## Food processing an preservation 125

Lab schedule (boys-Thursday)

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[1] Food Solutions

Any solution consists from two material, solvent and solute. In general, we refer to the substance, which present in greatest proportion in the solution as “solvent” while all the other substances in the solution are considered as “solute”

\[ \text{SOLUTION} = \text{SOLVENT} + \text{SOLUTE} \]

It is often necessary to express the proportions of the solute and solvent in any solution. Specifying the concentration of the solution does this.

Concentration:

1. Molar concentration:

   Is defined as the number of moles of solute per liter solution, or one molecular weight by gram in one-liter solution.

2. Percent concentration:

   Is defined by two ways, by weight or volume. 10% mean that 10 gm solute and 90 ml solvent (volume).

Solution types:

[Handwritten notes]
1. Saturated solutions: which contains as much dissolved solute as it can hold.

2. Unsaturated solutions: which contains less solute than the amount required for saturation.

**Food Solutions**

[A] Salt solution

Sodium chloride is the most commonly used in food industries especially, in canning, pickles, fish, etc, it should be noted that table salt (NaCl) is considered preservative chemical substance. It is extracted and refined from the sea.

[B] Sugar solution:

A number of sugars may be used in preparing the solutions such as:

1. Sucrose: it is the ordinary table sugar derived from sugar cane and beets. It is disaccharide (glucose + fructose).
2. Glucose: it is the simplest sugar found in foods especially in fruits and it is derived from the starch.
[2] Hydrometers

The instrument commonly used in measuring the concentration of food solutions is known as the Hydrometer. There are many types of hydrometers:

1) Brix:

Which gives the percentage of sugar in the solution. It is graduated from up to down on the specific temperature.

2) Baume:

It is used for measuring the concentration of salt in the solution. It was graduated from up to down on the specific temperature.

3) Salometer:

It is used for measuring the saturation of salt solutions. Also, it was graduated from up to down on the specific temperature.

4) Trale's:

It is used for measuring the concentration of alcohol in the solutions. It was graduated from down to up on the specific temperature.
Refrigeration

The fresh vegetables and fruits are preserved by cold storage, in refrigerator. The preservation period of time is depend on many factors during the cold storage such as:

1. Temperatures.
2. Relative humidity.
3. Packaging systems.

Packaging of vegetables and fruits during cold storage is very important factor affecting the quality characteristics of these products.
[4] Freezing

In order to produce frozen foods of good quality care must be taken in all processing steps:

1. Selecting raw materials
2. Washing: it is necessary step for vegetables and fruits for the following purposes:
   [1] Removing soil or dirt

3. Preparation and grading: food must be prepared to the desired form for the freezing step and this depends on the type of raw food.
   Cut into desired shape and removing the outer parts ends of some food grading of raw foods may be done according to size or quality of raw foods.

4. Blanching: Many foods are given a hot water or steam in step known as the blanch for the following reasons:
   1. Removing raw flavors from some foods such as okra.
   2. Reduces the bacterial load of raw foods.
3. Improving the green color of raw vegetables.

5. Packaging:

6. Freezing: After packaging the product is placed in the freezer at specific temperature for required time until complete freezing. [-18°C]

7. Storing: store the frozen product at -20°C in the freezer.
[5] Pasteurization

Orange juice:

Pasteurization: at 80-85°C\5-10 min. in boiling water bath for killing the microorganisms and inactivate the enzymes cooling immediately in cold water bath.

Milk:
There are two ways in milk:
1. Low temperature 62.8°C\30 min.
2. High temperature 71.7°C\15 sec.
After the process the milk must be cooled to cooled to not more than 10°C.

Egg:

Bulk liquid egg is pasteurized at 64.4°C\2-5 min.
Followed by cooling to below 3.3°C.
Canning

1. Selection of raw foods
2. Washing
3. Preparation and grading
4. Blanching
5. Filling:
6. Addition of solution: sugar solution is added to fruits, while salt solution (1-2%) is added to vegetables.
7. Exhausting: to remove air from the container and to decrease the pressure during the heating, this step can be done by addition of hot solutions.
8. Thermal processing:
   - Acid foods [pH less 4.5] at 100\(^\circ\)C \(\times\) 20 min. in boiling water bath.
   - Non- and less acid foods [pH more than 4.5] at 121\(^\circ\)C \(\times\) 20 min. in a retort.

9. Cooling: after the thermal processing the containers are cooled immediately with cold water bath to about 38\(^\circ\)C.
10. Labeling and storing: after labeling and casing the containers are stored for 14 days before marketing to ensure the safety of the products.
[17] Drying

1. Selection of raw foods
2. Washing
3. Preparation and grading
5. Sulfuring: for all fruits and onions & garlic, by expositing to fumes of burning sulfur or solution of sodium metabisulfite (0.2-1.0%), the SO2 in dried food must be less than 2000 ppm. For:
   - Inhibition of enzymes.
   - Improve the color
   - Improve the storage stability
   - Prevent the oxidation of vitamins.

Some root vegetables are blanched and treated with SO2 like potatoes & carrots.

6. Spread on trays: the food pieces are placed on the tray by known weight per area, increasing the load reduces the drying rate.
7. **Drying**: set the drier at 70-90°C depending on the type of foods until the final moisture content of 5% for vegetable and for 25% in fruits.

8. **Packaging**: after drying, weight the product and packaged in bags and stored.