

Catalytic Alkylation of C2-C4 Hydrocarbons

Authors : Bolysbek Utelbayev, Tasmagambetova Aigerim, Toktasyn Raila, Markayev Yergali, Myrzakhanov Maxat

Abstract : Intensive development of secondary processes of destructive processing of crude oil has led to the occurrence of oil refining factories resources of C2-C4 hydrocarbons. Except for oil gases also contain basically C2-C4 hydrocarbon gases where some of the amounts are burned. All these data has induced interest to the study of producing alkylate from hydrocarbons C2-C4 which being as components of motor fuels. The purpose of this work was studying transformation propane-propene, butane-butene fractions at the presence of the ruthenium-chromic support catalyst whereas the carrier is served pillar - structural montmorillonite containing in native bentonite clay. In this work is considered condition and structure of the bentonite clay from the South-Kazakhstan area of the Republic Kazakhstan. For preparation rhodium support catalyst (0,5-1,0 mass. % Rh) was used chloride of rhodium-RhCl₃•3H₂O, as a carrier was used modified bentonite clay. For modifying natural clay to pillar structural form were used polyhydroxy complexes of chromium. To aqueous solution of chloride chromium gradually flowed the solution of sodium hydroxide at gradual hashing up to pH~3-4. The concentration of chloride chromium was paid off proceeding from calculation 5-30 mmole Cr³⁺ per gram clay. Suspension bentonite (~1,0 mass. %) received by intensive washing it in water during 4 h, pH-water extract of clay makes -8-9. The acidity of environment supervised by means of digital pH meter OP-208/1. In order to prevent coagulation of a solution polyhydroxy complexes of chromium, it was slowly added to a suspension of clay. "Reserve of basicity" Cr³⁺:/OH-allowing to prevent coagulation chloride of rhodium made 1/3. After endurance processed suspensions of clay during 24 h, a deposit was washed by water and condensed. The sample, after separate from a liquid phase, dried at first at the room temperature, and then at 110°C (2h) with the subsequent rise the temperature up to 180°C (4h). After cooling the firm mass was pounded to a powder, it was shifted infractions with the certain sizes of particles. Fractions of particles modifying clay in the further were impregnated with an aqueous solution with rhodium-RhCl₃•3H₂O (0,5-1,0 mass % Rh). Obtained pillar structural bentonite approaches heat resistance and its porous structure above the 773K. Pillar structural bentonite was used for preparation 1.0% Ru/Carrier (modifying bentonite) support catalysts where is realised alkylation of C2-C4 hydrocarbons. The process of alkylation is carried out at a partial pressure of hydrogen 0.5-1.0MPa. Outcome 2.2.4 three methyl pentane and 2.2.3 trimethylpentane achieved 40%. At alkylation butane-butene mixture outcome of the isooctane is achieved 60%. In this condition of studying the ethene is not undergoing to alkylation.

Keywords : alkylation, butene, pillar structure, ruthenium catalyst

Conference Title : ICC 2015 : International Conference on Chemistry

Conference Location : Istanbul, Türkiye

Conference Dates : February 16-17, 2015