



Esterification of free fatty acids with methanol using heteropolyacids immobilized on silica

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ABSTRACT

The esterification of palmitic acid with methanol was studied using tungstophosphoric acid (PW), molybdophosphoric acid (PMo) and tungstosilicic acid (SiW) immobilized by sol-gel technique on silica, at 60 °C. It was observed that the catalytic activity decreases in the series: PW-silica > SiW-silica > PMo-silica.

A series of PW immobilized on silica with different PW loadings from 2.5 wt.% to 8.4 wt.% were prepared. It was observed that the PW-silica2 (with 4.2 wt.%) shows the highest catalytic activity on esterification of palmitic acid with methanol.

Catalytic stability of the PW-silica2 was evaluated by performing consecutive batch runs with the same catalyst sample. After the second batch it was observed a stabilisation of the initial activity.

In order to study the heteropolyacid lixiviation, a posterior catalytic experiment was carried out. The PW-silica2 was put in contact with methanol, without palmitic acid, during 72 h. After this period, the catalyst was separated from methanol by centrifugation, and the palmitic acid was added to the reaction mixture. It was observed that the reaction only occurs in the heterogeneous phase.

The PW-silica2 was also used as catalyst in esterification of others fatty acids: oleic and stearic acid. It was also observed a good catalytic activity of PW-silica2 for the different substrates used in the esterifications.

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