Simultaneous removal of selective CO_2 and H_2S using MDEA-based solvents for biogas purification

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Commercial absorbent MDEA (MDEA-PZ) is used to purify biogas by removing CO_2, H_2S and CH_4 gas. However, it has been reported that the addition of Piperazine (PZ) produces carcinogenic nitrosamines. Therefore, the use of MDEA-PZ is not recommended and it is important to find an alternative Absorbent.
In this study, we screened dozen of solvents were selected to activate the MDEA to replace PZ by demonstrating superior gas removal performance over PZ. The gas removal efficiency of all solvents was investigated using single gas CO2 (15 vol% CO_2, N2 balance) and mixed CO_2 / H_2S gas (CO_2 15. vol.%, H_2S 50 ppm, N_2 balance).
Furthermore, the gas removal efficiency of the solvent was tested 20 times by adsorption / desorption. The obtained results suggest that DETA, TEPA, and APA additive had better CO_2 and H_2S gas absorption capacities for single gases and mixed gas and thus can be used as activators for MDEA-based biogas purification process.