



National  
Qualifications  
2021 ASSESSMENT RESOURCE

**X813/75/02**

**Chemistry**  
**Section 1 — Questions**

Duration — 2 hours 30 minutes

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Instructions for the completion of Section 1 are given on *page 02* of your question and answer booklet X813/75/01.

Record your answers on the answer grid on *page 03* of your question and answer booklet.

You may refer to the Chemistry Data Booklet for National 5.

Before leaving the examination room you must give your question and answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



\* X 8 1 3 7 5 0 2 \*

SECTION 1 — 25 marks

Attempt ALL questions

1. Identify the element with similar chemical properties to fluorine.

- A Neon
- B Chlorine
- C Nitrogen
- D Hydrogen

2. An atom has an atomic number of 15 and a mass number of 31.

The atom has

- A 15 protons and 15 electrons
- B 15 protons and 16 electrons
- C 16 protons and 15 electrons
- D 16 protons and 16 electrons.

3. Which of the following molecules has a trigonal pyramidal shape?

- A HCl
- B CO<sub>2</sub>
- C NCl<sub>3</sub>
- D CHCl<sub>3</sub>

4. When sulfur dioxide gas dissolves in water, a solution containing hydrogen ions and sulfite ions is formed.

In which of the following equations are all of the state symbols correctly shown?

- A  $\text{SO}_2(\text{s}) + \text{H}_2\text{O}(\ell) \rightarrow 2\text{H}^+(\ell) + \text{SO}_3^{2-}(\ell)$
- B  $\text{SO}_2(\text{g}) + \text{H}_2\text{O}(\ell) \rightarrow 2\text{H}^+(\text{aq}) + \text{SO}_3^{2-}(\text{aq})$
- C  $\text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{aq}) \rightarrow 2\text{H}^+(\text{aq}) + \text{SO}_3^{2-}(\text{aq})$
- D  $\text{SO}_2(\ell) + \text{H}_2\text{O}(\text{aq}) \rightarrow 2\text{H}^+(\text{aq}) + \text{SO}_3^{2-}(\text{aq})$

5. 0.2 mol of potassium hydroxide was dissolved in water and the solution made up to 250 cm<sup>3</sup>.

What is the concentration, in mol l<sup>-1</sup>, of the potassium hydroxide solution?

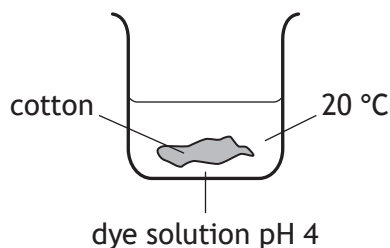
- A 0.0008  
B 0.05  
C 0.8  
D 50
6. Which substance exists as diatomic molecules?
- A Nitrogen monoxide  
B Nitrogen dioxide  
C Dinitrogen monoxide  
D Dinitrogen tetraoxide
7. Which of the following compounds is a base?
- A Magnesium nitrate  
B Magnesium sulfate  
C Magnesium chloride  
D Magnesium carbonate
8. Which line in the table correctly describes what happens to a dilute solution of hydrochloric acid when water is added to it?

	pH	H <sup>+</sup> (aq) concentration
A	increases	increases
B	decreases	decreases
C	increases	decreases
D	decreases	increases

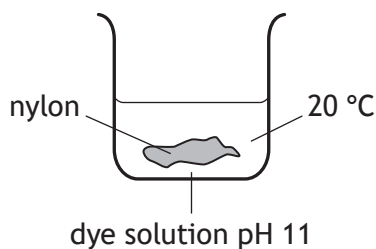
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Questions 9 and 10 refer to the diagrams below.

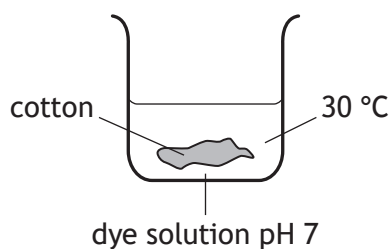
experiment 1



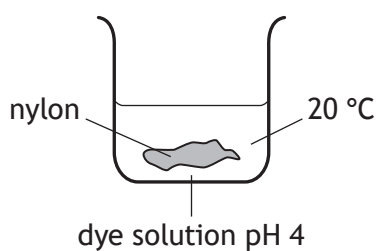
experiment 2



experiment 3



experiment 4



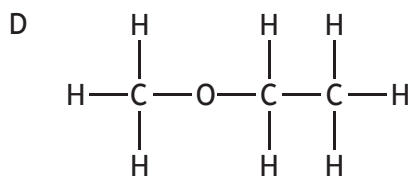
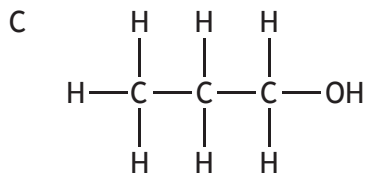
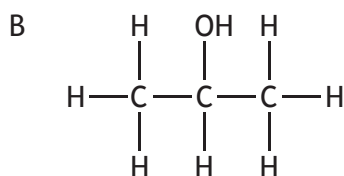
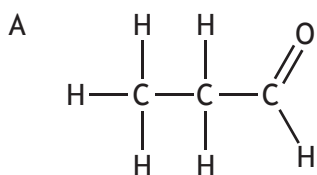
9. Which of the following statements correctly describes the dye solution in **experiment 2**?  
It contains
- A only hydrogen ions
  - B only hydroxide ions
  - C more hydrogen ions than hydroxide ions
  - D more hydroxide ions than hydrogen ions.
10. Identify the **two** experiments that should be used to compare the effect of pH on the dyeing of cloth.
- A Experiments 1 and 4
  - B Experiments 2 and 4
  - C Experiments 1 and 3
  - D Experiments 3 and 4

11. A straight chain molecule has the chemical formula  $C_{16}H_{28}$  and contains only single or double bonds between carbon atoms.

How many carbon to carbon double bonds must the molecule contain?

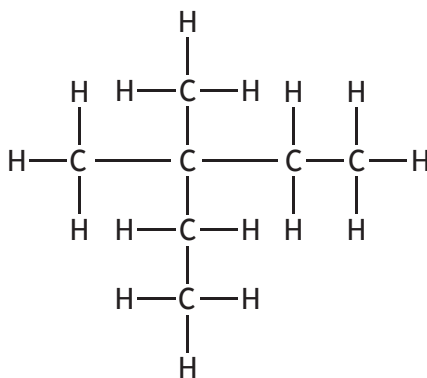
- A 1
- B 2
- C 3
- D 4

12. Which of the following compounds does **not** belong to a family with the general formula  $C_nH_{2n+2}O$ ?



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13.



The shortened structural formula for this compound is

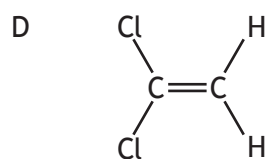
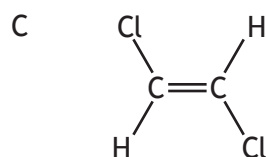
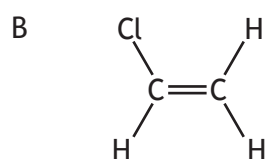
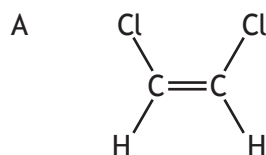
- A  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- B  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_3$
- C  $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}_3$
- D  $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{CH}_3$

14. **1,2-dichloroethene** has two possible structures known as **cis** and **trans**.

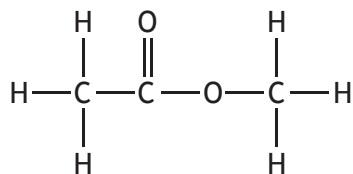
The **cis** structure has the chlorine atoms on the same side of the double bond.

The **trans** structure has the chlorine atoms on the opposite side of the double bond.

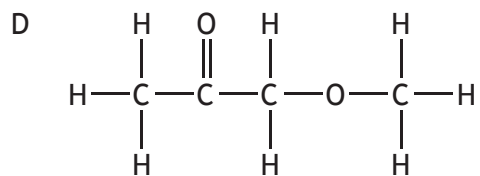
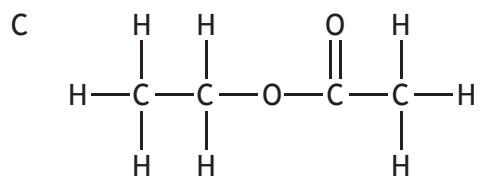
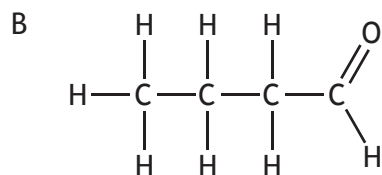
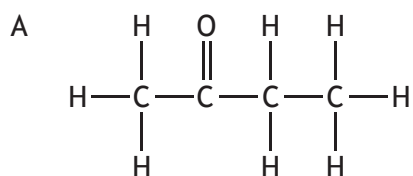
Which of the following is the **cis** structure of **1,2-dichloroethene**?



15. The structure shown is a member of a family of compounds known as esters.



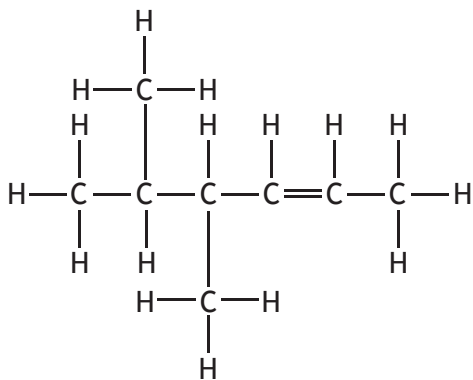
Which of the following is also an ester?



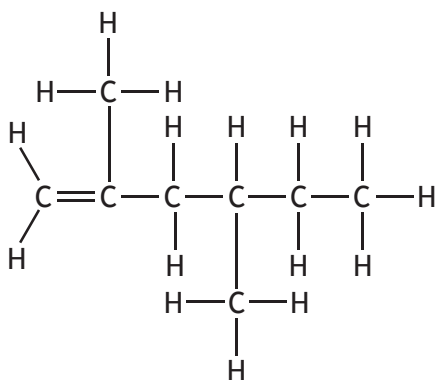
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16. The correct structural formula for 2,4-dimethylhex-2-ene is

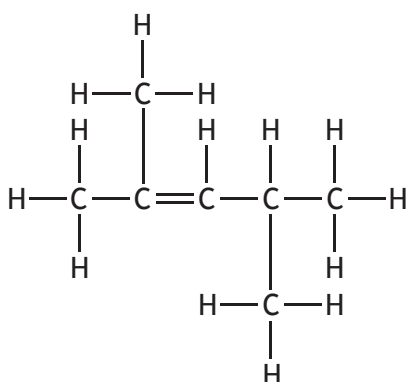
A



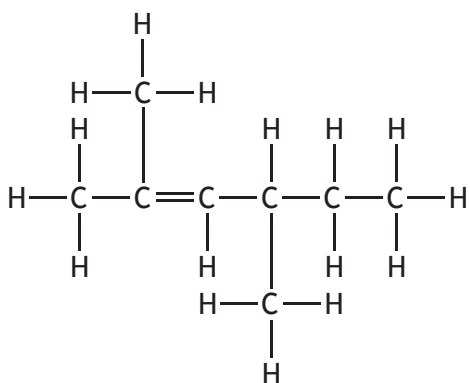
B



C



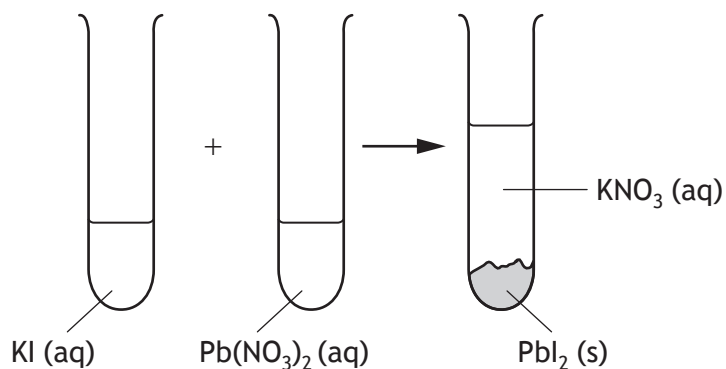
D





17. Ethanoic acid has a higher boiling point than methanoic acid because
- A the covalent bonds are stronger in methanoic acid
  - B the intermolecular forces of attraction are stronger in methanoic acid
  - C the covalent bonds are stronger in ethanoic acid
  - D the intermolecular forces of attraction are stronger in ethanoic acid.

Questions 18 and 19 refer to the reaction below.



18. The spectator ions in the reaction above are

- A  $\text{Pb}^{2+}$  and  $\text{NO}_3^-$
- B  $\text{K}^+$  and  $\text{NO}_3^-$
- C  $\text{K}^+$  and  $\text{I}^-$
- D  $\text{Pb}^{2+}$  and  $\text{I}^-$

19. The type of reaction shown above is

- A oxidation
- B reduction
- C neutralisation
- D precipitation.

[Turn over

20. The table shows the names of some common ions and their colours in solution.

Ion	Colour in solution
copper	blue
potassium	colourless
chromate	yellow
sulfate	colourless

Which of the following compounds would be colourless in solution?

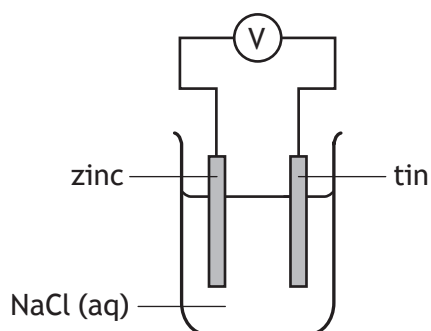
- A Potassium sulfate
- B Potassium chromate
- C Copper sulfate
- D Copper chromate

21. In which of the following reactions is a positive ion oxidised?

- A iodide ion → iodine
- B nickel(II) ion → nickel(III) ion
- C cobalt(III) ion → cobalt(II) ion
- D sulfate ion → sulfite ion

22. Which line in the table is correct for this cell.

You may wish to use the data booklet.

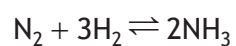


	Change in mass of zinc	Direction of electron flow
A	decrease	tin to zinc
B	decrease	zinc to tin
C	increase	tin to zinc
D	increase	zinc to tin

23. Which line in the table shows the materials that will stop  $\alpha$ ,  $\beta$  and  $\gamma$  radiation?

	Material that will stop		
	$\alpha$ radiation	$\beta$ radiation	$\gamma$ radiation
A	thick concrete	thin metal foil	sheet of paper
B	thin metal foil	sheet of paper	thick concrete
C	sheet of paper	thin metal foil	thick concrete
D	sheet of paper	thick concrete	thin metal foil

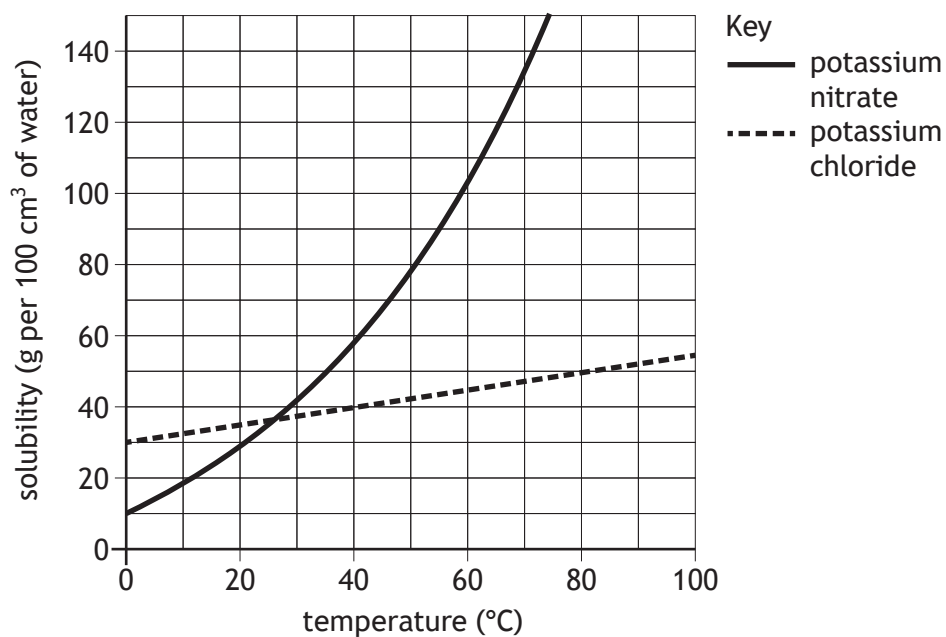
24. Which line in the table shows the correct name for the process and catalyst used for the reaction shown?



	Name of process	Catalyst used
A	Ostwald	iron
B	Haber	platinum
C	Ostwald	platinum
D	Haber	iron

[Turn over

25. The graph shows the solubility of compounds at various temperatures.



A student added different compounds to beakers each containing 100 cm<sup>3</sup> of water at 40 °C. The student added 50 g of potassium nitrate to one beaker and 50 g of potassium chloride to another beaker.

From the information in the graph which of the following statements is correct?

- A Both compounds completely dissolved at 40 °C.
- B Neither compound completely dissolved at 40 °C.
- C Only potassium chloride completely dissolved at 40 °C.
- D Only potassium nitrate completely dissolved 40 °C.

[END OF SECTION 1. NOW ATTEMPT THE QUESTIONS IN SECTION 2 OF YOUR QUESTION AND ANSWER BOOKLET]