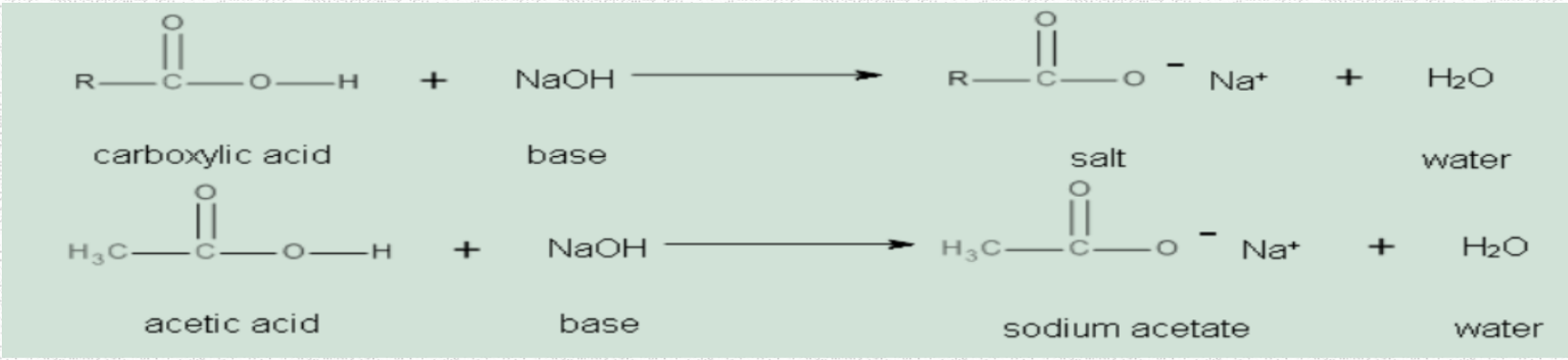
IDENTIFICATION OF CARBOXYLIC ACIDS SALTS

Carboxylic acids salts are organic compounds with the general formula (**RCOOM**) where (RCOO-) refers to the carboxylic acid part and (M+) is the alkali part which, in this experiment, may be either a metal cation (**Na^+** or **K^+**) or ammonium (**NH_4^+**).

These salts are colorless or white crystalline solids and are soluble in cold or hot water.

When carboxylic acids are reacted with strong bases, they are converted to salts as follows:



Also, they can be converted back to the acid form by reacting them with a strong acid:

Uses of carboxylic acid salts Because of their enhanced solubility in water compared to the acid form, many drugs and medicines that possess acid groups are marketed as carboxylic acid salts (sodium or potassium salts).

Identification of the carboxylic acid part (anionic part)

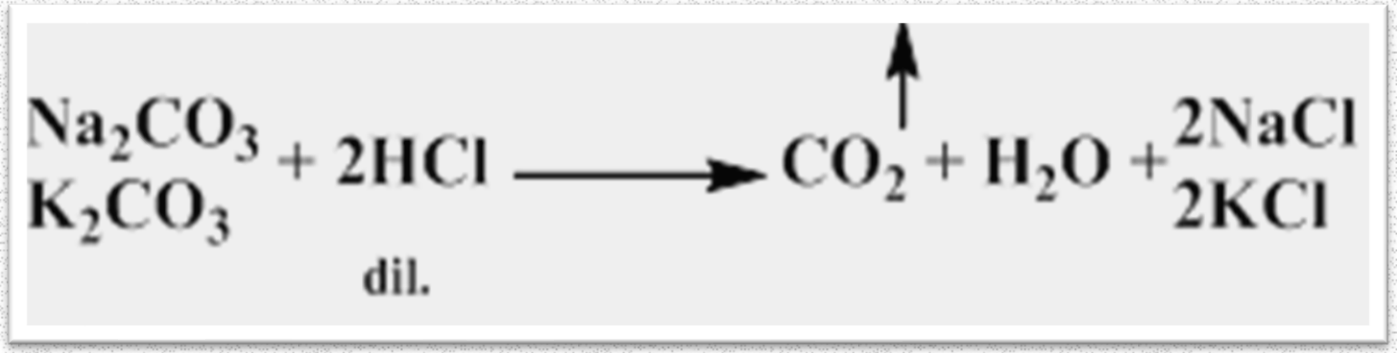
The carboxylic acid part can be identified by the *usual steps for identification of carboxylic acids* starting with ferric chloride test and, according to the result observed; the proper special test should be performed then to conclude the carboxylate name (formate, lactate, salicylate, etc.).

Identification of the alkali part (cationic part)

Identification of sodium or potassium cations

Place about 0.1 g of the salt on the edge of a metal spatula and start heating it gently on a flame with gradual increase in the heat strength. Sodium and potassium salts leave a residual amount of solid on the spatula in addition to the carbon coming from decomposition of the organic part.

This residual solid may be sodium carbonate or potassium carbonate and can be detected, after cooling, by the addition of few drops of dilute hydrochloric acid solution which results in a strong effervescence within the residual solid due to liberation of carbon dioxide gas.



During ignition observe the color of the flame. Sodium salts burn with a golden yellow flame whereas potassium salts burn with a purple flame.

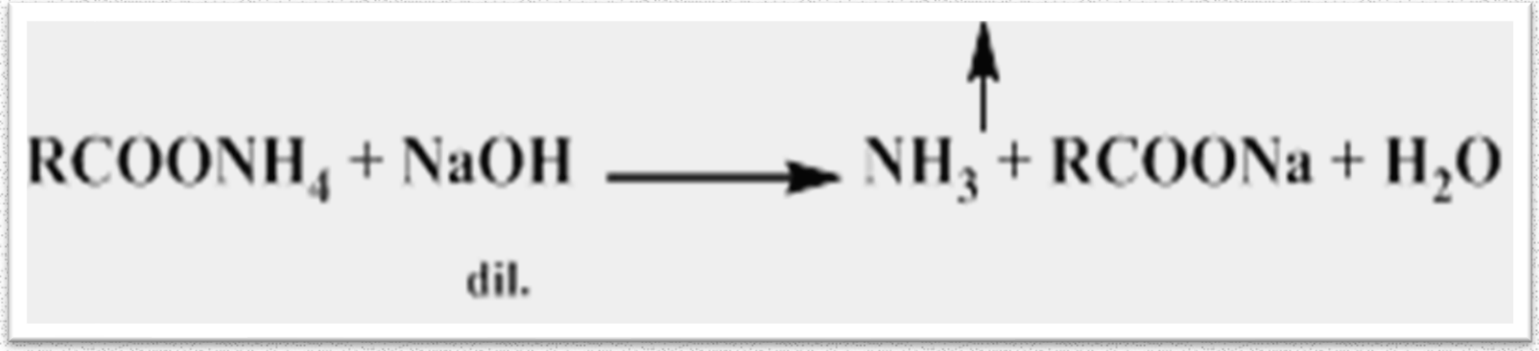
Na $\xrightarrow{\text{Ignition}}$ Golden yellow flame

K $\xrightarrow{\text{Ignition}}$ Purple flame

Identification of ammonium cation

Repeat the ignition procedure mentioned above and note that ammonium salts don't leave any residual solid except the carbon coming from decomposition of the organic part. After cooling, addition of few drops of dilute hydrochloric acid does not result in any effervescence.

Ammonium cation can be detected as follows: Place few crystals of the salt in a test tube and add 0.5 mL of 10% sodium hydroxide solution. At this stage free ammonia is liberated and can be smelt easily:



Place a small filter paper over the top of the tube and fold it down around the tube. Add 2 drops of 10% copper sulfate solution on the filter paper covering the mouth of the test tube. Heat the test tube mildly on a flame to boil the mixture. The liberated ammonia will react with the copper ions present on the filter paper resulting in a blue color.