



Estimation of water activity in food / seafood

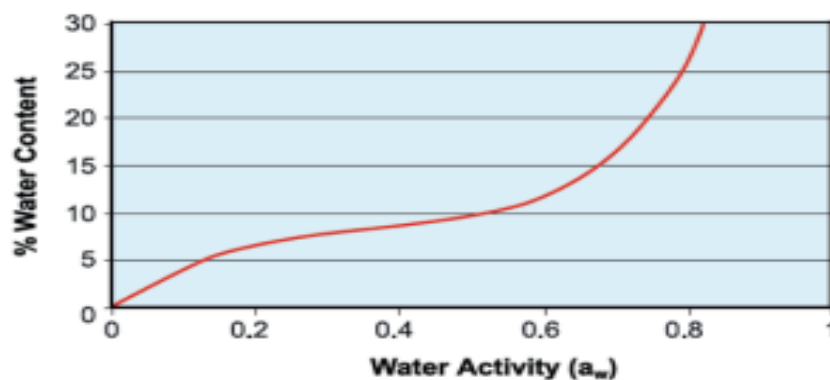
Introduction

Food spoilage means the original nutritional value, texture and flavour of the food are damaged, the food becomes harmful to people and unsuitable to eat. It is a metabolic process that causes foods to be undesirable or unacceptable for human consumption due to changes in sensory characteristics. As soon as a fish dies, spoilage begins. Bacteria will enter at a number of points, through the gills and into the blood vessels, through the lining of the belly cavity and eventually through the skin. In the flesh they can grow and multiply rapidly, producing disagreeable odours and flavours.

The Relationship between Water Activity and Moisture Content

Water activity in foods belongs to food science professionals for use in product development, quality control and food safety. It also became an important criterion for the evaluation and control of food safety and quality. Water activity is related to moisture content in a non-linear relationship known as a moisture sorption isotherm curve.

Picture: Sorption Isotherm



Cold Storage and Food Spoilage

Manifestations of food spoilage are many and varied, typically resulting in an off smell or taste. Generally food spoilage microorganisms are classified as yeasts, molds or bacteria. The spoilage flora, typical of diverse food commodities and products, is described in detail in recent publications by the International Commission on Microbiological Specifications of Foods.

Effect of water activity on fish spoilage:

Food designers use water activity to formulate products that are shelf stable. If a product is kept below a certain water activity, then mold growth is inhibited. This results in a longer shelf-life

Measure of Water Content

Gravimetric Method

Water content may be measured in food using a number of methods. The most basic of these are gravimetric methods. This involves drying a known quantity of the food product in an oven until all moisture has been evaporated. By measuring the dry matter content remaining, the water content can be determined. A vacuum oven can be used for heat sensitive foods.

Karl Fisher Titration

A more sophisticated method for the analysis of water content is the Karl Fisher Titration. The Karl Fisher titration is particularly adaptable to food products.

Analysis of Water Activity

A number of methods can be employed to measure the water activity including a resistive electrolytic, a capacitance or a dew point hygrometer.

Resistive electrolytic hygrometers

Resistive electrolytic hygrometers use a sensing element in the form of a liquid electrolyte held between two small glass rods by capillary force. The electrolyte changes resistance if it absorbs or loses water vapour.

Capacitance hygrometers

Capacitance hygrometers consist of two charged plates separated by a polymer membrane dielectric. As the membrane adsorbs water, its ability to hold a charge increases and the capacitance is measured.

Dew point hygrometers

The temperature at which dew forms on a clean surface is directly related to the vapour pressure of the air. Dew point hygrometers work by placing a mirror over a closed sample chamber.

The mirror is cooled until the dew point temperature is measured by means of an optical sensor. This temperature is then used to find the relative humidity of the chamber using psychometric charts. This method is theoretically the most accurate (± 0.003 aw) and often the fastest. The sensor requires cleaning if debris accumulates on the mirror.