

MILK ENZYMES

Enzymes are protein in nature. They start up chemical & biochemical reactions, control these reactions or sometimes speed up these reactions. But they do this without being consumed so these are called Biocatalyst.

The action of each type of enzyme is specific because each enzyme catalyses a specific reaction.

The enzymatic activity or enzymatic reactions are mainly affected by two factors as;

1. Temperature,
2. pH.

Enzymes are most active at neutral or close to neutral pH & show the optimum activity at optimum temperature range between 25-50⁰C. Their activity decreases if the temperature crosses the optimum range. At the temperature above 50⁰C, enzyme activity first decreases & then gradually ceases because the enzymes become denatures or inactivated.

Enzymes come in milk from two sources as;

1. The enzymes which come directly from cow's udder, these are called original enzymes.
2. The enzymes which come from bacterial sources are called as bacterial enzymes.

The total no. of enzymes which are present in milk is about 60. Many are unknown. These are divided in 5 groups depending upon their nature & activity.

1/. Peroxidases:

The peroxidases enzymes transfer the O₂ from Hydrogen peroxide to other readily oxidize-able substances. These enzymes can be inactivated by heating the milk to 80⁰C for a few seconds. The presence of this enzyme is tested by "Storch's peroxidase test".

2/. Catalases:

Catalases split hydrogen peroxide. The milk from diseased udder has higher catalase contents. So by determining the amount of free oxygen present in milk it is possible to estimate the catalase contents whether the milk from healthy or diseased udder. The catalase enzymes are also produced by some bacteria present in milk. These are destroyed by heating the milk at 75⁰C for 60 seconds.

3/. Phosphatases:

Phosphatases enzymes split phosphoric acid esters into phosphoric acid & alcohols. The presence of Phosphatases in milk is detected by adding phosphoric acid esters & a reagent that changes the color when it reacts with liberated alcohols. The change in color reveals that milk contains Phosphatases. These are destroyed by pasteurization that is 72⁰C for 15-20 seconds.

Phosphatase test is used to determine whether the pasteurization is done or not.

4/. Lipases:

Lipases enzymes split up the fat in to glycerol & free fatty acids. Excess free fatty acids in milk & milk products results in rancid taste & flavor.

The lipases are inactivated to a great extent by pasteurization but high temperature is required for its complete in-activation or denaturation.

Many bacteria produces lipases & these cause serious problems because bacterial enzymes are more resistant.

5/. Proteases:

Proteases enzymes break down the peptide linkage between peptides & amino acids. This results in the breakdown of protein.

Mostly these proteases enzymes come from bacterial origin, so these require higher temperature for inactivation.

Some protease enzymes like plasmin can survive even at UHT (Ultra High Temperature) treatment & cause problems during storage of milk.