National Qualifications 2022

X813/75/02

Chemistry
Section 1 — Questions

FRIDAY, 29 APRIL
1:00 PM – 3:30 PM

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.

SECTION 1 — 25 marks

Attempt ALL questions

1. Which of the following is the atomic number of a metal?

A 1

B 33

C 45

D 86

2. An atom is neutral because:

A the number of protons equals the number of neutrons

B the number of electrons equals the number of protons

C the number of electrons equals the number of protons plus neutrons

D the number of neutrons equals the number of electrons plus protons.

3. When liquid water changes to steam:

A weak forces of attraction between the water molecules are broken

B strong forces of attraction between the water molecules are broken

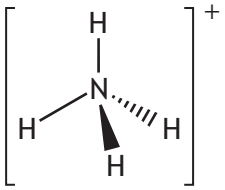
C weak forces of attraction between the atoms in the water molecules are broken

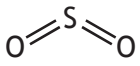
D strong forces of attraction between the atoms in the water molecules are broken.

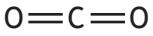
4. Which line in the table shows how the concentration of a solution changes when more solute or solvent is added?

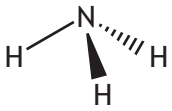
	Adding solute	**Adding solvent**
A	concentration decreases	concentration increases
B	concentration decreases	concentration decreases
C	concentration increases	concentration decreases
D	concentration increases	concentration increases

5. Which of the following structures would be described as angular?

A 

B 

C 

D 

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6. Electronegativity is a measure of the attraction a nucleus has for the shared pair of electrons in a covalent bond.

When two nuclei that have different electronegativity values are bonded together, the bond formed is described as 'polar covalent'.

The bigger the difference in the electronegativity values the more polar the bond.

The table contains electronegativity values for some atoms.

Atom	Electronegativity value
H	2.2
C	2.6
N	3.0
O	3.4

Which of the following bonds would be the most polar?

A O–H

B N–H

C C–H

D C–O

7. Which line in the table shows what would be observed during the electrolysis of copper chloride, using a d.c. supply?

	At the positive electrode	At the negative electrode
A	gas forms	solid forms
B	gas forms	gas forms
C	solid forms	gas forms
D	solid forms	solid forms

8. Which of the following compounds is a salt?

A Calcium oxide

B Hydrogen nitrate

C Sodium hydroxide

D Potassium ethanoate

9. The pH of the solution formed when ammonia is bubbled into water is most likely to be:

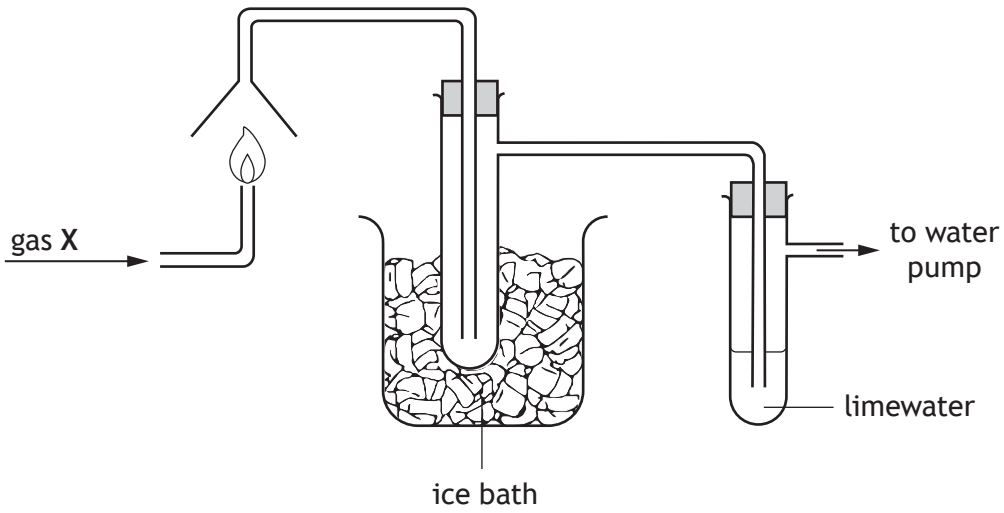
A 3

B 5

C 7

D 9.

10. The apparatus shown can be used to identify the products of combustion.



When gas **X** was burned, a colourless liquid collected in the cooled test tube but there was no change in the limewater.

Gas **X** could be:

A methane

B carbon monoxide

C hydrogen

D ethane.

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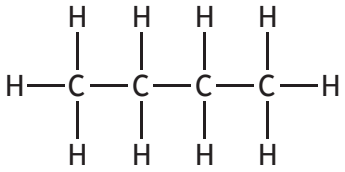
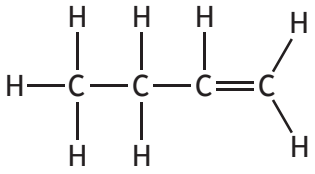
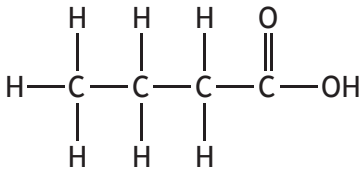
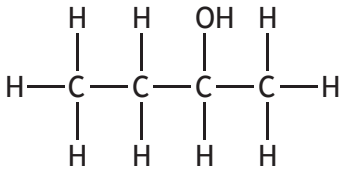
11. Which of the following compounds has the highest boiling point?
You may wish to use the data booklet to help you.

A 

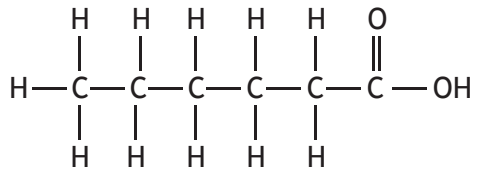
B 

C 

D 

12. Which of the following molecules will decolourise bromine solution and also form an acidic solution when added to water?

A



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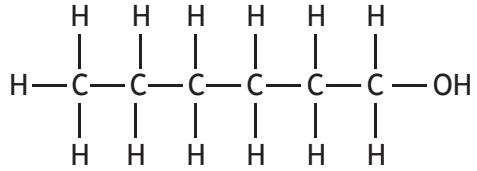

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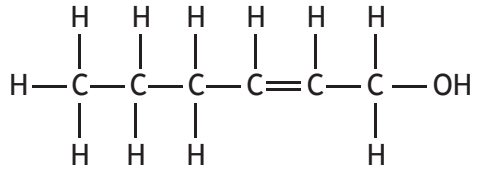

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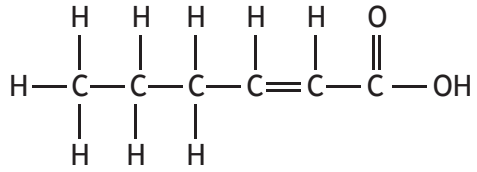

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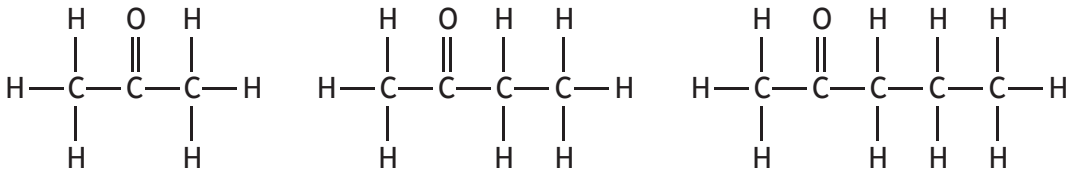
13. The first three members of the alkanones are



The general formula for the alkanones is:

A $C_nH_{2n-2}O$

B $C_nH_{2n}O$

C $C_nH_{2n+1}O$

D $C_nH_{2n+2}O$

14. Which of the following could be the formula mass of a cycloalkane?

A 40

B 42

C 54

D 58

15. Metallic bonding is a force of attraction between:

A positive ions and delocalised electrons

B negative ions and delocalised electrons

C negative ions and positive ions

D a shared pair of electrons and two nuclei.

16. Metals used to make aircraft have a density of less than 3 g cm^{-3} and have to withstand temperatures up to 600 °C.

Which line in the table gives the correct data for a metal used to make aircraft?

	Melting point (°C)	**Density (g cm^{-3})**
A	98	0.97
B	660	2.70
C	1854	6.52
D	1085	8.96

17. Which of these metals can only be extracted from its ore by electrolysis and forms an oxide that is insoluble in water?

You may wish to use the data booklet to help you.

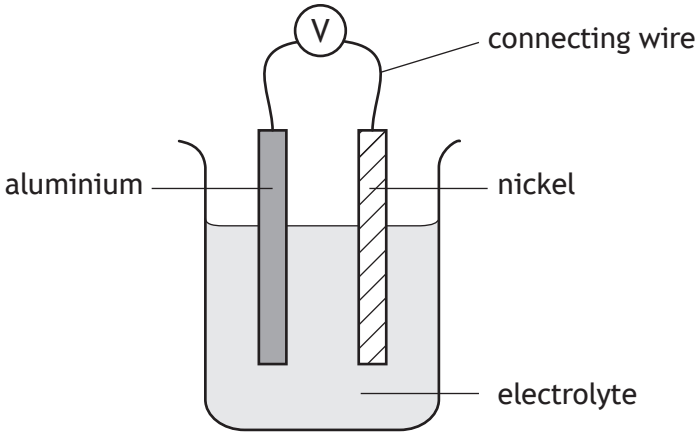
A Aluminium

B Calcium

C Copper

D Lead

18.



Which statement correctly describes the electron flow in the cell?

You may wish to use the data booklet to help you.

A Through the electrolyte from aluminium to nickel.

B Through the electrolyte from nickel to aluminium.

C Through the connecting wire from nickel to aluminium.

D Through the connecting wire from aluminium to nickel.

19. Which metal, when paired with magnesium in a cell, will produce the highest voltage?

You may wish to use the data booklet to help you.

A Iron

B Lead

C Tin

D Zinc

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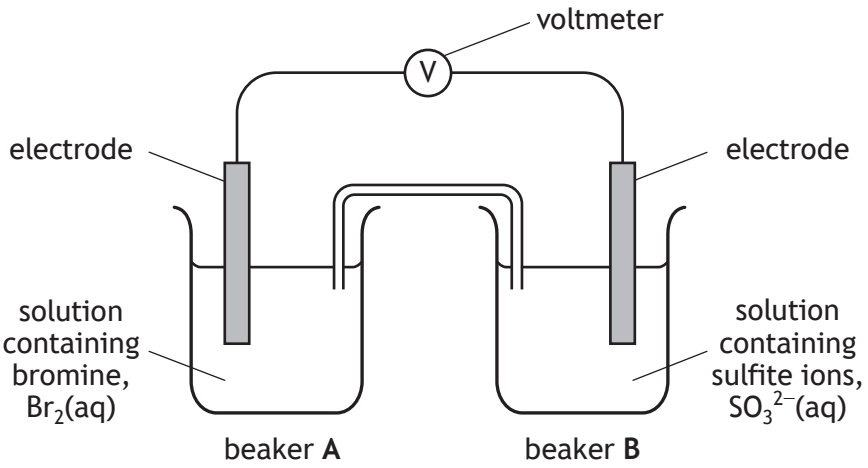
20.



The reactions occurring at each electrode are:

Beaker **A** $Br_2(\ell) + 2e^- \rightarrow 2Br^-(aq)$

Beaker **B** $SO_3^{2-}(aq) + H_2O(\ell) \rightarrow SO_4^{2-}(aq) + 2H^+(aq) + 2e^-$

Which of the following equations is the overall redox reaction in the cell?
You may wish to use the data booklet to help you.

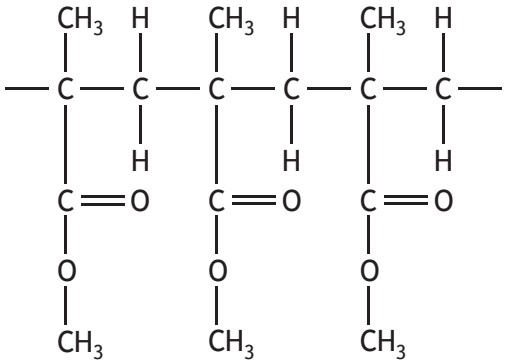
A $Br_2(\ell) + SO_3^{2-}(aq) + H_2O(\ell) + 2e^- \rightarrow 2Br^-(aq) + SO_4^{2-}(aq) + 2H^+(aq) + 2e^-$

B $2Br^-(aq) + SO_4^{2-}(aq) + 2H^+(aq) \rightarrow Br_2(\ell) + SO_3^{2-}(aq) + H_2O(\ell)$

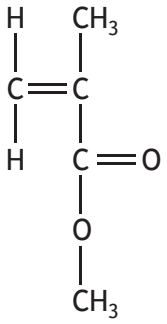
C $Br_2(\ell) + SO_3^{2-}(aq) + H_2O(\ell) \rightarrow 2Br^-(aq) + SO_4^{2-}(aq) + 2H^+(aq)$

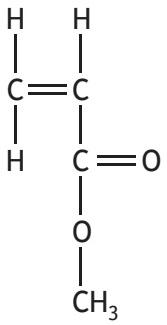
D $2Br^-(aq) + SO_4^{2-}(aq) \rightarrow Br_2(\ell) + SO_3^{2-}(aq)$

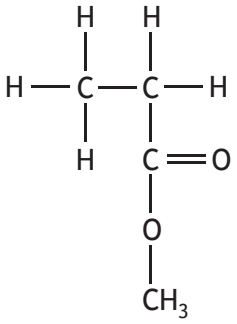
21. Polymethylmethacrylate is a polymer used in the manufacture of aircraft windows. A section of the polymer chain is drawn below.

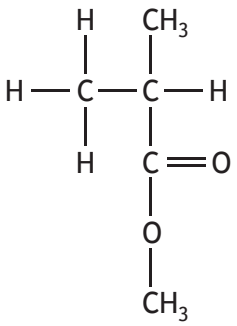


The monomer used to make this polymer is:

A 

B 

C 

D 

22. Which line in the table is correct for the Ostwald process?

	Product	Catalyst
A	HNO_3	iron
B	HNO_3	platinum
C	NH_3	iron
D	NH_3	platinum

23. Radon-222 is a radioisotope present in the Earth's atmosphere. Plants can absorb radon-222 through their roots.

Compared with radon-222 in the atmosphere, the half-life of the radon-222 in the plant cells will be:

A shorter

B longer

C the same

D dependent on the size of the plant.

24. A radioisotope is used to monitor blood flow around the body. In order to prevent damage to the body the radiation emitted must be able to escape through the skin.

Which line in the table describes the type of radiation emitted and half-life that would make a radioisotope suitable for this use?

	Type of radiation emitted	Half-life
A	alpha	long
B	beta	long
C	alpha	short
D	beta	short

25. A student measured 25 cm^3 of sodium hydroxide for a titration experiment using a 100 cm^3 measuring cylinder. Their teacher suggested that there was a more accurate piece of apparatus to measure this volume.

Which piece of apparatus should the student have used to more accurately measure out the 25 cm^3 volume of sodium hydroxide?

A 100 cm^3 beaker

B 25 cm^3 measuring cylinder

C 25 cm^3 pipette

D 100 cm^3 conical flask

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

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