rivatives [2].

We chose as ligand iminodiacetatic acid (IDA) (figure 2) [3]. The initial substrate was ethyl 6-iodhexanoate [4]. It was obtained by the oxidative cltavage of cyclohexanone in the presence of iodine, hydrogen peroxide and copper chloride. Then from it was obtained the product 2 the presence of dimethyliminodiacetate (it was previously synthesized from iminodiacetatic acid), potassium carbonate with heating. The product was purified with silica gel column chromatography with a yield of 70%.

We found that in this case, alkaline hydrolysis is more preferable than acidic (since acidic hydrolysis is a reversible process). Thus, the hydrolysis is carried out in methanol in the presence of sodium hydroxide with heating. The product (3) is obtained with high yields of 80% and not requiring additional purification.

So, we offer a simple and effective method to obtain IDA iminodiacetic acid derivatives based on readily available and non-toxic substrates – cyclic ketones. The resulting 6-bis (carboxyethyl) aminohexanoic acid (3) is planned to be used as a contrast agent for MRI, as shown in Scheme 2.

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MATHEMATICAL MODELING APPLICATION FOR STUDYING AND OPTIMIZATION OF SYNTHETIC DETERGENTS PRODUCTION

M.A. Pasyukova, I.O. Dolganova, A.A. Solopova

Scientific adviser – candidate of technical sciences, associate professor I.M. Dolganov.

National Research Tomsk Polytechnic University

634050, Russia, Tomsk, 30 Lenin Avenue, maria.pasyukova11@gmail.com

Highly viscous component is a by-product of sulfonation process. It accumulates in tubes of reactor and leads to non-uniformity of organic film flow, which leads to deterioration of product quality. When the concentration of a highly viscous component reaches a critical value the reactor is washed by water. This process eliminates the highly viscous component.

The purpose of this work is simulation of the sulfonation of linear alkylbenzene which takes place in the multi-tubular film reactor to study the duration of periods between reactor washings.

There are 4 periods between reactor washings selected for the research (Fig. 1). The necessity

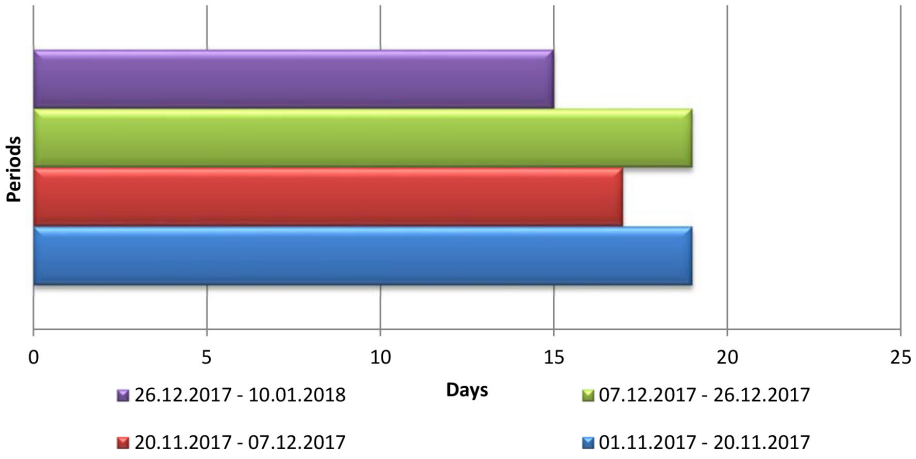

Fig. 1. *Experimental data on periods between reactor washings*

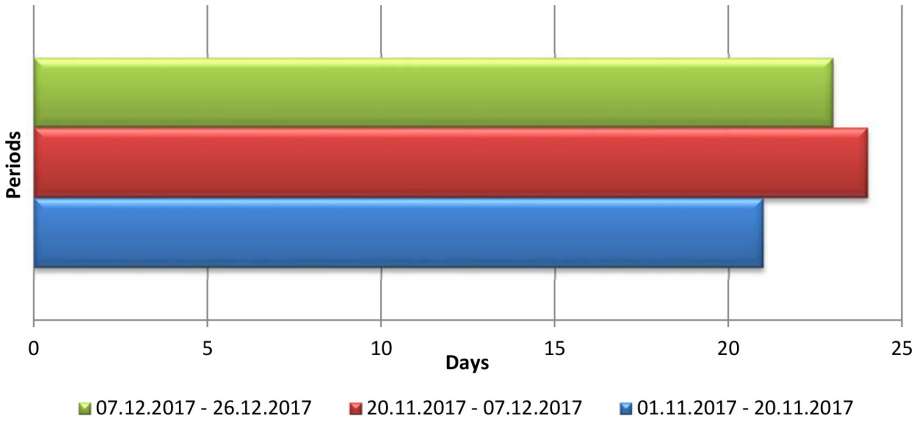

Fig. 2. *Calculated periods between reactor washings*

of washings of reactor tubes is indicated now by the pressure in reactor. This value depends on the amount of high viscosity component accumulated in the tubes.

The calculations of duration of periods between reactor washings were performed on previously developed mathematical model of sulfonation process. The calculations were stopped when the concentration of highly viscous component reached the critical value of 0.034% mass.

As it is seen from figures above, the number of periods reduced, their duration has increased. So, the average duration of periods between reactor washings reaches 17–18 days when the necessity of reactor washing was determined by pressure. When calculations were performed using the predictive ability of mathematical model on highly viscous component accumulation, the average duration of periods between reactor washings grew by 5 days.

It was established that usage of the mathematical model for studying the process allows increasing the duration of periods between reactor washings for film sulfonation reactor and eliminating the risk of obtaining off-test product.

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A STUDY OF MECHANICAL PROPERTIES CERAMICS BASED ON TITANIUM DIBORIDE

S.O. Pogorelova, A. Nassyrbayev, I.I. Shanenkov
Scientific adviser – PhD in Engineering sciences, Professor of ISE TPU A.A. Sivkov

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, 30 Lenin Avenue, sop2@tpu.ru

Ultrahigh temperature ceramics (UHTCs) based on titanium diboride has the potential to be used in many technological applications: aircraft industry, mechanical engineering, nuclear energy and metallurgy [1, 2]. The material for ceramics in this work was synthesized by the plasma dynamic method. The ceramics was sintered by a promising spark plasma sintering method, which is characterized by the speed of the process, due to which the grain growth of the microstructure of the sample is