rGO on PLA composite proved to be stable after mechanical exposure and after being in water and alkaline and acidic environments. Samples of PLA and PLA with rGO on the surface were tested for biocompatibility with mouse fibroblast cells 3T3 L1 for 72 hours. We found that there is cell growth on the surface of all samples, the cells are viable, no toxic components are released from the films, and there was no bacterial growth. There was no difference in cell growth during different sample processing. All samples remained sterile.

The biodegradable electronic components being developed will allow monitoring the condition of smart biodegradable implants in the human body.

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HYDROCARBON COMPOSITION ANALYSIS OF ZEOFORMING PRODUCTS OBTAINED FROM VARIOUS STABLE GAS CONDENSATES

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According to [1] there's an annual increase of natural gas production in Russian Federation. In proportion to natural gas obtaining increase the production by-product of this process called stable gas condensate (SGC) also rises.

SGC is obtained during the stabilization (also known as rectification) of unstable gas condensate, which in its turn is extracted (low-temperature condensation) during natural gas production. As a result, there's a liquid, clear product containing hydrocarbons with the amount of carbon higher than 5, and a commercial gas which mostly consists of methane fraction and inconspicuous amount of ethane fraction. As a rule, SGC is blended with commercial oil in order to increase the value of oil release into the main pipeline. However, the potential appliance of this feedstock is way wider.

In this work three SGC samples obtained from various oil fields in western Siberia of Russia were investigated in order to obtain blended components for automobile gasoline production.

Zeoforming is known to be one of the most promising ways of light hydrocarbon feedstock processing into blended components of automobile gasoline. The catalyst applied in this process is zeolite of ZSM-5 type.

The experiment was carried out at the laboratory catalytic unit with the use of zeolite catalyst provided by "Novosibirsk chemical concentrates plant". The experiment conditions are temperature of 375 °C, pressure of 0.25 MPa and feedstock space velocity 2 h^{-1}.

During the work the hydrocarbon group compositions of SGC feedstock and products of their processing at the catalytic unit were determined.

The hydrocarbon group composition of SGC samples and obtained zeoforming products (ZP) are shown at the tables 1 and 2.

According to table 2 data there's a vivid considerable increase of olefins and aromatic hydrocarbons content after the processing and also there's a vivid significant decrease of naphthenes content.

Table 1. Group hydrocarbon composition of SGC samples

Hydrocarbon group, % vol.	SGC 1	SGC 2	SGC 3
N-paraffins	41.16	35.15	34.46
Isoparaffins	38.28	43.00	43.63
Naphthenes	19.58	19.06	20.37
Olefins	0.46	1.24	0.98
Aromatic hydrocarbons	0.49	1.51	0.57

What's more, there is a decrease of n-paraffins content and there's an increase of isoparaffins content.

These changes in group composition of processing products in comparison to feedstock SGC samples can be explained with the following reasons:

1. The increase of isoparaffins content is caused by n-paraffins isomerization reactions.
2. The increase of olefins content is caused by n-paraffins cracking and partially with naphthenes cracking.
3. The increase of aromatic hydrocarbons content is provided with hydrogen transfer reactions in olefins.

Table 2. Group composition of zeoforming products of SGC samples

Hydrocarbon group, % vol.	ZP 1	ZP 2	ZP 3
N-paraffins	29.56	30.72	27.39
Isoparaffins	48.12	46.08	45.41
Naphthenes	6.89	7.04	9.78
Olefins	3.24	2.22	2.72
Aromatic hydrocarbons	12.18	13.88	14.69

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MATHEMATICAL MODELING OF VACUUM GAS OIL HYDROTREATMENT PROCESS

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Hydrotreating is one of the most important technologies in petroleum refining industry. The hydrotreating process removes heteroatomic compounds (sulfur, nitrogen and oxygen containing) from petroleum distillates by selectively reacting these compounds with hydrogen in a catalyst bed at elevated temperature. This reduces the emission of toxic gases during fuel combustion.

In the case of catalytic cracking feed, which are mainly integrated by heavy atmospheric gas oil, light vacuum gas oil and heavy vacuum gas oil, its hydrotreating is more difficult than hydrotreating of light and middle distillates because of the higher sulfur content in heavy streams. At the same time, heteroorganic compounds are characterized by a lower reactivity compared to the compounds that make up the light fractions. [1]. It is well-known that catalytic cracking is one of the main producers of gasoline in a refinery, and cat-cracked gasoline is usually the major contributor to the sulfur levels in the gasoline pool (about 90 %). For these reasons, catalytic cracking feed pretreating is an excellent tool to meet required product quality. Catalytic processes are quite complex, because they cover a huge number of different reactions in which a large number of components are involved. Mathematical modeling is one of the ways to improve the efficiency of chemical and technological processes [2].

The aim of the work is to develop a mathematical model of vacuum gas oil hydrotreatment process that takes into account the change in the hydrocarbon composition of feed.

To create a mathematical model of the process, first of all, it is necessary to determine the reactions and compounds involved in chemical transformations. Thus, in the course of this work, a formalized transformation scheme was developed, which will later become the basis for creating a mathematical model of vacuum gas oil hydrotreatment process (Fig. 1).

Based on the results of liquid adsorption chromatography with gradient displacement of samples before and after hydrotreatment, the separation of vacuum gas oil into resins, saturated (alkanes and naphthenes) and aromatic (light, medium and heavy) hydrocarbons was introduced into the scheme. Benzothiophene and dibenzothiophene were chosen as sulfur-containing pseudo-components, on which