CATALYTIC PROPERTIES OF MODIFIED SILICA GELS IN OXIDATIVE DEHYDROGENATION OF ETHYLBENZENE

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According to [1], oxides of silicon and alkaline earth metals exhibit low activity in oxidative dehydrogenation of alkylaromatic hydrocarbons. We observed that the activity of catalysts in oxidative dehydrogenation of ethylbenzene increased sharply when small amounts of calcium or strontium oxides were introduced into the composition of macroporous silica gel. A similar effect was also observed when silica gel was modified with magnesium, but in this case the maximum yield of styrene was attained at higher concentrations of magnesium oxide. The obtained results are shown in Fig. 1, from which it is evident that the yield of styrene passed through a maximum, depending on the concentration of alkaline-earth metals. With decreasing ionic radius of the cations, the maximums became broader and shifted toward higher concentrations. The decrease of the catalysts' activity when large amounts of the oxides were introduced was probably due to the formation of highly basic centers, which drove the reaction toward exhaustive oxidation and thus lowered the selectivity of the reaction with respect to styrene.

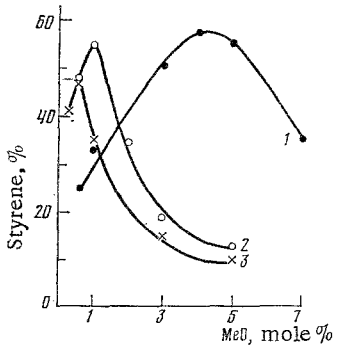

Fig. 1. Effect of the concentration of magnesium oxide (1), calcium oxide (2), and strontium oxide (3) in the composition of macroporous silica gel on the oxidative dehydrogenation of ethylbenzene at 760°K with an ethylbenzene:air:water vapor molar correlation of 1:6:5 and a volumetric liquid velocity of 0.5 h^{-1}.

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