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The Influence of Feedgas Ratio on the Ethene Hydroformylation using Rh-Co Bimetallic Catalyst Supported by Reduced Graphene Oxide

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Abstract : The influence of feed-gas ratio on the ethene hydroformylation over an Rh-Co bimetallic catalyst supported by reduced graphene oxide (RGO) has been investigated in a tubular fixed bed reactor. Argon was used as balance gas when the feed-gas ratio was changed, which can keep the partial pressure of the other two kinds of gas constant while the ratio of one component in feed-gas was changed. First, the effect of single-component gas ratio on the performance of ethene hydroformylation was studied one by one (H_2, C_2H_4 and CO). Then an optimized ratio was found to obtain a high selectivity to C_3 oxygenates. The results showed that: (1) 0.5%Rh-20%Co/RGO is a promising heterogeneous catalyst for ethene hydroformylation. (2) H_2 and CO have a more significant influence than C_2H_4 on selectivity to oxygenates. (3) A lower H_2 ratio and a higher CO ratio in feed-gas can lead to a higher selectivity to oxygenates. (4) The highest selectivity to oxygenates, 61.70%, was obtained at the feed-gas ratio CO: C_2H_4: H_2 = 4: 2: 1.

Keywords : ethene hydroformylation, reduced graphene oxide, rhodium cobalt bimetallic catalyst, the effect of feed-gas ratio
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