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DETERMINATION OF MOISTURE CONTENT IN FOOD PRODUCTS

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Abstract
In this article, determining the moisture content in food products when evaluating product quality, the moisture content of products is an important indicator that affects safety, durability and other technological aspects. In practice, various methods are used to study meat and meat products using specialized equipment such as drying cabinets. Sample preparation (release from the shell, grinding to the desired size, mixing) is one of the important stages of testing. For examination, the samples are placed in a glass container with a crushed stopper. In food enterprises, as a rule, the mass fraction of moisture in the raw material of the product is controlled regardless of the form of its binding, i.e. humidity is determined. Humidity is expressed as a percentage. When determining humidity, the thermogravimetric method and the refractometric method are most often used.

Keywords: Food, product, storage, simash, standard, methods, GOST, production, etc.

Introduction

One of the most basic and important analyses of food products is the analysis of the quantitative determination of water. After removing the water from the food, the "total dry matter" remains. The amount of dry matter in food is inversely proportional to the ratio of water. As the amount of water increases, the moisture content of food decreases.

Reasons to look at the moisture content of food; these are important reasons, such as checking compliance with standards, determining its commercial value, determining its stability and shelf life, determining its nutritional value, and determining compliance with packaging and transportation conditions.

Measuring humidity and volatile substances is also important when determining the shelf life of products. With an increase in the moisture content in food, the activity of microorganisms also increases. However, chemical phenomena occur, such as non-enzymatic (non-enzymatic) darkening reactions.

The products with the highest moisture content use oven drying, infrared drying and distillation methods (for substances with essential oil). Only substances such as spices lose some of their weight because they lose water when determining humidity using an oven or infrared drying. Therefore, the distillation method is used in different ways.

The determination of moisture and volatiles is based on the calculation of losses by ensuring that food products are preheated to 105 °C and that moisture and volatiles are completely removed from the product. Moisture in food is contained in three different ways.

Relative humidity: Determined by protein and carbohydrate molecules in food or colloidal surfaces.

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Free water: This is the water between the cells, which can be removed by evaporation and drying.

Absorbed moisture: this is the water that is on the top surface of the food.

Water is the source of life. 2/3 of the human body consists of water. For example, the water content will be in the blood – 83%, in the brain-75%, in muscles-75%, in the skin-72%, in bones-22%. The animal's body consists of 70% water. A person cannot live without water for more than 2 days, and without food he can live for several weeks.

Water is involved in all biochemical processes occurring in a living organism. In the food industry, water can be used for technological purposes: water can be a raw material, food can also be in the composition of products. Water is used to produce solutions, extracts, syrups. Drinking water is the main component of human health.

Water penetrates into all food products and adapts to their consistency and structure, affecting their appearance, taste during storage and stability of products. Water is present in food in a "bound" and "free" state. " Bound" water is associated with various nutritional components-proteins, lipids and carbohydrates. Water in the "free" state binds to biopolymers and adapts to undergo hydrolytic processes.

The property of water elasticity. A decrease in volume with an increase in pressure is characteristic of the compressibility of water. In ordinary liquids, elasticity increases with temperature. At high temperature, the liquid is soft, has a low density, and is easily compressed. Water behaves the same way at a high temperature of 500C larda. However, at low temperatures from 0 to 450 c, the compressibility of water changes in the opposite position, as a result of which 450 c seems to be minimal. The isothermal compressibility of water at a temperature of 00C is 4 times greater than the isothermal compressibility of ice (Fig.3).

Temperature-dependent compressibility of water (Fig. 3)

During melting, the elasticity changes to a maximum. We compare the elasticity of water and ice with the elasticity of other substances. Hydrogen bonds in their composition are characteristic of changes in the compressibility of water and ice.

Compressibility of substances in the range from 5 to 300 s

T. oS Bs . 1012, Din/cm2

water methanol gasoline

5 51.6 - 84.2

10 48,7 114,9 88,5

15 - 118,8 92,2

25 46,6 122,7 95,6

30 45,8 131,0 103,1

As can be seen from this example, the temperature-dependent maximum and minimum curves characterize the water as unpretentious. Such curves indicate the presence of two opposites. The first process is thermal motion. As the temperature rises, this movement increases and the water becomes disorganized. The second process takes place only at low temperature and becomes orderly.

Another powerful property of water is the dependence of heat capacity on temperature. The heat capacity shows how much heat is required to increase the temperature of a substance by one degree. When the substance is heated, the heat capacity increases, the heat capacity of water

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decreases with an increase in temperature from 00C to 370C and increases from 370C to 1000C. The heat capacity of water vapor is approaching the heat capacity of ice. The minimum heat capacity of the water will be about 370C. This temperature is considered normal for the human body (36.6 °C 370 C). It is at this temperature that complex biochemical processes occur in the human body, which means that the conditions are most favorable from an energy point of view.
The heat capacity of a substance in three aggregate states
Aggregate state heat capacity of the substance (Sor, cal/mol)
N2O NH3 CH4 HCl H2 Hg Na
Gas 8,7 9,9 ... 6,7 6,9 ... 5,0
Liquid 18.0 12.0 11.0 12.0 11.0 6.8 7.6
hard 9.0 9.0 14.0 15.0 13.0 6.7 8.0
When ice melts, the heat capacity changes twice, a large change in such melting is not observed in any substance. The heat capacity of ice is less remarkable, it is close to the heat capacity of monatomic crystals and is equal to the heat capacity of solid ammonia. In the process of melting metals, the heat capacity practically does not change. However, when melting polyatomic molecules, the heat capacity decreases. This condition is explained by the fact that molecules can move in a liquid, but not in an icy state. Thermal motion in liquids can also be determined by thermal conductivity. changes in the thermal conductivity of water, depending on temperature, are given.

Molar volume of water and temperature dependence of ice.
For comparison, changes in the thermal conductivity of ccl4 are shown. SL4 is also similar to an ordinary liquid, with increasing temperature, the thermal conductivity decreases and the heat capacity increases. as it turned out, the thermal conductivity of ice decreases fourfold during melting. The change in the thermal conductivity of supercooled water is similar to the change in the thermal conductivity of ordinary water. Another remarkable property of water is that in its free state it acquires a spherical shape (raindrop, dew).
Another property of water is humidity. In ordinary liquids, humidity decreases with increasing pressure, decreases with increasing temperature. The change in water humidity will be different. Figure 5 shows the dependence of humidity N2O and SS ≤ 2 on temperature.
The dependence of humidity N2O and SS ≤ 2 on temperature Fig.6. Dependence of humidity on pressure
As can be seen from the figure, the humidity of Ssc4 is less than that of water up to a temperature of 230C. And for high temperatures, there are a lot of them compared to water. The dependence of humidity on pressure for different temperatures is shown in Figure 6. From this it can be seen that at low temperatures, when the pressure increases to 2000 atm, the water humidity decreases and then begins to rise.
The humidity of 1 g of dry matter is determined by the mass fraction of water and is expressed mainly in (%) percentages. The moisture content of food varies.
Fruits, vegetables 70⁄95
Beer, juices 87...90
Eggs 70⁄80
Cow's milk 85...89

Meat 60...75
Cheese 37...40
Bread 35...50
Jam 28...35
Cake 20...28
Flour 14.5...15
Starch 13/20
Honey 10/20
Butter 16...18
Cookies 6/9
Caramel 7/8
Chocolate 5/7
Milk powder 4...7
Egg powder 4...8.5

Humidity is an important indicator of the quality of raw materials and food products, determining their ability to persist for a long time without being damaged - acidification, mold formation, etc. In addition, the moisture content of raw materials is the main factor determining the yield of finished products from a certain amount of raw materials.

The moisture content of raw materials is most often determined by drying. There are many modifications of this method, which differ from each other in the duration and temperature of heating the sample of a whole or crushed sample, as well as the degree of its grinding. There may be cases when a product with an excessively high mass fraction of moisture is subjected to pre-drying before drying. To speed up drying, as well as for drying substances that easily decompose at temperatures above 100 ° C, the process is carried out at reduced pressure, which makes it possible to lower the temperature. For viscous materials (molasses, sugar syrup, etc.), drying is difficult due to the formation of a hard crust on the surface of the material. To facilitate and accelerate the drying process in such cases, fillers are used, when mixed with which viscous products become loose. Calcined quartz sand and filter paper rollers are used as fillers. All options used should ensure the possibility of the most complete dehydration of the product without significant loss of its solids.

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