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Simultaneous CO₂ Capture and Amino Acid Production Using Bipolar Membrane Electrodialysis (BMED)

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Abstract:

Amino acid salts have the potential for CO₂ capture due to their lower vapor pressure and higher stability against oxidative degradation. In our present study, the CO₂ capture and extraction of methionine were simultaneously achieved from methionine salt using bipolar membrane electrodialysis (BMED). CO₂ capture was firstly achieved using the methionine salt and then the mixture was converted into methionine and CO₂ through the BMED process. Our procedure may significantly challenge the conventional amino acid acidification process using inorganic acids. Results indicated that a high-purity methionine was successfully obtained along with the successful recovery of CO₂. The attain methionine extraction ratio can be as high as 99.57% while the energy consumption can be as low as 7.0 kW h for 1 kg of CO₂. Therefore, it is a highly effective and environmentally friendly process for capturing CO₂ and simultaneous producing this amino acid.

Keywords: CO₂ capture; electrodialysis; membrane separations; methionine salt; water splitting

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