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Study of vacuum gas oil cracking over high acid ZrO,-SiO, mixed oxide

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r raditionally, acid alumino silicate catalysts were used in fluid catalytic cracking process. Typical cracking catalyst contains H-Y faujasite, kaolin or bentonite, alumina, an obligatory additive (up to 2 wt.%) of Ln₂O₃ and a small amount of platinum (20-50 ppm). Additive of deficient lanthanides improves the activity and hydrothermal stability of alumino silicate catalyst. In this communication the results on comparative testing of the high acidic ZrO,-SiO, mixed oxides and alumina silicate petromax-50P catalyst in cracking of industrial vacuum gas oil are presented. The acid silica-zirconia samples were prepared from Ukrainian zircon (ZrSiO₄) concentrate according to our developed procedure. These samples did not contain additional La^{3+} ions. The cracking experiments were performed using a flow reactor with fixed bed of a catalyst (10 cm³) under WHSV = 4 h⁻¹ at 500 °C for 10 minutes. After that, a catalyst was regenerated in air flow at 600 °C and then an experiment was repeated. The stable activity of ZrSi samples was kept after carrying out 20-25 experiments. The industrial vacuum gas oil with Tm=30 °C was used. The distillation of liquid cracking products was carried out under vacuum according to ASTM D 1160-03. The analysis of gasoline fractions with EBP = 200 °C was performed according to ASTM D 6729. Obtained results show that ZrSi samples provide the higher yield of gasoline fraction (on 8-10%) than the zeolite catalyst. Gasoline fraction formed over ZrSi catalyst contains more i-alkanes and less aromatics (RON = 82) in comparison with petromax-50P gasoline (RON=79). The high cracking ability of ZrSi samples could be explained by their higher acidity ($H0 \ge -11.35$; [BH]=1.0-1.1 mmol/g; $S \le 390$ m2/g) in comparison with aluminosilicates (H0 \ge -8.2).

Biography

Volodymyr V Brei pursued his PhD in Physical Chemistry. Currently he is the Head of Department of Heterogeneous acid-base catalysis and Director of Institute for Sorption and Endoecology Problems, Corresponding Member of Ukrainian Academy of Sciences (catalysis) since 2009.

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