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Liquid-phase Continuous-flow Preparation of High Energy Fuel Exo-THDCPD

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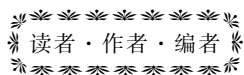
Abstract: Exo-tetrahydrodicyclopentadiene (exo-THDCPD) is an important high density liquid hydrocarbon fuel. To improve the synthesis efficiency of exo-THDCPD, a new process of continuous preparation of exo-THDCPD, including the cascade of two reactors (continuous-flow bubbling hydrogenation reactor and continuous-flow isomerization tank reactor), namely the cascade of two processes (dicyclopentadiene (DCPD) was hydrogenated to endo-THDCPD over Pd/C catalyst and the endo-THDCPD was isomerized to exo-THDCPD over AlCl_3 catalyst) was studied. The liquid-phase continuous-flow preparation of exo-THDCPD was realized. Results show that the optimum liquid-phase continuous-flow process conditions of preparing exo-THDCPD are determined as: weight hourly space velocity (WHSV), 2.4 h^{-1} ; hydrogenation pressure (p_H), 0.1 MPa; H_2 gas flow rate, $80 \text{ mL} \cdot \text{min}^{-1}$; DCPD concentration (C_{DCPD}), $0.76 \text{ mol} \cdot \text{L}^{-1}$; hydrogenation reaction temperature: $30 \text{ }^\circ\text{C}$; isomerization; reaction temperature, $70 \text{ }^\circ\text{C}$; conversion of DCPD, 100% and yield of exo-THDCPD, 92.5%.

Key words: exo-tetrahydrodicyclopentadiene (exo-THDCPD); continuous-flow; hydrogenation; isomerization; process

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