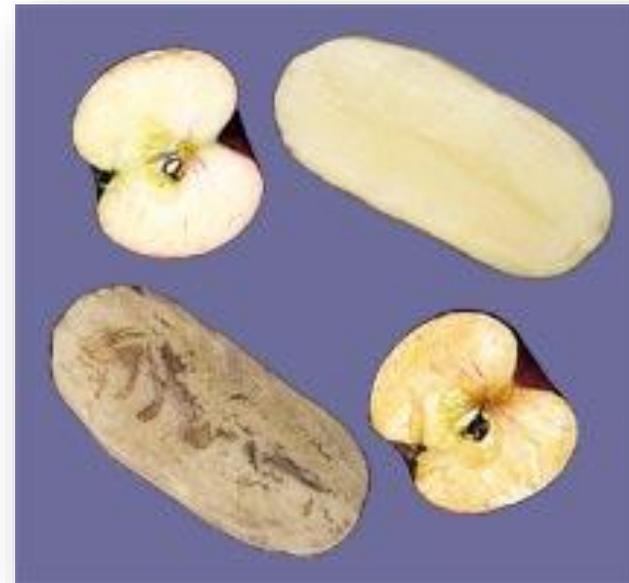


FOOD ENZYMES AND THEIR APPLICATIONS

**BA PART I, PAPER 1, Home science department,
rmc sasaram**

PPO reaction leading to enzymatic browning



Enzymatic Browning of Fruits : Experiment

- Apple (or potato, banana, etc.) slice is put in each of the following solutions. The browning is observed at 5, 10 , and 20 minutes.
 - Control (no solution; open to air)
 - Water Only
 - 0.1% acetic acid
 - 0.1% citric acid
 - 0.1% ascorbic acid

Enzymatic Browning Experiment: Control



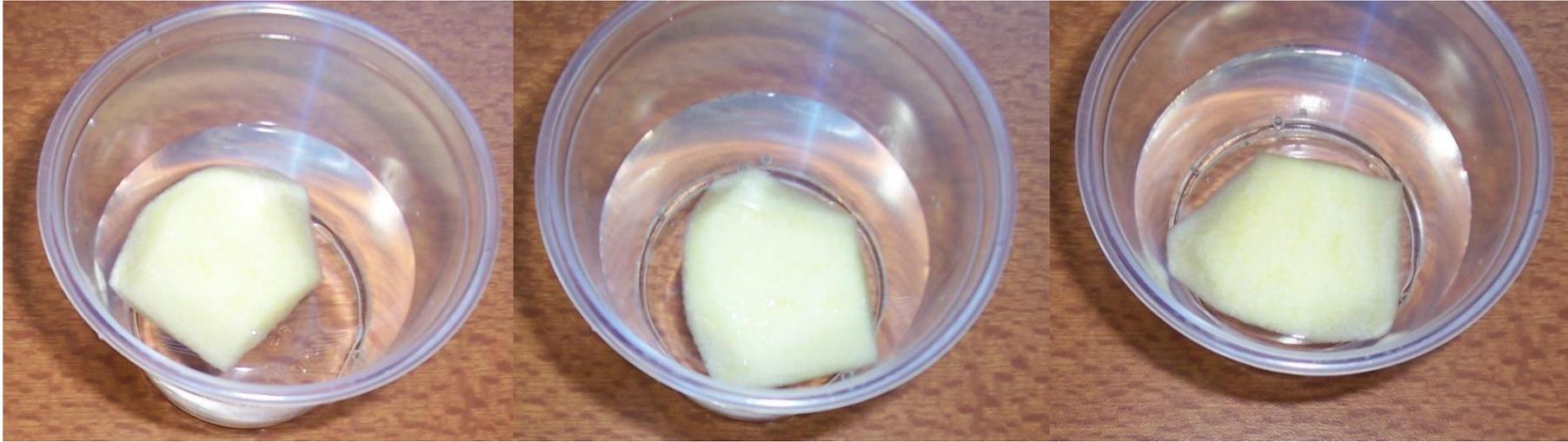
5 min

10 min

20 min

Browning of apple piece is evident, increase with time → action of PPO

Enzymatic Browning Experiment: Water



5 min

10 min

20 min

H₂O – Oxygen is necessary for the browning reaction; Immersion in H₂O restricts the available oxygen

Enzymatic Browning Experiment: 0.1% Acetic Acid



5 min

10 min

20 min

Acetic acid – a strong organic acid;
Reduces the pH below 3.0 and irreversibly
inactivates the enzyme

Enzymatic Browning Experiment: 0.1% Citric Acid



5 min

10 min

20 min

Citric acid – acts as a chelating agent; complexes copper ions that are necessary for enzyme activity

Enzymatic Browning Experiment: 0.1% Ascorbic Acid



5 min

10 min

20 min

Ascorbic acid – Acts as antioxidant; Oxygen preferentially oxidized the ascorbate and not the phenolic compounds

Applications of Food Enzymes

Amylase	<i>Bacillus subtilis</i> , <i>Aspergillus niger</i>	Starch hydrolysis, glucose production
Glucoamylase	<i>A. niger</i> , <i>Rhizopus</i> <i>niveus</i> , <i>Endomycopsis</i>	Saccharification of starch, glucose production
Trypsin	Animal pancreas	Meat tenderizer, beer haze removal
Papain	Papaya	Digestive aid, meat tenderizer, medical applications
Pepsin	Animal stomach	Digestive aid, meat tenderizer
Rennet	Calf stomach	Cheese manufacturing
Glucose isomerase	<i>Flavobacterium</i> <i>arborescens</i> , <i>Bacillus</i> <i>coagulans</i> , <i>Lactobacillus</i> <i>brevis</i>	Isomerization of glucose to fructose
Penicillinase	<i>B. subtilis</i>	Degradation of penicillin
Glucose oxidase	<i>A. niger</i>	Glucose → gluconic acid, dried-egg manufacture
Lipases	<i>Rhizopus</i> , pancreas	Hydrolysis of lipids, flavoring and digestive aid
Invertase	<i>S. cerevisiae</i>	Hydrolysis of sucrose for further fer- mentation
Pectinase	<i>A. oryzae</i> , <i>A. niger</i> , <i>A. flavus</i>	Clarification of fruit juices, hydrolysis of pectin
Cellulase	<i>Trichoderma viride</i>	Cellulose hydrolysis

THANKS