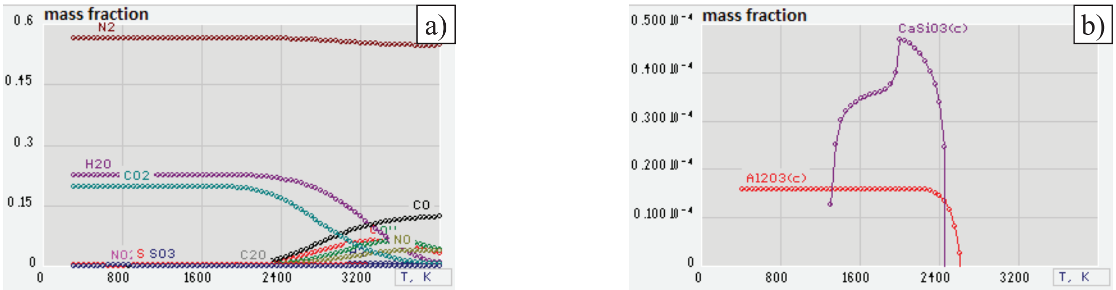

Fig. 2. *Equilibrium formulation of gaseous (a) and condensed (b) products of SL plasma utilization in form of WOC (74% air : 26% WOC)*

Figure 2 shows characteristic equilibrium formulation of gaseous (a) and condensed (b) products of SL plasma utilization in form of WOC where air mass fraction is 74%. To disappearance of soot C(c) (Figure 2b).

This fact suggests that SL utilization process in air plasma in this case (74% of air) occurs normally.

Taking into account this temperature data and temperature of plasma torch, it should be that plasma torch is able to provide an inflammation and an ignition of WOC in rector.

All the obtained results could be used in creating commercial plants based on HFT plasmatrom for effective plasma recycling and utilization of different industrial wastes.

References

1. *Sarkanaeva K.V., Ludvig K.H. 1975 Lignins (Moscow: Lesnaya Promyshlennost).*
2. *Bogdanov A.V., Rusetskaya G.D., Mironov A.P., Ivanova M.A. 2000 Complex recycling of industrial wastes of paper and paperboard plants (Irkutsk: IrSTU Publ.).*
3. *Holkin Yu I 1989 Technologies of hydrolized plants (Moscow: Lesnaya Promyshlennost).*

THE OPTIMIZATION OF SURFACTANTS` TECHNOLOGY ON THE BASIS OF ALKYL BENZENE SULPHONIC ACID

A.A. Krutey, I.O. Dolganova
Scientific Supervisor – DSc, Professor, E.N. Ivashkina
Linguistic Advisor – I.O. Dolganova

National Research Tomsk Polytechnic University
Russia, 634050, Tomsk, 30 Lenin st., incom@tpu.ru

Today in the world the consumption of synthetic detergents (SD) on the basis of the surfactant is growing annually. So the market volume of the surfactant amounted about 26.8 billion dollars in 2012, it is expected to grow to 31 billion in 2016 and to 36 billion in 2020 [1]. LLC "KINEF" is the biggest manufacturer of linear alkylbenzenesulfonates in Russia. In this regard, it is necessary to pay close attention to the optimization of linear alkylbenzenesulfonates technology and it will allow to achieve a higher economic impact on companies.

Linear alkylbenzenesulfonates (LABS) is the main used component for the production of SD. These chemical substances are aromatic compounds with hydrocarbon chain of 10–13 carbon atoms and one or more sulfonate groups. The feedstock for the production of LABS is alkyl benzene sulphonic acid (ABSA). The technology of producing ABSA comprises the following steps: 1) extracting of n-paraffin fractions C_{10-20} (Parex process); 2) separation of n-paraffins C_{10-13} during the prefractionation; 3) production of olefins on Pt-catalyst after the dehydrogenation of paraffins (Pakol process); 4) hydrogenation of diolefins to mono-olefins (Difayn process); 5) alkylation of benzene with olefins to form linear alkylbenzenes (LAB); 6) sulfonation of LAB [2].

The aim of this work was to develop recommendations for optimizing the technology of high-quality alkyl benzene sulphonic acid (content of alkyl benzene sulphonic acid is not less than 96 wt.%, content of compounds are not more than 2 wt.%) on the basis of an application using of the developed mathematical model` sulfonation of LAB.

Table 1. The dependence of the ABSA`s quality from temperature

Parameters	Mode 1	Mode 2	The original value (manufacturing data)	Mode 3	Mode 4	Mode 5
t_1, °C	34	33	32.1	31	30	29
t_2, °C	33.5	32.5	31.5	30.5	29.5	28.5
unsulfonated residue, % mass	1.94	1.91	1.89	1.86	1.84	1.82
ABSA, % mass	95.78	95.82	95.84	95.88	95.91	95.93

Studies were conducted with using process data and the results of tests from the laboratory (GC-MS, IR spectroscopy), and specially the developed mathematical model.

The analysis of the composition` feedstock was done and its impact on the quality ABSA was evaluated. It was revealed that the high content of aromatics leads to a decrease alkyl benzene sulphonic acid in the final product. This is because the high viscosity components are formed in the sulfonation reactor. Figure shows the dependence of the ABSA`s number from the high-viscosity component.

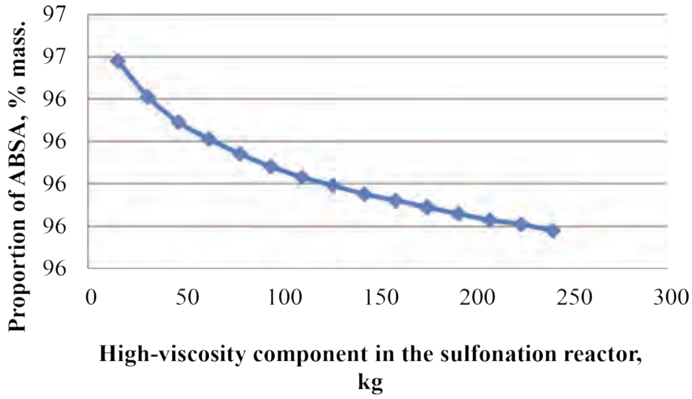

Fig. 1. *The dynamics of changes in the ABSK`s number the accumulation of highly viscous components in the reactor of sulfonation*

On the next step it is showed the effect on the quality of the finished product from temperature`s feed and the cooling water flowing in the sulfonation reactor. The results of model calculations are presented in the table.

It was found that the decrease in temperature is beneficial to ABSA because the number of unsulfonated residue was decreased.

As a result of studies were made recommendations on the intensification of production LABS.

References

1. *http://www.acmite.com/market-reports/chemicals/global-surfactant-market.html.*
2. *Bannov P.G., Refining processes. / P.G. Bannov.– M.: TsNIITEneftehim, 2001.– P.625.*

SYNTHESIS OF Gd-BASED MRI CONTRAST AGENT

V.V. Kurtukov, O.A. Guselnikova, A.A. Olshtrem, A.Di. Martino
Scientific supervisor – PhD, Associate Professor, P.S. Postnikov
Linguistic advisor – PhD, Associate Professor, I.A. Matveenko

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, 30 Lenin Ave., kurtukov@tpu.ru

In the last decades, many researches have been focused on magnetic nanoparticles with different functional groups attached to them. Such materials have a wide range of applications in pharmacological and medical spheres, such as targeted drug delivery, magnetic resonance imaging (MRI), production of biosensors and catalysis [1]. The scientific group of P.S. Postnikov has developed a new method for synthesis of stable zerovalent iron (ZVI) nanoparticles (NPs), coated with aryl groups, using aromatic diazonium salts (ADS) [2]. The process is described in Scheme 1.

Now that a reliable synthetic method for production of nanoparticles was acquired, it was decided to develop a procedure for acquisition of a MRI contrast compound, using aryl-coated AVI NPs as