Systematic methods and tools for design of sustainable chemical processes for CO2 utilization - DTU Orbit (07/06/2019)

Systematic methods and tools for design of sustainable chemical processes for CO2 utilization

A systematic computer-aided framework for sustainable process design is presented together with its application to the synthesis and generation of processing networks for dimethyl carbonate (DMC) production with CO2 utilization. The framework integrated with various methods, tools, algorithms and databases is based on a combined process synthesis-design-intensification method. The method consists of three stages. The synthesis-stage involves superstructure based optimization to identify promising networks that convert a given set of raw materials to a desired set of products. The design-stage involves selection and analysis of the identified networks as a base case design in terms of operational feasibility, economics, life cycle assessment factors and sustainability measures, which are employed to establish targets for improvement in the next-stage. The innovation-stage involves generation and screening of the more sustainable alternatives through a phenomena-based process intensification method. Applications of the framework are highlighted for the DMC production process.

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