

Unit
12

Lesson
8

AIM

- What are the different types of organic reactions?

AGENDA

- U12L8 Lesson video
- Organic Reaction notes and practice

YOYO

- Watch the lesson video on YouTube (U12L8)

HOMEWORK

- CL#24 – Organic Reactions– due TONIGHT by 11:59 pm
- Follow calendar

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Reaction #1: Combustion

- Organic compound is burned in the presences of oxygen to produce CO₂ and H₂O
- O₂ is always a REACTANT
- Example: CH₄ + 2O₂ → CO₂ + 2H₂O

CH₄ + 2O₂ → CO₂ + 2H₂O

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Reaction #1: Combustion

Question 1: Which reaction best represents the complete combustion of ethene?

- C₂H₄ + HCl → C₂H₅Cl
- C₂H₄ + Cl₂ → C₂H₄Cl₂
- C₂H₄ + 3O₂ → 2CO₂ + 2H₂O
- C₂H₄ + H₂O → C₂H₅OH

Question 2: When C₃H₈ burns completely in an excess of oxygen, the products formed are

- CO and H₂O
- CO₂ and H₂O
- CO and H₂
- CO₂ and H₂

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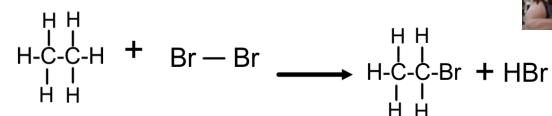
Reaction #2: Substitution



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Reaction #2: Substitution

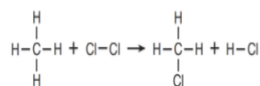
- **One or more** atoms are replaced by **another** atom(s)
- Only happens in **alkanes**
- Results in **two** products
- One H is switched with one **halogen** (group 17)



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Reaction #2: Substitution

Question 3: Given the equation representing a reaction:



What type of reaction is represented by this equation?

- Addition
- Esterification
- Polymerization
- Substitution

Question 4: Given the balanced equation $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{Br}_2 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{HBr}$. This organic reaction is best classified as

- An addition reaction
- An esterification reaction
- A polymerization reaction
- A substitution reaction

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Reaction #3: Addition

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



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Reaction #3: Addition

Question 5: Which equation represents an addition reaction?

- $C_3H_8 + Cl_2 \rightarrow C_3H_7Cl + HCl$
- $C_3H_6 + Cl_2 \rightarrow C_3H_6Cl_2$
- $CaCl_2 + Na_2CO_3 \rightarrow CaCO_3 + 2NaCl$
- $CaCO_3 \rightarrow CaO + CO_2$

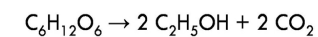
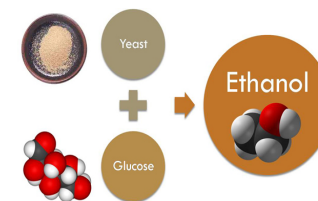
Question 6: Given the balanced equation for an organic reaction $C_2H_2 + 2Cl_2 \rightarrow C_2H_2Cl_4$. This reaction is best classified as

- Addition
- Esterification
- Fermentation
- Substitution

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Reaction #4: Fermentation

- Enzymatic breakdown of **sugar** into **alcohol** (ethanol) and CO_2
- Identify alcohol and CO_2 as a product
- Example: $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$



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Reaction #4: Fermentation

Question 7: What are the two main products of a fermentation reaction?

- Ethanol and carbon dioxide
- Ethanol and water
- Sugar and carbon dioxide
- Sugar and water

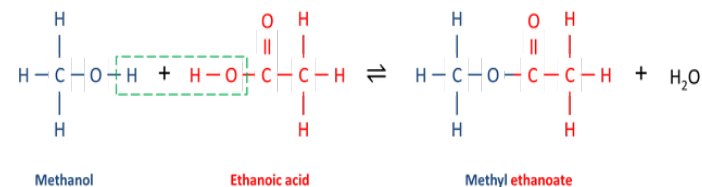
Question 8: Which equation represents fermentation?

- $C_2H_6 + Cl_2 \rightarrow C_2H_6Cl + HCl$
- $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
- $CH_3COOH + CH_3OH \rightarrow CH_3COOCH_3 + H_2O$
- $nC_2H_4 \rightarrow (C_2H_4)_n$

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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



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Esters Table of esters and their smells	from the alcohol (first word)										
	methyl 1 carbon	ethyl 2 carbons	propyl 3 carbons	2-methyl propyl 4 carbons	butyl 4 carbons	pentyl 5 carbons	hexyl 6 carbons	benzyl benzene ring	heptyl 7 carbons	octyl 8 carbons	nonyl 9 carbons
methanoate 1 carbon	ETHERIAL		ETHERIAL								
ethanoate 2 carbons	[Images of various fruits and smells]										
propanoate 3 carbons	[Images of various fruits and smells]										
2-methyl propanoate 4 carbons, branched	ETHERIAL		[Images of various fruits and smells]								
butanoate 4 carbons	[Images of various fruits and smells]										
pentanoate 5 carbons	[Images of various fruits and smells]										
hexanoate 6 carbons	[Images of various fruits and smells]										
benzoate benzene ring	[Images of various fruits and smells]										
heptanoate 7 carbons	[Images of various fruits and smells]										
esters from carboxylic acid	[Images of various fruits and smells]										
octanoate 8 carbons	[Images of various fruits and smells]										
nonanoate 9 carbons	[Images of various fruits and smells]										
cinnamate	[Images of various fruits and smells]										
decanoate 10 carbons	[Images of various fruits and smells]										

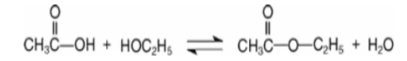
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Reaction #5: Esterification

Question 9: A reaction between an alcohol and an organic acid is classified as

- Esterification
- Fermentation
- Saponification
- Substitution

Question 10: Given the reaction:



This reaction is an example of

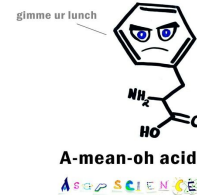
- Fermentation
- Saponification
- Hydrogenation
- Esterification

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Reaction #6: Polymerization

- Small molecules called **monomers** 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

WHAT DO YOU CALL AN ACID WITH AN ATTITUDE?



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Reaction #6: Polymerization

- Addition Polymerization
 - Adding small **alkenes** together by breaking the double bond, to create a large chain
 - Identify by “n” which represents a large number

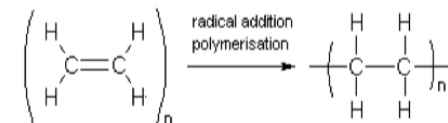
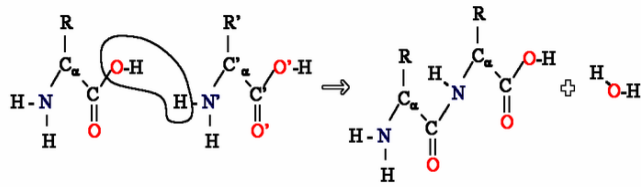


Fig 1: The polymerisation of ethene into poly(ethene)

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Reaction #6: Polymerization

- Condensation Polymerization
 - Joining 2 molecules by removing water

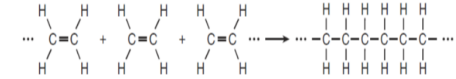


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Reaction #6: Polymerization

- Question 11:* The process of joining many small molecules into larger molecules is called
- Neutralization
 - Polymerization
 - Saponification
 - Substitution

Question 12: Given the equation:



Which type of reaction is represented by this equation?

- Combustion
- Esterification
- Polymerization
- Substitution

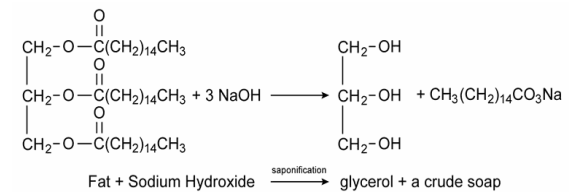
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Reaction #7: Saponification

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



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Reaction #7: Saponification

Question 13: In which reaction is soap a product?

- a. Addition
- b. Substitution
- c. Saponification
- d. Polymerization

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

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