

Vapor Phase Transesterification of Dimethyl Malonate with Phenol over Cordierite Honeycomb Coated with Zirconia and Its Modified Forms

Authors : Prathap S. Raghavendra, Mohamed S. Z. Shamsuddin, Thimmaraju N. Venkatesh

Abstract : The transesterification of dimethyl malonate (DMM) with phenol has been studied in vapour phase over cordierite honeycomb coated with solid acid catalysts such as ZrO_2 , $Mo(VI)/ZrO_2$ and SO_4^{2-}/ZrO_2 . The catalytic materials were prepared honeycomb coated and powder forms and characterized for their total surface acidity by NH_3 -TPD and crystallinity by powder XRD methods. Phenyl methyl malonate (PMM) and diphenyl malonate (DPM) were obtained as the reaction products. A good conversion of DMM (up to 82%) of MPM with 95% selectivity was observed when the reactions were carried out at a catalyst bed temperature of 200 °C and flow-rate of 10 mL/h in presence of $Mo(VI)/ZrO_2$ as catalyst. But over SO_4^{2-}/ZrO_2 catalyst, the yield of DPM was found to be higher. The results have been interpreted based on the variation of acidic properties and powder XRD phases of zirconia on incorporation of $Mo(VI)$ or SO_4^{2-} ions. Transesterification reactions were also carried out over powder forms of the catalytic materials and the yield of the desired phenyl ester products were compared with that of the HC coated catalytic materials. The solid acids were found to be reusable when used for at least 5 reaction cycles.

Keywords : cordierite honeycomb, methyl phenyl malonate, vapour phase transesterification, zirconia

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020