

Synthesis of cellulose carbamate and its properties

B.E. Babamuratov¹, X.X. Turaev¹, A.T. Djalilov², H.S. Beknazarov²

¹Termez State University, Termez, Uzbekistan,

²Tashkent Research Institute of Chemical Technology,
Tashkent, Uzbekistane-mail: babamuratov1985@mail.ru

In nature, cellulose is based on plants, which means that cellulose is mainly extracted from plants. However, due to the high demand for cellulose and its derivatives, it does not fully meet the demand for them [1]. The use of local raw materials to meet such requirements can be one of the most important solutions to the problems that arise [2].

One of the most important properties of carbamate cellulose is that it can be used as a filler in disposable polyethylene films used for the cultivation of seasonal crops in open fields. The resulting polyethylene films do not break down under the influence of external factors, leaving no waste, and as a result of this decomposition, carbamate cellulose acts as a fertilizer for plants.

The experiment was performed in a three-nozzle flask equipped with a thermometer, a refrigerant and an automatic mixer. Initially, urea was dissolved in distilled water to prepare solutions at different temperatures as well as urea solutions of different concentrations. This process was performed based on the solubility coefficient of urea. The prepared urea solutions were then slowly added to the cellulose chips and mixed with a mixing mechanism. This process was carried out in the temperature range of 20-30 °C for 3 hours. The resulting product was filtered and placed in an oven at 35-45 °C for drying. The product, dried for about 2 hours, was placed in a Petri dish and placed in a 700 W microwave oven. The product was heated at maximum temperature for 10-15 minutes. The product was then removed from the microwave and thoroughly washed in distilled water. The washed product was stored in an oven at 60 °C and dried. The result is a light yellow carbamate-cellulose polymer. The resulting product was weighed, compared with the mass of the original raw material, and the reaction yield was calculated. The IR spectrum of the resulting substance was obtained and analyzed. In the next part of our experiment, we studied the effect of solvents on synthesized carbamate cellulose. To do this, we tried 10 g of well-dried fruit. The sample was immersed in several solvents and observed to dissolve over a period of time.

References

- [1] P. Willberg-Keyriläinen, J. Hiltunen, J. Ropponen, Cellulose (2018) 25: 195.
- [2] G. Rahmonberdiev, M. Murodov, K. Negmatova, A. Lysenko. Effective Technology of Obtaining The Carboxymethyl Cellulose From Annual Plants. Materials science and engineering an introduction. Switzerland (2012): 541.