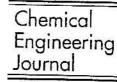


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## A hybrid numerical approach for multi-responses optimization of process parameters and catalyst compositions in CO<sub>2</sub> OCM process over CaO-MnO/CeO<sub>2</sub> catalyst

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## Abstract

A new hybrid numerical approach, using Weighted Sum of Squared Objective Functions (WSSOF) algorithm, was developed for multi-responses optimization of carbon dioxide oxidative coupling of methane (CO<sub>2</sub> OCM). The optimization was aimed to obtain optimal process parameters and catalyst compositions with high catalytic performances. The hybrid numerical approach combined the single-response modeling and optimization using Response Surface Methodology (RSM) and WSSOF technique of multi-responses optimization. The hybrid algorithm resulted in Pareto-optimal solutions and an additional criterion was proposed over the solutions to obtain a final unique optimal solution. The simultaneous maximum responses of C<sub>2</sub> selectivity and yield were obtained at the corresponding optimal independent variables. The results of the multi-response optimization could be used to facilitate in recommending the suitable operating conditions and catalyst compositions for the CO<sub>2</sub> OCM process.

Keywords: Weighted Sum of Squared Objective Functions; CO2 OCM process; Multi-responses optimization; Pareto-optimal solutions

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