Glossary

Adenosine triphosphate (ATP): Adenosine with three phosphates attached to the 5′ carbon of ribose. ATP is a coenzyme and one of the cell's energy currencies.

Amphipathic: "Hating both"-a molecule with a hydrophobic region and a hydrophilic region is said to be amphipathic.

Anomers: Anomers are stereoisomers of cyclized monosaccharide molecules differing only in the configuration of the newly created center of chirality arising from the cyclization.The carbon of a newly created center of chirality arising from the cyclization of a sugar is called an anomeric carbon.

Anti-oxidants: Substance that reduces oxidative damage by scavenging free electrons.

Caramelization: Caramelization is the process of removal of water from a sugar (such as sucrose or glucose) followed by isomerization and polymerization steps.

Cell wall: The rigid, outermost layer of the cells of plants, some protists and most bacteria.

Cellulose: The chief component of the cell wall in the green plants, some algae and a few other organisms; an insoluble complex carbohydrate formed of microfibrils of glucose molecules.

Chitin: A tough, resistant, nitrogen-containing polysaccharide that forms the cell walls of certain fungi, the exoskeleton of arthropods, and the epidermal cuticle of other surface structures of certain other invertebrates.

Crystallization: Crystallization refers to the formation of solid crystals from a homogeneous solution. It is essentially a solid-liquid separation technique and a very important one at that.

Dietary Fibre: Dietary fibers are the indigestible portion of plant foods that move food through the digestive system and absorb water. Dietary fiber consists of nonstarch polysaccharides such as cellulose and many other plant components such as dextrins, inulin, lignin, waxes, chitins, pectins, beta-glucans

and oligosaccharides.

Epimers: They are those isomers which differ from each other in the configuration around a single specific carbon other than anomeric carbon atom. Glucose differs from galactose with regard to carbon 4 in arrangement of –OH group; similarly glucose & mannose are C2-epimers.

Eukaryotic: Organism whose cells contain distinct nuclei and other organelles; includes all known organisms except prokaryotes (bacteria and cyanobacteria).

Fat: Triacylglycerol (triglyceride) that is solid at room temperature. In contrast, oils are liquid at room temperature.

Gelatinization: Formation of a water-retentive gel by expansion of starch granules when heated in moist conditions. Starch swells up by heating and continues to absorb water and showing more viscosity and clarity along with increase of temperature and then will reach to maximum viscosity.

Glucose: Hexose monosaccharide. Glucose is the commonest sugar in the blood and is the dominant cellular fuel in animals, being used in glycolysis to generate ATP and pyruvate, the latter fueling the Krebs cycle.

Glyceride: Compound formed by attaching units to a glycerol backbone. Triacylglycerols (previously called triglycerides) and phospholipids are glycerides.

Glycerol: $CH_2OH\text{-}CHOH\text{-}CH_2OH$. The backbone to which acyl groups (fatty acid chains) are attached to make triacylglycerols and phospholipids.

Glycogen phosphorylase: Enzyme that releases glucose-1-phosphate monomers from glycogen. The glucose-1-phosphate is then converted to glucose-6-phosphate, which can be used in respiration or dephosphorylated to glucose for release into the blood.

Glycogen: Glucose polymer that can be quickly hydrolyzed to yield glucose; an $\alpha 1 \rightarrow 4$ polymer of glucose with $\alpha 1 \rightarrow 6$ branches.

Glycolysis: Breakdown of glucose to pyruvate.

Glycosidic bond: Bond linking monosaccharide residues in which the carbon backbones are linked through oxygen and a water molecule is lost.

Glycosylation: Addition of sugar residues to a molecule. Both proteins and lipids can be glycosylated.

Hydrocarbon tail: Long chain of carbon atoms with attached hydrogens found in phospholipids and triacylglycerols. The tail represents all of a molecule of fatty acid except the carboxyl group.

Hydrocolloids: A hydrocolloid is defined as a colloid system wherein the colloid particles are dispersed in water. A hydrocolloid has colloid particles spread throughout water and depending on the quantity of water available can take on different states, e.g., gel or sol (liquid). Hydrocolloids are thickening, gelling and stabilizing agents, which play a major role in numerous food and beverage products.

Hydrophilic: Molecule or part of a molecule that can interact with water.

Hydrophobic effect: Tendency of hydrophobic molecules or parts of molecules to cluster together away from water, such as hydrophobic amino acid residues in the center of a protein, or the fatty acid chains in lipid bilayers.

Hydrophobic: A molecule or part of a molecule that will associate with other hydrophobic molecules in preference to water.

Hydroxyl group: -OH group. The term is specifically *not* used for an -OH that forms part of a carboxyl group —COOH.

Inversion: A mixture of equal parts of glucose and fructose resulting from the hydrolysis of sucrose. It is found naturally in fruits and honey and produced artificially for use in the food industry. is important in the manufacture of sugar confectionery, and especially boiled sweets, since the presence of 10- 15% invert sugar prevents the crystallization of sucrose.

Ketone: Any chemical containing a carbon atom with single bonds to two other carbons and a double bond to an oxygen. Acetone (CH3—CO—CH3) and acetoacetate (CH3—CO— CH2—COO–) are ketones.

Lactose Intolerance: Lactose intolerance is an inability to digest and absorb lactose (the sugar in milk) that results in gastrointestinal symptoms when milk or products containing milk are drunk or eaten.

Lactose: Disaccharide comprising galactose linked to glucose by a $\beta 1 \rightarrow 4$ glycosidic bond.

Lipid Bilayer: Two layers of lipid molecules that form a membrane.

Maillard Browning: The Maillard reaction is a chemical reaction between an amino acid and a reducing sugar, usually requiring heat. Like caramelization, it is a form of non-enzymatic browning. The reactive carbonyl group of the sugar reacts with the nucleophilic amino group of the amino acid, and forms a variety of interesting but poorly characterized molecules responsible for a range of odors and flavors.

Modified Starch: Modified starch are normal natural starches that have been altered chemically or physically to assist in the food processing industry. They can be crossbonded, esterified or converted by acids or enzymes to have greater viscosity, clarity etc. They have used in canning, instant puddings, frozen foods etc.

Monomer: Single unit, usually used to refer to a single building block of a larger molecule.

Monosaccharide: Sweet-tasting chemical with many hydroxyl groups that can adopt a form in which an oxygen atom completes a ring of carbons. All the monosaccharides in this book have the general formula Cn(H2O)n where n = 5 (pentoses) or 6 (hexoses).

Mutarotation: Mutatrotation is the term given to the change in the specific rotation of a cyclic monosaccharide as it reaches an

equilibrium between its α and β anomeric forms.

Nonpolar: Covalent bonds in nonpolar molecules have electrons shared equally so that the constituent atoms do not carry a charge.

Pectin: Polysaccharide component of the plant cell wall; the amount of pectin in the cell wall determines its thickness.

Pentose: Monosaccharide with five carbon atoms.

Polar: Having covalent bonds in which the electrons are unequally shared, so that atoms have partial charges. Polar molecules can interact with water by electrostatic interactions and by hydrogen bonding.

Polymer: Chemical composed of a long chain of identical or similar subunits.

Retrogradation: Some starch gels may lack stability and slowly exude water through the gel surface. Although amylose is soluble in the hot gelatinized starch mixture, it tends to become insoluble in the cooled mixture. This phenomenon is called retrogradation and it occurs when the amylose chains bind together in helical and double helical coils. Retrogradation affects the texture of the food product and it also lowers the digestibility of the product.

Ribose: Pentose sugar used to make the nucleotides that form RNA.

Syneresis: The separation of liquid from a gel caused by contraction of gelling agents.