

**HIGH-DENSITY FAST FLUIDIZED BED REACTOR, APPARATUS FOR
PREPARING LIGHT OLEFINS BY MEANS OF CATALYTIC CRACKING, AND
METHOD THEREOF**

ABSTRACT

The present application discloses a high-density fast fluidized bed reactor, an apparatus for catalytic cracking to produce light olefins, and a method thereof. The apparatus comprises a high-density fast fluidized bed reactor and a fluidized bed regenerator. In the high-density fast fluidized bed reactor, the catalyst circulation intensity from the catalyst residence zone to the reaction zone is as high as 500-1000 kg/(m²·s), thereby increasing the bed density in the reaction zone and achieving a high bed density under high superficial gas velocity conditions. The method achieves a continuous mixed hydrocarbon catalytic cracking process for light olefins through a fluidized bed reaction-regeneration process, and supplies heat for the reaction by injecting and combusting fuel oil. The reaction contact time of the product gas in the high-density fast fluidized bed reactor is <2 s, effectively improving light olefin selectivity. In this method, the single-pass conversion rate of the feedstock is ≥50% wt, the selectivity for ethylene + propylene is ≥70% wt, and the propylene/ethylene (mass ratio) is ≥3.

(FIG. 1)