

Alcohol

Methanol	Ethanol	Propan-1-ol
Chemical Formula:	Chemical Formula:	Chemical Formula:

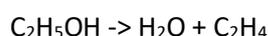
Chemical Reaction of Alcohol

Combustion

- Refer to Alkanes Chapter
- Burns in Oxygen to produce Carbon Dioxide and Water
- Note: Rmb how to write and balance the equation

Dehydration (Elimination reaction)

- Reagent and Condition: Concentrated Sulfuric Acid as dehydrating agent



General Molecular Formula:

Functional Group is -OH hydroxyl group

Preparation of Alcohols

Fermentation

- Chemical process where microorganisms like yeast act on glucose to produce ethanol and carbon dioxide
- Takes place in absence of O_2 to force yeast to undergo anaerobic respiration (normal respiration would not produce ethanol)
- Reagent and Conditions: Rice/Fruits for glucose, Yeast as Catalyst, Absence of O_2 , Best at 37°C
- $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{CH}_3\text{CH}_2\text{OH} + 2\text{CO}_2$

Hydration of Alkenes

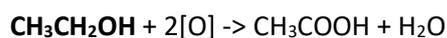
- Reagent: Steam
- Condition: 300°C , 60 atm, Concentrated Phosphoric Acid as catalyst

Ethene + $\text{H}_2\text{O} \rightarrow$ Ethanol

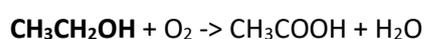
Propene + $\text{H}_2\text{O} \rightarrow$ Propan-2-ol

Oxidation

- Reagent and Condition: Acidified Potassium Dichromate (VI)/ $\text{K}_2\text{Cr}_2\text{O}_7$, heat under reflux
 - o Observation: Orange $\text{K}_2\text{Cr}_2\text{O}_7$ turns green
- OR
- Reagent and Condition: Acidified Potassium Manganate (VII)/ KMnO_4 , heat under reflux
 - o Observation: Purple KMnO_4 turns colourless



- Another possible reaction is oxidation by atmospheric O_2



Esterification (Condensation type of reaction)

- Alcohol reacts with carboxylic acid to give ester
- Reagent and Condition: Conc. H_2SO_4 as catalyst, heat under reflux
- (Refer to Esters Chapter ahead for drawing and naming)

Carboxylic Acid

Reacts with Carbonates

Methanoic Acid	Ethanoic Acid	Propanoic Acid
Chemical Formula:	Chemical Formula:	Chemical Formula:

Eqn:

Reacts with reactive metals

Eqn:

Reacts with Alcohols to form Ester (Esterification)

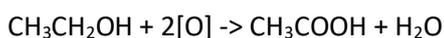
General Molecular Formula:

Functional Group is -COOH carboxyl group

Preparation of Carboxylic Acid

Oxidation

- Reagent and Condition: Acidified Potassium Dichromate (VI)/ $K_2Cr_2O_7$, heat under reflux
 - o Observation: Orange $K_2Cr_2O_7$ turns green
- OR
- Reagent and Condition: Acidified Potassium Manganate (VII)/ $KMnO_4$, heat under reflux
 - o Observation: Purple $KMnO_4$ turns colourless



Properties of Carboxylic Acid

Weak monobasic Acid

Eqn:

Exhibit typical acidic properties

Reacts with alkali or base

Eqn:

Common Question: Why does a solution of CH_3COOH dissolved in $CHCl_3$ not turn blue litmus paper red?

- CH_3COOH exist as simple molecular structure, no dissociation occurs, so No H^+ ions produced.

- Reagent and Condition: Concentrated H_2SO_4 as catalyst, heat under reflux
- (Refer to Esters Chapter ahead for drawing and naming)

Ester

General Formula: $\text{RCO}_2\text{R}'$ where R and R' are alkyl groups which may be the same or different.

Esters are sweet-smelling liquids or solids, used to make perfumes or artificial flavorings

How to name esters

The alkyl derivative from the alcohol comes first, then the part from the acid.

Example Equations to drawing esters

Propanol + Methanoic Acid

Reactions of Esters

Hydrolysis to form the corresponding alcohol and carboxylic acid

Acidic Hydrolysis of ethyl propanoate

Basic Hydrolysis of Propyl Methanoate

Ethanol + Propanoic Acid