Practical Fermentation Technology

Acetic Acid Fermentation

Acetic Acid produced by fermenting various substrates such as starchy solution, sugar solution, sugarcane, syrup date, dates, grain, apples, molasses, fruit juices to be used as starting material.

Acetobacter bacteria, which are normally used to produce vinegar, all acetic acid bacteria are rod-shape, obligate aerobes, gram-negative which oxidized ethanol (ethanol is the common substrate in acetic acid fermentation formed as a result of fermentation of sugar) can produce vinegar up to 14% acetic acid, throw process called oxidative fermentations, acetic acid bacteria grow as a surface film due to their aerobic nature and active motility.

# Vinegar contains 4-8% acetic acid by volume.

Manufacture of vinegar into two steps:

1- Fermentation of sugar to alcohol (ethanol) – anaerobic process carried out by ***Saccharomyces cerevisiae***.

2- Oxidation of alcohol to acetic acid- aerobic oxidation carried out by acetic acid bacteria of genus ***Acetobacter***.

**Vinegar**

***Ethanol***

***Sugar***

***Backers*** ***Yeast Acetic acid bacteria***

***Alcohol Fermentation Acetic Acid Fermentation***

Legislation in many countries requires that the acetic acid in vinegar must be produced by fermentation rather than by chemical process (non-fermented vinegar) there are three chemical processes to produce acetic acid:

1. 1- Acetaldehyde oxidation

2- Methanol carbonylation

3- Butane oxidation

***Titratable Acidity Calculation:***

The Titratable Acidity is a total amount of acid in the solution as determined by the titration using a standard solution of sodium hydroxide (NaOH) using the following formula.

1- Transfer a known amount (1 ml) of alcohol solution in 250 ml Erlenmeyer flask.

2- Add about 19 ml of distilled water and 12 drops of 10% Phenolphthalein as an indicator reagent.

3- Fill the burette with 0.1N NaOH Solution.

4- Titrate the mixture with 0.1N NaOH until the mixture starts to turn pinkish and stay pinkish, and then record the amount of 0.1N NaOH used for titration.

Titratable Acidity = ***ml of NaOH x Normality of NaOH x m.equivalent weight of acetic acid x 100***

 ***Weight of sample x Total titration volume***

#***m. equivalent weight of acetic acid*** = 0.06005

1 gm = ***Weight of sample*** #

 20 ml (1 gm+ 19 ml) ***Total titration volume*** =#