コスモ・バイオ株式会社

Catalog Number: 100447

alpha-Amylase

CAS # : 9000-90-2

Description: This a-amylase product is a liquefying diastase supplied as a dry, free-flowing powder having high uniformity and excellent storage stability.

Source: *Bacillus subtilis*

Physical Description: Off-white powder

Activity: Approximately 165,000 Bacterial Amylase Units per gram.

Unit Definition: One Bacterial Amylase Unit is defined as that quantity of enzyme which will dextrinize one milligram of starch per minute at pH 6.6 and 30^{o}C.

Salmonella: Negative

E. coli: Negative

Recommended Storage: +4^{o}C

Temperature Range: 60 - 80^{o}C

pH Range: 5 to 7 (optimum around 6.1)

Inactivation: 10 minutes at 90 - 100^{o}C

Level of Enzyme: Less than 0.03% of this material based on the weight of starch usually suffices to liquefy a 20% slurry of starch in 15 to 30 minutes. At lower levels, the rate is somewhat slower, and viscous pastes form at first which may be difficult to handle.

Effect of pH:

pH	% Relative Activity
10.0	25
9.0	50
8.0	65
7.0	90
6.1	100
5.5	95
5.0	85
4.1	25

Effect of Temperature: Enzymes are most sensitive to heat in dilute solution and in the absence of substrate. a-Amylase has good stability when heated with a slurry of about 10% starch, but is much less stable in hot dilute solutions of starch or in pure water. The addition of certain salts greatly improves stability under such conditions. Maximal effect on stability is obtained by using about 0.75 pound of calcium acetate and 25 pounds of sodium chloride per pound of enzyme. However, solutions of equal amounts of amylase, calcium acetate, and sodium chloride are usually satisfactory except under the severest conditions. The conversion of starch by a-Amylase increases in rate with rising temperature to a maximum of about 80^{o}C. Heating above this temperature begins to destroy the amylase. Good stability occurs at the gelatinization range of starches (70 - 80^{o}C). Below this range, however, the conversion is quite slow.

Termination of Enzyme Action: The activity of this product is most conveniently destroyed by heating the reaction mixture at 90 - 100^{o}C for about 10 minutes. When high temperatures may not be used, the enzymes may be destroyed by raising or lowering the pH to a value well beyond the normal operating range. If the substrate can tolerate the high temperatures employed in deactivation, but the temperature cannot be raised quickly enough to prevent further unwanted changes in viscosity, a combination of acidification and heating can terminate the enzyme activity. The addition of 1 to 1.5 pounds of 80% acetic acid per 100 pounds of starch slows the rate of conversion enough to prevent significant loss in viscosity before the inactivation temperature is attained.

Typical Use: The general procedure for the enzymatic liquefaction of starch is the same, regardless of the nature of the end product. The degree of conversion is followed by measuring the viscosity. The ultimate viscosity is controlled by the level of enzyme and the time which elapses after gelatinization. The usual conditions are 0.03 - 0.06% a-Amylase based on weight of starch for 15 to 30 minutes.

The starch is suspended in cold water with agitation sufficient to assure uniform dispersion. If vigorous agitation is provided, the dry solid enzyme may be added directly to the suspension. A safer practice, however, is to dissolve the dry enzyme in a little water before charging. The reaction mixture is then heated to the gelatinization temperature and held there (or slightly hotter) until the required viscosity is reached. Potato, tapioca, sago, arrowroot, and cereal starches other than those obtained from maize or rice are gelatinized at 70 - 75^{o}C. Maize and rice starches require a temperature of 80oC. When the conversion is complete, the mixture is heated quickly to 100oC and held 10 minutes to inactivate the enzyme. Additional heating at 100^{o}C is sometimes done to effect further reduction in viscosity by the action of heat alone.

Reference:

1. *Merck Index,* **12th Ed.**, No 640