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Additive polymerization of norborene in the presence of highly effective catalytic systems on the basis of Ni(0)/HA/BF_3·OEt_2

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Abstract

A number of catalytic systems on the basis of complexes Ni(0) and BF_3·OEt_2 have been tested in polymerization of norborene. It is established that the addition to catalytic system Ni $(PPh_3)_4$ + 400BF_3·OEt_2 of controllable quantities of water in the interval of molar relations from 2 to 104 leads to considerable growth of activity of catalytic systems (~27 times) and to the reduction of characteristic viscosity of polymers. At the use of catalytic systems $(CH_2{=}CH_2)Ni(PPh_3)_2$/6H_2O/200BF_3·OEt_2 the activity in polymerisation of norborene increases 3 times as compared to the system Ni$(PPh_3)_4$/9H_2O/400BF_3·OEt_2. Influence of molar relations H_2O/Ni and norborenena/Ni, as well as the temperatures of reaction on the yield and characteristic viscosity of polynorborenes, obtained in the presence of catalytic systems Ni$(acac)_2$/2PPh_3/5$AlEt_3$/nC_2H_4/mH_2O/200BF_3·OEt_2 is studied. Among the studied proton donors (H_2O, acacH, HBF_4·OEt_2, MeOH) methanol as the activator is the most effective. The structure of polynorborenes has been studied with the methods of NMR ^1H, ^{13}C and IR spectroscopy.