STUDY OF THE KINETICS OF ALCOHOL SYNERSIS

Kaminskiy Oleksandr
Ph.D. in Chemistry, Associate Professor
alexkamin@ukr.net
Denysiuk Roman
Ph.D. in Chemistry, Associate Professor
denisuknet@ukr.net
Pysarenko Snizhana
Ph.D. in the field of knowledge "Chemical and Bioengineering", assistant
snezhunka1107@gmail.com
Panasiuk Dmytro
assistant
dima.panasuk261195@gmail.com
Department of Chemistry
Zhytomyr Ivan Franko State University, Ukraine

Gels are widely used in microbiological, sanitary-hygienic, and clinical laboratories for the preparation of nutrient media, for conducting some types of electrophoresis, immunoelectrophoresis, and for gel filtration. Polyacrylamide, agar and starch gels are used as carriers during electrophoresis in the laboratory diagnosis of such diseases as rheumatism, myocardial infarction, pneumonia, schizophrenia, thalassemia and others [1-2].

The process of gelatinization (gelation) of substances and solutions also plays an important role in the technology of production of artificial fiber, some explosives, confectionery, etc. [3].

Gels can undergo the process of aging or syneresis - the process of reducing the volume of the gel occurs while maintaining its shape, but part of the dispersion medium (solvent) is separated.

In order to establish the processes of syneresis of alcohol gels over time, gels were synthesized with a ratio of alcohol to gelling agent (2:1), respectively.

To construct the kinetic curves of syneresis, the change in volume of the initial gel was measured during 5; 10; 20; 30; 60; 90; 120 min from the moment of gel formation.

To determine the rate of syneresis, the formed gels of alcohols were evenly distributed with a spatula in a beaker and the initial volume of the gel was determined.

The rate of syneresis of alcohols (alcohol gels) was determined by the following empirical formula:

$$\upsilon = \frac{V_0 - V}{\tau}(ml/min),$$

where V_0 – is the initial volume of the gel, ml; V – gel volume during syneresis, ml; τ – syneresis time, min.

The degree of syneresis was calculated according to the following formula:

$$\alpha = \frac{V}{V_0} * 100\%$$

In fig. 1 shows the dependence of the gel syneresis rate of the corresponding alcohol from the moment of gel formation.

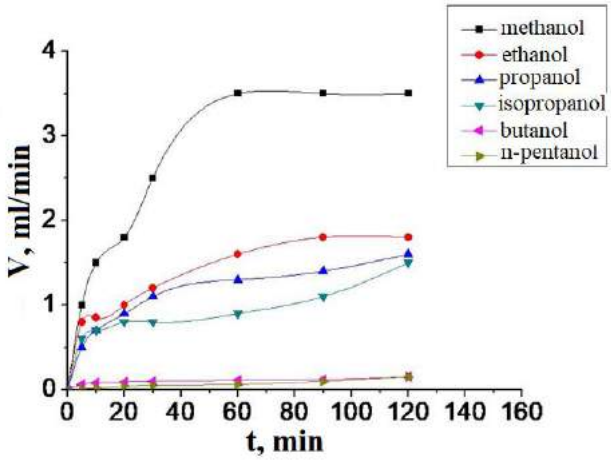

Fig. 1 Graph of the dependence of the rate of gel syneresis of the corresponding alcohol from the moment of gel formation

It was established that the rate of syneresis of gels depends on the time of the gel standing in the air (Fig. 1). Thus, during the first 5 min of syneresis, the gel began to be exposed to methanol (syneresis took place on average by 50%); in 10 minutes, it was possible to notice the syneresis of other alcohol gels. After two hours of standing, the syneresis of the gels was significantly noticeable in all the glasses with the gel. The n-pentanol gel did not undergo aging for the longest time. Obviously, the speed of syneresis is affected by the length of the carbon skeleton (with an increase in the carbon chain, the speed of syneresis decreases), which is related to the evaporation temperatures of alcohols.

References

1. Гелі косметичні. Загальні технічні умови : СОУ 24.5-37-103:2004. К.: Мінагрополітики України, 2004. 6 с. (Стандарт Мінагрополітики України).
2. Гелі, їх виникнення, будова і властивості. [Електронний ресурс]. Режим доступу: https://studfile.net/preview/6272689/page:11/.
3. Баранова І. І. Особливості опрацювання гелів на основі бодяги. Збірник наукових праць співробітників НМАПО ім. П. Л. Шупика, 2010. Вип. 19, Кн. 3. С. 584-588.