

## DAFTAR PUSTAKA

- Adriani, D., A. Wresta, T.D. Atmaja dan A. Saepudin, 2014, "A Review on Optimization Production and Upgrading Biogas Through CO<sub>2</sub> Removal Using Various Techniques", *Applied Biochemistry and Biotechnology*, Vol. 172, No. 4, hal. 1909-1928.
- Alabadi, A., S. Razzaque, Y. Yang, S. Chen dan B. Tan, 2015, "Highly Porous Activated Carbon Materials from Carbonized Biomass with High CO<sub>2</sub> Capturing Capacity", *Chemical Engineering Journal*, Vol. 281, hal. 606-612.
- Alhashimi, H.A. dan C.B. Aktas, 2017, "Life Cycle Environmental and Economic Performance of Biochar Compared with Activated Carbon: A Meta-analysis", *Resources, Conservation and Recycling*, Vol. 118, hal. 13-26.
- Alonso-Vicaro, A., J.R. Ochoa-Gomez. S.G. Gil-Rio, O. Gomez-Jimenez-Aberasturi, C.A. Ramirez-Lopez, J. Torrecilla-Soria dan A. Dominguez, 2010, "Purification and Upgrading of Biogas by Pressure Swing Adsorption on Synthetic and Natural Zeolites", *Microporous and Mesoporous Materials*, Vol. 134, hal. 100-107.
- Awe, O.W., Y. Zhao, A. Nzlhou, D.P. Minh dan N. Lyczko, 2017, "A Review of Biogas Utilisation, Purification and Upgrading Technologies", *Waste Biomass Valor*, Vol. 8, hal. 267-283.
- Bezerra, D.P., R.S. Oliveira, R.S. Vieira, C.L. Cavalcante Jr. dan D.C.S. Azevedo, 2011, "Adsorption of CO<sub>2</sub> on Nitrogen-Enriched Activated Carbon and Zeolite 13X", *Adsorption*, Vol. 17, hal. 235-246.
- Bond, T. dan M.R. Templeton, 2011, "History and Future of Domestic Biogas Plants in The Developing World", *Energy for Sustainable Development*, Vol. 15, hal. 374-354.
- Bonenfant, D., M. Kharoune, P. Niquette, M. Mimeault dan R. Hausler, 2008, "Advances in Principal Factors Influencing Carbon Dioxide Adsorption on Zeolites", *Science and Technology of Advanced Materials*, Vol. 9, hal. 1-7.
- Boonpoke, A., S. Chiarakorn, N. Laosiripojana, S. Towprayoon dan A. Chidthaisong, 2011, "Synthesis of Activated Carbon and MCM-41 from Bagasse and Rice Husk and Their Carbon Dioxide Adsorption Capacity", *Journal of Sustainable Energy and Environment*, Vol. 2, hal. 77-81.
- Boulinguez, B. dan P.L. Cloirec, 2010, "Adsorption on Activated Carbon of Five Selected Volatile Organic Compounds Present in Biogas: Comparison of Granular and Fiber Cloth Materials", *Energy Fuels*, Vol. 24, hal. 4756-4765.
- Budzianowski, W.M., 2016, "A Review of Potential Innovations for Production, Conditioning and Utilization of Biogas with Multiple-Criteria Assessment", *Renewable and Sustainable Energy Reviews*, Vol. 54, hal. 1148-1171.

- Cao, X. dan W. Harris, 2010, "Properties of Dairy-Manure-Derived Biochar to Its Potential Use in Remediation", *Bioresource Technology*, Vol. 101, hal. 5222-5228.
- Cely, P., G. Gasco, J. Paz-Ferreiro dan A. Mendez, 2015, "Agronomic Properties of Biochars from Different Manure Wastes", *Journal of Analytical and Applied Pyrolysis*, Vol. 111, hal. 173-182.
- Cha, J.S., S.H. Park, S. Jung, C. Ryu, J. Jeon, M. Shin, Y. Park, 2016, "Production and Utilization of Biochar: A Review", *Journal of Industrial And Engineering Chemistry*, Vol. 40: 1-15.
- Chen, Y., X. Zhang, W. Chen, H. Yang dan H. Chen, 2017, "The Structure of Biochar from Biomass Pyrolysis and Its Correlation with Gas Pollutant Adsorption Performance", *Bioresource Technology* 246, hal. 101-109.
- Creamer, A.E., B. Gao dan M. Zhang, 2014, "Carbon Dioxide Capture Using Biochar Produced from Sugarcane Bagasse and Hickory Wood", *Chemical Engineering Journal*, Vol. 249, hal. 174-179.
- Cuellar, A.D. dan M.E. Webber, 2008, "Cow Power: The Energy and Emissions Benefits of Converting Manure to Biogas", *Environmental Research Letters*, Vol. 3, hal. 1-8.
- Dahlan, E.N., 2007, Analisis Kebutuhan Luasan Hutan Kota sebagai Sink Gas CO<sub>2</sub> Antropogenik dari Bahan Bakar Minyak dan Gas di Kota Bogor dengan Pendekatan Sistem Dinamik, Disertasi: Institut Pertanian Bogor.
- DEN (Dewan Energi Nasional), 2014, *Outlook Energi Indonesia 2014*, Jakarta: Kementerian Energi dan Sumber Daya Mineral RI.
- Ditjen EBTKE (Direktorat Jenderal Energi Baru, Terbarukan dan Konservasi Energi), 2016, *Statistik EBTKE 2016*, Jakarta: Kementerian Energi dan Sumber Daya Alam.
- FAO, 2015, *FAO Statistical Pocketbook, World Food and Agriculture 2015*, Roma: FAO.
- Gerlach, F., B. Grieb dan U. Zerger, 2013, *Sustainable Biogas Production: A Handbook for Organic Farmers*, Fankurt: FiBL Projekte GmbH.
- Hagos, K., J. Zong, D. Li, C. Liu dan X. Lu, 2016, "Anaerobic Co-digestion Process for Biogas Production: Progress, Challenges and Perspectives", *Renewable and Sustainable Energy Reviews*, hal. 1-12.
- Hauchhum, L. dan P. Mahanta, 2014, "Carbon Dioxide Adsorption on Zeolite and Activated Carbon by Pressure Swing Adsorption in A Fixed Bed", *International Journal of Energy Environment Engineering*, Vol. 5, No. 4, hal. 349-356.
- Heidari, A., H. Younesi, A. Rashidi, A.A. Ghoresyshi, 2014, "Evaluation of CO<sub>2</sub> Adsorption with Eucalyptus Wood Based Activated Carbon Modified by Ammonia Solution through Heat Treatment", *Chemical Engineering Journal*, Vol. 254, hal. 503-513.
- Heraldy, E., Hisyam SW dan Sulistiyono, 2003, "Characterization and Activation of Natural Zeolit From Ponorogo", *Indonesian Journal of Chemistry*, Vol. 3:2, hal. 91-97.

- Hernawan, S.K. Wahono, R. Maryana, D. Pratiwi, 2015, "Modification of Gunungkidul Natural Zeolite as Bioethanol Dehydrating Agents", *Energy Procedia*, Vol. 65, hal. 116-120.
- Huang, Y., P. Chiueh, C. Shih, S. Lo, L. Sun, Y. Zhong dan C. Qiu, 2015, "Microwave Pyrolysis of Rice Straw to Produce Biochar as An Adsorbent for CO<sub>2</sub> Capture", *Energy*, Vol. 84, hal. 75-82.
- Hunt, J., M. DuPont, D. Sato dan A. Kawabata, 2010, "The Basics of Biochar: A Natural Soil Amendment", *Soil and Crop Management*, hal. 1-6.
- Inyang, M., B. Gao, P. Pullammanappallil, W. Ding dan A.R. Zimmerman, 2010, "Biochar from Anaerobically Digested Sugarcane Bagasse", *Bioresource Technology*, Vol. 101, hal. 8868-8872.
- IDBP (Indonesia Domestic Biogas Programme), 2017, *Annual Report Indonesia Domestic Biogas Programme*, Jakarta: Kantor Pusat BIRU.
- IPCC (Intergovernmental Panel on Climate Change), 2014, *Climate Change 2014: Mitigation of Climate Change Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge: Cambridge University Press.
- Jassal, R.S., M.S. Johnson, M. Molodovskaya, T.A. Black, A. Jollymore dan K. Sveinson, 2015, "Nitrogen Enrichment Potential of Biochar in Relation to Pyrolysis Temperature and Feedstock Quality", *Journal of Environmental Management*, Vol. 152, hal. 140-144.
- Jain, A., R. Balasubramanian dan M.P. Srinivasan, 2016, "Hydrothermal Conversion of Biomassa Waste to Activated Carbon with High Porosity: A Review", *Chemical Engineering Journal*, Vol. 283, hal. 789-805.
- Jorgensen, P.J., 2009, *Biogas – Green Energy, Process Design Energy Supply Environment*, Aarhus: Digisource Danmark A/S.
- Kacem, M., M. Pellerano, A. Delebarre, 2015, "Pressure Swing Adsorption for CO<sub>2</sub>/CH<sub>4</sub> Separation: Comparison Between Activated Carbon and Zeolites Performances", *Fuel Processing Technology*, Vol. 138, hal. 271-283.
- Kementerian Pertanian Republik Indonesia, 2016, *Data Lima Tahun Terakhir*, <<http://www.pertanian.go.id/>> (diakses 20 Februari 2017).
- Khalil, S.H., M.K. Aroua dan W.M.A.W. Daud, 2012, "Study on The Improvement of The Capacity of Amine-Impregnated Commercial Activated Carbon Beds for CO<sub>2</sub> Adsorbing", *Chemical Engineering Journal*, Vol. 183, hal. 15-20.
- Kongnoo, A., S. Tontisirin, P. Worathanakul dan C. Phalakornkule, 2017, "Surface Characteristics and CO<sub>2</sub> Adsorption Capacities of Acid-Activated Zeolite 13X Prepared from Palm Oil Fly Ash", *Fuel*, Vol. 193, hal. 385-394.
- Kouvelos, E., K. Kesore, T. Steriotis, H. Grigoropoulou, D. Bouloubasi, N. Theophilou, S. Tzintzos dan N. Kanelopoulos, "High Pressure N<sub>2</sub>/CH<sub>4</sub> Adsorption Measurements in Clinoptilolites", *Microporous and Mesoporous Materials*, Vol. 99, hal. 106-111.
- Kusdarto, 2008, "Potensi Zeolit di Indonesia", *Jurnal Zeolit Indonesia*, Vol. 7, No. 2, hal. 79-87.

- Las, T. dan H. Zamroni, 2002, "Penggunaan Zeolit dalam Bidang Industri dan Lingkungan", *Jurnal Zeolit Indonesia*, Vol. 1, No.1, hal. 27-34.
- Lee, S. dan S. Park, 2015, "A Review on Solid Adsorbents for Carbon Dioxide Capture", *Journal of Industrial and Engineering Chemistry*, Vol. 23, hal. 1-11.
- Lian, F., G. Cui, Z. Liu, L. Duo, G. Zhang dan B. Xing, 2016, "One-step Synthesis of A Novel N-doped Microporous Biochar Derived from Crop Straws with High Dye Adsorption Capacity", *Journal of Environmental Management*, Vol. 176, hal. 61-68.
- Llorach-Massana P., E. Lopez-Capel, J. Pena, J. Rieradevall, J.I. Montero dan N. Puy, 2017, Technical Feasibility and Carbon Footprint of Biochar Co-Production with Tomato Plant Residue, *Waste Management* 67, hal. 121-130.
- Lopez, M.E., E.R. Rene, M.C. Veiga dan C. Kennes, 2012, Biogas Technologies and Cleaning Techniques, dalam *Environmental Chemistry for a Sustainable World: Volume 2: Remediation of Air and Water Pollution*, Diedit oleh E. Lichtfouse, Belanda: Springer Netherlands, hal. 347-377.
- Luthfianto, D., E. Mahajoeno dan Sunarto, 2012, "Pengaruh Macam Limbah Organik dan Pengenceran Terhadap Produksi Biogas dari Bahan Biomassa Limbah Peternakan Ayam", *Bioteknologi*, Vol. 9:1, hal. 18-25.
- Lwiza, F., J. Mugisha, P.N. Walekhwa, J. Smith dan B. Balana, 2017, "Dis-adoption of Household Biogas Technologies in Central Uganda", *Energy for Sustainable Development*, Vol. 37, hal. 124-132.
- Mamun, M.R.A., M.R. Karim, M.M. Rahman, A.M. Asiri dan S. Torii, 2016, "Methane Enrichment of Biogas by Carbon Dioxide Fixation with Calcium Hydroxide and Activated Carbon", *Journal of The Taiwan Institute of Chemical Engineers*, Vol. 58, hal. 476-481.
- Maroto-Valer, M.M., Z. Tang dan Y. Zhang, 2005, CO<sub>2</sub> Capture by Activated and Impregnated Anthracites, *Fuel Processing Technology*, Vol. 86, hal. 1487-1502.
- McNair, H.M. dan E.J. Bonelli, 1988, *Dasar Kromatografi Gas*, diterjemahkan K. Padmawinata, Bandung: Penerbit ITB.
- Mofarahi, M. dan F. Gholipour, 2014, "Gas Adsorption Separation of CO<sub>2</sub>/CH<sub>4</sub> System Using Zeolite 5A", *Microporous and Mesoporous Materials*, Vol. 200, hal. 1-10.
- Montanari, T., E. Finocchio, E. Salvatore, G. Garuti, A. Giordano, C. Pistarino dan G. Busca, 2011, "CO<sub>2</sub> Separation and Landfill Biogas Upgrading: A Comparison of 4A and 13X Zeolite Adsorbents", *Energy*, Vol. 36, hal. 314-319.
- Nagrockiene, D. dan G. Girskas, 2016, "Research into The Properties of Concrete Modified with Natural Zeolite Addition", *Construction and Building Materials*, Vol. 113, hal. 964-969.
- Navia, R. dan D.E. Crowley, 2010, "Closing the Loop on Organic Waste Management: Biochar for Agricultural Land Application and Climate Change Mitigation", *Waste Management and Research*, Vol. 28:6, hal. 479.

- Ng, W.C., S. You, R. Ling, K.Y. Gin, Y. Dai dan C. Wang, 2017, "Co-gasification of Woody Biomass and Chicken Manure: Syngas Production, Biochar Reutilization, and Cost-Benefit Analysis", *Energy* 139, hal. 732-742.
- Nguyen, M.V dan B.K. Lee, 2016, "A novel Removal of CO<sub>2</sub> Using Nitrogen Doped Biochar Beads as a Green Adsorbent", *Process Safety and Environmental Protection*, Vol. 104, hal. 490-498.
- Noyola, A., J.M. Morgan-Sagastume dan J.E. Lopez-Hernandez, 2006, "Treatment of Biogas Produced in Anaerobic Reactors for Domestic Wastewater: Odor Control and Energy/Resource Recovery", *Reviews in Environmental Science and Bio/Technology*, Vol. 5, hal. 93-114.
- Octaviani, S., 2012, Sintesis dan Karakterisasi Zeolite ZSM-5 Mesopori dengan Metode Desilikasi dan Studi Awal Katalis Oksidasi Metana, Skripsi: Universitas Indonesia.
- Pathak, H., N. Jain, A. Bhatia, S. Mohanty dan N. Gupta, 2009, "Global Warming Mitigation Potential of Biogas Plants in India", *Environmental Monitoring Assessment*, Vol. 157, No. 1, hal. 407-418.
- Pudjaatmaka, A. H., 1986, *Kimia Organik* Jilid 2, Jakarta: Erlangga.
- Prosiding Seminar Nasional Kimia dan Pendidikan Kimia 2010: Profesionalisme Peneliti dan Pendidik dalam Riset dan Pembelajaran yang Berkualitas dan Berkarakter, Universitas Negeri Yogyakarta, 2010, *Kajian Modifikasi dan Karakterisasi Zeolit Alam dari Berbagai Negara*, Lestari D.Y., Yogyakarta: Universitas Negeri Yogyakarta.
- Qambrani, N.A., Md.M. Rahman, S. Won, S. Shim dan C. Ra, 2017, "Biochar Properties and Eco-friendly Applications for Climate Change Mitigation, Waste Management, and Wastewater Treatment: A Review", *Renewable and Sustainable Energy Reviews*, Vol. 79, hal. 255-273.
- Roberts, K.G., B.A. Gloy, S. Joseph, N.R. Scott dan J. Lehmann, 2010, "Life Cycle Assessment of Biochar Systems: Estimating the Energetic, Economic, and Climate Change Potential", *Environmental Science and Technology*, Vol. 44, hal. 827-833.
- Shafeeyan, M.S., W.M.A.W. Daud, A. Houshmand, A. Arami-Niya, 2011, "Ammonia Modification of Activated Carbon to Enhance Carbon Dioxide Adsorption: Effect of Pre-oxidation", *Applied Surface Science*, Vol. 257, hal. 3939-3942.
- Smith, P., D. Martino, Z. Cai, D. Gwary, H. Janzen, P. Kumar, B. Mccarl, S. Ogle, F. O'Mara, C. Rice, B. Scholes dan O. Sirotenko, 2007, *Agriculture dalam Climate Change 2007: Mitigation*, Diedit oleh Metz, B., Cambridge: Cambridge University Press.
- Stefaniuk, M. dan p. Oleszczuk, 2015, "Characterization of Biochars Produced from Residues from Biogas Production", *Journal of Analytical and Applied Pyrolysis*, Vol. 115, hal. 157-165.
- Sugiarto, T. Oerbandono, D. Widhiyanuriyawan, F.S.P. Putra, 2013, "Purifikasi Biogas Sistem Kontinyu Menggunakan Zeolit", *Jurnal Rekayasa Mesin*, Vol. 4:1, hal. 1-10.

- Sun, Q., H. Li, J. Yan, L. Liu, Z. Yu dan X. Yu, 2015, "Selection of Appropriate Biogas Upgrading Technology – A Review of Biogas Cleaning, Upgrading and Utilisation", *Renewable and Sustainable Energy Reviews*, Vol. 51, hal. 521-532.
- Treybal, R.E., 1980, *Mass Transfer Operation* (3<sup>rd</sup> edition), Singapura: McGraw Hill.
- Tubiello, F.N., M. Salvatore, R.D.C. Golec, A. Ferrara, S. Rossi, R. Biancalani, S. Federici, H. Jacobs dan A. Flammini, 2014, *Agriculture, Forestry and Other Land Use Emissions by Sources and Removals by Sink: 1990-2011 Analysis*, Roma: FAO.
- Wibowo, E., M. Rokhmat, Sutisna, Khairurrijal dan M. Abdullah, 2017, "Reduction of Seawater Salinity by Natural Zeolite (Clinoptilolite): Adsorption Isotherms, Thermodynamics and Kinetics", *Desalination*, Vol. 409, hal. 146-156.
- Xiong, A., Z. Shihong, Y. Haiping, S. Tao, C. Yingquan dan C. Hanping, 2013, "Influence of NH<sub>3</sub>/CO<sub>2</sub> Modification on The Characteristic of Biochar and The CO<sub>2</sub> Capture", *Bioenergy Resources*, Vol. 6, hal. 1147-1153.
- Xu, A., Y. Kan, L. Zhao dan X. Cao, 2016, "Chemical Transformation of CO<sub>2</sub> During Its Capture by Waste Biomass Derived Biochars", *Environmental Pollution*, Vol. 213, hal. 533-540.
- Yao, Y., B. Gao, M. Inyang, A.R. Zimmerman, X. Cao, P. Pullammanappallil dan L. Yang, 2011, "Removal of Phosphate from Aqueous Solution by Biochar Derived from Anaerobically Digested Sugar Beet Tailings", *Journal of Hazardous Materials*, Vol. 190, hal. 501-507.
- Yunus, M., 1987, *Teknik Membuat dan Memanfaatkan Unit Gas Bio*, Yogyakarta: Gadjah Mada University Press.
- Zhang, J., R. Singh dan P.A. Webley, 2008, "Alkali dan Alkaline-Earth Cation Exchanged Chabazite Zeolites for Adsorption Based CO<sub>2</sub> Capture", *Microporous and Mesoporous Materials*, Vol. 111, hal. 478-487.
- Zhang, X., S. Zhang, H. Yang, Y. Feng, Y. Chen, X. Wang dan H. Chen, 2014, "Nitrogen Enriched Biochar Modified by High Temperature CO<sub>2</sub>-Ammonia Treatment: Characterization and Adsorption of CO<sub>2</sub>", *Chemical Engineering Journal*, Vol. 257, hal. 20-27.
- < <http://www.listrik.org/pln/tarif-dasar-listrik-pln/>> (diakses 10 Oktober 2017).
- < <https://www.tokopedia.com/asw83/timbangan-gantung-jarum-50-kg/>> (diakses 10 Oktober 2017).
- < <https://www.tokopedia.com/cahayanusantara/kompresor-oilless-1-hp-swan-dr-175-22l>> (diakses 10 Oktober 2017).
- < <https://www.tokopedia.com/tigaduasatu/timbangan-digital-dapur-sf400?src=topads>> (diakses 10 Oktober 2017).
- < <https://www.tokopedia.com/tokoswit/kunci-sok-lengkaptool-kit-kenmaster-sekrup-fisher-set>> (diakses 10 Oktober 2017).