it was distilled in the temperature range of 187–188 °C. The yield of corresponding product reached 30–35 %.

In addition, IR-spectra of the obtained products were carried out using infrared spectroscopy (IR - Fourier spectrometer «SIMENS FT-801»).

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EVALUATION OF CATALYST DEACTIVATION DEGREE AT THE INDUSTRIAL DEWAXING UNITS USING THE METHOD OF MATHEMATICAL MODELLING

A.S. Lutsenko, N.S. Belinskaya, E.V. Frantsina
Scientific supervisor – DSc, professor E.D. Ivanchina
Linguistic advisor – PhD, Assistant lecturer N.S. Belinskaya

National Research Tomsk Polytechnic University
634050, Russia, Tomsk, Lenin avenue 30, Lutsenko_A_S@mail.ru

The actual problem of catalytic hydrodewaxing, as well as other catalytic processes, is to increase the operation life of the catalyst. This problem absorbs up to 90 % of all funds for development and exploitation. The technology and design of catalytic processes are completely dictated by the problem of the catalytic deactivation. These include processes such as cracking, isomerization, all processes of dehydrogenation, hydrotreating, etc. [1]. Reducing the activity of the catalyst is equivalent to reducing the capacity of unit. Reducing selectivity of catalyst is equivalent to over-consumption of raw materials and energy and it is equivalent to reducing the quality of the target product.

In this study, the degree of deactivation of identical catalysts (HYDEX-G, extrudate shape 2.5 mm) of two hydrodewaxing units was compared using mathematical model [2]. The following abbreviations were introduced: U1 is the hydrodewaxing unit of the Ltd “KINEF”; U2 is the hydrodewaxing unit of OJSC "ANPZ VNK". For the research, the following data was used: technical characteristics of reactors, industrial operating data of units, data characterizing the quality of raw materials and products (group and fractional compositions, raw and product densities, sulfur and nitrogen content etc.). The catalyst deactivation study was carried out during the operation of the units from 06.10.16 to 25.01.2017.

The total volume of processed raw materials of U1 and U2 for the period is 685 and 700 thousand m3 respectively (Table 1). The raw materials processed at U1 are heavier and, probably, the deactivation rate of the U1 catalyst should be higher. However, in fact, during the testing period of oper-

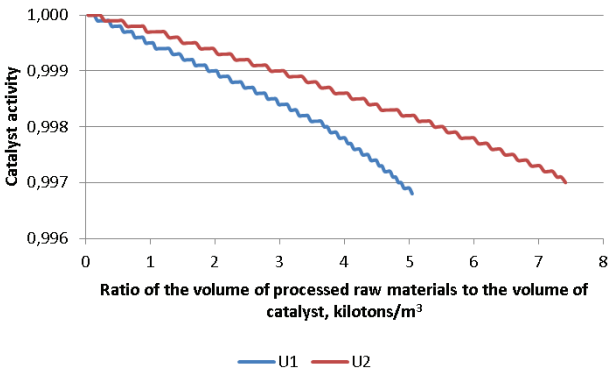

Fig. 1. *The graph of the dependence of the activity of the catalyst on the volume of raw materials processed by the 1 m³ of volume of the catalyst*

Table 1. Performance characteristics of dewaxing units

Unit	U1	U2
The volume of raw materials, m^3	684602.4	699518.4
Raw materials consumption, m^3/h (average value)	254.7	260.2
Catalyst volume, m^3	115	80
Average value of raw material density, kg/m^3	847.1	847.7
The average sulfur content, % (in raw materials)	0.851	0.255
The average nitrogen content, ppm (in raw materials)	164.2	61.01
Initial boiling point of fraction, °C (average value)	213	197
Boiling point 50 %, °C (average value)	287	270
Boiling point 96 %, °C (average value)	372	336

ation of the units, the process temperature was increased by 5 °C in both installations.

To compare the deactivation degree of the processes were reduced to one initial conditions using the mathematical model, for which the activity of the catalyst was A = 1.

The change in the activity of the catalyst depending on the weight of the processed raw material by the 1 m^3 volume of the catalyst is shown in Figure 1. It can be concluded from the dependences that the deactivation rate of the catalyst of the U1 is, as expected, slightly higher than at the U2. This is due to the fact that the raw material of the U1 is heavier, more sulfurous, characterized by a greater proportion of nitrogen-containing hydrocarbons, which increase the rate of the catalyst deactivation. In addition, at the end of the period the deactivation degree is only slightly higher at the U2.

At approximately the same degree of deactivation in the unit U2 (in terms of the volume of raw material recycled by the 1 m^3 of the catalyst) were procced 1.5 times more raw materials, then by the unit U1.

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SYNTHESIS OF OXIDIZING REAGENTS BASED ON 2-IODOBENZENESULFONIC ACID

I.A. Mironova
Scientific supervisor – R. Y. Yusubova, PhD in Chemistry
Department of Biotechnology and Organic Chemistry
National Research Tomsk Polytechnic University
634050, Russia, Tomsk, Lenina Av. 30, iam6@tpu.ru

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 attention [1–3]. Most of them are eco-friendly and versatile reagents for various synthetically important oxidative transformations [4]. Polyvalent iodine (V) compounds are particularly useful, they are selective oxidants commonly used in the synthesis of natural products [1–4]. However, some of them have significant drawbacks. For instance, 2-iodoxybenzoic acid (IBX) is employed in organic synthesis as highly effective and mild oxidant, but it has low solubility in the most organic solvents except DMSO and has potentially explosive properties [1, 2].

Another representative of cyclic iodylarenes is Dess-Martin Periodinane (DMP) has gained a status of a reagent of choice for selective oxidation of alcohols to carbonyl compounds, especially in complex molecules containing other sensitive functional groups [5]. However, Dess-Martin reagent is less stable and more expensive than IBX.

Ishihara and coworkers researched thia analog