HYDROGENOLYSIS OF α-METHYLFURAN OVER NICKEL ON IONIC SUPPORTS

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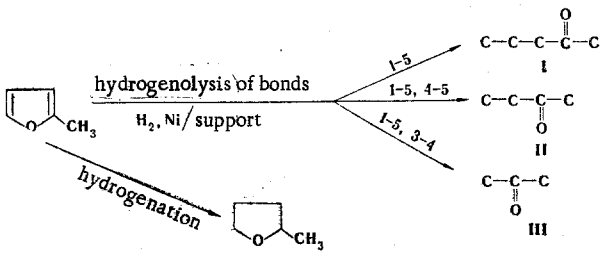
UDC 547.725:541.127

The catalytic conversion of α-methylfuran in a stream of H_2 over metal catalysts on quartz generally gives aliphatic ketones I, II, and III and α-methyltetrahydrofuran [1].



The chief reaction product in the catalysis of α-methylfuran over 0.5% Ni/CaF_2 at 100°C is α-methyltetrahydrofuran; at 200° the degree of conversion reaches 100%, but methyl propyl ketone (50%) is also obtained along with α-methyltetrahydrofuran (50%). A similar catalyzate composition is observed at 300°. Consequently, Ni/CaF_2 is a selective catalyst for hydrogenation and hydrogenolysis at the 1–5 bond.

Sodium fluoride and sodium chloride supports were also investigated. The method for the preparation of catalysts on ionic supports was described in [2]. Probing of the sites of distribution of Ni^{2+} in the lattice of the supports by means of diffuse reflection spectra attests to different energy states of the metal in the investigated supports. The catalytic properties were investigated with a pulse apparatus by a previously described method [2], and the catalyzate was analyzed with a Khrom-4 chromatograph. Prior to the reaction, the catalysts were activated in a stream of H_2 and 400° (for ~30 min). Nickel deposited on NaF and NaCl catalyzes only conjugate hydrogenolysis with production of the ketones in a ratio of 1:1:1. This constitutes evidence for a planar orientation of the heteroring relative to the active portions of the nickel surface on these supports. From a comparison of the data from the catalytic experiments it may be assumed an edgewise orientation that promotes hydrogenation and selective hydrogenolysis at the 1–5 bond is realized for Ni/CaF_2.

LITERATURE CITED

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V. I. Lenin Moscow State Pedagogic Institute. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 12, pp. 1699-1700, December, 1974. Original article submitted July 29, 1974.

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