

Life cycle assessment and techno-economic analysis for the formic acid production using CO<sub>2</sub>

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Carbon dioxide utilization process for producing formic acid could be more environmentally-friendly synthesis process alternatives to fossil-based formic acid production. Formic acid is also known for having potential as a hydrogen carrier and as fuel for fuel cells. Techno-economic analysis and Life cycle assessment verify the feasibility and the sustainability of the CO<sub>2</sub>-based process. This study focused on life cycle assessment and economic evaluation of Formic acid synthesis process using CO<sub>2</sub>. This work deals with the electrochemical reduction process which is one of the main available methods to convert CO<sub>2</sub> into formic acid. The process model is developed in Aspen plus for obtaining the energy and mass balances, and the purchase equipment cost of the formic acid plant. According to the results, the CO<sub>2</sub> based process saves CO<sub>2</sub> emissions when compared to the conventional process, under specific conditions. In addition, this study provides insights with regard to developing both more effective CO<sub>2</sub> reduction process and economical process.