Learning Objectives

• Describe structure and function of carbohydrates

• Explain and describe the different types of carbohydrates

• Describe and give examples of enantiomers
Monosaccharides

• The fuel for metabolism
• Used as both energy source and for biosynthesis
• Stored in the liver and muscle cells
L and D Glucose

- L and D: mirror images
  Optical isomers
  same molecular formula
  different spatial arrangements of atoms

- Configuration (arrangement of elements) is called Fischer’s configuration (named after Emil Fischer)

- D glucose: most common hexose
  found in fruits, corn syrup, honey
  “blood sugar”
Anomers

- Cis ($\beta$) the OH molecules is on the same side as the CH$_2$OH atom
- Trans ($\alpha$) the OH molecule is on the opposite side of the CH$_2$OH atom
- The $\beta$ and $\alpha$ forms are anomers of each other
- Anomers: special type of diastereoisomers applies to molecules is in the cyclic form
Disaccharides

Table sugar - most common sugar in all plants.

Sugar cane and beet, are up to 20% by mass sucrose.

Disaccharide of α-glucose and β-fructose.
Disaccharides

Disaccharide molecules are joined by **Glycosidic bonds**

Covalent bond

dehydration reaction (removal of $\text{H}_2\text{O}$ molecule)
Benedict’s Test

Detected by ability to reduce Cu$^{2+}$ $\rightarrow$ Cu$^+$ with Benedict’s reagent (Blue$\rightarrow$red orange)

Test for glucose in the blood: solution (Benedicts reagent) changes from blue to orange
Soluble Fiber

Functions of Soluble Fiber

- bind with fatty acids
- prolong stomach emptying time so that sugars are released and absorbed more slowly

Benefits of Soluble Fiber

- lower total cholesterol and LDL cholesterol (the Bad cholesterol) therefore reducing the risk of heart disease
- regulate blood sugar for people with diabetes

Food Sources of Soluble Fiber

- Oat/Oat bran
- Dried beans and peas
- Nuts
- Barley
- Flax seed
- Fruits such as oranges and apples
- Vegetables such as carrots
- Psyllium husk