Activated carbon cloth-supported Pd-Cu catalyst: application for continuous water denitrification

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Pd-Cu catalysts supported on woven fibrous cloths have been tested for continuous nitrate hydrogenation in water. The results demonstrate that activated carbon cloth (ACC) is an adequate support for the Pd-Cu bimetallic catalysts, providing better activity and selectivity than that of supports like glass fiber cloth (GFC) and GFCs coated with Al₂O₃ or SnO₂, which were also studied.

A series of 2% Pd-Cu/ACC catalysts were prepared by selective deposition of Cu on Pd/ACC and examined at steady-state in a continuous three-phase radial flow reactor. The activity and selectivity of the bimetallic catalysts depend on the Cu:Pd ratio and the metal loading. The beneficial effect of copper on nitrate hydrogenation activity with a Pd-Cu/ACC catalyst is probably related to the formation of an active Pd-Cu ensemble working as active sites for nitrate-to-nitrite reduction. The maximal nitrate conversion was achieved with a 0.6 wt.% Cu-2 wt.% Pd/ACC catalyst showing a 92% selectivity towards gaseous products.