Development of Technology for Obtaining Cellulose From the Plant Castor Bean

Sidikova G. A, Atamuratova M. Sh, Shamadinova N. E
Tashkent Institute of Chemical Technology

Annotation. Castor oil is an evergreen perennial plant from the Euphorbiaceae family. It is believed that it originated in Ethiopia, from where it spread throughout the tropics and subtropics of the whole earth [1]. Strong branched stems, covered with unusual large leaves, are very decorative. This makes castor beans very popular with gardeners.

Key words: Technology, Castor Bean, Obtaining Cellulose.

Castor oil is a sprawling, fast-growing shrub 2-10 m high. In its natural environment, it exists for several years, delighting with its huge size and decorative leaves. In temperate climates, castor is grown as an annual. During the season, it manages to grow up to 3 m in height. Strong, branched shoots are hollow tubes with a ribbed surface. They are covered with green, pinkish or purple skin with a slight matte coating of a bluish hue.

Large petiolate foliage grows alternately. The length of one petiole is 20-60 cm. The leaf has a deeply cut finger shape and consists of 5-7 lobes. The width of one leaf plate reaches 30-80 cm. The oval-shaped segments with a pointed edge and wavy sides are painted in a dull green color. The central and lateral veins extending from it are clearly visible on the surface.

Cellulose, as the most widespread natural polymer material, is one of the most important semi-finished products used in the paper, textile and chemical industries.

The main plant raw materials for the production of cellulose are softwood, hardwood and cotton lint. Cellulose can also be obtained from such non-wood plant species as flax, cotton stems (husk), hemp, jute, kenaf, etc.

But, despite the presence of a significant raw material base, in recent years, researchers and technologists have been intensively searching for new types of cellulose-containing raw materials for the production of cellulose and, based on it, paper and paper products [1].

In order to obtain cellulose, studies were carried out on alkaline cooking of crushed castor bean stalks at different temperatures and the main indicators of the obtained cellulose were studied, which are shown in table 1.

Table 1. The influence of cooking time on pulp yield and its main indicators

№	NaOH, g/l	Temperature, ^{0}C	τ, hour	Exit, %	Humidity, %	Sol, %	α-cellulose, %	CP
1.	5	98-100	2	25,0	-	-	-	-
2.	5	98-100	3	30,0	3,2	8,90	-	-
3	5	98-100	4	42,1	3,0	4,87	-	-
	5	98-100	5	50,4	3,0	1,06	95,2	870
	5	98-100	6	48,1	3,1	0,97	95,8	690

Table 2 shows comparative data on the values of S_{OH} and CK of pulp samples obtained from poplar and castor bean wood.

Table 2. S_{OH} and CK values of various pulp samples

Name of samples	$S_{он}$, cm^2	СК, %
Castor bean stalk	32	39
Cellulose from castor beans, after boiling and bleaching	69	58
Poplar wood	33	38
Cellulose from poplar wood	72	71

From the data in Table. It can be seen from Table 3 that the SC value of castor bean cellulose is noticeably lower than that of poplar wood cellulose, which indicates its more porous structure. This suggests that castor bean cellulose is more reactive to various esterification reactions and is suitable for further chemical processing.

References

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