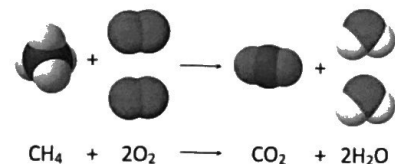


Organic Reactions

Reaction #1: Combustion

- Organic compound is burned in the presence of **oxygen** to produce **CO₂** and **H₂O**
- O₂ is always a **reactant**
- Example: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

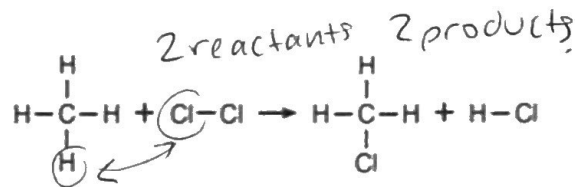


- Question 1: Which reaction best represents the complete combustion of ethene?
 - a. $\text{C}_2\text{H}_4 + \text{HCl} \rightarrow \text{C}_2\text{H}_5\text{Cl}$
 - b. $\text{C}_2\text{H}_4 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_4\text{Cl}_2$
 - c. $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
 - d. $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$
- Question 2: When C₃H₈ burns completely in an excess of oxygen, the products formed are
 - a. CO and H₂O
 - b. CO_2 and H₂O
 - c. CO and H₂
 - d. CO_2 and H₂

always produce CO₂ & H₂O in a combustion rxn

Reaction #2: Substitution

- One or more** atoms are replaced by **another** atom(s)
- Only happens in **alkanes**
- Results in **two** products
- One H is switched with one **halogen** (group 17)



- Question 3: Given the equation representing a reaction:

What type of reaction is represented by this equation?

- a. Addition
- b. Esterification
- c. Polymerization
- d. $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{Br}_2 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{HBr}$. This organic reaction is best classified as

- a. An addition reaction
- b. An esterification reaction

Br & H switched

- c. A polymerization reaction
- d. A substitution reaction

Reaction #3: Addition

- Adding one or more atoms at a **double or triple bond**
- Happens in **alkenes** or **alkynes**



- Question 5: Which equation represents an addition reaction?

- a. $\text{C}_3\text{H}_8 + \text{Cl}_2 \rightarrow \text{C}_3\text{H}_7\text{Cl} + \text{HCl}$
- b. $\text{C}_3\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_3\text{H}_6\text{Cl}_2$

- c. $\text{CaCl}_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{NaCl}$
- d. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

- Question 6: Given the balanced equation for an organic reaction $\text{C}_2\text{H}_2 + 2\text{Cl}_2 \rightarrow \text{C}_2\text{H}_2\text{Cl}_4$. This reaction is best classified as

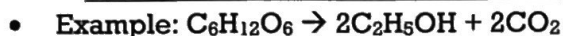
- a. Addition
- b. Esterification

- c. Fermentation
- d. Substitution

Reaction #4: Fermentation

- Enzymatic breakdown of **sugar** into **alcohol** (ethanol) and **CO₂**
- Identify alcohol and **CO₂** as a product

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 Teacher: _____ Period: _____ Class: _____



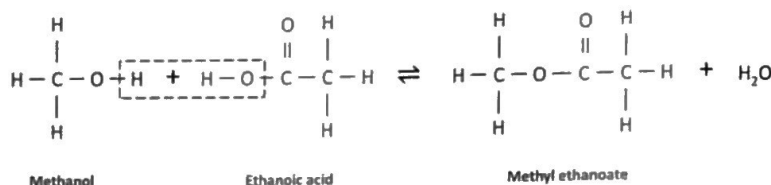
- **Question 7:** What are the two main products of a fermentation reaction?
 - a. Ethanol and carbon dioxide
 - b. Ethanol and water
 - c. Sugar and carbon dioxide
 - d. Sugar and water
- **Question 8:** Which equation represents fermentation?
 - a. $C_2H_6 + Cl_2 \rightarrow C_2H_6Cl + HCl$
 - b. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
 - c. $CH_3COOH + CH_3OH \rightarrow CH_3COOCH_3 + H_2O$
 - d. $nC_2H_4 \rightarrow (C_2H_4)_n$

alcohol & CO₂ = product

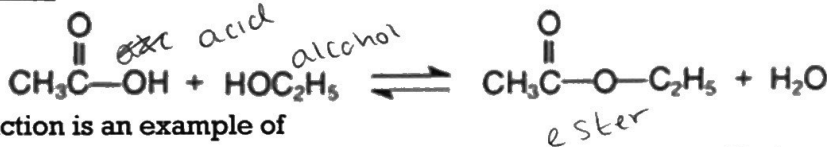
alcohol CO₂

Reaction #5: Esterification

- The formation of an ester by reacting an **organic acid** and an **alcohol**
- Esters are used in synthetic flavors, perfumes, and cosmetics
- Possible scents: bananas, wintergreen, and pineapples



- **Question 9:** A reaction between an alcohol and an organic acid is classified as
 - a. Esterification
 - b. Fermentation
 - c. Saponification
 - d. Substitution
- **Question 10:** Given the reaction:



This reaction is an example of

- a. Fermentation
- b. Saponification
- c. Hydrogenation
- **d. Esterification**

definition

Reaction #6: Polymerization

- Small molecules called **monomer** bond together to form **polymers**
- Can be natural (proteins) or artificial (plastics)
 - **Starch** – long chains of sugars
 - **Proteins** – long chains of amino acids
 - **Cellulose** – made of repeating units of sugar
- Addition Polymerization
 - Adding small **alkenes** together by breaking the double bond, to create a large chain
 - Identify by "n" which represents a large number

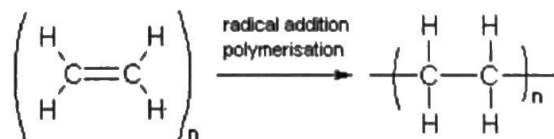
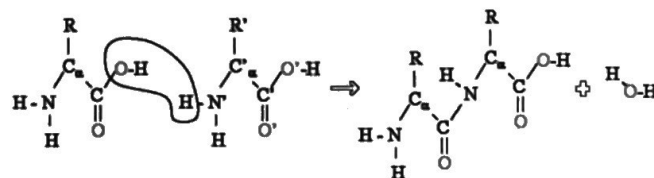


Fig 1: The polymerisation of ethene into poly(ethene)

- Condensation Polymerization
 - Joining **two** molecules by removing **water** (dehydration synthesis)
 - **Question 11:** The process of joining many small molecules into larger molecules is called



- a. Neutralization
- **b. Polymerization**
- c. Saponification
- d. Substitution

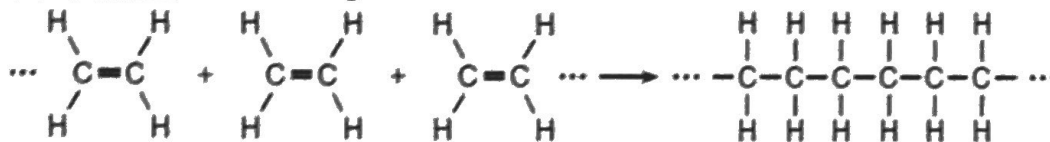
definition.

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KEY

o **Question 12:** Given the equation:



Which type of reaction is represented by this equation?

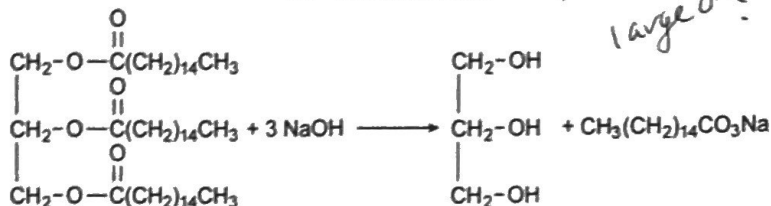
- a. Combustion
- b. Esterification

- c. Polymerization
- d. Substitution

many small pieces make 1 large one.

Reaction #7: Saponification

- Ester breaking down into acid and alcohol
- Reverse esterification
- Produces soap
- Fat + strong base → soap + glycerol



Fat + Sodium Hydroxide $\xrightarrow{\text{saponification}}$ glycerol + a crude soap

o **Question 13:** In which reaction is soap a product?

- a. Addition
- b. Substitution

- c. Saponification (looks like the word soap)
- d. Polymerization

o **Question 14:** The hydrolysis of a fat by a base is called

- a. Saponification
- b. Esterification
- c. Polymerization
- d. Neutralization

definition question.