The process of n-paraffin hydrocarbons dehydrogenation is one of the perspective obtaining methods of high linear olefins which is used as a working beginning for synthetic detergents, oil additives, corrosion inhibitors, etc.

Today the production of surface-active substances is based on alkylenbenzoyl obtaining by the alkylation of benzene with chlorated parafins and farafine oils.

The chlorine hydride and chlorine formed by process are thrown to atmosphere causing damage to ecology. In this respect, the use of olefins obtained by dehydrogenation of n-paraffins in the production of surface active substances, permits to create ecologically pure process.

In this report are considered the important scientific and applied problems of the application of the mathematic modelling methods and optimization for highly-exothermal oxidative dehydrogenation process of n-paraffin hydrocarbons \((C_{10}-C_{13})\) on oxide catalyst.

The investigations were carried out on a laboratory unit with gradientless flow integral microreactor under the conditions providing lack of distortion effect of mass and heat transfers.

The kinetic experiments were carried out at 813-853 K, atmospheric pressure, varying starting molar concentration of n-paraffins - 2.537-5.075 \(10^{-4}\) mol/l, of oxygen - 0.374-1.869 \(10^{-4}\) mol/l and contact time less than 0.12 sec by using Ni-Sb-V oxides system modified by Li\(_2\)O on Al\(_2\)O\(_3\) as catalyst.

Analyses of starting compounds and reaction products were carried out by the method of gas chromatography on chromatograph Color - 100.

Analyses of contact gas for CO\(_2\) and lower olefins contents determination was implemented by using of chromatograph LHM-80 with the column 3 m, zeolite NaX filler.

Catalytic activity has been determined by taking into account of a conversion of satrting n-paraffins \((C_{10}-C_{13})\) hydrocarbons, the process in respect of corresponding hydrocarbons.

It was established the rate of aromatic hydrocarbons formation is increased in 1.06 at 853 K as the concentration of olefin hydrocarbons in the starting product is increased. The increasing of temperature brings to increasing of cooking.

As a result of complex studies it was constructed mathematic model of dynamic and statics of process based on reliable kinetic data and describing the reaction mechanism.

Analyses of the apparatus designing problem with taking into account the theoretically optimum temperature profile shows that high degree of hydrocarbons conversion 36.7 % with the selectivity 81.8 % can be achieved in the 3 sectional adiabatic reactors.

On the basis of mathematic modelling and optimum designing of hydrocarbon oxidative dehydrogenation process can be established ecologically effective technologies.