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Carbon Capture and Utilization Using Industrial Wastewater under Ambient Conditions

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ABSTRACT. This study deals with the chemical conversion of carbon dioxide contained in industrial flue gas. Unlike previous studies, which used natural resources to obtain inorganic metal carbonate salts, this study used industrial wastewater produced from a refined salt production facility. The calcium concentration in the wastewater was 21285.737 ppm, as estimated by inductively coupled plasma–optical emission spectroscopy. Monoethanolamine, diethanolamine (DEA), and methyl-diethanolamine solutions were used as carbon dioxide absorbents, leading to CO_2 loading values for the first absorption step of 0.4193, 0.3967, and 0.2814 (mol CO_2/mol amine), respectively. After saturating 400 mL of each absorbent solution using 15 vol% carbon dioxide gas mixed with nitrogen, 100 mL of industrial wastewater was added to the mixture, resulting in the formation of inorganic metal carbonate salts. After a filtration step, the samples were dried and instrumental analyses including scanning electron