

AN ABSTRACT OF A DISSERTATION

OPTIMIZATION OF METHANOL SYNTHESIS REACTORS

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Doctor of Philosophy in Engineering

The continuous quench and Casale mixed flow methanol synthesis reactors were optimized using the Rayleigh-Ritz technique. The simulation results of the optimized reactors were compared with those of isothermal tubular, one-stage adiabatic, and multistage adiabatic quench reactors. It was shown from the simulation results that the optimized reactors produced more methanol than the multistage adiabatic quench reactor. The best case of the continuous quench and the Casale mixed flow reactors produced 2912 and 2756 T/D of methanol, respectively, while the four-stage adiabatic quench reactor produced 2611 T/D of methanol.

The best case of the isothermal tubular reactor produced 3382 T/D of methanol which was the highest production of methanol; however, mechanical design for tube sheet diameter larger than 6 meters and its integrity becomes questionable.

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CERTIFICATE OF APPROVAL OF DISSERTATION

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