Reductive Amination of Carbonyl Compounds on Nb$_2$O$_5$-Supported Ruthenium

Significance: Nb$_2$O$_5$-supported ruthenium nanoparticles (Ru/Nb$_2$O$_5$) were prepared by mixing Nb$_2$O$_5$ with an aqueous solution of Ru(NO)(NO$_3$)$_3$ followed by treatment under flowing H$_2$/argon at 673 K (eq. 1). Ru/Nb$_2$O$_5$ promoted the reductive amination of carbonyl compounds 1 with NH$_3$ and H$_2$ to give the corresponding primary amines 3 in \( \geq 98\% \) yield (eq. 2).

Comment: Ru/Nb$_2$O$_5$ prevented the formation of secondary amines and undesired hydrogenated byproducts. Ru/Nb$_2$O$_5$ was characterized by means of SEM, STEM, XPS, TPR, XRD and FT-IR analyses. Ru/Nb$_2$O$_5$ was recovered and reused three times without loss of its catalytic activity (2f; first reuse: 99% yield; second reuse: 93%; third reuse: 94%).