

Abstract

Disclosed are a modified Y-type molecular sieve, a catalytic cracking catalyst comprising the same, their preparation and application thereof, wherein the modified Y-type molecular sieve has a rare earth content of about 4-11% by weight on the basis of rare earth oxide, a sodium content of no more than about 0.7% by weight on the basis of sodium oxide, a zinc content of about 0.5-5% by weight on the basis of zinc oxide, a phosphorus content of about 0.05-10% by weight on the basis of phosphorus pentoxide, a framework silica-alumina ratio of about 7-14 calculated on the basis of $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio, a percentage of non-framework aluminum content to the total aluminum content of no more than about 20%, and a percentage of the pore volume of secondary pores having a pore size of 2-100 nm to the total pore volume of about 15-30%. The modified Y-type molecular sieve has a high crystallinity, a structure comprising secondary pores, and a high thermal and hydrothermal stability; the modified Y-type molecular sieve and the catalytic cracking catalyst comprising the same show a higher hydrogenated LCO conversion efficiency, a lower coke selectivity, a higher gasoline yield, and a higher total yield of ethylene and propylene, when used in the catalytic cracking of hydrogenated light cycle oils (LCOs).