

## Petrochemical feedstock production from polyethylene wastes

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### Abstract

This research article describes a method of catalytic cracking of plastic wastes (as raw materials we used plastic bags made of polyethylene of high pressure low density, they are characterized by having a smooth waxy surface softness, a high transparency and elasticity) with aluminosilicate catalyst (in an amount of 10% from the weight of the loaded raw materials). The process is conducted at atmospheric pressure, vapor temperature reaches 230 °C, constant rate of heating raw materials 5 deg/min. Liquid yield was 80 wt. %, gaseous product yield was 5 wt. %.

It was elucidated that the catalytic cracking of polyethylene with high-silica zeolites is the best way to produce petrochemical raw materials with high octane characteristics (octane number is 81 points according to the research method and 89 points according to the motor method). To increase the octane number and improve the knock rating of the distillates (reduction of the content of *n*-paraffins due to insufficient degree of isomerization and reduction of fuel crystallization point) catalytic conversion was carried out during the process of the catalytic cracking of liquid raw material on ZSM-5 catalysts with silicate module 200. The content of *n*-paraffins with normal structure is reduced by 9.7 wt. %, which is a testament to the effectiveness of suitable catalyst for this process. Liquid product yield was 87 wt. %, gaseous product yield was 7 wt. %. The process is conducted at atmospheric pressure, operating temperature of 350 °C was maintained constant, feed rate 20 ml/h. The octane number of the resulting distillate was 90 points according to the motor method, and 110 points according to research method. Thus, as a part of the study of catalytic cracking and catalytic conversion we obtained liquid product rich in aromatics, *n*-paraffin, naphthenic hydrocarbons and rich gas and propane and butane with normal and *iso*-structure. The article also provides a brief overview of patent development and running in the production of industrial processes, processing of plastic wastes into synthetic fuel, the advantages and disadvantages of each method are examined.

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