Table 2. Influence of polymer blend composition on the yield of lactide (β_l) and its purity

Polymer blend	β_l, %	T_m, °C (after recrystallization)	
		First	Second
PLA	41.87±5.95	85–88	88–90
PLA+Fe_2O_3	37.80±35.12	84–94	94–96
PLA+TiO_2	70.00±0.65	82–92	86–93

amounted about 70%, on average.

The percent of the yield is rather high, therefore, obtaining of lactide from polymer wastes and its reuse are rational. The data of IR-spectroscopy demonstrate the existence of functional groups specific to lactide, what corresponds to the literary data [4]. The melting point (T_m) of obtained monomers increases after the second recrystallization (Table 2), but it doesn't reach the required values, namely, 95–96 °C. M-lactide is also a part of gaseous products (together with lactic acid), because its boiling point is 10–20 degrees lower than that of L- and D-monomers and other lactic acid isomers under the conditions of our experiment.

The cleanest isomer of lactide (with T_m = 94–96 °C) was obtained by depolymerization of polylactide with Fe_2O_3. In other cases in concert with individual L- and D-monomers m-lactide (T_m = 54 °C) was also present. Even small impurities of this monomer decrease considerably the melting point of L- and D-lactide.

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OPTIMIZATION OF THE LINEAR ALKYL BENZENE SULFONIC ACID MANUFACTURING USING THE MATHEMATICAL MODELING METHODS

A.A. Krutei, I.O. Dolganova, I.M. Dolganov
Research supervisor – assistant I.O. Dolganova

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, 30 Lenin Avenue, alex_krutey@mail.ru

To date, the consumption of synthetic detergents (SD) based on surfactants annually increases in the whole world. Linear alkyl benzene sulfonic acid (LABSA) is the main component, which is used for the production of SD. These substances are chemical compounds of the alkyl aromatic series with a saturated unbranched hydrocarbon chain of 10-13 carbon atoms and one or more sulfonic groups. LABSA is a typical representative of anionic surfactants obtained by sulfonation of linear alkyl benzene (LAB) with sulfuric anhydride. The largest producer of linear alkyl benzene sulfonic acid in Russia is LLC KINEF. Nevertheless, industrial capacities don`t have enough powers to provide the market with a sufficient quantity of the desired product. Therefore, there is already a deficit of LABSA in the domestic market, which is filled with less effective surfactants or imported, more expensive analogues.

The purpose of this work was the modeling of the optimal sulfur supply process in LABSA technology and creation of optimization recommendations for the production of high quality linear alkyl benzene sulfonic acid (LABSA content is not less than 96% by weight, content of non-sulfonated compounds is not more than 2% by weight). The research was based on the analysis of technological data and the results obtained with the help of a mathematical model.

In previous research works, a direct dependence was established between the content of undesirable aromatic compounds in the feedstock and the quality of the final product [1]. Therefore, it has been hypothesized that for the normal work mode of the sulfonation with sulfuric anhydride in the reactor, which contain a high content of by-product aromatic components in the feedstock, it is necessary to increase the sulfur feed to combustion. It can help to enlarge the sulfuric anhydride concentration in the sulfonation reactor. This assumption is confirmed by an analysis of the production data presented in Fig. 1:

Then, the optimum values of sulfur were calculated with using the mathematical model. The optimum values are directly connected to the concentration of aromatic compounds in the raw materials. LABSA yield constantly maintains on a high level (Fig. 2).

It is established that the obtained data on the optimal sulfur consumption allow to increase the LABSA content in the product stream by 1–0.5 %.

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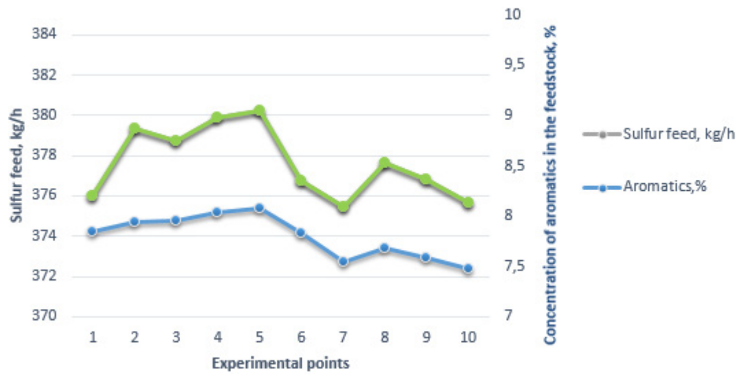

Fig. 1. *Dynamics of the change in sulfur supply for combustion from the content of aromatic compounds in raw materials*

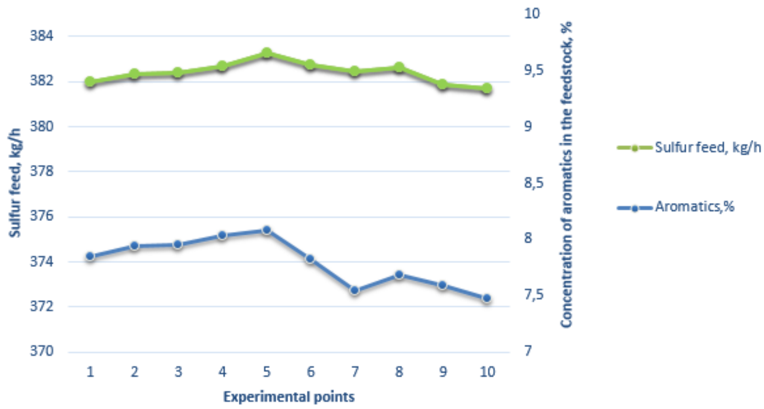

Fig. 2. *Dynamics of the change in the optimal sulfur supply for combustion from the content of aromatic compounds in raw materials*

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TWO-LAYER HIGH-EFFICIENCY OLED-STRUCTURES BASED ON NEW POLYFLUORENES

A.E. Kurtsevich[1,2], A.V. Odod[1,2]
Scientific director – Dr. Sc. (Phys.-Math.), Head of the Laboratory of Organic Electronics T.N. Kopy'lova[1]

[1]*Siberian Physics and Technics Institute*
Novosobornaya Square, 1, mail@spti.tsu.ru

[2]*The National Research Tomsk State University*
Tomsk, Lenina Avenue, 36, rector@tsu.ru

Polyfluorene is widely used as the main material for creating blue LEDs [1]. For the production of red LEDs, in particular, iridium complexes with organic ligands are used [2]. Because iridium is a rare metal, the light-emitting devices produced on its basis have a high cost. To solve this problem, it was proposed to use polyfluorene derivatives, the maximum radiation of which falls on the red and green regions.

The main of this work was to create high-efficiency light-emitting devices based on polyfluorene derivatives. To do this, it was necessary to make an OLED structure, measure its electroluminescent and geometric characteristics.

The study used polyfluorene derivatives synthesized in the laboratory of polymer nanomate-