LECTURE 4

4.0 BROWNING REACTIONS

Complex reactions which occur in food leading to formation of brown colour. It could be as a result of processing or storage of food. Two main types:

- Enzymic Browning
- Non-Enzymic

4.1 ENQYMIC BROWNING OF FOODS

Browning catalysed by enzyme, it occurs in the

- Presence of oxygen
- Phenolase Enzyme (or Polyphenol loxidases)
- Enzyme activity can be divided into 2:
  - The cresolase activity
  - The catecholase activity.
- Characteristics:
  - The enzymes are copper proteins and they are active in the monovalent form of copper.
  - pH of activity near 7
  - Fairly resistant to heat.
- Specificity of the Enzyme
  - Acts on monophenol or ortho-diphenol not on meta-diphenol.
- Reactions:
  - Crisolate activity – It acts as oxygen transferable in the hydrogenation ofmonophenol to polyphenol derivatives. Eg. Tyrasine – 3, 4 – dihydroxy phenyl Alamine (DOPA).
  - Catccholase activity.

    Acts as a dehydragenase enzyme in removing Hydrogen from substances. DOSA – O. quinine phenyl Alamine,
  - The quinine then forms DOPAchrome which polymerises to form melanin.
- Application:

  Common during processing of vegetable tissues that rich in polyphenols e.g yam.

4.1.2 **Control of Enzymic Browning**

Aim – To stop activity of phenolase enzyme.

Methods:

- Heat treatment e.g. Blanching
- Use of SO_2 – It inhibits phenolase enzyme.
- Use of acids.

  Eg. Ascorbic acid

  other acids e.g. Citric, Malic
- Removal of surface oxygen
- Use of salts e.g. Nacl solution
- Other methods e.g. Borate salts, HCN etc. Some of these may not be applicable to food because of some other effects e.g HCN in poisonous, boric/Borate salt may colour the food etc.