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Effect of P/Ni ratio on the performance of nickel phosphide phases supported on zirconia for the hydrodeoxygenation of m-cresol

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Abstract: The catalytic performances of various nickel phosphide catalysts (NiP) supported on ZrO₂ synthesized with different P/Ni molar ratios (0.8, 2 and 3) were investigated in hydrodeoxygenation (HDO) of m-cresol at 340 °C under 4 MPa. The solid sample with the highest P/Ni ratio (NiP-3/ZrO₂) presented the best catalytic performances in terms of activity, which were attributed to the presence of the pure Ni₂P phase, the other samples containing either a mixture of Ni₂P and Ni₁₂P₅ (NiP-2/ZrO₂) or Ni₁₂P₅(NiP-0.8/ZrO₂) alone were less active. The use of ZrO₂ as support required a large excess of P to obtain Ni₂P as active phase.