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**CHEMISTRY**

**5070/12**

Paper 1 Multiple Choice

**October/November 2019**

**1 hour**

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

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**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.

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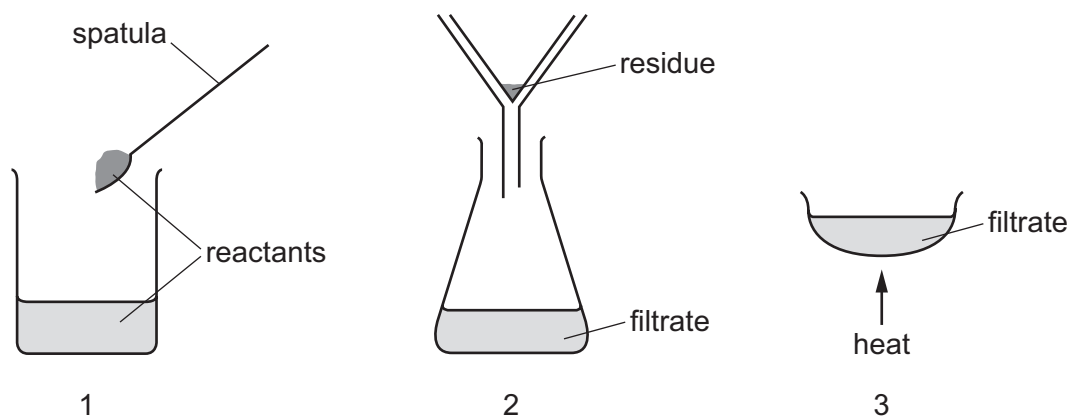
This document consists of **15** printed pages and **1** blank page.



- 1 The concentration of aqueous sodium carbonate can be found by reaction with hydrochloric acid of known concentration. The indicator methyl orange is used.

Which items of equipment are needed?

- A burette, measuring cylinder, gas syringe  
 B burette, measuring cylinder, thermometer  
 C burette, pipette, conical flask  
 D burette, pipette, stopwatch
- 2 The diagrams show three stages, 1, 2 and 3, used in the preparation of a salt.



Which row correctly shows the solubilities both of the reactants and of the salt formed in this preparation?

	solubility of reactants	solubility of salt formed
<b>A</b>	both soluble	insoluble
<b>B</b>	both soluble	soluble
<b>C</b>	one soluble, one insoluble	insoluble
<b>D</b>	one soluble, one insoluble	soluble

- 3 The nucleon number of an atom is typically greater than its proton number. The difference between these two numbers indicates the number of .....1..... in the atom.

Atoms that have different nucleon numbers but the same proton number are called .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	electrons	isomers
<b>B</b>	electrons	isotopes
<b>C</b>	neutrons	isomers
<b>D</b>	neutrons	isotopes

- 4 Which three elements exist as diatomic molecules at room temperature?

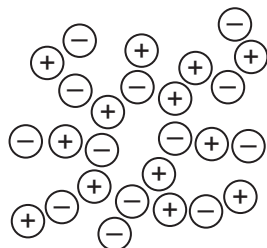
- A** hydrogen, oxygen, helium
- B** nitrogen, chlorine, neon
- C** nitrogen, oxygen, fluorine
- D** oxygen, chlorine, helium

- 5 Which is a pure compound?

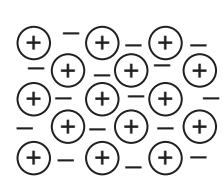
- A** dry air
- B** ethanol
- C** steel
- D** petrol (gasoline)

6 Which diagram best represents the structure of a solid metal?

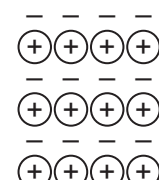
**A**



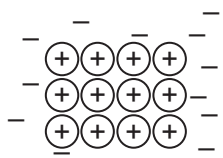
**B**



**C**

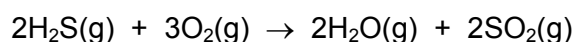


**D**



key  
 ⊖ a negative ion  
 ⊕ a positive ion  
 - an electron

7 Hydrogen sulfide burns in an excess of oxygen according to the equation shown.



48 dm<sup>3</sup> of hydrogen sulfide is burned.

Which volume of sulfur dioxide will be formed at room temperature and pressure?

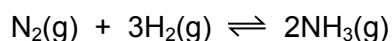
[All volumes are measured at the same temperature and pressure.]

- A** 24 dm<sup>3</sup>      **B** 36 dm<sup>3</sup>      **C** 48 dm<sup>3</sup>      **D** 96 dm<sup>3</sup>

8 Which statement about electrical conductivity is correct?

- A** Covalent compounds, such as glucose, conduct when molten or dissolved in water.  
**B** Dilute acids, such as sulfuric acid, conduct because all the ions are free to move.  
**C** Ionic compounds, such as sodium chloride, conduct due to movement of electrons.  
**D** Metals, such as copper, conduct due to movement of positive ions.

9 Ammonia is manufactured from nitrogen and hydrogen by the Haber process.



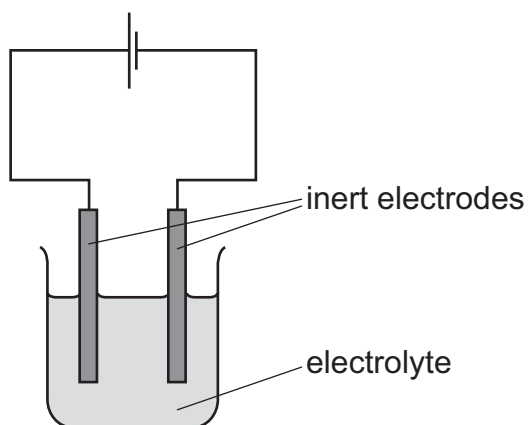
What is the percentage yield when 60 kg of ammonia is produced from 60 kg of hydrogen?

- A** 5.9%      **B** 17.6%      **C** 35.3%      **D** 50.0%

10 What is the ratio of the number of molecules in 71 g of gaseous chlorine to the number of molecules in 2 g of gaseous hydrogen?

- A 1:1                      B 1:2                      C 2:1                      D 71:2

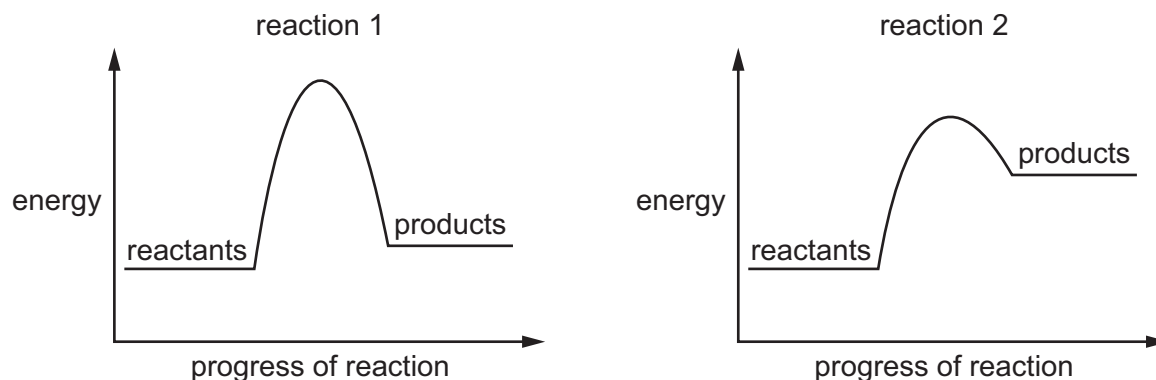
11 The diagram shows the apparatus for an electrolysis experiment.



Using the apparatus shown, which electrolyte would give colourless gases at both electrodes?

- A aqueous copper(II) sulfate  
B concentrated aqueous sodium chloride  
C dilute sulfuric acid  
D molten lead bromide
- 12 Which metal is most likely to be extracted from its molten chloride by the use of electrolysis?
- A calcium  
B copper  
C iron  
D silver

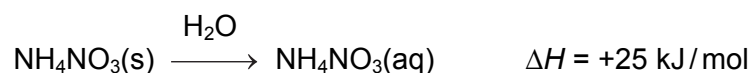
13 Two energy profile diagrams are shown. The scale on the y-axis is the same for both diagrams.



Which statement is correct?

- A Both reactions are exothermic.
- B Only one reaction is endothermic.
- C The activation energy of reaction 1 is smaller than the activation energy of reaction 2.
- D The enthalpy change of reaction 2 is larger than the enthalpy change of reaction 1.

14 Ammonium nitrate dissolves in water.



Which statements are correct?

- 1 The reaction is endothermic.
- 2 The water gets colder during the reaction.
- 3 Heat energy is absorbed by the ammonium nitrate from the water.

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

15 Which statement about photosynthesis is correct?

- A Chlorophyll is a reactant.
- B Oxygen is a product.
- C Sunlight is a reactant.
- D Water is a product.

16 In which reaction is the underlined substance reduced?

- A C(s) + CO<sub>2</sub>(g) → 2CO(g)  
B Cl<sub>2</sub>(g) + 2I<sup>-</sup>(aq) → I<sub>2</sub>(aq) + 2Cl<sup>-</sup>(aq)  
C Mg(s) + CuO(s) → MgO(s) + Cu(s)  
D Zn(s) + 2H<sup>+</sup>(aq) → Zn<sup>2+</sup>(aq) + H<sub>2</sub>(g)

17 Catalysts alter the rate of chemical reactions.

Which statements correctly describe the effect of adding a catalyst to a reaction?

- 1 All reactant particles have more energy and move faster.
- 2 The activation energy is lowered.
- 3 More reactant particles collide with enough energy to react.

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

18 Solution T has the following properties.

- 1 It reacts with magnesium forming a gas.
- 2 It reacts with calcium carbonate forming a gas.

Which statement about solution T is correct?

- A It contains more OH<sup>-</sup> ions than H<sup>+</sup> ions.  
B It has pH 9.  
C Its reaction with calcium carbonate produces hydrogen.  
D It reacts with aqueous ammonia.

19 Which substance is soluble in water?

- A copper(II) carbonate  
B copper(II) oxide  
C copper(II) hydroxide  
D copper(II) nitrate

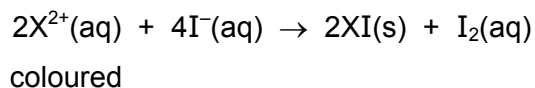
20 Which statement about ammonia is correct?

- A It is a colourless, odourless gas.  
B It is a gas that turns damp blue litmus paper red.  
C It is formed when potassium nitrate is heated with aqueous sodium hydroxide and aluminium.  
D It is manufactured using vanadium(V) oxide as a catalyst.





24 The ions of metal X react with aqueous potassium iodide.



From this information, it can be deduced that X is most likely a .....1..... metal and the  $X^{2+}(aq)$  ions are .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	Group II	oxidised
<b>B</b>	Group II	reduced
<b>C</b>	transition	oxidised
<b>D</b>	transition	reduced

25 Which substance is a metal?

	melting point	conducts electricity when solid	conducts electricity when molten
<b>A</b>	high	x	✓
<b>B</b>	high	x	x
<b>C</b>	high	✓	✓
<b>D</b>	low	x	x

26 Which metal can be obtained from its oxide by using either carbon or hydrogen?

- A** Cu                      **B** Fe                      **C** Mg                      **D** Zn

27 Metal carbonates decompose when heated.

Which carbonate is most stable to heat?

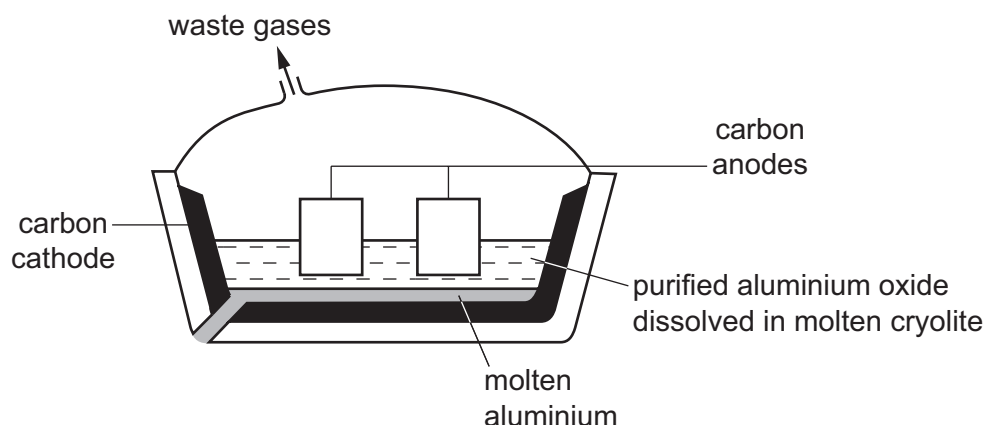
- A** calcium carbonate  
**B** copper(II) carbonate  
**C** lead(II) carbonate  
**D** zinc carbonate

28 Iron is extracted from its ore in a blast furnace. Coke and limestone are also added to the blast furnace.

What is the purpose of the limestone?

- A to decompose to release oxygen to burn the coke
- B to decompose to release oxygen to oxidise the iron
- C to decompose to neutralise the acidic impurities
- D to react with coke to heat the blast furnace

29 Aluminium is extracted from aluminium oxide by electrolysis.



Which statement about this electrolysis is correct?

- A Aluminium ions gain electrons to form aluminium.
- B Cryolite increases the melting point of the electrolyte.
- C Cryolite reacts with impurities to form slag.
- D The carbon cathode has to be replaced regularly as it reacts with oxygen.

30 Steel is produced by blowing oxygen into impure molten iron.

A student suggests two reasons why this process is carried out.

- 1 The oxygen removes some of the carbon from the impure iron.
- 2 The oxygen oxidises iron(II) ions to iron(III) ions.

Which reasons are correct?

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

31 Z is a pollutant gas that is formed in internal combustion engines.

An aqueous solution of Z is acidic.

Z is removed from the exhaust gases in a catalytic converter by reduction.

What is Z?

- A** CO                      **B** N<sub>2</sub>                      **C** H<sub>2</sub>O                      **D** NO<sub>2</sub>

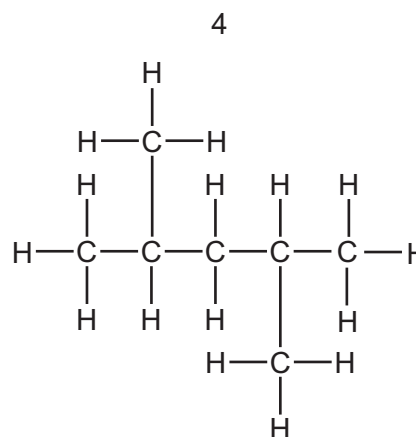
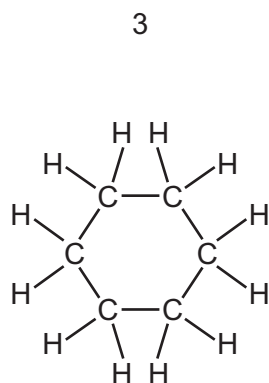
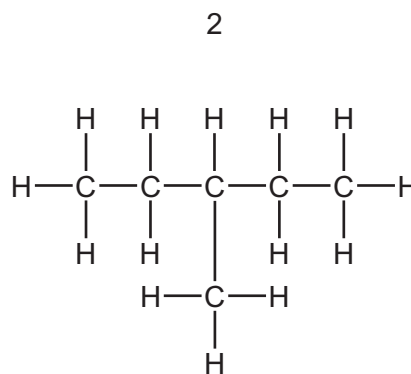
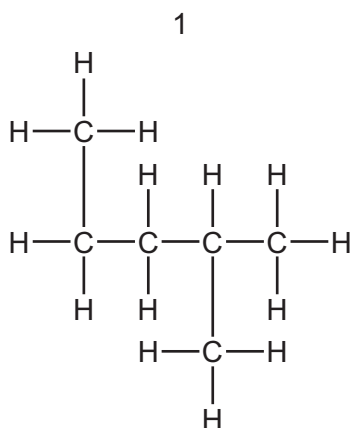
32 A student investigates the properties of a colourless organic liquid.

Which observation shows that the liquid is unsaturated?

- A** It decolourises aqueous bromine.  
**B** It has a sweet smell.  
**C** It is a good solvent for organic compounds.  
**D** It produces carbon dioxide when burned.

33 Alkanes are saturated compounds containing carbon and hydrogen only.

Structures 1, 2, 3 and 4 are saturated hydrocarbons.



Which pair of structures are isomers?

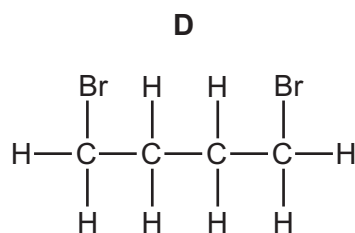
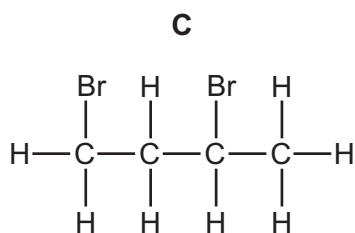
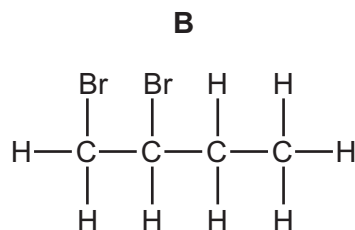
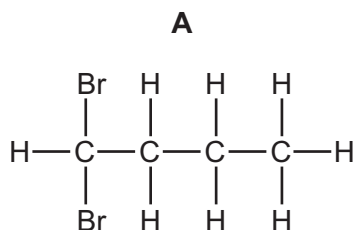
**A** 1 and 2

**B** 1 and 4

**C** 2 and 3

**D** 2 and 4

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



35 Which statement about propene is correct?

- A** It can be formed by cracking butane.
- B** It has the formula  $\text{C}_3\text{H}_8$ .
- C** It is a saturated hydrocarbon.
- D** It reacts with hydrogen to form ethane.

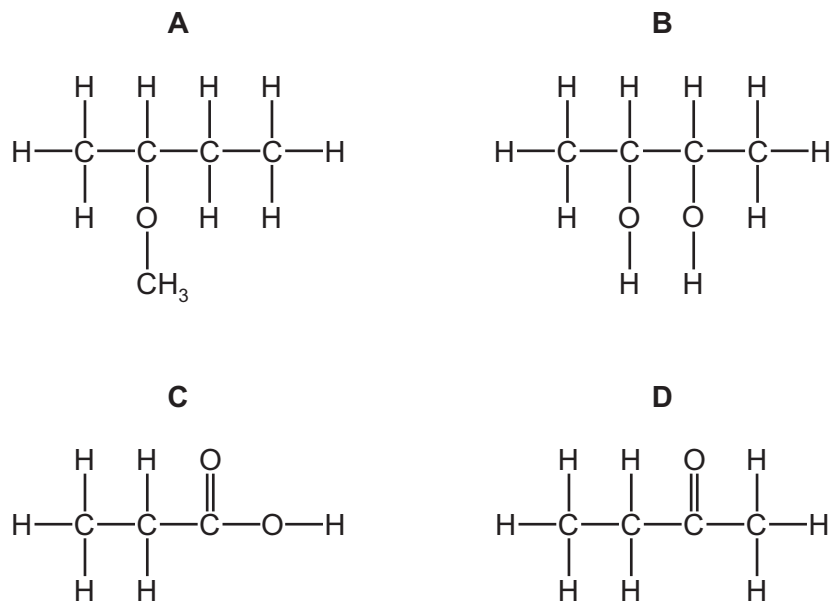
36 Which term describes the structure of *Terylene*?

- A** polyalkene
- B** polyamide
- C** polyester
- D** protein

37 Which process is involved in the formation of ethanol from ethene?

- A** addition
- B** combustion
- C** polymerisation
- D** substitution

38 Which compound is an alcohol?



39 Which two compounds react together to form  $\text{CH}_3\text{CH}_2\text{COOCH}_3$ ?

- A ethanoic acid and ethanol
- B methanoic acid and ethanol
- C methanoic acid and propanol
- D propanoic acid and methanol

40 Which compound might be suitable to flavour a soft drink?

- A  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$
- B  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- C  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
- D  $\text{CH}_3\text{CHCHCH}_2\text{CH}_3$

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