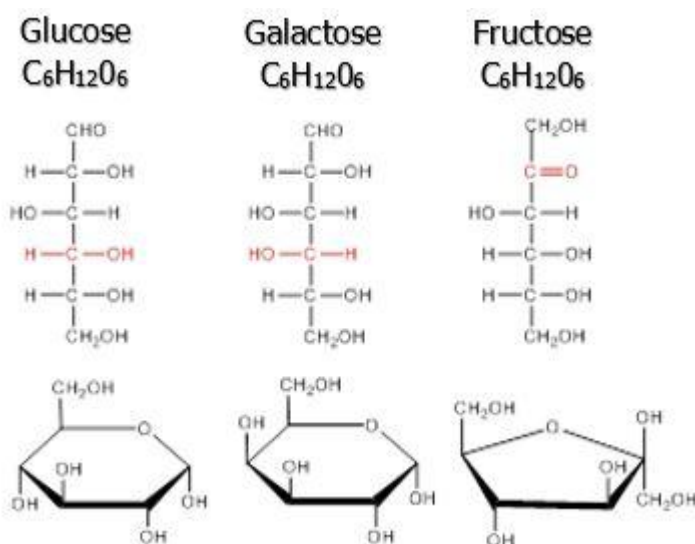


### 3.3.1

## Monosaccharides

Monosaccharides (mono = one, saccharide = sugar) are the basic subunits of carbohydrates. They contain from 3–7 carbons and have the general formula of  $(\text{CH}_2\text{O})_n$  where  $n$  ranges from 3–7 (5 or 6 being the most common). For example, if  $n = 6$ , the formula for the monosaccharide would be  $\text{C}_6\text{H}_{12}\text{O}_6$ . Please note that the ratio of carbon to water ( $\text{H}_2\text{O}$ ) is 1:1 in a monosaccharide, giving credence to the name carbohydrate. Note also that monosaccharides contain a significant amount of oxygen. Carbohydrates have the highest oxygen to carbon ratio of any of the important organic molecules. Monosaccharides contain multiple hydroxyl functional groups and always on carbonyl functional group. These oxygens can increase the solubility of carbohydrates in water (due to the increased number of polar covalent bonds).

Common monosaccharides include **glucose, fructose, galactose, ribose, and deoxyribose**. Notice that the name of each of these sugars ends with the suffix -ose. This suffix, -ose, means full, specifically full of oxygen. The names of most sugars will end with this suffix. The structures of three common dietary monosaccharides are shown in the figure below. Note that the molecules can exist in two different forms. When they are in a dry or powdered state, they exist as a linear molecule (top), but when dissolved in water, they adopt a ringed form with oxygen being one of the members of the ring (bottom).



*Linear and Ring Structure of Isomers of  $\text{C}_6\text{H}_{12}\text{O}_6$ . Image created by MG 2013*



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