Reactions model for simplified mixture was developed on the basis of experimental data. The calculation of thermodynamic characteristics for all reactions was the next stage.

We created a model of the reactor in HYSYS Aspen Tech™ using Simple Rate as a reaction model, in which reversible reactions depending on the Arrhenius equation for energy activation and equilibrium constants depending on polynomial temperature are assumed.

We took constants and activation energies for direct reactions as a first approximation on the basis of [2]. A part of initial data for kinetic calculations is shown in table 1.

The following conclusions can be made:

1. Inverse kinetic problem for hydrocarbons conversion on a zeolite catalyst has been solved;
2. Model of the reactor for the process of Zeoforming has been developed;
3. The adequacy of the model has been confirmed

Developed software for simulation and optimization allows analyzing and designing a reactor process.

References

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Anti-turbulent additives to oil and petroleum products

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Pipeline oil transportation is one of the most important components of Russian petrochemical complex because of the specific geography of oil fields and hydrocarbon consumption. One of the main problems in a process of oil transportation is fluid resistance. It occurs due to the resistance occurring when fluid flow meets with a solid surface, for example, pipeline wall. As a result, this fluid flow (substream) that moves to near-wall zone, spontaneously changes the direction and moves towards the center of pipeline cross

section. Substream gradually begins to curl and sway, and accelerates when it approaches the center of fluid flo . Eventually, substream becomes unstable and breaks up, releasing the fluid in the flow center. This phenomenon is called turbulent outbreak (or burst), and such type of fluid flow is called turbulent.

The higher flow rate is, the more the number of turbulent outbreak takes place. Increasing number and power of turbulent outbreak leads to unproductive loss of energy, which affects flowrate throughput. There are two methods of increasing flowrate throughput. The first method includes new pipelines construction or increasing the pipeline diameter, however, it's economically consuming. The second method is the use of antiturbulent additives. The main ingredients of these additives are high-molecular polymers. Polymeres prevent turbulent outbreak and reduce turbulence in the flow center, as well as absorb outbreak energy. The application of antiturbulent additives is cheaper method to increase flowrate throughput than new pipelines construction or increasing the pipeline diameter (looping the pipeline).

High economic indicator of pipeline transport is a reason for its wide using. Pipeline design doesn't always predict correctly load increasing for 10 years. Taking into account high flowrate throughput is not justified – the equipment should be used to the maximum extent possible, otherwise it's economically consuming. Also accidences are possible causing pumping stations laying-off, when it is necessary to reduce losses of the consumption with the less power of pumping equipment. Energy consumption reduction in a process of oil transportation is an urgent problem. The solution of this problem is the use of atiturbulent polymer additives. As a rule, the cost of additives is high. If the problem of getting high-chair elastomers is almost solved (there are many methods), the problem of getting dissolving form rapidly is not studied enough. In our case synthesis was conducted on Ziegler-Natto catalyst system (trivalent titanium chloride+diethyl). Using this system allows having a choice among bulk and mortar polymerization. The last one gave less molecular mass. Preparing bulk polymer and its use are tested but it is overly viscous, fire hazardous, its pumping into the pipeline is difficult. Suspension additives are much more transportable and adaptable to use. Polymer dispersion is a complicated process, because it is necessary to find a compromise between good dispersing ability, process ability and the lowest degradation of the polymer. One of the methods is cooling of rubber below the glass transition temperature and subsequent mechanical grinding. This method allowed us to get dry powder from bulk polymer, its suspension can be got rapidly but it spited quickly off and also it is a reason for high polymer distinction. Another method is getting polymer by precipitant from mortar. In

this case there is a problem of separating mortar and precipitant.

There is a method of polymer emulsionizing by rotor-stator homogenizer (concentration about 20%) with aqueous alcohols, glycols, glycol ethers, ketones [1]. This method allows decreasing the mechanical distinction of polymer and using water as the dispersive material. Taking into account this experiment we tried to find the cheapest homogenization methods and the most available emulsifiers, as well as we tried to find possibility to separate by heat and vacuum distillation. As a result, aqueous suspension and dry powder are obtained. Water, viscosity increasing agent, water soluble surfactant, calcium stearate were used. The last is applied in order to stabilize the aqueous suspension as dry filler to prevent particles caking. As a consequence, samples of suspension with a concentration of up to 20% polymer were obtained. In the dry powder polymer concentration was brought to 60%. The powder form is the most promising in terms of storage, transportation and use, it is composed of 0.4–1 mm size of the polymer particles (60%), calcium stearate (30%), water-soluble surfactant (10%). In the experiment a mixture of anionic and nonionic surfactants was used as water-soluble surfactant.

In conclusion, we want to say that researching Toms effect has huge potential, because mechanism of this effect has not yet discovered. And it can be used not only in oil transportation, but in many different areas of human activities, like shipbuilding, car industry, missilery etc. Thus we can extend using of these additives.

Reference

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Potassium 4-Iodylbenzenesulfonate (PIBS) as a convenient water-soluble reagent based on hypervalent iodine

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Intensive study of hypervalent iodine derivatives has led to the creation of many reagents based on it, which have different properties, and each of them has its advantages and disadvantages and, therefore, they attract close