

# Effective absorption of SO<sub>2</sub> by imidazole-based PILs with multiple active sites: Thermodynamic and mechanical studies

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March 07, 2024

## Abstract

In view of the environmental hazards caused by SO<sub>2</sub>, the development of efficient SO<sub>2</sub> capture technology has important practical significance. In this work, a low viscosity protic ionic liquids containing imidazole, ether linkage, and tertiary amine structure, was synthesized by acid-base neutralization of tris(3,6-dioxaheptyl)amine (TMEA) and imidazole (Im) for SO<sub>2</sub> absorption. The results showed that the solubility of SO<sub>2</sub> in [TMEA][Im] reached 12.754 mol·kg<sup>-1</sup> at 298.2 K and 100 kPa and the ideal selectivity of SO<sub>2</sub>/CO<sub>2</sub>(1/1) and SO<sub>2</sub>/H<sub>2</sub>S(1/1) are 141.6 and 11.8 at 100 kPa, respectively. Furthermore, [TMEA][Im] can be reused and the SO<sub>2</sub> absorption performance was not significantly reduced after five cycles. In addition, the absorption of low-concentration SO<sub>2</sub> (2000 ppm) in [TMEA][Im] was also tested. Further spectroscopic research and thermodynamic analysis suggested that the high SO<sub>2</sub> uptake by [TMEA][Im] was caused by the synergistic effect of physical and chemical absorption.

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