

BROWNING

SCOPE

- TYPES (ENZYMATIC/NON-ENZYMATIC)
- ROLE IN FOOD PREPARATION
- PREVENTION OF UNDESIRABLE BROWNING

INTRODUCTION

- OCCURS DURING PRE-PREPARATION, PROCESSING OR STORAGE
- COLOUR VARIES FROM PALE YELLOW TO BROWN TO BLACK DEPENDING UPON THE FOOD
- IS DESIRABLE/UNDESIRABLE
- DESIRABLE-DELICIOUS/ACCEPTABLE

TYPES

- **DESIRABLE/UNDESIRABLE**
- DESIRABLE-DELICIOUS/ACCEPTABLE
- CONTRIBUTE TO FLAVOR, AROMA, COLOUR
- EXAMPLES-BROWNING OF CRUST, BAKED GOODS,POTATO CHIPS,ROASTED NUTS,ROASTED COFFEE.
- **UNDESIRABLE**
- SEEN IN MILK POWDER, EGGS,DRY FRUITS,CUT FRUITS,CANNED MILK
- OFF ODOUR AND OFF COLOUR OCCURS

- NB: EVEN IN CASE OF DESIRABLE BROWNING CONTROLLED BROWNING IS NECESSARY

CLASSIFICATION

ENZYMATIC BROWNING

- COLOUR CHANGES OCCUR IN FRUITS AND VEGETABLES DUE TO THE PRESENCE OF ENZYMES
- MOSTLY HAPPENS IN CUT FRUITS AND VEGETABLES
- APPLES, BANANAS, BRINJALS, POTATOES

NON-ENZYMATIC BROWNING

1. MAILLARD REACTION

- PROTEIN SUGAR INTERACTION
- LEADS TO FORMATION OF AROMA, COLOUR AND FLAVOUR OF GRAINS, CEREALS, BAKED GOODS

2. CAMELISATION

UNDER CONTROLLED TEMPERATURE EG IN CAMEL CUSTARD IT LEADS TO DERIRABLE FLAVOR , WHEREAS IF BURNT IS UNDESIRABLE

TYPES

- **ASCORBIC ACID BROWNING:** FRUITS CONTAINING ASCORBIC ACID EG. STRAWBERRIES STORING FRUITS AT LOW TEMP CAN HELP PREVENT IT
- **LIPID BROWNING:** OCCURS IN HIGH FATTY ACIDS WITH PROEINS EG. WHITE FISH

PREVENTION OF BROWNING

BY INACTIVATING ENZYMES

- APPLICATION OF HEAT: BLANCHING, AS ENZYMES ARE PROTEINS HEAT DENATURES THEM
- APPLICATION OF SALT: BY IMMERSING FOOD IN BRINE, BUT TEMPORARY AS MORE IMMERSION MAY LEAD TO UNPALATABILITY
- LOWERING PH: ASCORBIC ACID/CITRIC ACID ACT AS ANTI-OXIDANTS
- CHILLING FOOD SLOWS DOWN ENZYMATIC ACTIVITY

BY AVOIDING CONTACT WITH OXYGEN

- COATING FRUITS WITH SUGAR/SUGAR SYRUP
- IMMERSING VEGETABLES IN WATER (BOILING WATER IS PREFERRED AS IT REMOVES WATER OXYGEN)
- VACUUM PACKING

SULPHURING

- FRUITS TREATED WITH SULPHUR FUMES
- APPLYING SO₂ GAS HELPS
- SULPHUR IS A STRONG REDUCING AGENT THEREBY PREVENTING BROWNING