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## Daftar Pustaka

- Abbas, S. Z., Dupont, V. and Mahmud, T. (2017) ‘Kinetics study and modelling of *steam* methane reforming process over a NiO/Al<sub>2</sub>O<sub>3</sub> catalyst in an adiabatic packed bed reactor’, *International Journal of Hydrogen Energy*, 42(5), pp. 2889–2903. doi: 10.1016/j.ijhydene.2016.11.093.
- Amran, U. I., Ahmad, A. and Othman, M. R. (2017) ‘Kinetic based simulation of methane *steam* reforming and *water gas shift* for *hydrogen* production using aspen plus’, *Chemical Engineering Transactions*, 56, pp. 1681–1686. doi: 10.3303/CET1756281.
- Aries, R. S., and Newton, R. D. (1955). ‘Chemical Engineering Cost Estimation’ McGraw-Hill, New York.
- Askgaard, T. S. *et al.* (1995) ‘A Kinetic Model of Methanol Synthesis’, *Journal of Catalysis*, 156(2), pp. 229–242. doi: 10.1006/jcat.1995.1250.
- Badan Pusat Statistik (2020a) *Keadaan Angkatan Kerja Kabupaten/Kota Provinsi Kalimantan Timur 2017-2019*.
- Badan Pusat Statistik (2020b) *Kota Bontang Dalam Angka*.
- Badan Pusat Statistik (2020c) *Statistik Perdagangan Luar Negeri Indonesia: Ekspor-Impor 2020*.
- Basile, A. and Dalena, F. (2017) *Methanol: Science and Engineering, Methanol: Science and Engineering*. Elsevier. doi: 10.1016/C2016-0-00366-2.
- Blackmer: Compressor and Pump Company (1999) ‘Steps To Compressor Selection & Sizing’, *Selecting the Proper Compressor*, p. 17.
- Borisut, P. and Nuchitprasittichai, A. (2019) ‘Methanol Production via CO<sub>2</sub> *Hydrogenation*: Sensitivity Analysis and Simulation—Based Optimization’, *Frontiers in Energy*



---

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*Research*, 7(September), pp. 1–10. doi: 10.3389/fenrg.2019.00081.

Bozzano, G. and Manenti, F. (2016) ‘Efficient methanol synthesis: Perspectives, technologies and optimization strategies’, *Progress in Energy and Combustion Science*, 56, pp. 71–105. doi: 10.1016/j.pecs.2016.06.001.

Bussche, K. M. and Froment, G. F. (1996) ‘A steady-state kinetic model for methanol synthesis and the *water gas shift* reaction on a commercial Cu/ZnO/Al<sub>2</sub>O<sub>3</sub> catalyst’, *Journal of Catalysis*, 161(1), pp. 1–10. doi: 10.1006/jcat.1996.0156.

Coulson, J. M. and Richardson, F. F. (2005) *Coulson & Richardson’s Chemical Engineering. Vol. 6, Chemical engineering design*, Oxford: Elsevier Butterworth-Heinemann. Elsevier.

Dalena, F. *et al.* (2018) ‘Advances in methanol production and utilization, with particular emphasis toward *hydrogen* generation via membrane reactor technology’, *Membranes*, 8(4). doi: 10.3390/membranes8040098.

Debajyoti, B. (2015) ‘Design Parameters for a Hydro desulfurization (HDS) Unit for Petroleum Naphtha at 3500 Barrels per Day’, *World Scientific News*, 3, pp. 99–111.

El-Nagar, R. A. and Ghanem, A. A. (2019) ‘Syngas Production, Properties, and Its Importance, Sustainable Alternative Syngas Fuel’, *IntechOpen*, pp. 1–8. Available at: <https://www.intechopen.com/chapters/69842>.

El-shafie, M., Kambara, S. and Hayakawa, Y. (2019) ‘*Hydrogen* Production Technologies Overview’, (January). doi: 10.4236/jpee.2019.71007.

Frilund, C. *et al.* (2020) ‘Desulfurization of Biomass Syngas Using ZnO-Based Adsorbents: Long-Term *Hydrogen* Sulfide Breakthrough Experiments’, *Energy and Fuels*, (5). doi: 10.1021/acs.energyfuels.9b04276.

Fogler, H. S. (2004) *Elements of Chemical Reaction Engineering 3rd ed.* Hall International.

---

---



---

---

Inc.

Froment, G. F., Bischoff, K. B. and Wilde, J. De (2011) *Chemical Reactor Analysis and Design*. 3rd edisi. Hoboken, New Jersey: John Wiley & Sons.

Holman, J. P. (2010) *Heat Transfer*. 10th edisi. McGraw-Hill. doi: 10.1080/01973762.1999.9658510.

Hagh, B. F. (2004) 'Stoichiometric analysis of *autothermal* fuel processing', *Journal of Power Sources*, 130(1–2), pp. 85–94. doi: 10.1016/j.jpowsour.2003.11.041.

Kiss, A. A. *et al.* (2016) 'Novel efficient process for methanol synthesis by CO<sub>2</sub> hydrogenation', *Chemical Engineering Journal*, 284, pp. 260–269. doi: 10.1016/j.cej.2015.08.101.

*Laporan Tahunan PT Badak NGL* (2019).

Lücking, L. E. (2017) *Methanol Production from Syngas : Process modelling and design utilising biomass gasification and integrating hydrogen supply*, Delft University of Technology.

Machado, C. F. R. *et al.* (2014) 'A comparative analysis of methanol production routes : synthesis gas versus CO<sub>2</sub> hydrogenation', *2014 International Conference on Industrial Engineering and Operations Management*, pp. 2981–2990.

Matche.com. (2014). 'Process Equipment Cost Estimates'. Diakses pada Juni 2022, dari <http://matche.com/equipcost/Default.html>.

Manças, V. H., Matos, H. A. and Špatenka, Š. (2013) 'Advanced steady-state modelling and optimisation of Natural Gas Reforming reactors', pp. 1–10.

Metcalf & Eddy. (1991) 'Wastewater Engineering: Treatment, Disposal and Reuse, Third Edition', McGraw-Hill, New York.

---

---



- 
- 
- Nakyai, T. and Saebea, D. (2019) ‘Exergoeconomic comparison of syngas production from biomass , coal , and natural gas for dimethyl ether synthesis in single-step and two-step processes’, *Journal of Cleaner Production*, 241, p. 118334. doi: 10.1016/j.jclepro.2019.118334.
- Peter, M. (2012) ‘Mechanistic modeling of reaction kinetics and dynamic changes in catalyst morphology on a mesoscopic scale’.
- Piña, J. and Borio, D. O. (2006) ‘Modeling and simulation of an *autothermal reformer*’, *Latin American Applied Research*, 36(4), pp. 289–294.
- Peters, M. S., and Timmerhaus, K. D. (1991). ‘Plant Design and Economics for Chemical Engineers 4th ed. McGraw-Hill, Singapore.
- Ren, H. *et al.* (2015) ‘Methanol synthesis from CO<sub>2</sub> hydrogenation over Cu/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalysts modified by ZnO, ZrO<sub>2</sub> and MgO’, *Journal of Industrial and Engineering Chemistry*, 28, pp. 261–267. doi: 10.1016/j.jiec.2015.03.001.
- Rezaie, N. *et al.* (2005) ‘A comparison of homogeneous and heterogeneous dynamic models for industrial methanol reactors in the presence of catalyst deactivation’, *Chemical Engineering and Processing: Process Intensification*, 44(8), pp. 911–921. doi: 10.1016/j.cep.2004.10.004.
- Sinnot, R. and Towler, G. (2013) *Chemical Engineering Design*, *Chemical Engineer*. Elsevier. doi: 10.1016/C2009-0-61216-2.
- Shahbaz, M. *et al.* (2017) ‘The influence of catalysts in biomass *steam* gasification and catalytic potential of coal bottom ash in biomass *steam* gasification: A review’, *Renewable and Sustainable Energy Reviews*, 73(February), pp. 468–476. doi: 10.1016/j.rser.2017.01.153.
- Uskov, S. I. *et al.* (2020) ‘Propane pre-reforming into methane-rich gas over ni catalyst:
- 
-



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---

Experiment and kinetics elucidation via genetic algorithm’, *Energies*, 13(13), pp. 1–10.  
doi: 10.3390/en13133393.

Vaziri, R. S. and Babler, M. U. (2019) ‘Removal of *hydrogen* sulfide with metal oxides in  
packed bed reactors-A review from a modeling perspective with practical implications’,  
*Applied Sciences (Switzerland)*, 9(24). doi: 10.3390/app9245316.

Xu, J. and Froment, G. F. (1989) ‘Methane *steam* reforming, methanation and *water-gas shift*:  
I. Intrinsic kinetics’, *AIChE Journal*, 35(1), pp. 88–96. doi: 10.1002/aic.690350109.

Zahedi nezhad, M., Rowshanzamir, S. and Eikani, M. H. (2009) ‘*Autothermal* reforming of  
methane to synthesis gas: Modeling and simulation’, *International Journal of Hydrogen  
Energy*, 34(3), pp. 1292–1300. doi: 10.1016/j.ijhydene.2008.11.091.