

# Performance and mechanism of the separation of C8 $\alpha$ -olefin from F-T synthesis products using novel Ag-DES

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## Abstract

As an attractive alternative technology for the separation of long chain olefin and paraffin, a novel silver-based deep eutectic solvent (Ag-DES) was prepared and utilized for 1-octene/n-octane separation. Comprehensive reactive extraction separation experiments were performed to highlight the Ag-DES concentration and operating temperature discriminations using compounds with different ratio of 1-octene/n-octane. The novel Ag-DES showed optimal separation performance regarding 1-octene/n-octane and possessed the highest levels separation selectivity in the range 3.75-16.74 with excellent circulation stability in our best knowledge. Furthermore, FT-Raman measurements and quantum chemistry calculation were conducted to elucidate the interaction mechanism of Ag-DES in the separation of 1-octene and n-octane, which revealed that both chemical complexation and strong physical attraction existed in the complex of Ag-DES with 1-octene rather than n-octane. This study lends important insight for the development of Ag-DES reactive extraction separation process for the energy-efficient long chain  $\alpha$ -olefin purification from F-T synthesis products.

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