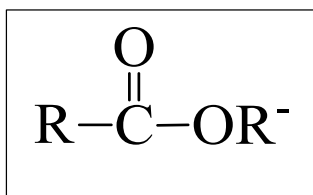


Preparation of Esters

Theoretical Part

Closely related to the carboxylic acids and to each other are a number of chemical families known as **functional derivatives of carboxylic acids**: acid chloride, anhydrides, amides, and esters. These derivatives are compounds in which the -OH of a carboxylic group has been replaced by -Cl , -OOCR , -NH_2 , or -OR .



R, R^- may be alkyl or aryl group

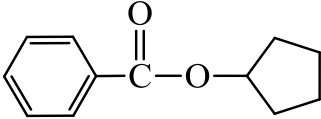
Like the acid to which it is related, an acid derivative may be aliphatic or aromatic, substituted or un substituted ; whatever the structure of the rest of the molecule, the properties of the functional group remain essentially the same.

Nomenclature:

The names of acid derivatives are taken in simple ways from either Common name or the IUPAC name of the corresponding carboxylic acid

for ester ic acid is replaced to –ate, proceeded by the name of alcohol or phenol group.

Examples:

Formula	Common name	IUPAC name
$\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OCH}_3$	Methyl formate	Methyl Methanoate
$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5$	Ethyl Acetate	Ethyl Ethanoate
$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{C}_6\text{H}_5$	Phenyl Acetate	Phenyl Ethanoate
	Cyclo pentyl Benzoate	Cyclo pentyl Benzoate

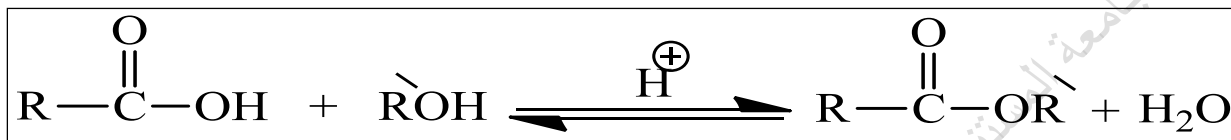
Physical Properties of esters:

- 1- The presence of the C=O group makes the acid derivatives polar compounds.
- 2- Esters have boiling points that are about the same as those of aldehydes or ketones of comparable molecular weight.
- 3- The borderline for solubility in water ranges from three to five carbons but solubility decrease with a long chain.
- 4- The acid derivatives are soluble in the usual organic solvents.

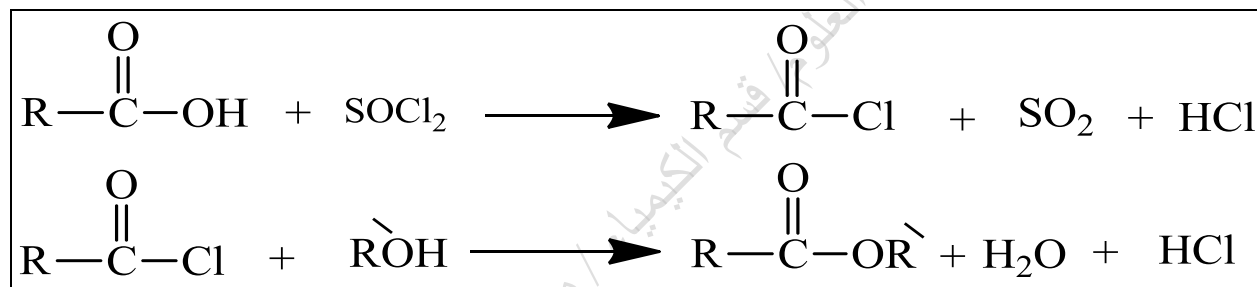
5- Volatile esters have pleasant, rather characteristic odors; they are often used in the preparation of perfumes and artificial flavorings.

Preparation of esters:

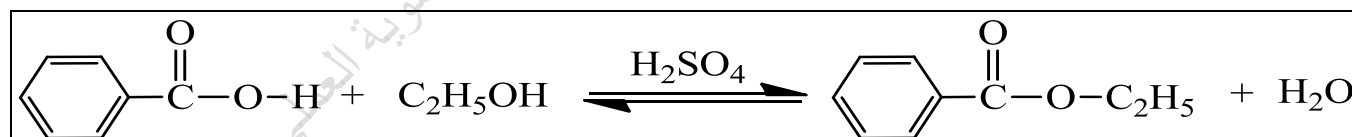
1. Fisher method:



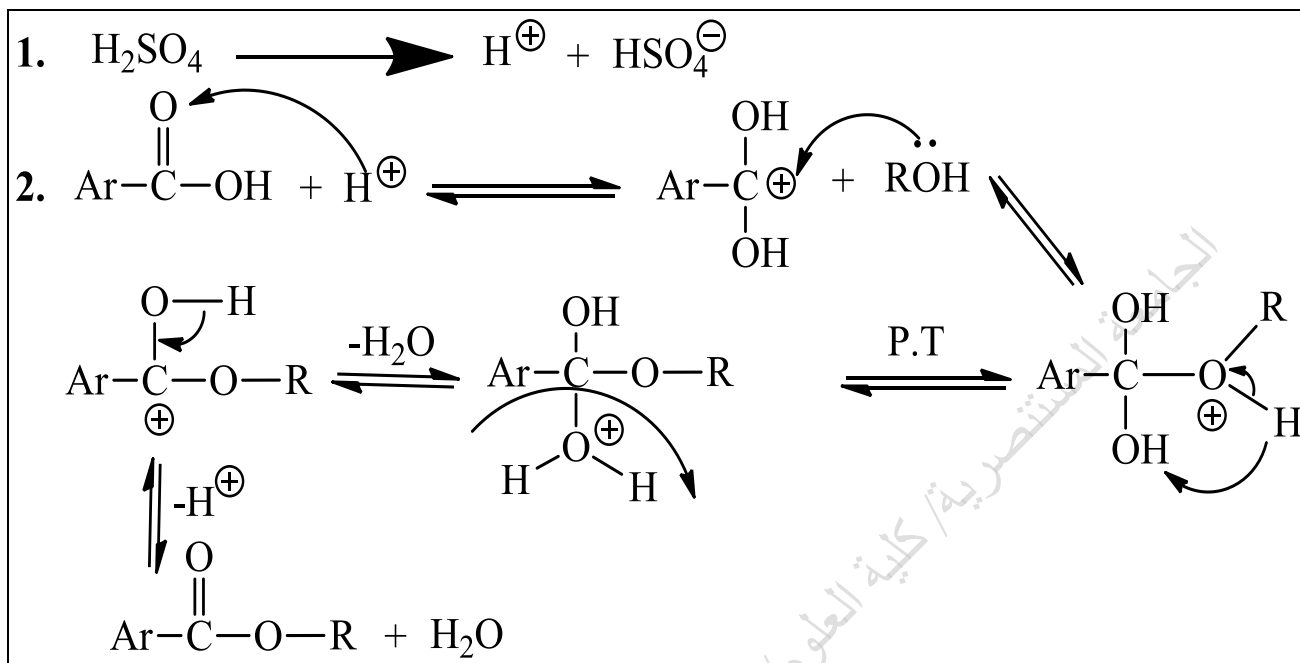
2-Scotten – Baumann technique:



The general equation:



The mechanism for the reaction:



Uses of Esters:

The esters have pleasant odor. It is commonly used as a flavoring agent in various substances. This ester is present in alcoholic beverages, fruits, milk, butter and black tea. For the most part, ethyl benzoate originates from food and is considered a nutrient.

Experimental part:

- 1- In a (100ml) round bottomed flask a mixture of (1.25g) of benzoic acid, (8ml) absolute ethanol and (5drops) of concentrated sulfuric acid is placed
- 2- Reflux the mixture gently for (30min) with occasional shaking until a clear solution is formed.
- 3- The mixture is Poured into a separating funnel then (10ml, 2%) of sodium carbonate with (10ml) of ether are added after cooling .
- 4- The separating funnel Shacked vigorously several times
- 5- The organic layer is run off carefully and the aqueous layer rejected.

- 6- The organic layer is left to dry to get the product.
- 7- The percentage range of the product is calculated.

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Experiment 3