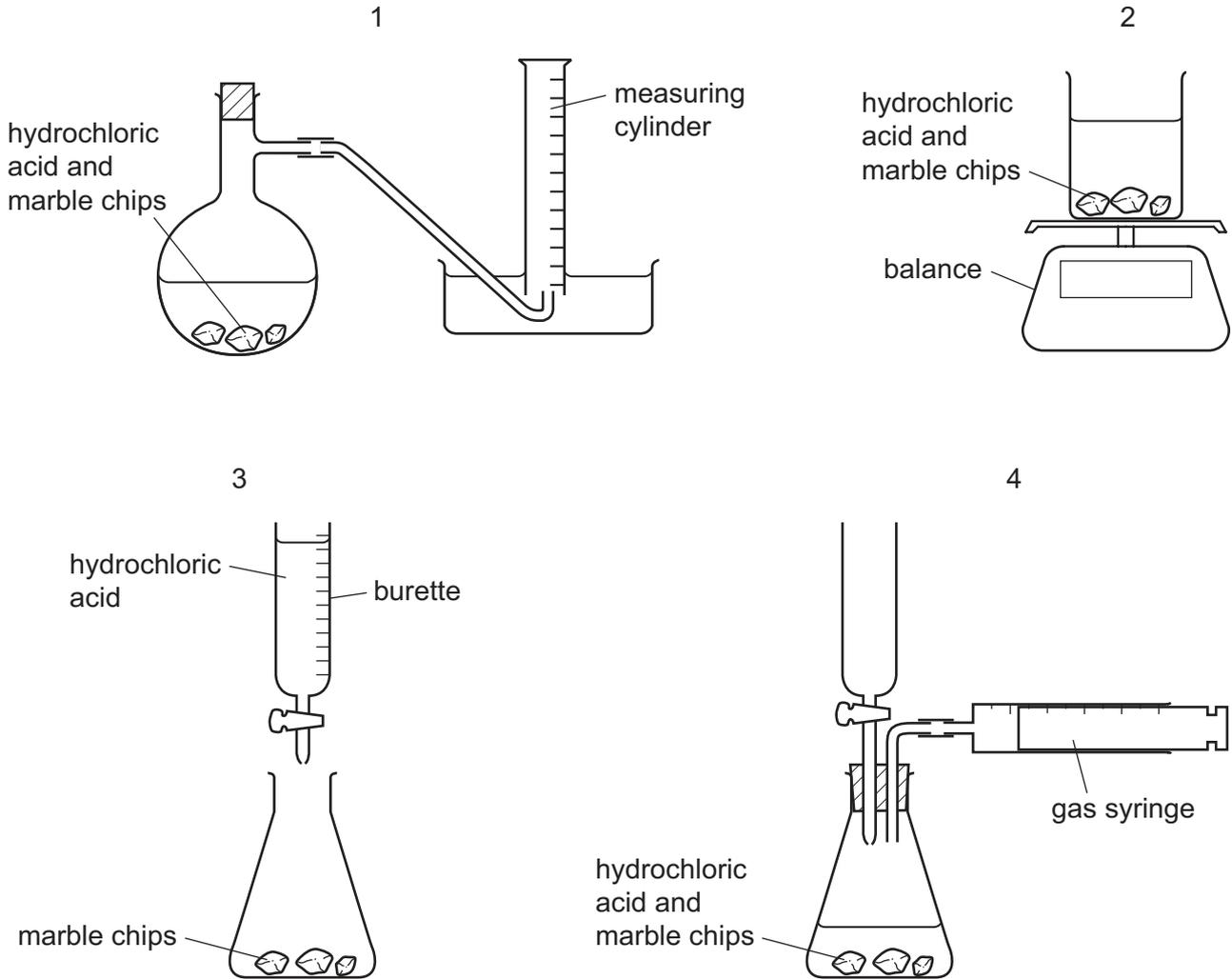
Electronic calculators may be used.

This document consists of **13** printed pages and **3** blank pages.

- 1 A student wants to carry out an experiment to follow the rate of the reaction between hydrochloric acid and marble chips.



Which diagrams show apparatus that is suitable for this experiment?



- A** 1 and 2 only **B** 1 and 3 only **C** 1 and 4 only **D** 1, 2 and 4

- 2 Solutions of lead(II) nitrate and potassium iodide are mixed together in the preparation of lead(II) iodide.

Which method can be used to separate the lead(II) iodide from the mixture?

- A** crystallisation
B distillation
C evaporation
D filtration

- 3 A small amount of aqueous copper(II) sulfate is put into a test-tube. A few drops of aqueous ammonia are added to the test-tube. Then an excess of aqueous ammonia is added to the same test-tube.

What are the two observations?

	few drops of aqueous ammonia	excess aqueous ammonia
A	light blue precipitate	dark blue solution
B	light blue precipitate	light blue precipitate
C	dark blue solution	dark blue solution
D	dark blue solution	light blue precipitate

- 4 An atom of element Z has 14 neutrons and 13 protons.

It forms a positive ion.

How many electrons does the ion of Z have?

- A** 10 **B** 13 **C** 14 **D** 27

- 5 Which gas is **neither** an element **nor** a compound?

- A** ammonia
B chlorine
C air
D carbon monoxide

- 6 Why does ammonia gas diffuse faster than hydrogen chloride gas?

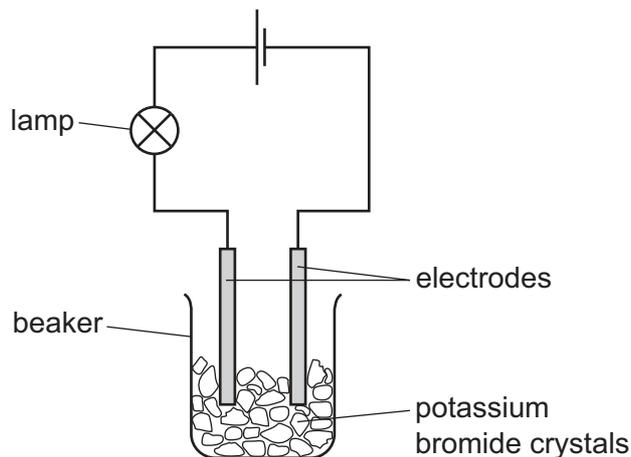
- A** Ammonia has a higher boiling point than hydrogen chloride.
B Ammonia is a base, hydrogen chloride is an acid.
C The ammonia molecule contains more atoms than a hydrogen chloride molecule.
D The relative molecular mass of ammonia is smaller than that of hydrogen chloride.

- 7 The compound formed between elements X and Y is ionic.

Which statement about elements X and Y is correct?

- A** X and Y are both at the left-hand side of the Periodic Table.
B X and Y are both at the right-hand side of the Periodic Table.
C X and Y are both transition elements.
D X is at the opposite side of the Periodic Table from element Y.

- 8 The experiment shown is used to test potassium bromide crystals.



The lamp does not light.

Distilled water is then added to the beaker and the lamp lights.

Which statement explains these results?

- A** Electrons are free to move in the solution when potassium bromide dissolves.
B Metal ions are free to move when potassium bromide melts.
C Metal ions are free to move when potassium reacts with water.
D Oppositely charged ions are free to move in the solution when potassium bromide dissolves.
- 9 How many electrons are used in covalent bonding in the N_2 molecule?
A 2 **B** 4 **C** 6 **D** 10
- 10 Propene, $CH_3CH=CH_2$, has a very low boiling point because of the weakness of the
A C–C bond.
B C=C bond.
C C–H bond.
D intermolecular forces.
- 11 What is the empirical formula of a compound containing 12g of carbon, 2g of hydrogen and 16g of oxygen only?
A CHO **B** CHO_2 **C** CH_2O **D** C_2HO

12 What is the correct equation for the reaction taking place at the negative electrode when molten magnesium chloride is electrolysed using inert electrodes?

- A $Cl^- \rightarrow Cl + e^-$
- B $2Cl^- \rightarrow Cl_2 + 2e^-$
- C $Mg^+ + e^- \rightarrow Mg$
- D $Mg^{2+} + 2e^- \rightarrow Mg$

13 Which fertiliser contains the greatest percentage by mass of nitrogen?

- A $(NH_4)_2HPO_4$ $M_r = 132$
- B $(NH_4)_2SO_4$ $M_r = 132$
- C NH_4NO_3 $M_r = 80$
- D $CO(NH_2)_2$ $M_r = 60$

14 A volume of ethane, C_2H_6 , at r.t.p. has a mass of 20 g.

What is the mass of an equal volume of propene, C_3H_6 , at r.t.p.?

- A 20 g B 21 g C 28 g D 42 g

15 Which of these processes are both endothermic?

- A combustion, cracking
- B combustion, fermentation
- C cracking, photosynthesis
- D fermentation, photosynthesis

16 Ethanol is produced by the fermentation of glucose from sugar cane. In some countries ethanol is used as a fuel.

Which statements are correct?

- 1 Sugar cane is a non-renewable (finite) resource.
- 2 When sugar cane is growing it removes carbon dioxide from the atmosphere.

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

17 Which row correctly classifies the oxides in the table?

	carbon dioxide	copper(II) oxide	zinc oxide
A	acidic	amphoteric	basic
B	acidic	basic	amphoteric
C	acidic	neutral	amphoteric
D	basic	neutral	neutral

18 Sulfur is burnt in air.

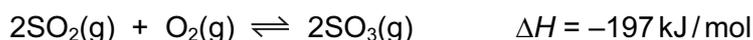
Which statement about this reaction is correct?

- A** The gas formed turns aqueous potassium dichromate(VI) from green to orange.
- B** The product is used as a food preservative.
- C** The reaction is endothermic.
- D** The reaction is reversible.

19 Which method is used to obtain chlorine from aqueous sodium chloride?

- A** crystallisation
- B** distillation
- C** electrolysis
- D** filtration

20 The equation shows the reaction for the formation of sulfur trioxide using a catalyst.



Which change in reaction conditions would produce more sulfur trioxide?

- A** adding more catalyst
- B** decreasing the pressure
- C** increasing the temperature
- D** removing some sulfur trioxide

21 How many of these salts are soluble in water?

- | | | | | | | | |
|----------|---------------|----------------------------|------------------------------|-----------------|---|----------|---|
| | AgCl | $\text{Ca}(\text{NO}_3)_2$ | $(\text{NH}_4)_2\text{SO}_4$ | PbCO_3 | | | |
| A | 1 | B | 2 | C | 3 | D | 4 |

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

Which element is a solid non-metal at r.t.p.?

The diagram shows a simplified periodic table with four elements marked: A, B, C, and D. Element A is in the second period, second group. Element B is in the second period, eighth group. Element C is in the third period, eighth group. Element D is in the fourth period, eighth group. There is an empty box above the gap between the first and second groups in the second period.

23 Which statements about fertilisers containing nitrates are correct?

- 1 They increase plant growth.
- 2 Nitrates dissolve in water.
- 3 Eutrophication is caused by nitrates from farmland entering rivers.
- 4 If nitrates are applied to alkaline soils they produce ammonia gas.

A 1 and 3 only B 1, 2 and 3 C 1, 2 and 4 D 2 and 3 only

24 Which is a property of the element molybdenum, ${}_{42}^{96}\text{Mo}$?

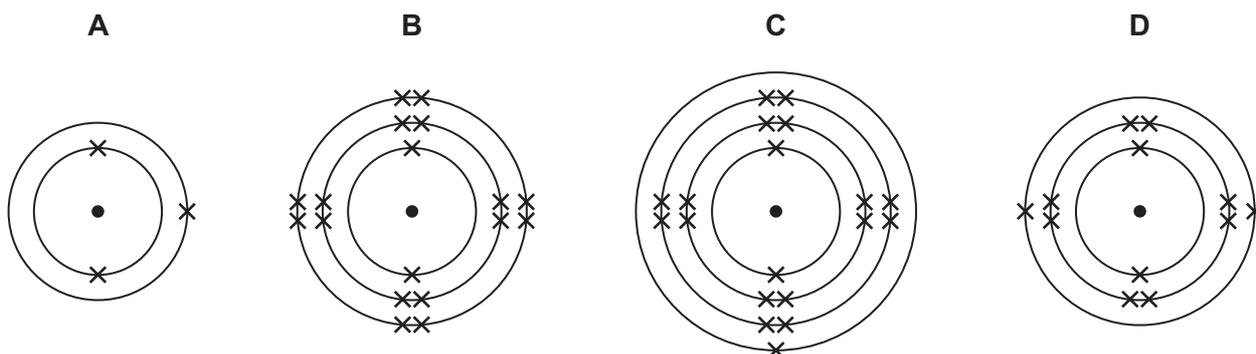
- A low density
- B low melting point
- C forms white or colourless compounds
- D has more than one oxidation state

25 In the Periodic Table, how many periods are needed to accommodate the elements of atomic numbers 1-18?

A 2 B 3 C 4 D 8

26 The diagram shows the arrangement of electrons in the atoms of four different elements.

Which is the **least** reactive of the four elements?



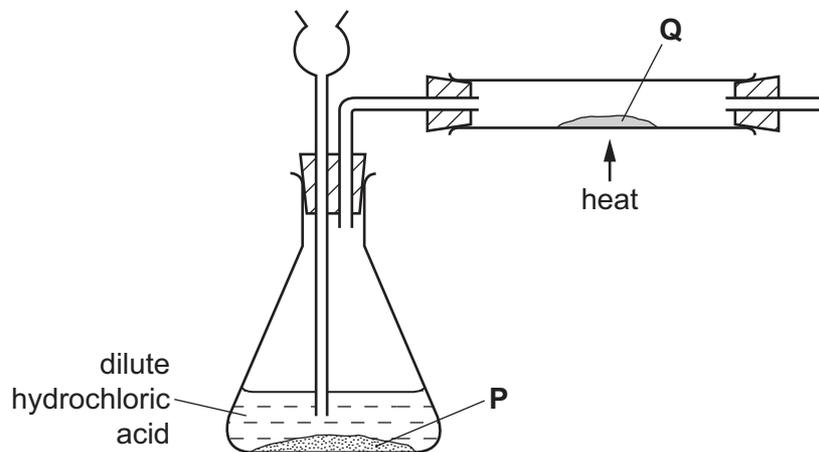
27 A gas **G**

- 1 has no smell,
- 2 is not poisonous,
- 3 reacts with hydrogen at high temperature and pressure.

What is gas **G**?

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

28 Substance **P** reacts with dilute hydrochloric acid to produce a gas. This gas reduces substance **Q**.



What are substances **P** and **Q**?

	P	Q
A	copper	copper(II) oxide
B	lead	lead(II) oxide
C	magnesium	zinc oxide
D	zinc	copper(II) oxide

29 Iron rusts when exposed to oxygen in the presence of water.

Which method will **not** slow down the rate of rusting of an iron roof?

- A attaching strips of copper to it
- B coating it with plastic
- C galvanising it with zinc
- D painting it

30 The solid carbonates of three metals, *W*, *X* and *Y*, are heated.

	result
carbonate of <i>W</i>	carbon dioxide given off solid changes colour from green to black
carbonate of <i>X</i>	carbon dioxide given off solid does not change colour
carbonate of <i>Y</i>	carbon dioxide not given off solid does not change colour

Which statements are correct?

- 1 Metal *Y* is more reactive than metal *X*.
- 2 Metal *W* is a transition metal.
- 3 If dilute nitric acid is added to all three carbonates, carbon dioxide is given off from the carbonates of *W* and *X* but not from the carbonate of *Y*.

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

31 Bond breaking is an endothermic process and bond making is an exothermic process.

For which change is it **not** possible, from the equation, to deduce whether the reaction is endothermic or exothermic?

- A $\text{Cl}_2(\text{g}) \rightarrow 2\text{Cl}(\text{g})$
- B $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$
- C $\text{H}_2\text{O}(\text{g}) \rightarrow 2\text{H}(\text{g}) + \text{O}(\text{g})$
- D $\text{H}(\text{g}) + \text{Cl}(\text{g}) \rightarrow \text{HCl}(\text{g})$

32 Which row is correct for the reaction of the alkene with steam and a catalyst?

	alkene	product
A	$\text{CH}_3\text{CH}=\text{CH}_2$	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ only
B	$\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ only
C	$\text{CH}_3\text{CH}=\text{CHCH}_3$	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ only
D	$(\text{CH}_3)_2\text{C}=\text{CH}_2$	$(\text{CH}_3)_2\text{CHCH}_2\text{OH}$ only

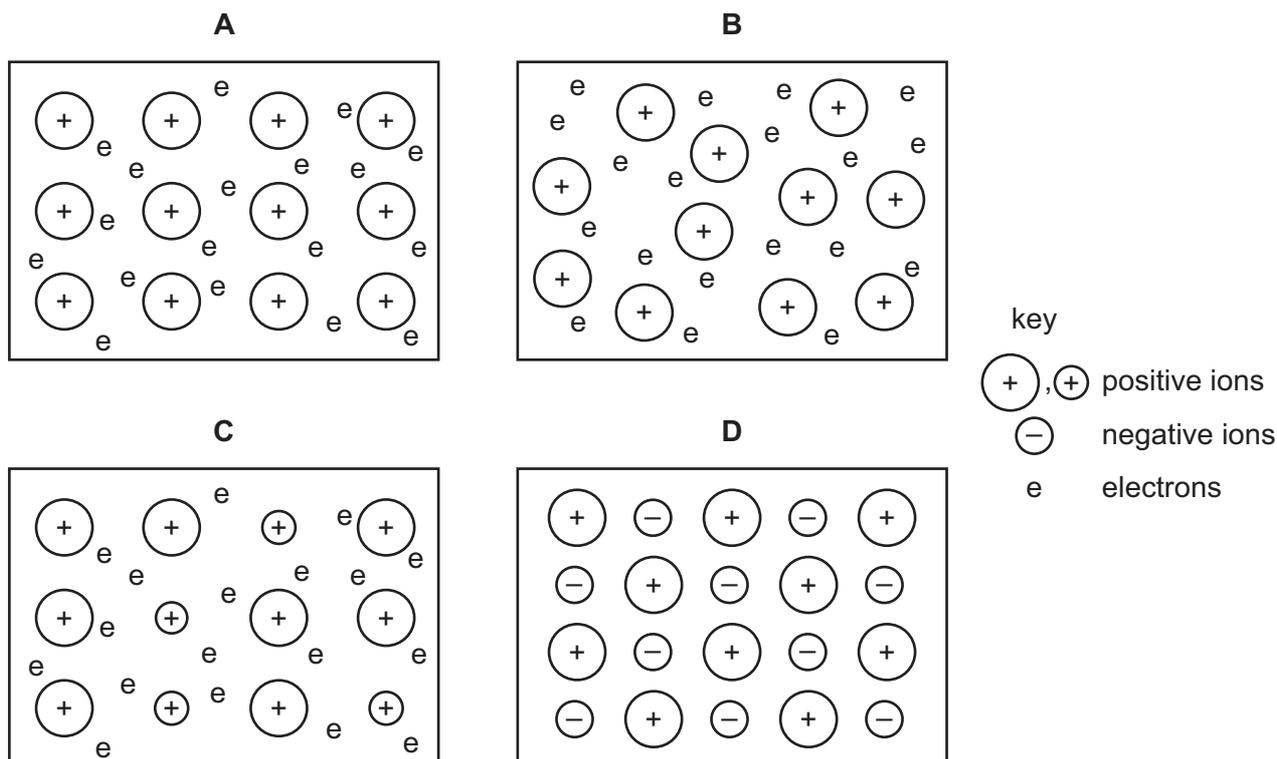
33 Why is carbon used in water purification?

- A** It acts as a filter to remove insoluble solids.
- B** It desalinates the water.
- C** It disinfects the water.
- D** It removes tastes and odours.

34 Which of the statements about the preparation and properties of ammonia is correct?

- A** Ammonia is formed when ammonium chloride is heated with an acid.
- B** Ammonia reacts with sodium hydroxide solution to form a salt and water.
- C** Ammonia reacts with water to form hydrogen ions.
- D** A solution of ammonia in water has a pH greater than 7.

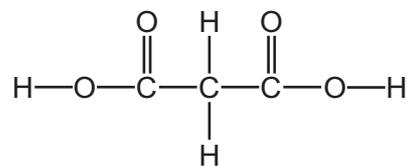
35 Which structure represents that of an alloy?



36 Which statement is **not** correct?

- A** Carbohydrates, proteins and fats are all natural macromolecules.
- B** *Terylene* contains the same linkages as a protein.
- C** When a carbohydrate is hydrolysed, sugars are formed.
- D** When a protein is hydrolysed, amino acids are formed.

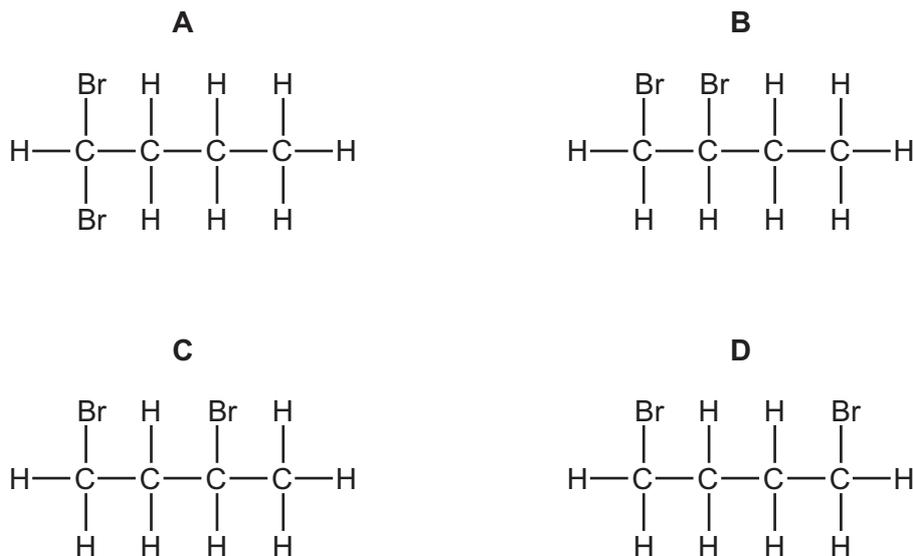
37 Which statements would be true of the compound which has the formula shown?



- 1 It would react with excess aqueous sodium hydroxide in a 1 : 1 molar ratio.
- 2 In aqueous solution, it would have a pH of 9.5.
- 3 It would react with an alcohol to form an ester.

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

38 When butene reacts with bromine, which compound could be made?



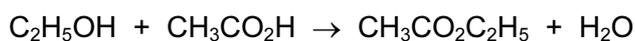
39 Methane is the first member of the alkane series of hydrocarbons. The second member is ethane.

Which statements about ethane are correct?

- 1 Ethane has the formula C_2H_4 .
- 2 Ethane has a higher boiling point than that of methane.
- 3 Ethane has the same molecular formula as methane.
- 4 Ethane has chemical properties very similar to those of methane.

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

40 When ethanol reacts with ethanoic acid, the ester ethyl ethanoate is formed.



What is the formula of the ester formed when methanol reacts with butanoic acid, $\text{C}_3\text{H}_7\text{CO}_2\text{H}$?

- A** $\text{C}_2\text{H}_5\text{CO}_2\text{C}_2\text{H}_5$
B $\text{C}_3\text{H}_7\text{CO}_2\text{C}_2\text{H}_5$
C $\text{CH}_3\text{CO}_2\text{C}_3\text{H}_7$
D $\text{C}_3\text{H}_7\text{CO}_2\text{CH}_3$

