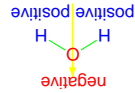


## Sugar Water - Outline

- Properties of Water
- Hydrogen Bonds
- Freezing Point Depression
- Boiling Point Elevation
- Definitions
- Sugar Water Solutions

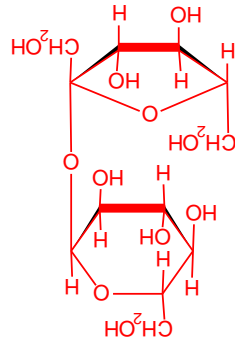
## Polarity

Water molecule is **Polar** (partial charges)



- Since Opposite charges attract, attracted to other polar molecules
- Strong water-water attraction means high boiling point
- Good solvent: Other polar molecules dissolve in water

## Sucrose



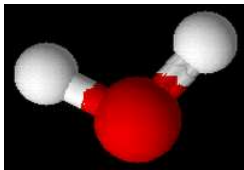
Sugar contains large number of O-H bonds.  
Good Hydrogen bonding with water.

## Hydrogen Bonds

Hydrogen bonding

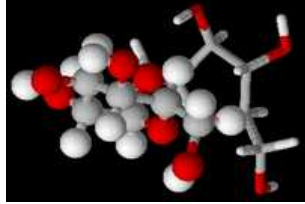
- Attraction between molecules
- Molecules must contain either O-H or N-H
- Increases boiling point of pure substance
- Increases solubility of molecules in water

## Properties of Water



- Structure H-O-H
- Geometry is bent

## Sucrose



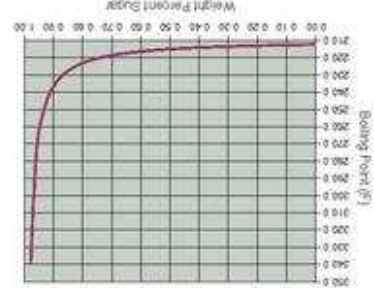
Ball-&-Stick images of sucrose and water.



- Definitions - cont.**
- Concentration: Measure of how much solute in a solution
  - Precipitate: Solid that 'falls out' of a solution
  - Crystallization: Crystalline precipitate

- Definitions**
- Solute: Stuff to dissolve (sugar)
  - Solvent: Substance solute is dissolved in (water)
  - Solution: Solute + Solvent (sugar water)
  - Soluble: Solute dissolves in solvent
  - Insoluble: Solute doesn't dissolve (much) in solvent
  - Saturated: A solution that contains maximum amount of solute

- Freezing Point Depression**
- Addition of solute to a solvent lowers freezing point.
- Salt on roads in winter
  - Heath Bars in Ice Cream ;)



**Sugar in Water**

- Sugar dissolves readily in water (polar, H-bonds)
- Boiling point increases with increased sugar

- Boiling Point Elevation**
- Addition of solute to a solvent raises boiling point.
- Salt water
  - Sugar water solutions

| Candy          | Boiling Point (°F) | b.p. (°C) |
|----------------|--------------------|-----------|
| Candy          | 230-234            | 110-112   |
| Syrup          | 235-240            | 113-116   |
| Fudge          | 244-248            | 118-120   |
| Caramel        | 250-266            | 121-130   |
| Divinity, rock | 270-290            | 132-143   |
| Taffy          | 300-310            | 149-154   |
| Brittle        |                    |           |

**Candy**