

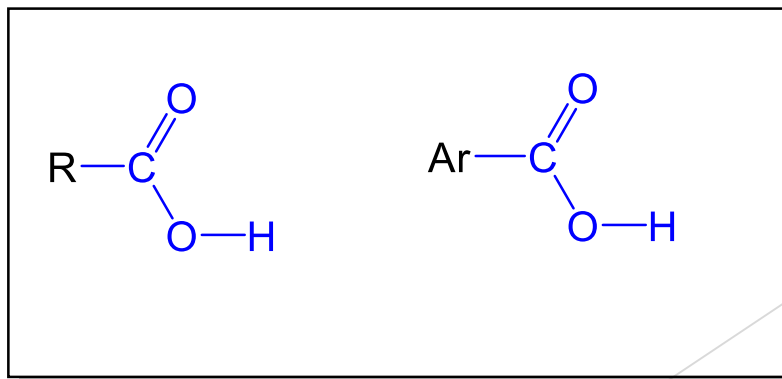
# *Practical Organic Chemistry III*

## Experiment No. (3) Identification of carboxyl group

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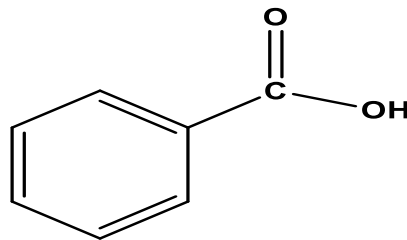
# Carboxylic acid

- ▶ is an organic compound that possesses at least one carboxylic group (-COOH). The general formula for aliphatic carboxylic acid class is R - COOH, where the R is the rest of the molecule e.g. **acetic acid**.
- ▶ On the other hand, aromatic carboxylic acids have the general formula Ar - COOH, where Ar contains at least one aromatic ring as in aromatic carboxylic acids. Carboxylic acids are highly acidic compounds as they are deprotonated easily forming carboxylate anions.

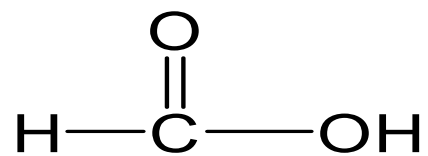


# *Nomenclature of Carboxylic Acids*

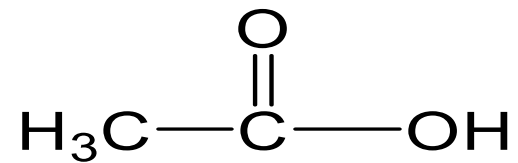
- ▶ Select the longest carbon chain containing the carboxyl group. The -e ending of the parent alkane name is replaced by the suffix **-oic acid**.
- ▶ The carboxyl carbon is always numbered “1” but the number is not included in the name.
- ▶ Name the substituents attached to the chain in the usual way.
- ▶ Aromatic carboxylic acids (i.e., with a CO<sub>2</sub> directly connected to a benzene ring) are named after the parent compound, **benzoic acid**.



**benzoic acid**



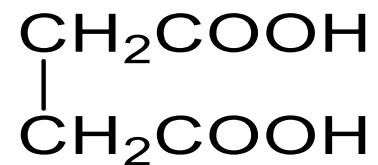
Formic acid



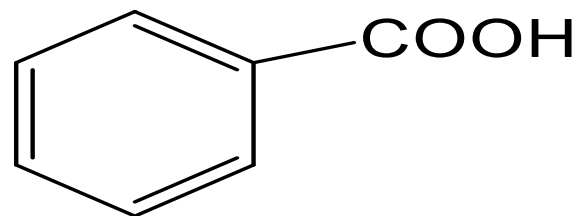
acetic acid



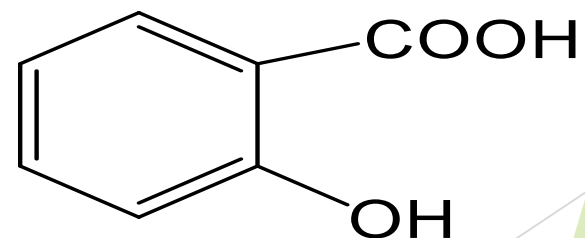
Oxalic acid



Succinic acid



Benzoic acid



Salicylic acid

# *Uses of Carboxylic Acids*

- ▶ Many carboxylic acids as well as their derivatives are widely used in various applications including pharmaceutical, industrial, food, etc.
- ▶ For instance, many carboxylic acids are used in polymers manufacturing such as adipic acid, maleic acid, terephthalic acid, etc.
- ▶ In addition, some carboxylic acids have been used in food industries either as preservatives or flavoring agents such as citric acid, propionic acids, acetic acid, etc .
- ▶ Ethelenediaminetetraacetic acid, commonly known as EDTA, has been used as a chelating agent in industry as well as in analytical purpose.
- ▶ Other fatty acids as well as their salts have been used in soaps and coatings industries.
- ▶ Acetic acid is used in vinegar preparation, as well as in cleansing products, antiseptics and detergents.

## *Test for carboxylic acid group:*

### **procedure :**

**(a) Litmus test-** to a blue litmus paper add (1 drop) from aqueous solution of acid, appearance of a red colour indicates the presence of a carboxylic acid.

**(b) Sodium bicarbonate test :** To a saturated solution of sodium bicarbonate add small amount of given organic compound. Brisk effervescence indicates the presence of carboxylic acid group:



### (C). Ester Test

Carboxylic acid reacts with alcohol in presence of conc. sulphuric acid to form **ester** that is identified by the presence of a **fruity smell**.

