Catalytic Transfer Hydrogenation of Levulinic Acid to γ-Valerolactone over Ni₃P-CePO₄ Catalysts

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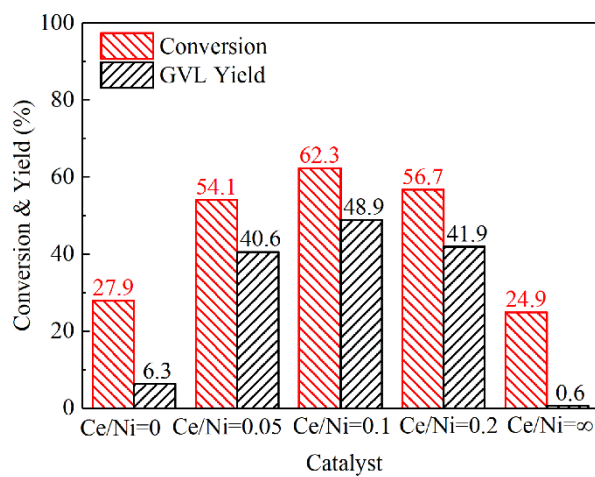
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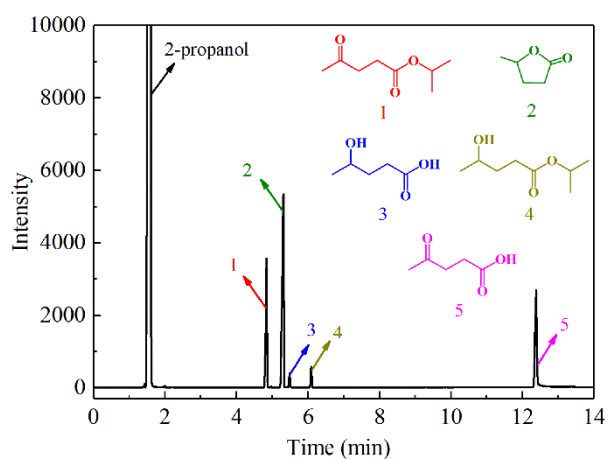[§] Yinchuan Energy Institute, Yongning Wangtaibu, Yinchuan 750105, China

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Results and Discussion


Figure S1. Catalytic performance of the Ni_3P-$CePO_4(x)$ catalyst in the CTH of LA to GVL. Reaction conditions: LA 20 mmol, Ni_3P-$CePO_4(x)$ 0.2 g, 2-propanol 38 mL, 180 °C, 60 min, 750 rpm.

Figure S2. Representative gas chromatogram of the liquid product from CTH of LA.

Table S1. Kinetic parameters for the CTH of LA to GVL over $Ni_3P-CePO_4$(0.1) catalyst.

Temperature (°C)	Rate constant ($mol \cdot L^{-1} \cdot min^{-1}$) [a]	Apparent activation energy ($kJ \cdot mol^{-1}$) [b]
160	1.8×10^{-3}	
170	2.6×10^{-3}	
180	4.6×10^{-3}	73.9
190	6.9×10^{-3}	
200	9.8×10^{-3}	

[a] Assuming a pseudo zero order to the concentration of LA.

[b] According to Arrhenius equation.
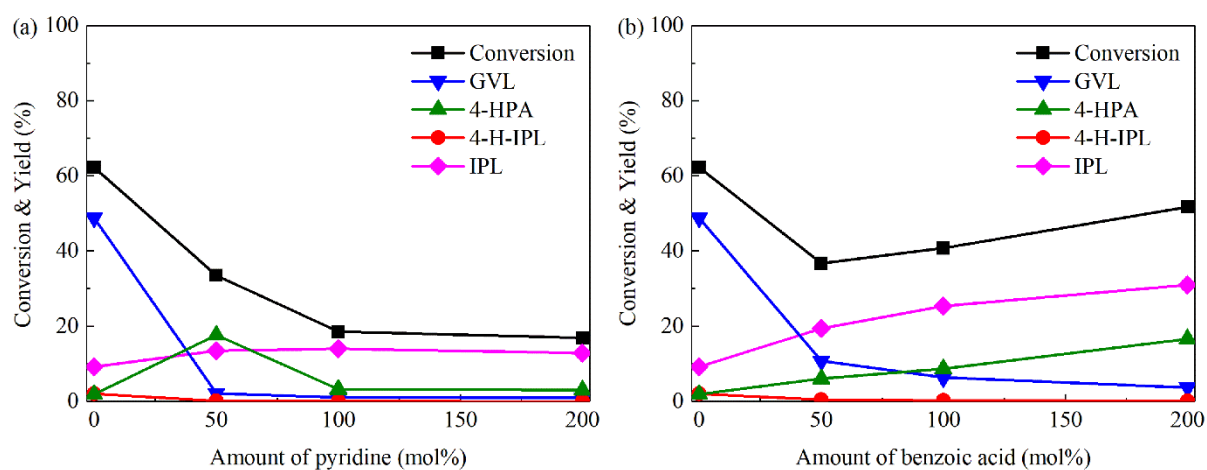
Figure S3. Variation of LA conversion and product yield with amount of (a) pyridine or (b) benzoic acid in CTH of LA over $Ni_3P-CePO_4$(0.1) catalyst.