

# APPLICATION OF ENZYMES IN FOOD INDUSTRY

## 8. PHOSPHOLIPASES

- a) Phospholipases selectively break down phospholipids into fatty acids and other lipophilic substances.
- b) They can be divided into four major classes (A, B, C and D) based on their mechanism of action.
- c) Phospholipases are widely used in food industry, most importantly in the production of oils, dairy industry and in the manufacture of several bakery items.
- d) They also find applications in the degumming of various vegetable oils, cheese manufacture and bread manufacture.
- e) Phospholipases are also used in the processing of various dairy products to enhance the stability of fat or maximize the yield of cheese, milk, butter and ice cream.
- f) The important applications of lipases include enhancing the cheese flavor, lipolyzed milk fat production for use in butter as flavor, *etc.*

## 9. ESTERASES

- a) Esterases play a prominent role in the food industry and alcoholic beverage industries, where they have been mostly used for the modification of oil and fat in various fruit juices and to produce fragrances and flavors.
- b) In cheese manufacture, the fruity flavors are the result of different methyl or ethyl esters of short-chain fatty acids. Feruloyl esterase is a key enzyme in the biosynthesis of ferulic acid, which is the precursor for vanillin, an aroma compound used in foods and beverages.

## 10. PECTINASES

- a) Pectinases are enzymes which catalyze the hydrolysis of glycosidic bonds in pectic polymers.
- b) Pectic substances found in tomato, pineapple, orange, apple, lemon pulp, orange peel and other citrus fruits act as natural substrate for this enzyme.
- c) Pectinases can be produced from natural as well as recombinant microbes with attempts made to increase their thermostability and yield.

- d) Juices with added pectinase have a clearer appearance and filterability than enzyme-depleted counterparts.
- e) Apart from reducing the turbidity and haze generation of naturally derived fruit juices such as apple and banana, pectinases also improve the colour and flavour of drinks.
- f) The addition of gelatin and pectin greatly increases the viscosity and turbidity of juices, and removal of the haze is the most costly part of juice production. The use of biogenic enzymes such as pectinases in juices would act almost nine times better than mechanical maceration to get good results.

## **11. RENNET**

- a) Extracted from the stomach of young calves
- b) It separates solid curd and liquid whey
- c) Different animal rennet are used for different cheese
- d) Most common vegetable rennet is “thistle” Enzymes used in food industry
- e) Animal rennet (bovine chymosin) is conventionally used as a milk-clotting agent in dairy industry for manufacture of quality cheeses with good flavor and texture