

Ni-Cu@ γ -Al₂O₃ catalyst achieves high efficiency selective hydrogenation of rosin

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Abstract: Rosin is a solid natural resin and is an important renewable resource from pine forests in our country. Its main components are abietic acid and pimaric acid, with small amounts of fatty acids, fatty acid alcohols, and neutral substances. Due to the unsaturated conjugated double bonds in the rosin molecules, oxidation occurs in the presence of oxygen in the air, resulting in a decrease in its performance. Therefore, modified rosin as an optimized product has received a lot of attention. Hydrogenated rosin, as one of the modified products of rosin, catalytically hydrogenates the non-ring double bond structure in resin acids, effectively improving the stability and antioxidant properties of rosin. γ -Al₂O₃ is widely used in catalysis due to its unique porous structure, catalytic activity and stability. As a low-cost and efficient non-precious metal solution, Ni supported catalysts have been used in the catalytic production of hydrogenated rosin. However, Ni based catalysts have the characteristics of high temperature decarboxylation and low selectivity for hydrogenation of dihydrorosin acid. To solve this problem, we reported a γ -Al₂O₃ supported Ni-Cu catalyst (Ni-Cu@ γ -Al₂O₃), which showed high activity and selectivity for dihydrorosin acid. The effect of Cu on Ni dispersion was studied. The high selectivity of rosin hydrogenation was achieved by increasing the dispersion of Ni and Ni-Cu bimetallic co-catalysis. The high stability of Ni-Cu@ γ -Al₂O₃ support and the high dispersion of Ni reduce the formation of clusters to maintain the high repeatability of the catalyst, and the separated Ni-Cu@ γ -Al₂O₃ catalyst can still maintain high catalytic activity after 10 cycles.