**DETERMINATION OF MOISTURE**

Moisture content is one of the most commonly measured properties of

food materials. It is important to food scientists for a number of different reasons:

* Legal and Labeling Requirements. There are legal limits to the maximum or minimum amount of water that must be present in certain types of food.
* Economic. The cost of many foods depends on the amount of water they contain - water is an inexpensive ingredient, and manufacturers often try to incorporate as much as possible in a food, without exceeding some maximum legal requirement.
* Microbial Stability. The propensity of microorganisms to grow in foods depends on their water content. For this reason many foods are dried below some critical moisture content.
* Food Quality. The texture, taste, appearance and stability of foods depends on the amount of water they contain.
* Food Processing Operations. A knowledge of the moisture content is often necessary to predict the behavior of foods during processing, e.g. mixing, drying, flow through a pipe or packaging.

**It is therefore important for food scientists to be able to reliably measure moisture contents. A number of analytical techniques have been developed for this purpose, which vary in their accuracy, cost, speed, sensitivity, specificity, ease of operation, etc. The choice of an analytical procedure for a particular application depends on the nature of the food being analyzed and the reason the information is needed.**

**Properties of Water in Foods**

The moisture content of a food material is defined through the following equation:

%Moisture = (mw/msample) 100

Where mw is the mass of the water and msample is the mass of the sample.

**In principle**:-

the moisture content of a food can therefore be determined accurately by measuring the number or mass of water molecules present in a known mass of sample. It is not possible to directly measure the number of water molecules present in a sample because of the huge number of molecules involved. A number of analytical techniques commonly used to determine the moisture content of foods are based on determinations of the mass of water present in a known mass of sample. Nevertheless, as we will see later, there are a number of practical problems associated with these techniques that make highly accurate determinations of moisture content difficult or that limit their use for certain applications. For these reasons, a number of other analytical methods have been developed to measure the moisture content of foods that do not rely on direct measurement of the mass of water in a food. Instead, these techniques are based on the fact that the water in a food can be distinguished from the other components in some measurable way.

the water molecules in a food may be present in a variety of different molecular environments depending on their interaction with the surrounding molecules.�

**The water molecules in these different environments normally have different physiochemical properties:**

* **Bulk water**. Bulk water is free from any other constituents, so that each water molecule is surrounded only by other water molecules. It therefore has physicochemical properties that are the same as those of pure water, e.g., melting point, boiling point, density, compressibility, heat of vaporization, electromagnetic absorption spectra.
* **Capillary or trapped water**. Capillary water is held in narrow channels between certain food components because of capillary forces. Trapped water is held within spaces within a food that are surrounded by a physical barrier that prevents the water molecules from easily escaping, e.g., an emulsion droplet or a biological cell. The majority of this type of water is involved in normal water-water bonding and so it has physicochemical properties similar to that of bulk water.
* **Physically bound water**. A significant fraction of the water molecules in many foods are not completely surrounded by other water molecules, but are in molecular contact with other food constituents, e.g. proteins, carbohydrates or minerals. The bonds between water molecules and these constituents are often significantly different from normal water-water bonds and so this type of water has different physicochemical properties than bulk water e.g., melting point, boiling point, density, compressibility, heat of vaporization, electromagnetic absorption spectra.
* **Chemically bound water**. Some of the water molecules present in a food may be chemically bonded to other molecules as water of crystallization or as hydrates, e.g. NaSO4.10H20. These bonds are much stronger than the normal water-water bond and therefore chemically bound water has very different physicochemical properties to bulk water, e.g., lower melting point, higher boiling point, higher density, lower compressibility, higher heat of vaporization, different electromagnetic absorption spectra.