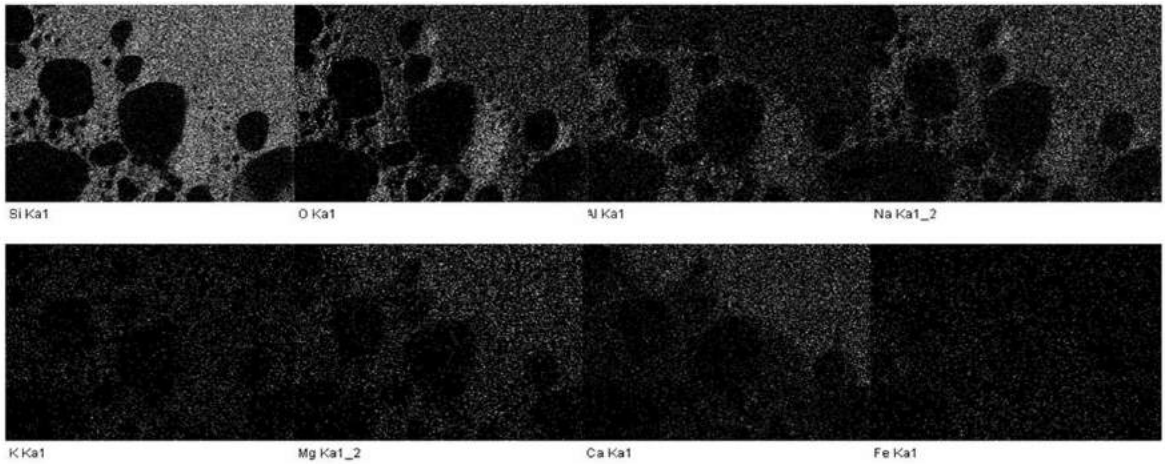

Fig. 3. Mapping of elements on the composite border "glass covering – foam glass"

It is confirmed by the mapping of elements on the sample surface by means of the x-ray power of dispersive microanalysis where in Figure 3 uniform distribution of cards of the Si, O, Al, Na, K, Mg, Ca and Fe elements is distinctly shown that testifies to its absence[2].

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INFLUENCE OF TECHNOLOGICAL PARAMETERS OF STABILIZATION COLUMN OPERATION (A PART OF DIESEL FUEL PRODUCTION UNIT) ON THE CONTENT OF HYDROGEN SULPHIDE IN STABLE GASOLINE

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Oil and gas industry experiences losses resulting from corrosion of pipelines and vessels. Hydrogen-sulphide corrosion is one of the main reasons for corrosive damage during operation of equipment under a wide range of media and conditions. Hydrogen sulphide can cause damages resulting from chemical and electric-chemical corrosion and hydrogen embrittlement. The fact is that the most aggressive component of the feedstock – hydrogen sulphide – appears not only in products of oil field, but also forms as a result of thermal and catalytic transformation of organo-sulphur compounds (thiols, sulphides, disulphides, thiothenes), carbon disulphide. In particular, in hydrodewaxing process significant fraction of hydrogen sulphide forms at the stage of hydrotreating. Increasing in temperature leads to increasing in hydrogen sulphide content as a result of both decreasing in its solubility and increasing in decomposition of sulphur-containing compounds. Corrosion is a complicated problem as large amount of influencing factors has to be taken into account. Corrosion prevention is not only increasing service life of petroleum refining equipment, but also decreasing operational costs as well as improvement of technical and economic indices of petroleum refining.

The aim of the present work is to research the influence of the operating conditions in stabilization column (a part of catalytic dewaxing unit) on hydrogen sulphide content in stable gasoline using the modelling environment HYSYS.

Research of influence of operation conditions at various process flow diagrams on the content of hydrogen sulphide in stable hydrogenate at different contents of hydrogen sulphide in unstable hydrogenate.

The considered apparatus – stabilization column – operates ineffectively. This is reflected in the fact that the degree of hydrogen sulphide and light hydrocarbons removal is too low. As a result the high concentration of hydrogen sulphide in the effluent is observed [1]. The effluent then is sent to rectification stage where one of the products – stable gasoline – is obtained and entire hydrogen sulphide is concentrated in this overhead product which promotes corrosion of the head of rectification column and pipelines.

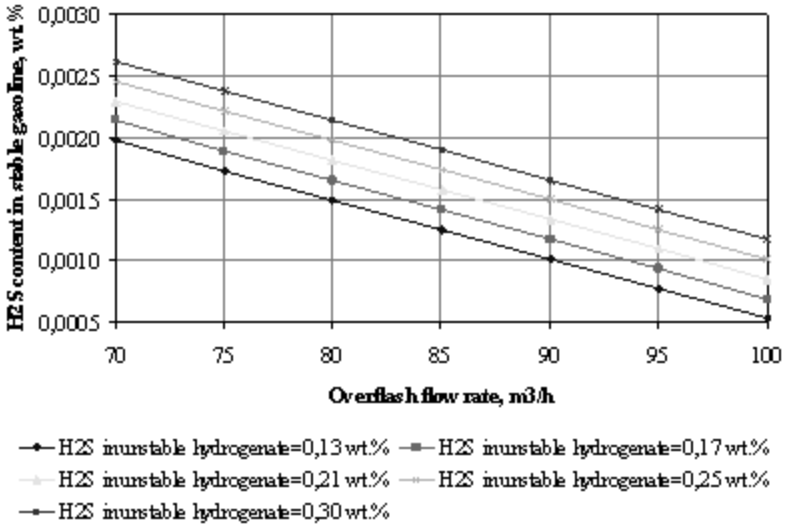

Fig. 1. Influence of overflash flow rate on hydrogen sulphide content in stable gasoline

To solve the considered problem the regression equation was obtained based on calculations performed in modelling environment HYSYS as follows:

$$C_{H2S}=0.6906+0.0002*X_1-0.0068*X_2-0.0033*X_3-0.0005*X_4,$$

here C_{H2S} – the content of hydrogen sulphide in stable hydrogenate, g; X_1 – the content of hudrogen sulphide in unstable hydrogenate, g; X_2 – overflash flow rate, m^3/h; X_3 – stable gasoline flow rate into the bottom of the column, m_3/h; X_4 – hydrogen-rich gas flow rate, m^3/h.

Figure 1 shows influence of overflash flow rate on hydrogen sulphide content in stable hydrogenate.

Increasing in overflash flow rate into stabilization column from 70 to 100 m^3/h the content of hydrogen sulphide in stable hydrogenate declines at hydrogen sulphide content in unstable hydrogenate varying from 0,13 wt.% to 0,30 wt.%. However, hydrogen sulphide presents in stable gasoline in considerate amount.

The calculation of hydrogen content in stable gasoline was performed depending on the flow rate of recycled stable gasoline, which is injected into the bottom of the column, and for the variety of hydrogen sulphide content in unstable hydrogenate. The results of calculation is presented in Figure 2.

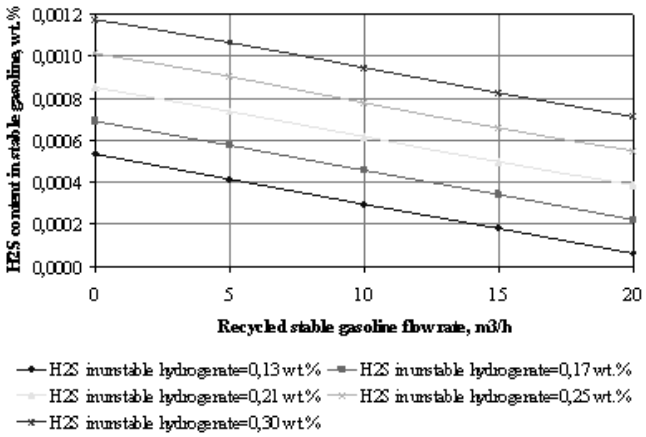

Fig.e 2. Influence of recycled stable gasoline flow rate on hydrogen sulphide content in stable gasoline (overflash flow rate is equal to 100 m^3/h)

The rise of vapour flow due to increase in recycled stable gasoline flow rate from 0 to 20 m^3/h feed into the bottom of the column provides decline in hydrogen sulphide in stable gasoline. Nevertheless, the concentration of corrosive hydrogen sulphide is high especially in case of stabilization hydrogenate containing high amount of hydrogen sulphide (more than 0,21 wt.%).

The research of hydrogen-containing gas flow rate influence on the presence of hydrogen sulphide in stable gasoline was carried out in the range from 0 to 300 m^3/h.

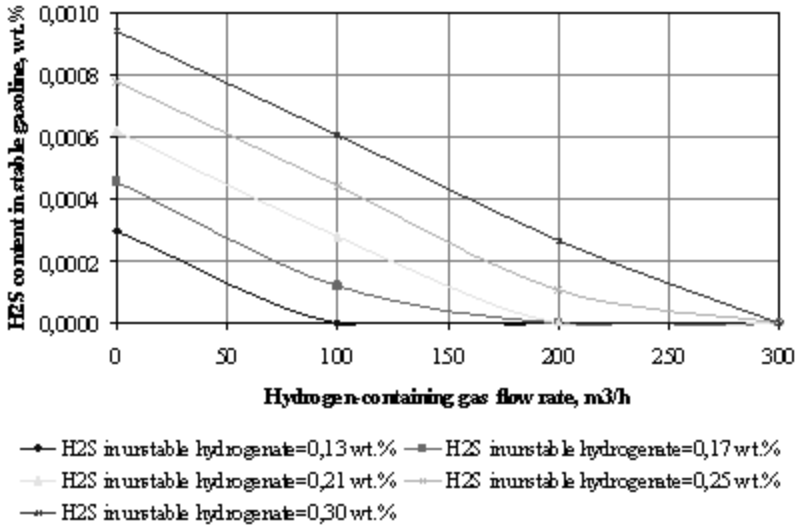

Fig. 3. Influence of hydrogen-containing gas flow rate on hydrogen sulphide content in stable gasoline (overflash flow rate is equal to 100m^3/h, recycled stable gasoline flow rate is equal to 10m^3/h)

As it can be seen in Figure 3 the injection of hydrogen-containing gas into feed flow allows reaching absence of hydrogen sulphide in stable gasoline and thus decreasing corrosiveness of stable gasoline.

To reach the absence of hydrogen sulphide in stable gasoline is possible by increasing vapour flow in stabilization column. The conducted research has proved that this is possible to do by increasing the amount of overflash, recycled stable gasoline flow rate and addition of hydrogen-containing gas into the column. At optimum mode of column operation hydrogen sulphide content in stable gasoline decreases to trace amount. As a result the service life of equipment, quality of stable gasoline and resource efficiency of the catalytic dewaxing unit increase.

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