

عنوان مقاله:

Optimization of La-Ce/HZSM- δ catalyst for thermal catalytic cracking of naphtha to light olefins to save energy and reduce CO₂ emission

محل انتشار:

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خلاصه مقاله:

Thermal cracking of hydrocarbons at 850-900 degree centigrade is the governing technology worldwide for light olefins production. But the most disadvantages of this route is large energy consumption and air pollution because of flue gas emission containing CO₂ and NO_x. To overcome these drawbacks catalytic cracking is an important and new field for research. So, in this work the effects of temperature and loadings of cerium and lanthanum over HZSM- δ catalyst for thermal catalytic cracking of naphtha were investigated using response surface methodology. In these experiments, the temperature, Ce, and La loadings were varied from 600 to 700 °C, 4 to 12wt.%, and 0.8 to 3wt%, respectively. The Box-Behnken design was utilized and a set of experiments were designed to obtain the optimum catalyst for maximizing the yield of ethylene and propylene. The analysis of variance (ANOVA) was carried out to identify the statistical significance of independent factors and their interactions. The results showed that temperature and Ce loading had the highest effects on the yields of ethylene and propylene, respectively. Based on the multi-objective optimization, the maximum yields of ethylene and propylene (17 and 33wt%, respectively) were obtained at cerium loading of 12 wt.%, lanthanum loading of 1.2 wt.%, and temperature of 700 °C

کلمات کلیدی:

Catalytic cracking, light olefins, Optimization, analysis of variance

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