Unit Operations in Food Processing

FST 201 (3-0)

Contents

- *Introduction: Materials handling*
- *Energy and Mass balance: Heat transfer fundamentals conduction, convection and radiation.*
- *Preparatory Operations: Receiving, Cleaning, Sorting, Grading, Peeling, Size reduction, Crystallization*
- *Types of mixers*
- *Centrifugation*
- *Homogenization*
- *Bleaching*
- *Deodorization*
- *Extraction*

- *Grinding*
- *Mechanical separation Techniques: Screening, Filtration, centrifugal filtration, Filtration based on motion of particles through sedimentation.*
- *Transport of Fluids through pipes: Laminar flow and turbulent flow*
- *Darcy's Law: permeability, porosity*
- *Solid liquid Extraction*

Recommended Books

- *Earle, R.L. 2013. Unit Operations in Food Processing. Second Edition. Elsevier publisher.*
- *McCabe, W.L., Smith, J.C and Harriott, P. 2005. Unit operations of chemical engineering. McGraw Hill Inc., New York, USA.*
- *Earle, R. L., and Earle, M.D.2004. Unit Operations in Food Processing. The New Zeland Institute of Food Science and Technology.*
- *Jeankopolis, C.J. 2004. Transport processes and separation process. Prentice Hall Professional Technical Reference New Jersey, USA.*
- *Gustavo A and Barbosa-Canovas V. 2002. Unit operations in food engineering. CRC Press, Boca Raton, Florida U.S.A*
- *Singh RP and Heldman DR. 2001. Introduction to food engineering, 3rd ed. Academic Press, New York, U.S.A.*

Introduction

- Unit Operations

“ A step or work done which mainly results in physical change or apparent nature of food product”

Examples:

cleaning, size reduction, extraction

Food Processing

- Set of methods or techniques used to transform raw materials into food or food into other form

Example

Tomatoes  Tomato ketchup

Reasons to perform Unit Operations

- To minimize the losses
- To utilize the product maximally
- To increase the profit
- To meet the consumer requirement

Materials Handling

The material handling process involves the

- Movement
- Protection
- Storage and control of materials.

This handling process occurs in manufacturing shop floors, warehousing, distribution, and even in material disposal.

This is why material handling is an important process in every facility.

Benefits

- The use of several types of material handling systems in food processing units brings several benefits.

These include;

- Substantial saving of *storage*
- *Space better stock control*
- *Safe conveyance* of products between production lines
- Lower risk of accidents and reduced processing time

Examples

- Fruits and vegetables
- Meat
- Grains