National Qualifications 2026

X813/75/02

Chemistry
Section 1 — Questions

TUESDAY, 12 MAY

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.

You must leave your answer booklet on your desk; if you do not, you could lose all the marks for this paper.

Qualifications Scotland
Teisteanasan Alba

X8137502

SECTION 1 — 25 marks

Attempt ALL questions

1. Which of the following statements is **not** true when a catalyst is added to a chemical reaction?

   A The mass of product formed is the same.

   B The time taken for the reaction to finish increases.

   C The catalyst can be recovered unchanged.

   D The rate of reaction increases.

2. Which of the following compounds has molecules that have the same shape as those found in ammonia, NH_3?

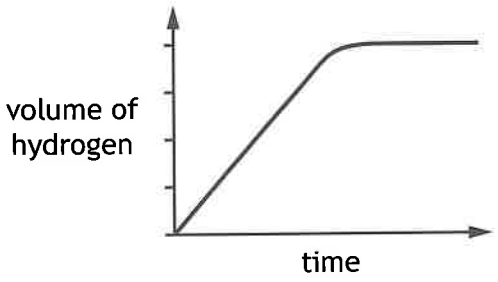
   A Sulfur dioxide

   B Carbon dioxide

   C Hydrogen fluoride

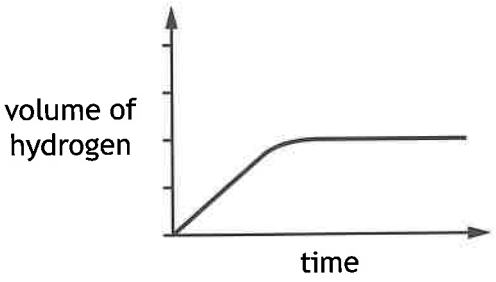
   D Phosphorus fluoride

3. A graph showing the volume of hydrogen gas produced over time when 2 g of zinc lumps is added to 100 cm^3 of 1 mol l^{-1} hydrochloric acid is shown.



Which of the following graphs would show the expected results if the experiment was repeated with 1 g of zinc powder and 100 cm^3 of 1 mol l^{-1} hydrochloric acid?

A



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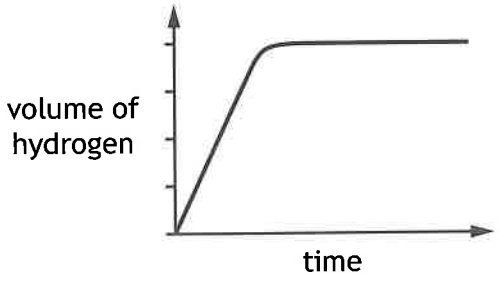

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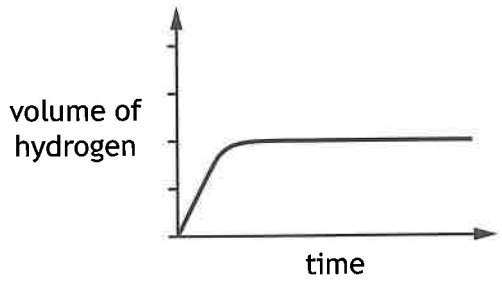

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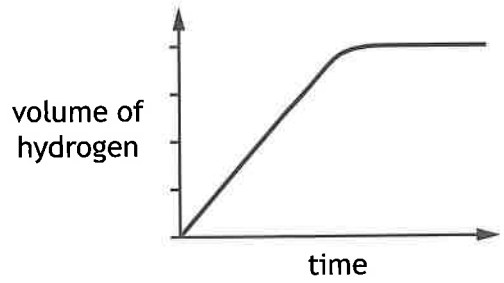


4. The greatest number of electrons is found in one mole of which of the following gases? You may wish to use the data booklet to help you.

A Neon
B Fluorine
C Oxygen
D Nitrogen

5. The table shows information about an ion.

Particle	Number
Electron	18
Neutron	19
Proton	20

The charge on the ion is

A 2+
B 2–
C 1+
D 1–

6. The difference in size between a sodium atom and a sodium ion is due to the

A mass number decreasing
B atomic number increasing
C charge of the nucleus increasing
D number of occupied energy levels decreasing.

7. Which line in the table shows the properties of a covalent network?

	Melting point (°C)	Boiling point (°C)	Conducts electricity	
			Solid	Liquid
A	1700	2230	no	no
B	686	1330	no	yes
C	181	1347	yes	yes
D	−95	69	no	no

8. An electrolyte can be made by dissolving potassium chloride in water.
Which line in the table correctly shows the solvent, solute and solution in this process?

	Solvent	Solute	Solution
A	water	electrolyte	potassium chloride
B	potassium chloride	water	electrolyte
C	electrolyte	potassium chloride	water
D	water	potassium chloride	electrolyte

9. Lithium aluminium hydride, $LiAlH_4$, has a gram formula mass of 38 g.
The percentage by mass of **metal** in lithium aluminium hydride is equal to

A $\frac{7}{38} \times 100$

B $\frac{27}{38} \times 100$

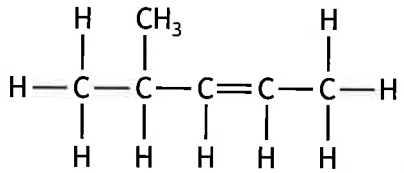
C $\frac{34}{38} \times 100$

D $\frac{4}{38} \times 100$

[Turn over

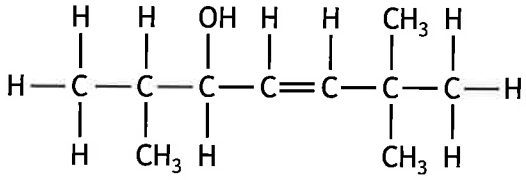
10. Which of the following oxides, when shaken with water, would give an acidic solution? You may wish to use the data booklet to help you.

A SO_2
B Na_2O
C SnO_2
D Ag_2O

11. 

The name of this compound is

A 2-methylpent-3-ene
B 4-methylpent-2-ene
C 2-methylpent-2-ene
D 4-methylpent-3-ene.

12. 

Which of the following is another way of representing this structure?

A $CH_3CH_2CH(OH)CHCHC(CH_3)_3$
B $CH_3CH(CH_3)CH(OH)CH_2CH_2C(CH_3)_3$
C $CH_3CH_2CH(OH)CH_2CH_2C(CH_3)_3$
D $CH_3CH(CH_3)CH(OH)CHCHC(CH_3)_3$

13. Which line in the table correctly describes the changes going from cyclopropane to cyclobutane?

	Formula mass	Strength of intermolecular forces
A	increases	decreases
B	increases	increases
C	decreases	increases
D	decreases	decreases

14. Which of the following is the structure of vinegar?

A CH_3COOH
B CH_3CH_2OH
C CH_3CH_2COOH
D $CH_3CH_2CH_2OH$

15. Metallic bonding is the electrostatic force of attraction between

A oppositely charged ions
B two nuclei and a shared pair of electrons
C positive ions and delocalised electrons
D negative ions and delocalised electrons.

16. Which of the following substances will react with an acid to produce a gas?

A Magnesium
B Magnesium oxide
C Magnesium hydroxide
D Magnesium chloride

[Turn over

17. Which of the following metals can be extracted from its ore by heating with carbon?

A Sodium
B Calcium
C Magnesium
D Iron

18. Which of the following metals would become liquid if placed in a beaker of boiling water? You may wish to use the data booklet to help you.

A Tin
B Indium
C Gallium
D Germanium

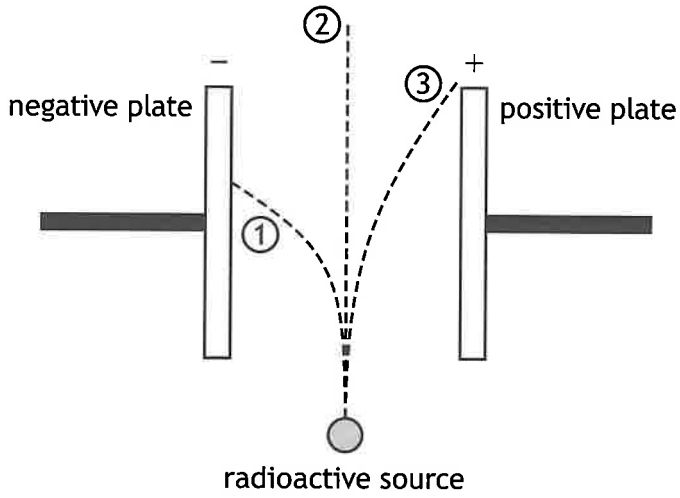
19. Which line in the table is correct for both the Haber and Ostwald processes?

	Haber process		Ostwald process	
	Catalyst	**Product**	**Catalyst**	**Product**
A	iron	ammonia	iron	nitric acid
B	iron	ammonia	platinum	nitric acid
C	platinum	nitric acid	platinum	ammonia
D	platinum	nitric acid	iron	ammonia

20. Which of the following is true for the elements nitrogen, phosphorus and potassium?
You may wish to use the data booklet to help you.

A They are all non-metals.
B They are all found in group 5 of the periodic table.
C They are all elements essential for healthy plant growth.
D They have symbols in the periodic table that are the first letter of their name.

21. The diagram shows the path of three different types of radiation as they pass through an electric field.

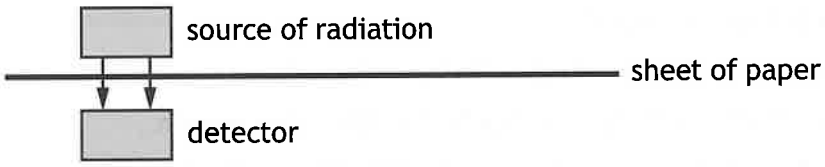


Which line in the table correctly identifies the types of radiation that follow paths ①, ② and ③?

	①	②	③
A	alpha	beta	gamma
B	alpha	gamma	beta
C	gamma	alpha	beta
D	beta	gamma	alpha

[Turn over

22. Paper factories can use radioactive sources to measure the thickness of the paper they produce. Radiation has to pass through the paper to a detector on the other side.



Which line in the table describes the most suitable radioactive source for this use?

	Radiation emitted	Half-life
A	alpha	long
B	beta	short
C	beta	long
D	alpha	short

23. What is the definition of half-life?

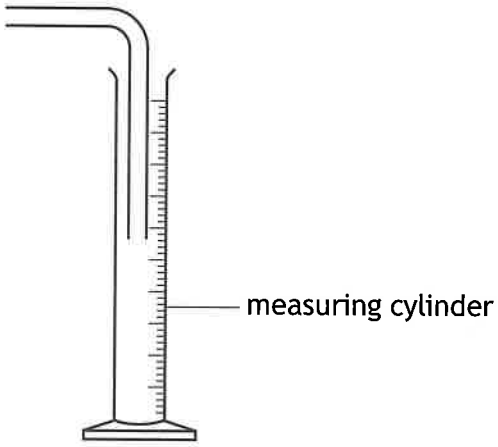
A Time taken for half of the nuclei of a particular isotope to decay.

B Half the time for the nucleus of a particular isotope to decay.

C Time taken for half the mass of a particular isotope to decay.

D Half the time for the mass of a particular isotope to decay.

24.



Which line in the table shows a gas that could be collected and measured using the apparatus shown?

Gas	Colour	Density
A	brown	more dense than air
B	colourless	more dense than air
C	colourless	less dense than air
D	brown	less dense than air

[Turn over

25. Transition metals can form large ions known as complexes.

The name used for the metal in the complex changes depending on the overall charge of the complex.

The table shows how the names change for the metals copper and iron in complexes with overall positive or negative charges.

Metal in the complex	Name used if the overall charge of the complex is positive	Name used if the overall charge of the complex is negative
Copper	copper	cuprate
Iron	iron	ferrate

The formula for complexes **X** and **Y** are given.

$[CuCl_4]^{2-}$	$[FeCl_2]^{+}$
Complex **X**	Complex **Y**

Which line in the table shows the correct names used for the metal part in complexes **X** and **Y**?

	Complex X	Complex Y
A	copper	iron
B	cuprate	ferrate
C	copper	ferrate
D	cuprate	iron

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