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Enzymes

1) Diastase



- **Syn:** Maltin, Diastase of malt, Amylase
- **B.S.:** It is mixture of amylolytic enzymes obtained from malt.
- **Description:**
- **Color:** Yellowish white
- Amorphous powder, obtained from infusion of malt
- **Odour:** faint characteristic

Preparation of diastase



- **Barley** is the dried grain of one or more varieties of ***Hordeum vulgare*** Linne (Family. **Gramineae**).
- Barley is grown throughout the world wherever the climate is favorable.
- Malt or malted barley is dried, artificially germinated barley grain.
- To prepare malt. heaps of barley grain are kept wet with water in a warm room and allowed to germinate until the caulicle(small stalk) protrude.
- The grain is then quickly dried. The enzyme diastase in the moist warm grains converts the starch to maltose, thereby stimulating the embryo to growth. The embryo is killed when the grain is dried.

Preparation of diastase



- Dry malt resembles barley, but is more crisp, has an agreeable odor, and has a sweet taste. It contains 50 to 70% of the sugar, maltose; 2 to 15% of dextrins; 8% of proteins; diastase; and a peptase enzyme.
- Malt is used extensively in the brewing and alcohol industries.
- It is the product obtained by extracting Malt, the partially and artificial germinated grain of one or more varieties of *Hordeum vulgare*.

Use



- 1. as a digestant
- 2. in the production of predigested starchy foods and also for conversion of starch to fermentable sugars in fermentation & brewing industries.

Identification test



- **1) Arsenic:**
- 0.25 gm of diastase is placed in a platinum, quartz, or porcelain crucible.
- In that 10ml of **Mg nitrate** in **ethyl alcohol** is added & **ignite** it.
- Then reduced to **ash** by heating at **450-550°C**.
- If carbeneous matter persist, it is wetted with minute amount of **Nitric acid**, which is further treated and heat at 450-550°C.
- After cooling, **3 ml HCl** is added to residue, which is dissolved by heating in a water bath.
- When this test is carried out with arsenic it should **NMT 4ppm**.

Papain



- **Syn:** Papayotin, Vegetable pepsin, Arbuz, Nematolyt, Caroid, Tromasin, velardon, Vermizym
- **B.S.:** it is green & dried leaves of *Carica papaya* L.
- Cultivated in Shri Lanka, Tanzania, Hawaii & Florida.
- Plant 5-6 m in height, bearing 30 cm in length & 5 kg in wt.
- **Family:** Caricaceae

Preparation



- Mostly found in latex of fruit(stem, leaves, petioles)
- Latex collected by making 2-4 incisions, about 1/8 inch deep
- While its become mature, on tree, green
- Incisions makes early in the morning, at interval 3-7 days.
- Collected on non metallic container or on cloth.
- Dry as soon as possible. Either by sun drying or by heating above 38° C.
- Final product should be creamy white.
- Sealed in air tight container to prevent loss of activity
- If 10% common salt & 1% sol. Of formaldehyde is added before drying, activity is maintained for many months.
- Yield of papain from latex is abt 20% (20-250g per tree).



- Highly active product is obtained by dissolving the commercial product in H_2O , H_2S , ppt's with alcohol.
- Commercial papain is adulterated with arrowroot starch, dried milk of cactus, gutta percha, rice flour & pepsin. (**Adulteration**)
- Bleaching is done for improving color, but it affects enzyme activity (lower)
- Papain possesses both milk clotting & protein digestion.
- Activity is lost when treated with H_2O_2 , but reduction with H_2S is regained.

Properties



- It occurs as a white or greyish-white, slightly hygroscopic powder.
- It is partially soluble in water & glycerol. It may digest about 35 times its wt. of lean meat.
- Best grades digest 200-300 times their wt. of coagulated egg albumin in alkaline media.
- Temperature range 60-90° C (optimum point 65°C)
- Best pH is 5.0, but work also in neutral & alkaline media.
- It is activated by reduction (HCN, H₂S), & inactivated by oxidation (H₂O₂).

Chemical Constituent



- Peptidase I, rennin, clotting enzyme pectase, chymopapain.
- It contain 15.5% nitrogen & 1.2% sulphur.
- Crystalline papain is most stable in range of 5-7 pH & readily destroyed at 30°C below pH 2.5 & above pH 12.
- **Identification test;**
- It is reacted with gelatin sol. At 80°C in presence of an activating cysteine chloral hydrate sol. For 1 hr.
- Then sol. Is cooled to 4°C for long time.

Uses



- To prevent adhesions, in sloughing & infected wounds, internally as protein digestant, as anthelmintic, to relieve episiotomy (incision of vulva) & used for treatment of dyspepsia (digestive), intestinal & gastric disorder.
- In tmt of diphtheria (respiratory tract infection)
- Used in digestive mixtures, liver tonic, reducing enlarged tonsils, in preventing of post – operating adhesions, carbuncles (boil, spot) & eschar (dry scar) burns.
- In prep. of toothpaste, cosmetics, in tanning industries for bating skin & hides.
- Anti-inflammatory agent
- Clarification of beverages (beer, fruit juice)
- in meat tenderizer
- Degumming of silk fibers in textile industry