

CHEMISTRY FORM FOUR

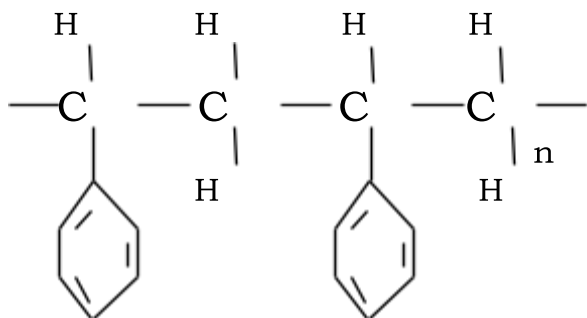
MARKING SCHEME:

1. (a) Distinguish between a strong and a weak acid. Give example to each. (2mks)

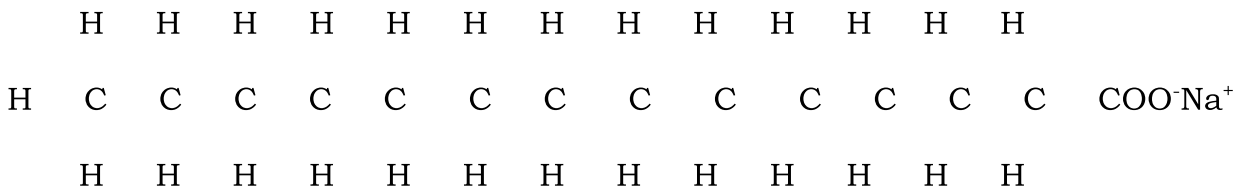
Strong acid is an acid that dissociates completely in aqueous solution e.g Hydrochloric acid, sulphuric acid.

Weak acid is an acid that dissociates partially in aqueous solution e.g Methanoic acid, Ethanoic acid.

- (b) The formula given below represents a portion of a polymer. Give ;



- i) The name of the polymer. (1mk)
Polyphenylethene or polystyrene.
- ii) Two disadvantages of continued use of this polymer. (2mks)
- **Are non-biodegradable hence pollute environment.**
- **Polythene gives off hydrogen cyanide and carbon IV oxide which is poisonous.**
2. (a) The structure of a detergent is.



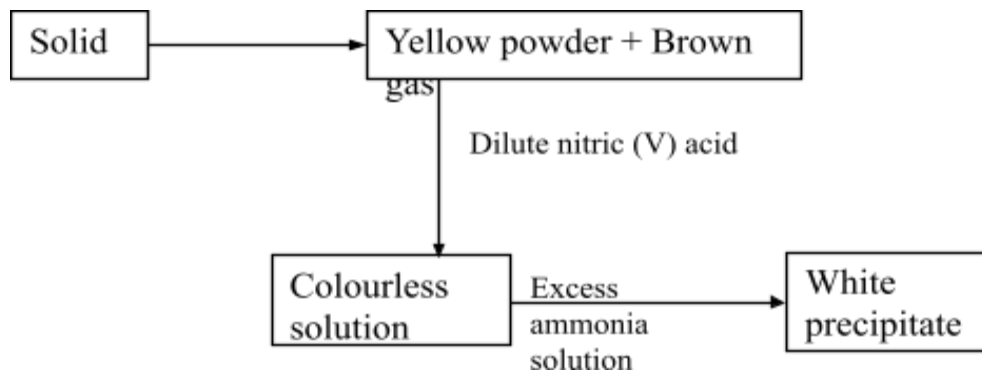
- i) Write the molecular formula of the detergent. (1mk)
 $\text{C}_{13}\text{H}_{27}\text{COO}^-\text{Na}^+$
- ii) What type of detergent is represented by the formula? (1mk)
Soapy detergent.

- iii) When this type of detergent is used to wash linen in hard water, spots (marks) are left on the linen. Write the formula of the substance responsible for the spot. (1mk)
 $(C_{13}H_{27}COO)_2Ca^{2+}$

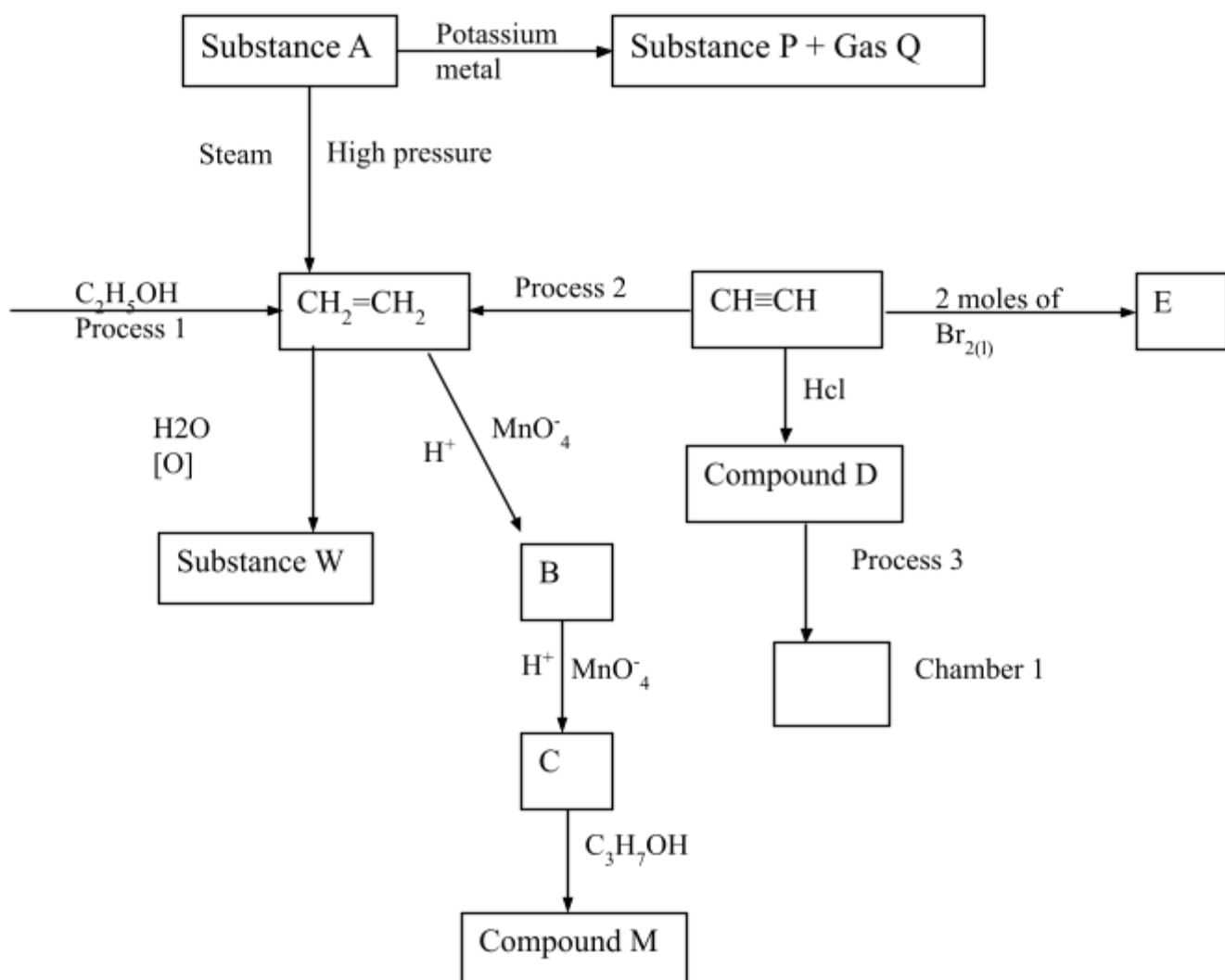
(b) Give the systematic names of the following compound.

- i) CH_3CH_2COOH . (1mk)
Pent-2-ene
- ii) $CH_3CH_2CH_2CHCH_2$. (1mk)
Pent-2-ene
- iii) $CHCCH_2CH_3$. (1mk)
But-2-yne
- iv) $CH_3C(CH_3)_2CH_2CH_3$. (1mk)
2,2-dimethylbutane

3. (a) Study the flow chart below and answer the questions that follow.



- a. Give the chemical formula of
- Solid P - **$Pb(NO_3)_2$** (1mk)
 - The yellow powder. - **PbO** (1mk)
 - The white precipitate. - **$Pb(OH)_2$** (1mk)
- b. (i) Identify ions that cause water hardness. (2mks)
 Ca^{2+} , Mg^{2+} , HCO_3^- , SO_4^{2-} and Cl^-
- (ii) List the two types of water hardness. (2mks)
- **Temporary hardness.**
 - **Permanent hardness.**
- c. Study the flow chart below and use it to answer the questions that follow.



i. Identify substances:- (6mks)

A – **Ethanol**

W – **CH₂OHCH₂OH: Ethane-1, 2-diol**

P – **Potassium ethoxide**

E – **CHBr₂CHBr₂, 1,1,2,2-tetra bromoethane**

D – **CH₂=CHCl 1-chloroethene**

Gas Q – **Hydrogen gas**

ii. State the conditions and reagents that are required for processes. (6mks)

Process 1 – **Reagent conc H₂SO₄, condition Heat to 180°C.**

Process 2 – **Reagent Hydrogen, condition Nickel catalyst 150°C**

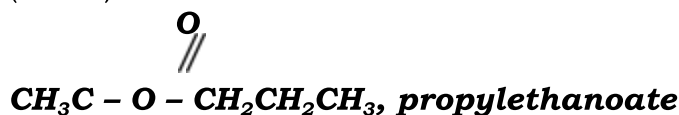
Process 3 – **Reagent chloroethene, condition High temp. High pressure.**

iii. Write the formula and the name of the compound formed in chamber I.
(2mks)

iv. Give the ~~polychloroethene~~~~(polyvinylchloride)~~ uses of the compound in c(iii) above.
(2mks)

- **Manufacture carpet**
- **Make electric cable.**

d. State the physical property of compound M and its structural formula.
(3mks)



4. (a) (i) The reaction of calcium with sulphuric (VI) acid starts and then come to stop. Explain. (3mks)

Calcium reacts with sulphuric (VI) acid forming insoluble calcium sulphate that coats unreacted calcium metal stopping the reaction.

(ii) Starting with copper(II) oxide, describe how a solid sample of copper (II) sulphate filtrate would be prepared. (4mks)

- **Add excess copper (II) oxide to sulphuric (III) acid.**
- **Filter to obtain copper sulphate filtrate and copper (II) oxide residue.**
- **Evaporate excess water to saturate the filtrate.**
- **Cool the solution to obtain large regular crystal of copper VII sulphate.**
- **Dry the crystals between the filter paper.**

(b) (i) Define solubility. (1mk)
This is the maximum mass of solute required to saturate ice grams of the solvent at a particular temperature.

(ii) 20 grams of potassium chlorate saturated 20cm³ of water. Calculate its solubility. (3mks)

20cm³ is equivalent to 20 gram

20g = 20g

100g

$$20 \times \frac{100}{20} = \frac{100g}{100g} \text{ of water.}$$

(iii) Define the term fractional crystallization of salts. (1mk)

It is the separation of different salts with different solubilities in the same solution.