Comparative study of catalytic dehydrogenation of methylbicyclohexyl

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Liquid organic hydrogen carrier (LOHC) is a promising method of storing hydrogen in a liquid compound by catalytic reaction. Many LOHCs have been developed over a decade, but there are a few studies on catalysts required for hydrogenation/dehydrogenation of LOHC. In this study, a catalytic activity of Pd and Pt with different supports was evaluated in the dehydrogenation reaction of LOHC. The benchmark LOHC was methylbiphenyl, which has a high hydrogen storage capacity of 6.7 wt.%. Hydrogenation of methylbiphenyl was carried out with Ru/Al2O3 at 60bar and 160℃, followed by the dehydrogenation of methylbicyclohexyl using different types of transition-metal catalysts such as Pd/C, Pd/Al2O3, Pt/C, Pt/Al2O3. The amount of released hydrogen and flow rate were measured by oil burette and mass flow meter, respectively. The product was analyzed by using 1H-NMR. The results could provide a direction for the designing of a useful catalyst for LOHC.