**Introduction**

Amylases are enzymes which hydrolyse starch molecule to give diverse products including dextrin and progressively smaller polymer composed of glucose units (Windish and Mhatre 1965). Alpha amylase acts on starch and breaking them up into sugars (hence the term saccharification). Starch is a carbohydrate source consisting of two molecules amylose and amylopectin. Amylose is formed from chains of glucose linked α1, 4 and amylopectin is formed from α1, 4 linked chains of glucose with 1, 6 linked branch points. The amylases are enzymes that work by hydrolyzing the straight chain bonds between the individual glucose molecules that make up the starch chain. A single straight chain starch is called an amylose. A branched starch chain (which can be 10 considered as being built from amylose chains) is called an amylopectin. These enzymes are of great significance in present day biotechnology with applications ranging from food, fermentation, and textile to paper industries, starch syrup industry, distillery and detergent industry (Pandey et al 2000). Amylase was the first enzyme to be discovered and isolated (Payen 1833). Although it can be derived from several sources, including plants, animals and microorganisms, microbial enzymes generally meet industrial demands. Alpha amylase are produced endogenously in many different organisms e.g. *B. subtilis*, *B. stearothermophilus*, *B. licheniformis*. Besides *Aspergillus niger*, *A. oryzae*. Today a large number of microbial amylases are available commercially and they have almost complete replaced chemical hydrolysis of starch in starch processing industry (Bernfeld 1955). This is because the amylase effects a rapid reduction on the length of the starch polymer. The resulting fragments are oligosaccharides that are readily soluble in water and are to short retain significant adhesive capability. Thus, to cope up with the increasing demand, a variety of projects have been focused on increased production, activity and stability of these enzymes. The major advantage of using microorganisms for the amylase production is economical bulk production capacity and microbes are also easy to manipulate to obtain enzymes of desired characteristics (Lonsane et al 1990). The history of amylases began in 1811 when the first starch degrading enzyme was discovered by Kirchhoff. Ohlsson suggested the classification of starch digestive enzymes in malt as alpha- and beta-amylases according to the anomeric type of sugars produced by the enzyme reaction (Gupta et al 2003). These enzymes can be divided basically into four groups: endoamylases, exoamylases, debranching enzymes and transferases (Sivaramakrishnan et al 2006). Endoamylases: cleave internal alpha-1, 4 bonds resulting in a-
anomeric products, exoamylases: cleave alpha-1, 4 or alpha-1, 6 bonds of the external glucose residues resulting in alpha or beta anomeric products.

Amylases have received a great deal of attention because of their significance especially in biotechnology (Reddy et al. 2003). Amylase constitutes a class of industrial enzymes having approximately 25% of the enzyme market world-wide (Sindhu et al. 1997). Many Bacillus species and thermostable Actinomycetes like Actinomycetes thermomonospora and Actinomycetes thermoactinomycyes are versatile producers of amylase (Buzzini et al. 2002). The genus Bacillus produces a large range of extracellular enzymes of which amylases and proteases are of Industrial importance. Currently two types’ of amylases glucoamylase and alpha-glucosidase are important for starch hydrolysis. Glucoamylase attacks -1, 4-bonds, releasing D-glucose molecules. This enzyme also attacks -1, 6 bonds at branching points in the amylopectin molecule but much more slowly than -1, 4 linkages.

**Distribution of α-amylase among microorganisms**

α -Amylases are universally distributed throughout the animal, plant and microbial kingdoms. Over the past few decades, considerable research has been undertaken with the extracellular α-amylase being produced by a wide variety of microorganisms (Fogarty et al. 1979). α -Amylase has been derived from several fungi, yeasts, bacteria and actinomycetes, however, enzymes from fungal and bacterial sources have dominated applications in industrial sectors.

**Determination of α-amylase activity**

α -Amylases are generally assayed using soluble starch or modified starch as the substrate. α -Amylase catalyses the hydrolysis of α-1, 4 glycosidic linkages in starch to produce glucose, dextrin. The reaction is monitored by an increase in the reducing sugar levels or decrease in the iodine colour of the treated substrate (Priest et al. 1977).

**Physiology of α-amylase production**

The production of α-amylase by submerged fermentation (SmF) and solid state fermentation (SSF) has been thoroughly investigated and is affected by a variety of physicochemical factors. Most notable among these are the composition of the growth medium, pH of the medium, phosphate concentration, inoculum age, temperature, aeration, carbon source and nitrogen source (Fogarty et al. 1979). Among different carbon, nitrogen and trace elements supplemented, glucose, peptone and calcium chloride, respectively enhanced enzyme production.

**Sources of α–Amylases**
Amylases are ubiquitous enzymes produced by plants, animals and microbes, where they play a dominant role in carbohydrate metabolism. Amylases from plant and microbial sources have been employed for centuries as food additives. Barley amylases have been used in the brewing industry.

Fungal amylases have been widely used for the preparation of oriental foods. In spite of the wide distribution of amylases, microbial sources, namely fungal and bacterial amylases, are used for the industrial production due to advantages such as cost effectiveness, consistency, less time and space required for production and ease of process modification and optimization (Burhan et al 2003). Among bacteria, Bacillus sp. is widely used for thermostable α-amylase production to meet industrial needs. B. subtilis, B. stearothermophilus, B. licheniformis and but B. amyloliquefaciens are known to be good producers of an amylase and these have been widely used for commercial production of the enzyme for various applications (Vihinen et al 2000).

**Characteristics of α–Amylases**

Enzyme is a glycoprotein. Its single polypeptide chain of about 475 residues has SH group and 4 disulphide bridges and contains a tightly bound Ca$^{2+}$. It exists in two forms (I &II) which have identical enzymatic properties, differing only in electrophoretic mobility. A binding site for Cl$^-$ has been reported which effect a conformational change that enhances activity.

**Stability**

Crystalline suspensions in sodium-calcium chloride are stable for several month refrigerated. Solutions in buffered sodium chloride pH 7.0 are stable for month providing the protein concentration exceeds0.1%.