Forms in which water is found in food materials

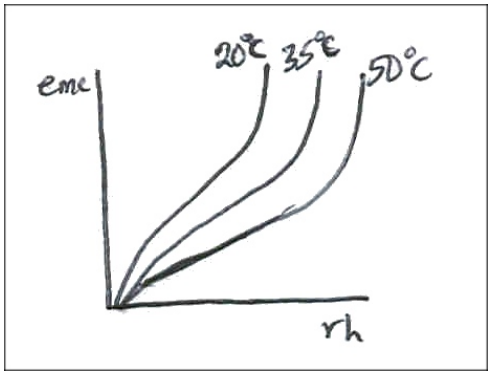
- Pure form as surface water. In this case , it is not part of the product but comes from external source
- Chemically bound to some salts either by its prime valence or as a hydrate. This is not expelled by the common method of food processing.
- Adsorbed as a very thin mono or poly – molecular layer in the internal or external surfaces of product by molecular forces or in fine pores by capillary condensation.
- Adsorbed by colloid substances and remain in a jell as of water of swelling due to its dipolar character.
- Present as a continuous phase, in which 0ther substances may be dispersed molecularly, colloid ally or as an emulsion.

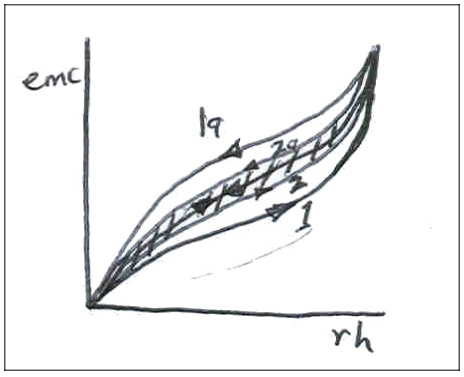
Equilibrium moisture content – moisture content at which the vapour pressure of the moisture present in a product is at equilibrium with the vapour pressure of the environment at constant temperature.

Relative humidity - Ratio of the moisture present in an environment at a given temperature and pressure relative to saturation \

Moisture isotherm -Relationship between the emc and rh at constant temperature.

It is a sigmoidal shaped curve of emc vs rh during sorption and desorption of biomaterials.





From the diagram, during sorption, the path of the curve is as shown as curve 1. It is expected that the curve will come back through the same path. However this doesn't happen in practice. Therefore curve 1a represent the desorption curve which shows that there a lagging effect called hysteresis (shaded portion) representing a lost in energy!. This effect is repeated with

repeated sorprtion and desorption with the energy lost reducing until the curve closes up and sorption and desorption follows the same path.

Fineness Modulus and Uniformity Index

Fineness modulus is the sum of the weight fractions retained in each of the seven sieves divided by 100. It indicates the average distribution of fines and coarse in a feed.

Uniformity index is a measure of the relative uniformity of of the different sizes of particles in a ground feed sample. It is expressed as a ratio of 3 figures which indicate the proportions of coarse, medium and fine particles in the feed.

Laboratory Determination of Fineness Modulus of a feed

Fineness Modulus is determined in the following way:
Weigh out 250g of ground feed and shake it through 7 sieves of Tyler sieve for 5min by means of ro –tap shaker or similar method. The mesh nos of the 7 sieves are 3/8, 4, 8, 14, 28, 48 and 100 as well as the pan at the bottom. The sieves are designated 1 – 7 starting from the smallest to the biggesti.e from 100 to 3/8 while the pan is designated as 0. Calculate the percentage of material on each screen and multiply it by the designated no. add up all and divide by 100. The result is known as F.M. of the feed.

EXAMPLES

(i) Below is a result of a sieve experiment using poultry feed.

Sieve Mesh	% of Material on each Screen
$^{3}/_{8}$	2
4	1.5
8	7.0

14	20.0
28	31.5
48	26.5
100	11.5
Pan	0

From this result, calculate the Uniformity Index. How can you describe the feed?

Coarse = (2 + 1.5 + 7.0)/10 = 1.05; approximately 1

Medium = (20 + 31.5)/10 = 5.15; approximately 5

Fine = (26.5 + 11.5 + 0)/10 = 3.8; approximately 4

Uniformity index = 1:5:4

From the above, the feed is between medium and fine.