

DETERMINATION OF FACTORS AFFECTING THE ACTIVITY OF WATER IN COSMETIC PRODUCTS

Perfume and cosmetic products currently occupy a significant place in human life. Recent market assessments of cosmetic products have shown the growth and development of this segment, which is confirmed by the expansion of the range, a special place in perfumes and cosmetic products are shampoos. Demand for shampoos today is formed, and in time will only increase.

Water is an important component of biological materials of plant and animal origin. It determines their consistency and structure and affects their shelf life. An important indicator of the state of moisture in the product is water activity, as it reflects the degree of participation of moisture in the processes occurring in the product. Water is a universal solvent, facilitates even distribution and easy application of cosmetics on the skin. In addition, water has moisturising properties and helps to maintain the skin's water balance. It helps retain moisture and prevents drying and dehydration of the skin. Water also helps to nourish the skin and improve its texture, making it soft and supple.

Water activity is one of the most important factors determining the quality and safety of food consumed on a daily basis. Water activity affects the shelf life, safety, texture, flavour and odour of food products. It is also important for the stability of pharmaceuticals and cosmetics. While temperature, pH and several other factors can influence how and at what rate (if at all) microorganisms will grow in a product, water activity may be the most important factor in controlling food spoilage [1].

Sodium chloride added to the shampoo formulation was considered as a factor affecting water activity. Measurements of ready shampoos, ready shampoos with fivefold addition of 0,003 per cent of sodium chloride were carried out.

When performing water activity measurements, a water activity analyser 'Roremeter RM-10' from NAGY Messsysteme GmbH. The operating principle of the analyser 'Roremeter RM-10' is based on the measurement of water activity (equilibrium relative humidity) of various products by the 'dew point' method. The sample in a plastic container is placed in the measuring chamber, which is tightly closed, forming an airtight compartment, and equilibrated inside the air space of the chamber. When the equilibrium state occurs, the relative

humidity of the air in the measuring chamber becomes equal to the water activity (equilibrium relative humidity) of the sample. The temperature of the mirror is determined by a Peltier thermoelectric element. The moment of the beginning of the condensation process on the mirror is controlled by an optical sensor of reflected light. The built-in fan mixes the air in the chamber and significantly reduces the time of equilibration of water vapour, ensuring the rapidity of the measurement method [1].

Analysing the graphs of dependence of water activity on the content of sodium chloride in shampoos, we can say that after the first addition of 0.003 % sodium chloride, water activity in all three shampoos decreased, as it usually happens when the concentration of dissociating substances increases. On subsequent addition of sodium chloride, the water activity increased, which may be due to the fact that the salt interacted with the surfactants to form micelles. Micelles are structures in which surfactants cluster around oil and mud particles to form an emulsion, which is reflected in the graphs of viscosity versus sodium chloride content.

When surfactants are added to a solution, they self-assemble into structures called micelles once a certain concentration, known as the critical micelle concentration, is reached. This allows for effective removal of impurities from the hair and scalp. The last time sodium chloride was added, the activity increased in shampoo №1, but began to decrease in shampoos 2 and 3.

The study allowed us to optimise the composition of the shampoo, which improved its characteristics and reduced the cost of components per batch of products by 0.33 rubles. Due to the optimisation of the shampoo formulation, by increasing the content of sodium chloride, which is a preservative and reduces the activity of water, preventing the development of bacteria and mould, which extends the shelf life of the shampoo. By increasing the content of sodium chloride, the viscosity of the shampoo is increased, as a result of which a comfortable shampoo consistency was obtained (the average viscosity of the shampoo is 10100 mPa-s). In addition, the shampoo has an enhanced fragrance composition, as it has been observed that after the addition of sodium chloride to shampoos, their fragrance is enhanced.

REFERENCES

1. Determination of water activity (equilibrium relative humidity) in foodstuffs and food raw materials using Roremeter RM-10: Measurement procedure. – Introduced 01.09.2006. – Belarusian State Institute of Metrology, 2006. –17 c.