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Simultaneous separation of H₂S and CO₂ from biogas by gas-liquid membrane contactor using single and mixed absorbents

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In the present work, we studied the simultaneous separation of H₂S and CO₂ from biogas by gas-liquid membrane contactor using single and mixed absorbents. The synthetic biogas contained 300 to 900 ppm H₂S, 30% to 50% CO₂ and CH₄. In order to gain a better understanding on the role of different absorbents on simultaneous separation of H₂S and CO₂ from biogas, water, monoethanolamine (MEA, primary amine), potassium carbonate (K₂CO₃, inorganic salt), Potassium hydroxide (KOH, inorganic salt), potassium glycinate (PG, organic salt), potassium sarcosine (PS, organic salt), potassium L-proline (PLP, organic salt) were applied as absorbent solutions. Poly (vinylidene fluoride) (PVDF) hollow fibre membrane was used in the membrane contactor modules. The performances of both single and mixed solutions on H₂S and CO₂ simultaneous absorption capacity were investigated. In addition, the effects of liquid and gas velocities, absorbent concentration and acid gas content of the feed, pressure, on the absorption performance, overall mass transfer coefficients and selectivity of H₂S were investigated. The results indicate that the use of K₂CO₃ and KOH as absorbents gave highest H₂S flux, and the highest CO₂ flux was obtained using PG as the absorbent. The use of mixed solutions can simultaneously improve the absorption flux of H₂S and CO₂. The results of H₂S selectivity showed that liquid side resistance is negligible in comparison with membrane and gas side resistances for H₂S absorption. On the contrary, liquid phase resistance controlled the mass transfer for the mass transfer of CO₂. For the partially wetted mode, the wetted membrane resistance was insignificant and gas phase resistance controlled the mass transfer.

Biography

Pengrui Jin has completed his Bachelor at the age of 23 years from Chongqing University of technology and he is doing his masters at Chongqing University School of Resources and Environmental Science. He has published two papers in reputed journals.

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