GLOSSARY OF TERMS

Chemical Terms:

Amino acid: organic compound composed of C, N, O which is the building block for proteins

Carbohydrate: hydrate of carbon and hydrogen (CH₂O) including sugars, starch and polysaccharide

Lipids: fats or oils, contain water insoluble components

Lipid Oxidation: reaction of unsaturated fat with oxygen to produce undesirable flavors

Maillard browning: reaction of reducing sugars with amino groups to form brown colors. Also produces a wide range of flavorful compounds that can have positive or negative effects on flavor acceptance.

Non-enzymatic browning: chemical reaction (not catalyzed by enzymes) that produces a brown color in food - Maillard browning is an example

Rancidity: there are two types, which can lead to confusion -
oxidative rancidity: see lipid oxidation. Most of the food industry uses the term rancidity to mean oxidative rancidity.

hydrolytic rancidity: hydrolytic cleavage of triglycerides to yield free fatty acids - associated with off flavors in dairy products. When dairy people speak of rancidity they generally mean the off flavor resulting from lipolysis. They use the term oxidized or tallowy to denote oxidative rancidity.

Cleaning and Sanitizing terms:

Chelation: complexing of metal ions with an organic compound - used to remove calcium and magnesium salts from water (water softening)

Chloramine: an organic chlorine compound used as a sanitizer in the food industry

CIP (cleaned in place): Circulation cleaning of food plant equipment without taking it apart.

COP (cleaned out of place): Circulation of equipment parts in a tank washer after dissemble. Generally the parts are placed in a tank and the parts are cleaned by circulation of the cleaning solution in the cleaning tank.
Emulsification: dispersion of oil in water (or water in oil) generally requiring the adsorption of a molecule with solubilities in both (emulsifier) to achieve the dispersion

Iodophor: a complex of iodine and an anionic surfactant to provide a sanitizer that is second in effectiveness to chlorine

Peptizing: hydrolysis of the peptide bond

Saponification: chemical hydrolysis of glycerides by the action of heat and sodium hydroxide

Sequestration: conversion of insoluble salts (Ca/Mg) into soluble complexes through the addition of inorganic sequestrants - such as phosphates.

Surfactants: a compound that reduces the surface tension of water

Sanitizing: reducing the microbial population on the surface of equipment to a level where they do not contaminate the product

Sterilizing: complete elimination of bacterial from the surface of equipment

Quaternary ammonium germicide: a chemical compound used as a sanitizer, but not as effective as chlorine or iodine
Soil: organic and inorganic deposits on equipment surfaces - may contain carbohydrates, proteins, fats/oils and/or mineral salts (primarily di-valent cations)

Wetting: reducing the surface tension of the surface of soil to improve cleaning efficiency

Engineering terms:

Drying: removal of free water from a product - which may be accomplished by sun drying, oven drying, spray drying or freeze drying.

Unit Operations: A single operation which is defined by physical principles:

Fluid flow: the unit operation of moving liquid from one place to another.

Heat transfer: the movement of energy in the form of heat into or out of a product. can be heating or cooling including boiling and freezing.

Mass transfer: the transfer of mass into or out of a food system, generally requiring a change in state. Does not refer to moving a product from one place to another. example: removal of
water during drying; removal of whey from curds during cooking.

**Mixing:** production of a homogenous mass.

**Separation:** separation of components on the basis of size, density, etc.

**Size adjustment:** reducing the size of particles in the food - such as by grinding, cutting or slicing.

**Unit Process:** A combination of unit operations, generally encompassed in the single piece of equipment, to achieve a specific objective in food processing; examples: Spray drying - combination of fluid flow, heat transfer and mass transfer; Pasteurization - combination of fluid, flow and heat transfer; Evaporation – combination of fluid flow, heat transfer and mass transfer

**Physical Terms:**

**Colligative property:** a physical property that is dependent upon the number of molecules in the product, rather than the type of molecule - dictates freezing point depression, boiling point elevation.
Boiling point elevation: increase in boiling point over that of water and dependent on the number of molecules in solution - important in drying and evaporation.

Freezing point depression: a colligative property dependent upon the number of molecules present and is the degree to which the freezing point is lowered in respect to water - important in the processing of frozen desserts and frozen foods.

Glass transition temperature: is the temperature at which a food product changes from a rubbery state to a solid glassy state.

Newtonian: term used to describe the viscous behavior of a fluid - where the viscosity is independent of both time and shear stress.

Non-Newtonian: describes a fluid where the viscosity changes as a function of either shear stress or time.

Viscosity: a measurement of the resistance of flow of a fluid product

Water activity: an expression of the free water content of a food and expressed as the relative humidity of the product - important in defining chemical changes in food and in determining the ability of microorganisms to grow in food.
Processing equipment terms:

**Centrifugal pump:** The rotation of an impeller forces the product into and out of the pump cavity - in which the fluid is accelerated centrifugally until it attains the tangential velocity close to the impeller tip. The flow is controlled by the choice of impeller diameter and rotary speed of the pump drive.

**Clarifier:** generally a disc-type centrifuge that employs forces of 5 to 10 thousand times gravity and forcing the denser material to the outside.

**Cream separator:** a disc type centrifuge in which the fluid is separated into low and high density fluid streams that permits the separate collection of cream and skimmilk.

**Evaporator:** a heated chamber under vacuum in which product is introduced and water vapor is "flashed Off". The water vapor is then cooled to condense it to water and removed from the system. The product is concentrated within the chamber until it reaches the desired solids content.

**Freeze dryer:** frozen product is placed in a high vacuum environment and water is removed by sublimation.
**Homogenizer:** a high shear positive pump that forces fluid though a very small orifice at very high pressure to form or reduce the size of an emulsion. The positive pump uses pistons or rotary lobes. The fluid forms the seal between the rotating parts.

**Hydraulic cooker:** a continuous sterilizer, where the cans are rotating during the sterilization process

**Microfiltration (MF):** a membrane process similar to UF, but with larger pores in the membrane than for UF - used to remove bacteria from fluids such as milk

**Multiple effect evaporators:** 2 or more evaporators placed in series to provide a means for the continuous concentration of a fluid product.

**Pasteurizer:** equipment which provides a means of heating the product at a specific temperature for a specific time to kill all but the most heat resistant pathogenic organisms

**HTST (high temperature short time):** used to define a continuous method of pasteurization, which for milk is 161.5°F for 15 seconds. Times and temperatures for other products varies as a function of their viscosity.
UHT (ultra-high temperature): used to define a very short time pasteurization or sterilization process when the temperature exceeds 190°F.

Plate heat exchanger: A heat exchanger constructed of plates so that the heating medium and product are located on opposite sides of the same plate and flow in counter-current.

Positive pump: Consists of a reciprocating or rotating cavity between two lobes or gears and a rotor. Fluid enters by gravity or a difference in pressure and the fluid forms the seals between the rotating parts. The rotating move of the rotor produces the pressure to cause the fluid to flow.

Reverse osmosis (RO): a membrane process than removes very small molecules, such as water - used to concentrate fluids as an alternative to evaporation

Still Retort: A type of batch sterilizer used for canning food, where the cans are not in motion during the sterilization process

Spray dryer: Equipment where product is sprayed into heated air to remove moisture

Sterilizer: Equipment used to eliminate all microorganisms in the food
**Tubular heat exchanger:** Two or more tubes are placed inside of each other, so that the heating media and product are flowing in opposite directions.

**Ultrafiltration (UF):** a membrane process which separates on the basis of size - used to concentrate proteins from small molecular weight soluble compounds

**Product Abbreviations:**

**FDM:** not fat dry milk

**SS (serum solids):** generally used in ice cream formulation calculations; the solids in milk that are not fat

**SNF:** solids not fat in dairy products

**WPC:** whey protein concentrate (whey protein content >34%)

**WPI:** whey protein isolate (whey protein content > 90%)