

ABSTRACT

The present application discloses a fluidized bed device for coupling naphtha and methanol to prepare aromatics and co-produce olefins and its application method. By using the device, under the action of a catalyst, naphtha reacts with methanol to generate product gas containing aromatics and light olefins as main components. The method in the present application can efficiently and selectively convert linear and branched aliphatic hydrocarbons into aromatics, while also increasing p-xylene production through aromatic methylation reactions, with the p-xylene content in the xylene mixture exceeding 75 wt%. The fluidized bed reactor in the present application achieves increased p-xylene production by controlling the progression of cascade reactions (naphtha→benzene/toluene→p-xylene). Additionally, it utilizes the methylation reaction of benzene/toluene with methanol to provide in-situ heat for the coupled naphtha-methanol aromatization process, thereby achieving autothermal balance.

Fig. 1 for publication