

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level



Chemistry

5070/1

Paper 1 Multiple Choice

2020

Additional Materials:

- Electronic calculator (non programmable)
- Multiple Choice Answer Sheet
- Soft clean eraser
- Soft pencil (HB is recommended)

Time: 1 hour

Marks: 40

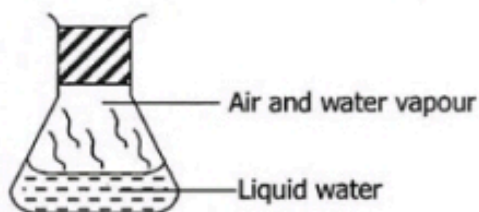
Instructions to Candidates

1. Ensure that the **school/centre name, subject paper, subject code, paper number, centre code, your examination number** and the **year** are correctly printed and shaded on the Answer Sheet. Do not change the already printed information.
2. There are **forty** questions in this paper. Answer all questions.
3. 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 provided.
4. **Read very carefully the instructions on the Answer Sheet.**

Information for Candidates

1. Each correct answer will score one mark.
2. Any rough working should be done in this question paper.
3. The **Periodic Table** is printed on page 15.
4. **Cell phones are not allowed in the examination room.**

- 1 Some cold water was poured into a conical flask and a rubber stopper inserted. The diagram shows the flask after a few minutes.

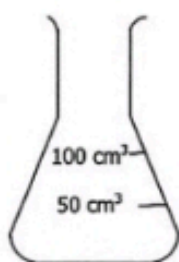


What is occurring in the flask?

- A Boiling and condensation
B Condensation and evaporation
C Evaporation and freezing
D Freezing and melting
- 2 Why does helium gas, He, diffuse faster than hydrogen chloride gas, HCl?

Helium ...

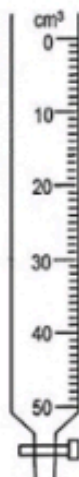
- A atoms have a lower mass.
B does not form molecules.
C is a noble gas.
D is less dense than air.
- 3 Which of the following pieces of apparatus is **most** suitable for accurately measuring out 23.0 cm³ of water?



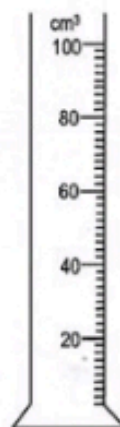
A



B

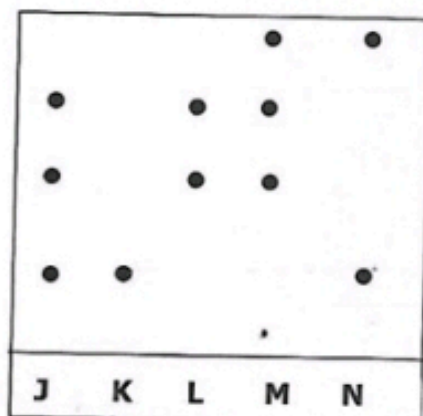


C



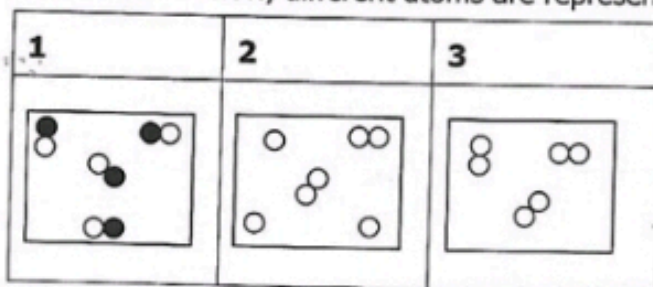
D

- 4 **J, K, L, M** and **N** are five food colourings. The dyes in these food colourings are separated by chromatography. This chromatogram shows the results.



The food colouring **J** could be a mixture of ...

- A **K** and **L**.
 B **K** and **M**.
 C **K** and **N**.
 D **L** and **N**.
- 5 In the boxes below, different atoms are represented by ● and ○.



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Which boxes contain pure substances?

- A 1 and 2
 B 1 and 3
 C 2 and 3
 D 1, 2 and 3
- 6 Element **X** has an electronic structure 2,8,8,1.
 Element **Y** has an electronic structure 2,8,6.
 What is formed when **X** and **Y** react?

	Type of compound	Formula
A	Covalent compound	X ₂ Y
B	Covalent compound	XY ₂
C	Ionic compound	XY ₂
D	Ionic compound	X ₂ Y

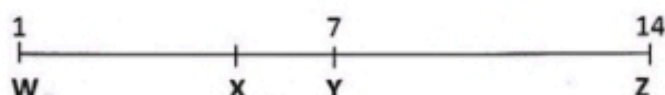
- 7 An element **T** forms an oxide with the formula **TO**.

What is the formula of its phosphate?

- A **TPO₄**
- B **T₂(PO₄)₃**
- C **T₃(PO₄)₂**
- D **T₃PO₄**

- 8 The pH of four different solutions **W**, **X**, **Y** and **Z** are shown on the pH scale below.

All the solutions have the same concentrations.



What could the solutions be?

	Ethanoic acid	Hydrochloric acid	Potassium hydroxide	Sodium chloride
A	W	X	Y	Z
B	W	X	Z	Y
C	X	Z	W	Y
D	X	W	Z	Y

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- 9 Which pair of substances produces a precipitate when their aqueous solutions are mixed?

- A Ammonium nitrate and silver sulphate
- B Ammonium sulphate and barium chloride
- C Potassium chloride and barium nitrate
- D Potassium nitrate and barium chloride

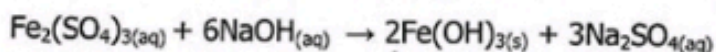
- 10 Which representation of dilute nitric acid is correct?

- A $\text{H}^{2+} + \text{NO}_3^-$
- B $\text{H}^+ + \text{NO}_3^{2-}$
- C $\text{H}^+ + \text{NO}_3^-$
- D $\text{H}_2^+ + \text{NO}_3^{2-}$

- 11 Aqueous sodium hydroxide reacts with a metal ion producing a coloured precipitate. This precipitate changes colour on standing. What is the ion present?

- A Al^{3+}
- B Cu^{2+}
- C Fe^{2+}
- D Zn^{2+}

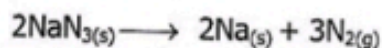
- 12** A solution containing one mole of sodium hydroxide is added to a solution containing one mole of iron (III) sulphate.
The equation for this reaction is shown below.



What is the number of moles of iron (III) hydroxide precipitate formed?

- A** $\frac{1}{3}$
B $\frac{1}{2}$
C $\frac{2}{3}$
D 1
- 13** What is the concentration in (g/dm^3) of hydrogen ions in $0.05\text{mol}/\text{dm}^3$ sulphuric acid?
- A** $0.025\text{g}/\text{dm}^3$
B $0.05\text{g}/\text{dm}^3$
C $0.10\text{g}/\text{dm}^3$
D $2.0\text{g}/\text{dm}^3$

- 14** Most modern cars are fitted with airbags. These airbags work by decomposing sodium azide to liberate nitrogen gas, which inflates the bag as shown by the equation below.



A typical driver's airbag contains 50g of sodium azide.

Calculate the volume of nitrogen gas that this amount will produce at room temperature and pressure.

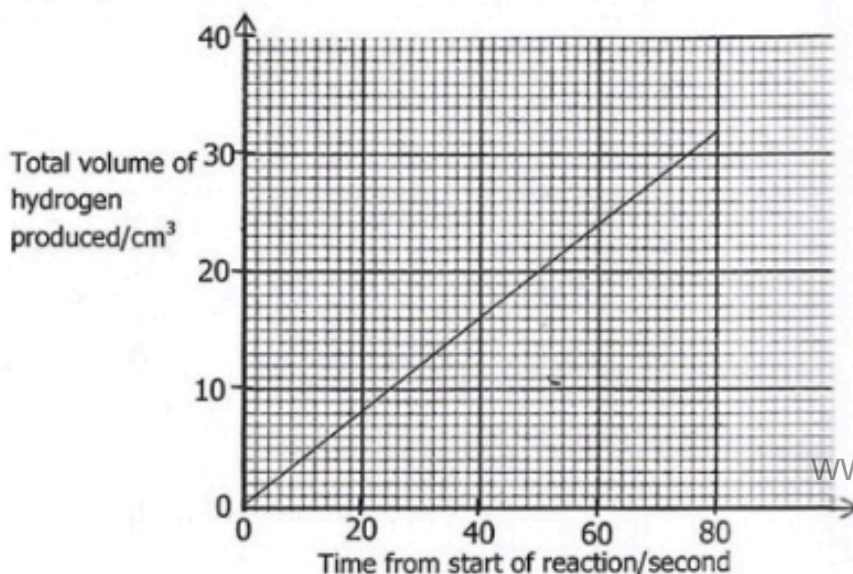
- A** 9.2 dm^3
B 13.9 dm^3
C 27.7 dm^3
D 72.0 dm^3
- 15** A 0.20g sample of a monobasic acid requires 8.0cm^3 of $0.40\text{mol}/\text{dm}^3$ sodium hydroxide for complete reaction.
What is the relative molecular mass of the acid?
- A** 62.5
B 250
C 625
D 640

- 16** When 20cm^3 of a gaseous alkene burns in an excess of oxygen, 60cm^3 of carbon dioxide are formed. Both volumes are measured at r.t.p.

What is the formula of the alkene?

- A** C_3H_6
- B** C_3H_8
- C** C_6H_{14}
- D** C_6H_{12}

- 17** Dilute hydrochloric acid was reacted with magnesium ribbon and the volume of hydrogen gas evolved was measured for the first 80 seconds.



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What was the rate of production of hydrogen?

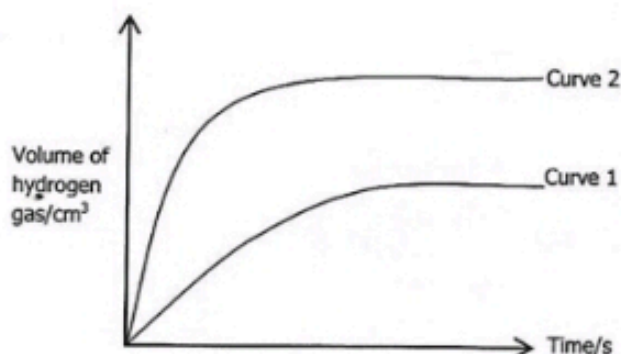
- A** $0.4\text{cm}^3/\text{s}$
 - B** $2.5\text{cm}^3/\text{s}$
 - C** $4.0\text{cm}^3/\text{s}$
 - D** $25\text{cm}^3/\text{s}$
- 18** Sulphur trioxide is prepared from a reaction between sulphur dioxide and oxygen in the contact process.



Which change would increase the yield of sulphur trioxide?

- A** Removal of sulphur dioxide
- B** A decrease in pressure
- C** A decrease in temperature
- D** An increase in pressure

- 19 The diagram below shows rate curves for a chemical reaction between zinc metal and excess dilute acid. Curve 1 was produced by reacting 20g of zinc granules with the dilute acid.

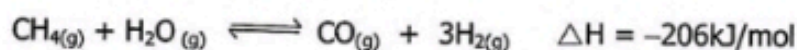


Which alteration to the conditions will produce curve 2?

- A 20g of powdered zinc and warm acid.
 - B Less zinc powder and more dilute acid.
 - C More zinc granules and warm acid.
 - D More concentrated acid and 20g of zinc granules.
- 20 A gas **X** has the following characteristics and uses:
- 1 Changes a damp blue litmus paper to red and then bleaches it.
 - 2 Used to kill bacteria.
 - 3 Is a green-yellow gas.

What is the gas **X**?

- A Ammonia
 - B Carbon monoxide
 - C Chlorine
 - D Methane
- 21 The formation of carbon monoxide and hydrogen from methane and steam at 750°C, is represented by the equation below.



Which mass of methane will react to produce 556kJ of heat?

- A 19.85g
- B 30.88g
- C 34.75g
- D 43.18g

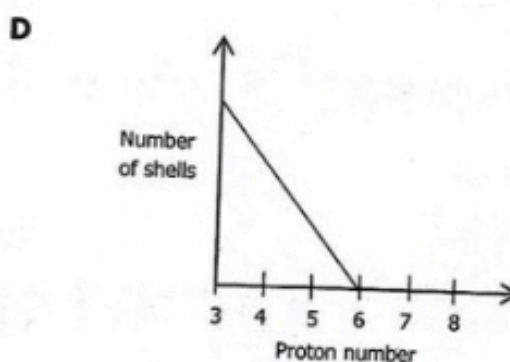
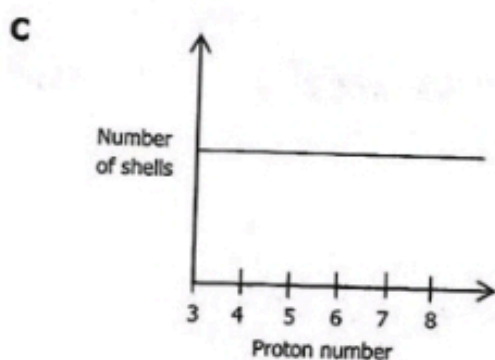
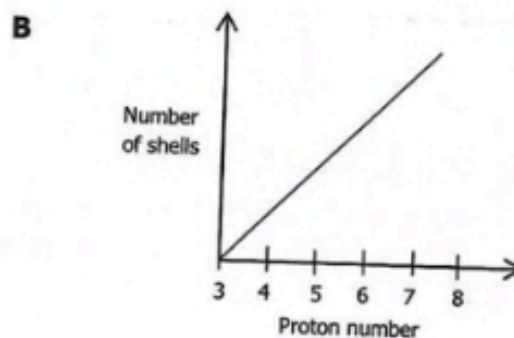
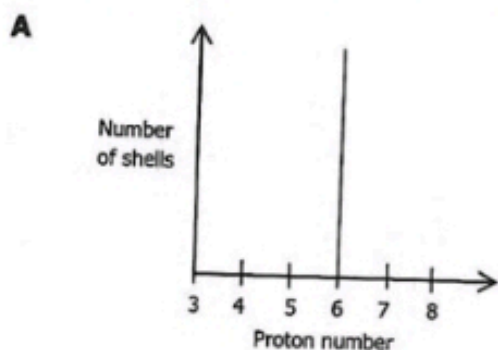
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- ch

- 24 Which graph below shows how the number of shells in one period relates to the number of protons of elements in that period?

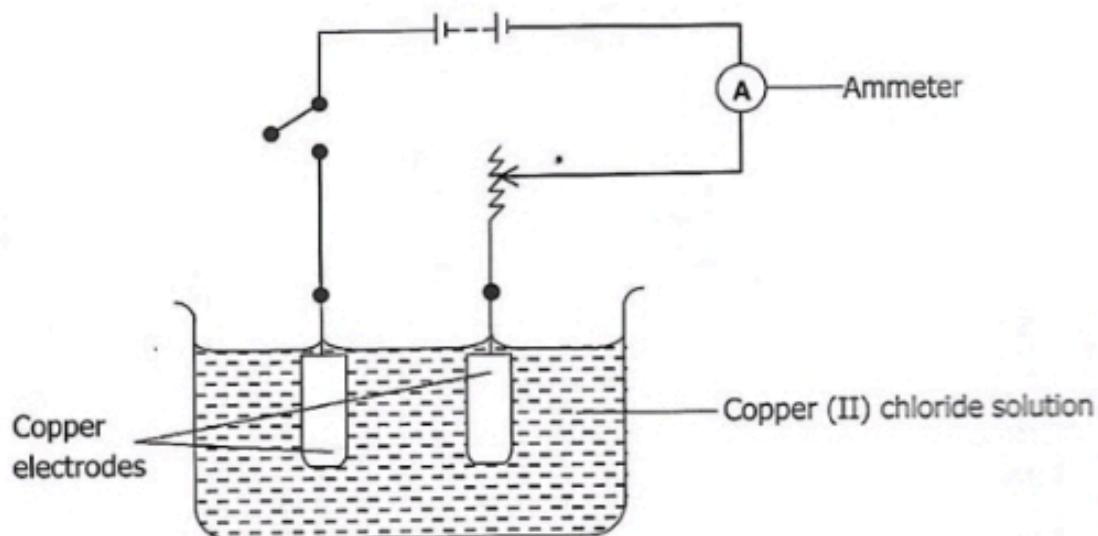


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- 25 Which of the following reactions is **not** possible?

- A** $2\text{NaBr} + \text{F}_2 \rightarrow 2\text{NaF} + \text{Br}_2$
B $2\text{KCl} + \text{I}_2 \rightarrow 2\text{KI} + \text{Cl}_2$
C $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$
D $2\text{NaI} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{I}_2$

- 26 An experiment is carried out to measure the quantity of electricity required to deposit one mole of atoms of copper by electrolysis of an aqueous solution of copper (II) chloride using copper electrodes.



Which of the following pieces of apparatus, in addition to those shown in the diagram, is needed to perform the experiment?

- A Bulb
 - B Bunsen burner
 - C Stop watch
 - D Voltmeter
- 27 The number of moles of electrons (Faradays) needed to deposit 26g of chromium from a solution containing chromium ions (Cr^{3+}) is ...
- A 2.0F.
 - B 1.5F.
 - C 1.0F.
 - D 0.5F.
- 28 During the electrolysis of an aqueous solution of a cerium salt, 70g of cerium is deposited at the cathode by 2 moles of electrons.

The formula of the cerium ion will be ...

- A Ce^{2-} .
- B Ce^{2+} .
- C Ce^{4-} .
- D Ce^{4+} .

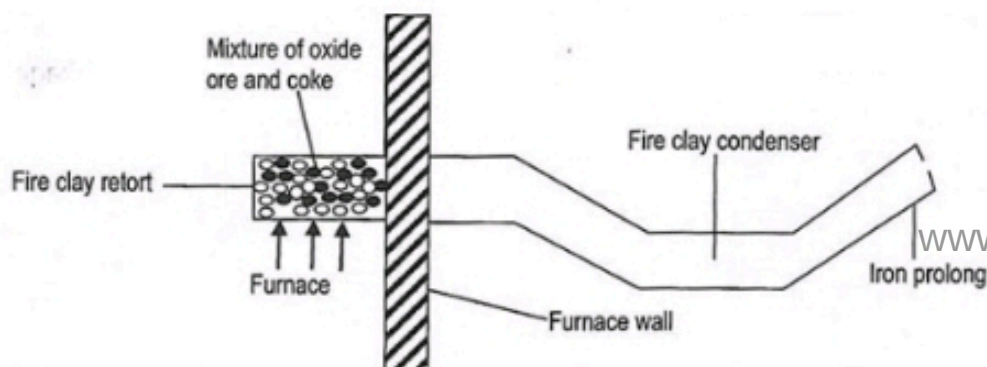
29 Which element is liberated at the cathode by the electrolysis of an aqueous solution containing its ions?

- A Bromine
- B Chlorine
- C Hydrogen
- D Oxygen

30 A powdered mixture of metals contains magnesium, iron, lead and silver. Excess hydrochloric acid is added until no more mixture dissolves. What is the undissolved residue?

- A Iron
- B Lead
- C Magnesium
- D Silver

31 The diagram below shows the extraction of a metal.



Which of the following gives the ore, metal and use for the metal extracted?

	Ore	Metal	Use
A	Bauxite	Aluminium	Overhead electricity cable
B	Calamine	Zinc	Galvanising
C	Magnetite	Iron	Bodies of machinery
D	Malachite	Copper	Ornamental work

32 The first stage in the extraction of copper from chalcopyrites, CuFeS_2 , is represented by the equation, $4\text{CuFeS}_2 + 8\text{O}_2 \rightarrow 2\text{Cu}_2\text{S} + 4\text{FeO} + 6\text{SO}_2$.

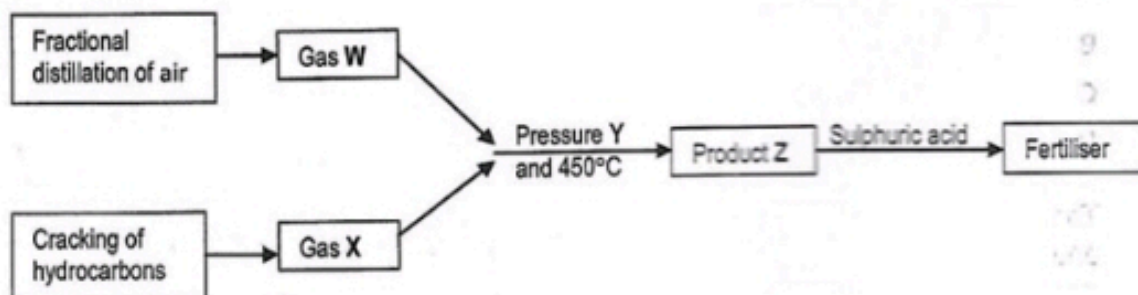
Which substance is added to the furnace to remove iron (II) oxide impurity from the copper (I) sulphide?

- A Zinc oxide (ZnO)
- B Silicon (IV) oxide (SiO_2)
- C Magnesium oxide, (MgO)
- D Calcium carbonate, (CaCO_3)

33 Which gas is present in the exhaust fumes of a car engine in a much greater amount than any other gas?

- A Carbon dioxide
- B Carbon monoxide
- C Nitrogen
- D Water vapour

34 The diagram shows a flow chart for the manufacture of a fertiliser.



In the flow chart, what do the letters **W**, **X**, **Y** and **Z** represent?

	W	X	Y	Z
A	N ₂	H ₂	high	NH ₃ /
B	H ₂	N ₂	high	NH ₃
C	O ₂	SO ₂	high	SO ₃
D	O ₂	SO ₂	low	SO ₃

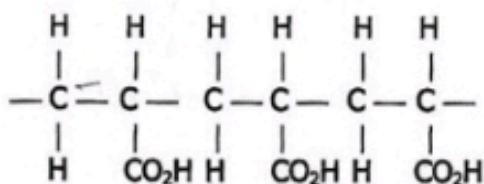
35 Which catalyst is used in the manufacture of nitric acid in the Ostward process?

- A Iron
- B Nickel
- C Platinum-Rhodium
- D Vanadium (V) oxide

36 The table below shows fractions and their uses. For which fraction is the use **not** correct?

	Name of fraction	Use
A	Naphtha fraction	Making chemicals
B	Kerosene	Fuel for cars
C	Diesel	Fuel for trains
D	Bitumen	Tarring roads

- 37 The absorbent material in babies' disposable nappies is made from the polymer whose structure is shown below.



From which of the monomers below could this polymer be obtained?

- A $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$
 B $\text{HOCH}_2\text{CH}_2\text{CO}_2\text{H}$
 C $\text{HO}_2\text{CCH}=\text{CHCO}_2\text{H}$
 D $\text{H}_2\text{C}=\text{CHCO}_2\text{H}$
- 38 The table below shows the displayed formulae of six organic compounds **P**, **Q**, **R**, **S**, **T** and **U**.

P $ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array} $	Q $ \begin{array}{cc} \text{H} & \text{H} \\ & \\ \text{H}-\text{C} & -\text{C}-\text{H} \\ & \\ \text{H} & \text{H} \end{array} $	R $ \begin{array}{cc} \text{H} & \text{H} \\ & \diagdown \quad \diagup \\ & \text{C}=\text{C} \\ & \diagup \quad \diagdown \\ \text{H} & \text{H} \end{array} $
S $ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & & \text{H} & \text{H} \\ & & & \\ & \text{H}-\text{C}-\text{H} & & \\ & & & \\ & \text{H} & & \end{array} $	T $ \begin{array}{cc} \text{H} & \text{H} \\ & \\ \text{H}-\text{C} & -\text{C}-\text{H} \\ & \\ \text{Br} & \text{Br} \end{array} $	U $ \begin{array}{cc} & \text{H} \\ & \\ \text{H} & \diagdown \quad \diagup \text{C}-\text{H} \\ & \diagup \quad \diagdown \\ & \text{C}=\text{C} \quad \\ & \diagdown \quad \diagup \\ \text{H} & \text{H} \end{array} $

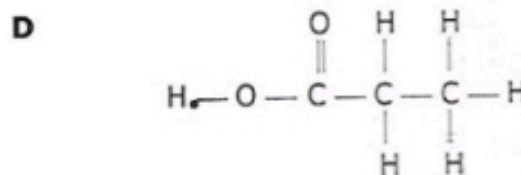
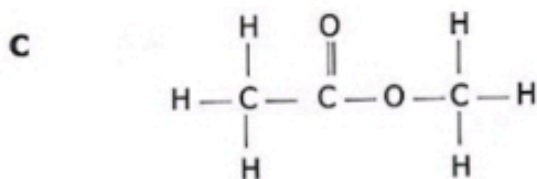
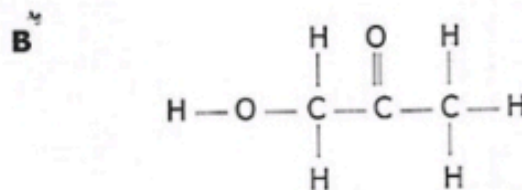
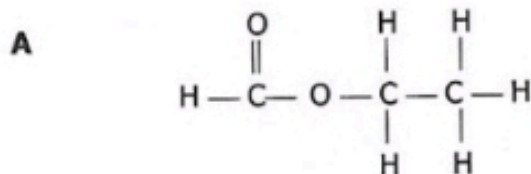
Which of these conversions is an example of an addition reaction?

Compound ...

- A **R** → **U**.
 B **Q** → **T**.
 C **P** → **Q**.
 D **R** → **Q**.

- 39 An organic compound **P**, has a molecular formula $C_3H_6O_2$ and turns damp, blue litmus paper red.

What is the structure of **P**?



- 40 Which type of reaction occurs between propene and hydrogen?

- A** Addition
- B** Dehydration
- C** Displacement
- D** Substitution

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[illegible]

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

$N_A = 6.0 \times 10^{23}/\text{mol}; T_F = 96500\text{C}.$

Chemistry/5070/9/2020