

**WORKSHEET 20**School: **Ba Sangam College**Subject: **Chemistry**Year: **12**

Name: _____

Strand	4 Materials
Sub strand	4.2 Organic Chemistry
Content Learning Outcome	CH 12.4.2.2 Investigate the preparations and reactions of alcohols and carboxylic acids.

4.2.4 Production of some organic substances**1. Polyvinylchloride (PVC)**

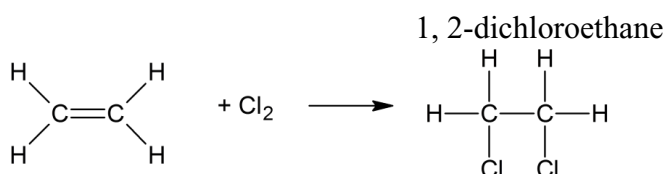
- Polyvinylchloride (PVC) is a major plastic material which has many uses in building, transport, packaging, electrical/electronic and healthcare applications.
- They are used for making water pipes, garden hose pipes and electrical insulators.
- Some properties of PVC are: It is long lasting, cheap and light, does not corrode and water resistant.

Production of PVC

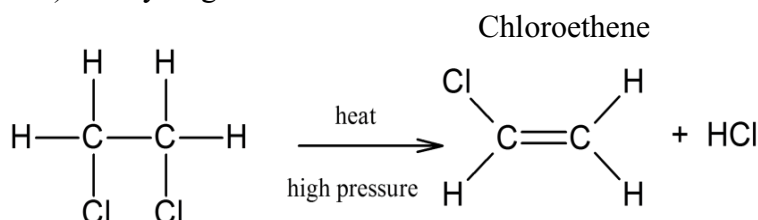
PVC is made from vinyl chloride (chloroethane) molecules.

Step 1

- Chlorine is added to ethene to form 1, 2-dichloroethane.

**Step 2**

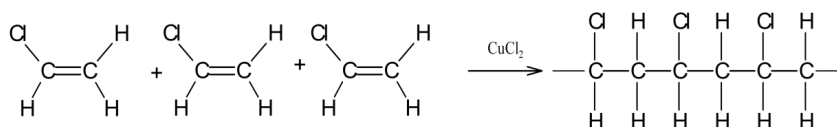
- 1,2-dichloroethane is then heated under high pressure to form vinyl chloride (chloroethene) and hydrogen chloride.

**Step 3**

- The hydrogen chloride in step 2 is removed by dissolving in water and the vinyl chloride is heated in the presence of a catalyst, normally copper chloride (CuCl_2) to pr

duce polyvinyl chloride. This process is known as polymerization.

(Part of PVC)



2. Methanol

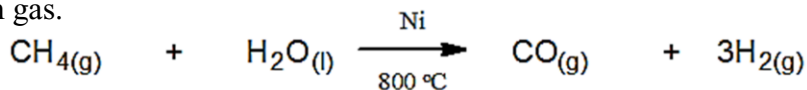
Methanol can be made from natural gas.

Step 1

- Sulphur and sulphur compounds are removed from natural gas.

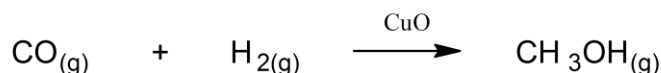
Step 2

- The alkane (methane) is decomposed using steam and nickel catalyst and converted to synthesis gas using nickel catalyst at around 800-850°C.
- This process is known as steam reforming and the product obtained are carbon monoxide and hydrogen gas.



Step 3

- The synthesis gas is then cooled, compressed and reheated in a methanol converter using copper oxide catalyst.
- The products from the converter undergo fractional distillation to produce methanol.



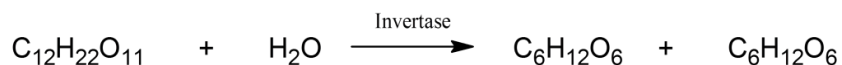
Methanol

3. Ethanol

Ethanol can be produced by fermenting sugar under the enzymes present in the yeast.

Step 1

- Cane sugar (sucrose) is hydrolyzed to glucose and fructose using the enzyme invertase.



Step 2

- Glucose and fructose produced in step 1 are decomposed to ethanol and carbon dioxide using the enzyme zymase.



Step 3

- Ethanol is collected by fractional distillation which yields a mixture containing about 96% ethanol

Activity

- Briefly explain how the breathalyzer tests works.

_____ (2m)

2. Name the two organic compounds which can be used to prepare the ester, $\text{CH}_3 (\text{CH}_2)_2 \text{COOCH}_2 \text{CH}_3$ which is responsible for the odor of pineapples.

_____ (1m)

3. The ester, propyl methanoate, can be prepared in the laboratory by reacting propanol and methanoic acid.

i. Write the expanded structural formula of propyl methanoate.

_____ (2m)

ii. Once the ester propyl methanoate is prepared, aqueous sodium carbonate is added. Explain why aqueous sodium carbonate is added.

_____ (1m)

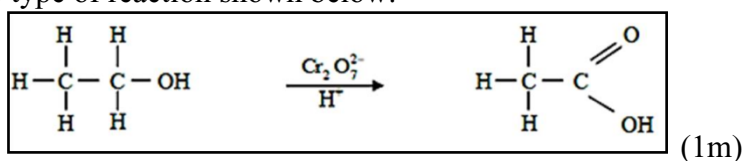
iii. Give one other condition that is necessary for the preparation of propyl methanoate.

_____ (1m)

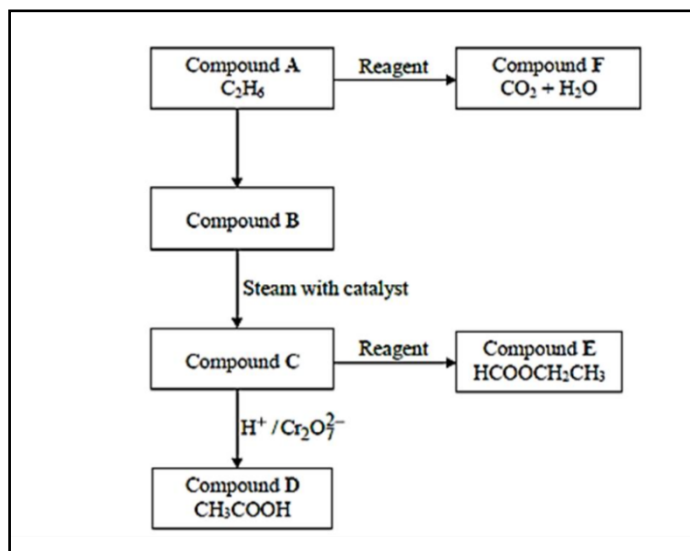
iv. State two uses of esters

_____ (2m)

4. Identify the type of reaction shown below.



5. Consider the flow diagram shown below and answer the questions that follow.



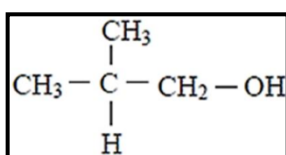
i. Name the Compounds

ii. Name the reagent needed to convert:

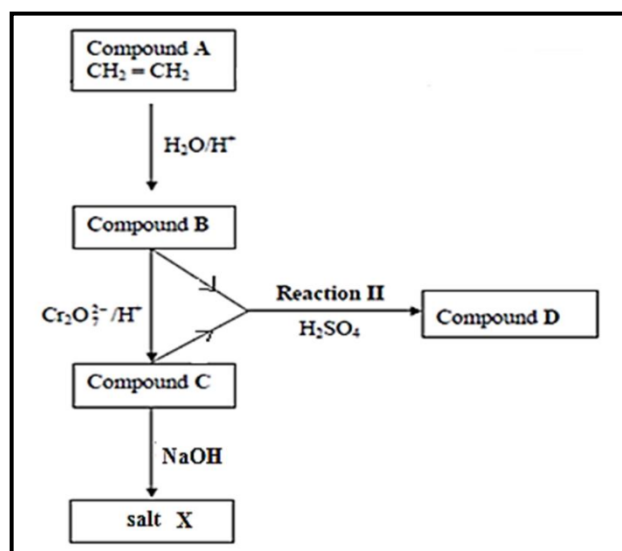
I. Compound A to Compound F.

II. Compound C to Compound E.

6. Name the following compound.



7. Use the reaction sequence in the following diagram to answer the questions that follow.



i. Name the compounds B, C and D.

(1m)

ii. Name the reactions I and II.

(1m)

iii. Draw the expanded structural formula of Compound D.

iv. Give the name of salt X

(1m)

v. Give one use of compound D

(1m)