

Modeling and simulation of methanol dehydration reaction to dimethyl ether in isothermal fixed bed reactor = Pemodelan dan simulasi reaksi dehidrasi metanol menjadi dimetil eter di reaktor fixed-bed isothermal

Lisa Marie Zulkarnain, author

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Abstrak

Di tengah fenomena pemanasan global, simulasi proses sintesis dimetil eter dapat dikembangkan sebagai acuan dalam aplikasi kehidupan nyata. Parameter operasi yang menghasilkan paling DME yang meliputi tekanan inlet reaktor dari 18 atm, reaktor suhu inlet 533 K, tekanan distilasi 8 atm, kecepatan arus masuk 0,408 m / s, dan panjang reaktor 4 meter. Di bawah parameter tersebut, 10,7 mol / s dari dimetil eter diproduksi, dengan hasil total 47% dan konversi metanol 90%. Penambahan aliran recycle meningkatkan hasil sebesar 2%. simulasi ini kemudian bervariasi berdasarkan tekanan, suhu, kecepatan arus masuk, dan panjang reaktor, dimana suhu mempengaruhi konversi sebesar 76% maksimal.

In the midst of the global warming phenomenon, a simulation of dimethyl ether synthesis process can be developed as a reference in real-life application. The operating parameters that produces the most DME include the reactor inlet pressure of 18 atm, reactor inlet temperature of 533 K, distillation pressure of 8 atm, inflow velocity of 0.408 m/s, and reactor length of 4 meters. Under these parameters, 10.7 mol/s of dimethyl ether is produced, with total yield of 47% and methanol conversion of 90%. The addition of recycle stream increases the yield by 2%. The simulation is then varied based on pressure, temperature, inflow velocity, and reactor length, wherein temperature affect the conversion by 76% at maximum.