

## DAFTAR PUSTAKA

- Aboul-Gheit, A.K., Gad, F.K., Abdel-Aleem, G.M., El-Desouki, D.S., Abdel-Hamid, S.M., Ghoneim, S.A. and Ibrahim, A.H, 2014, Pt, Re and Incorporation in Sulfated Zirconia as Catalyst for n-pentane Isomerization, *Egypt. Petrol. Res. Inst.*, 23, 303-314.
- Ahmed, A.I, El-Hakam, S.A., Samra, S.E., El-Khouly, A.A., and Khder, A.S., 2008, Structural Characterization of Sulfated Zirconia and Their Catalytic Activity in Dehydration of Ethanol, *Coll. Surf. A Physicochem. Eng. Asp.*, 317, 62-70.
- Akkari, E., Chevvalier, S. and Boillereaux, L., 2005, A 2d Nonlinear Grey-Box Model Dedicated to Microwave Thawing Theoretical and Experimental Investigation, *Comput. and Chem. Eng.*, 30, 321-328.
- Aneu, A., Wijaya, K., Syoufian, A., Silica-Based Solid Acid with Different Concentration of H<sub>2</sub>SO<sub>4</sub> and Calcination Temperature: Preparation and Characterization, *Silicon.*, 13, 2265-2270.
- Arata, K. and Hino, M., 1990, Preparation of Superacid by Metal Oxides and Their Catalytic Action, *Mater. Chem. Phys.*, 26, 213-237.
- Arevalo, A.M.Z, Ortega, G.C.C., Lozada, W.A.V., Ariza, I.E.P., Bautista, M.M.C., and Rios, J.S.V., 2017, Conceptual Approach to Thermal Analysis and Its Main Applications, *Prospect*, 15, 117-125.
- Bella, G.D., Trapani, D.D., Torregrossa, M., Viviani, G., 2013 Performance of a MBPR Pilot Plant Treating High Strength Wastewater Subject to Salinity Increase: Analysis of Biomass Activity and Fouling Behaviour, *Bioresource Technology*, 147, 614-618.
- Benjamin, C, Pflitsch, C., Pasel, C., Helmich, M., Bathen, D., Atakan, B., 2015, Silica-Based adsorbents with Activated Carbon Structure, *Microporous and Mesoporous Materials*, 210, 202-205.
- Boedoyo, M.S., 2010, Pemanfaatan Dimethyl Ether (DME) sebagai Substitusi Bahan Bakar Minyak dan Elpigi, *J. Tek. Ling*, 11, 301-311.
- CaO, Y., J.C Hu, Z.S. Hong, J.F. Deng, K.N., Fan, 2002, Characterization of High Surface-Area Zirconia Aerogel Synthesized from Combined Alcohothermal and Supercritical Fluid Drying Techniques, *Catal. Lett.*, 81, 107.
- Chavan, F., Madje, B., Brahad, J., Ubale, M., Ware, M., Shingare. and Shinde, 2008, Silicagel Supported NaHSO<sub>4</sub> Catalyzes Organic Reaction: an Efficient Synthesis of Coumarins, *Bull. Catal. Soc. of India.*, 7, 41-45.
- Chokkaram, S.R., Srinivasan, D.R., Milburn, B.H., Davis, J., 1994, *J. Coll. Interface. Sci.*, 160-165.
- Chumaidi, A., Moentamaria, D., Murdani, A., 2016, Dehidrasi Metanol Menjadi Dimetil Eter, *Prosiding Sentia*, 8, 2085-2347.
- Farhan, H. M. and Sapawe, N., 2019, Effect of Calcination Temperature on The Structure and Catalytic Performance of ZrO<sub>2</sub> Catalyst in Phenol Degradation, *Mater. Today. Proc.*, 19, 1533-1536.
- Fechete, I., Y. Wang, J.C., Ve'drine, 2012, The Past, Present and Future of Heterogeneous Catalysis, *Catalyst*, 189, 2-27.

- Fu, B., Gao, L., Niu, L., Wei, R. and Xiao, G., 2009, Biodisel from Waste Cooking Oil Via Heterogeneous Superacid Catalyst  $\text{SO}_4^{2-}/\text{ZrO}_2$ , *Energ. Fuels.*, 23, 569-572.
- Garcia, C.M., Teixeira, S., Marciniuk, L.L. and Schuchardt, U., 2008, Transesterification of Soybean Oil Catalyzed by Sulfated Zirconia, *Bioresource Technol.*, 6608-6613.
- Hasanudin, H., Asri, W.R., Putri, Q.U., Fanani, Z., Bahrin, D., Agustina, T.E., Wijaya, K., 2022, Montmorillonite-Zirconium Phosphate Catalysts for Methanol Dehydration, *Iranian Journal of Catalysis*, 12, 389-397.
- Kapasi, Z.A., Nair, A.R., Somawane, S., 2010, Bioufel an Alternative Source of Energy for Present and Future, *J. Adv. Sci. Technol.*, 13, 105-108.
- Karimullah, R., Elvia, R., dan Amir, H., 2018, Penentuan Parameter Adsorpsi Silika Sintetik dari Cangkang Kelapa Sawit Terhadap Kandungan Ammonium pada Limbah Cair Tahu, *Jurnal Pendidikan dan Ilmu Kimia*, 2, 66-71.
- Li, Yu, Guo, Yu, and Liu, Y., 2005, Synthesis of High Pure  $\text{TiO}_2$  Nanoparticles from  $\text{Ti}(\text{SO}_4)_3$  in Presence of EDTA as Complexing Agent, *China. Particuology*, 3, 240-242.
- Lion, M., Maache, M., Lavalley, J.C., Ramis, G., Busca, G., Rossi, P.F. and Lorenzelli, V., 1990, FT-IR Study of The Bronsted Acidity of Phosphated and Sulphated Silica Catalyst, *J. of Mol. Struct.*, 218, 417-422.
- Nordin, N., Hamzah, Z., Hashim, O., Kasim, F.H. and Abdullah, R., 2015, Effect of Temperature in Calcination Process of Seashells, *Malays. J. of Analyt. Sci.*, 19, 65-70.
- Oscik, 1982, Adsorption, Ellis Horwood Ltd, Engl.
- Ogawa, T., Inoue, N., Shikada, T., Ohno, Y., 2003, Direct Dimethyl Ether Synthesis, *J. of Nat. Gas Chem.*, 12, 219-227.
- Patel, A., Brahmakhatri, V. and Singh, N., 2013, Biodisel Production by Esterification of Free Fatty Acid over Sulfated Zirconia, *Renew. Energ.*, 51, 227-233.
- Platon, A. and Thomson, W.J., 2003, Quantitative Lewis/Bronsted Ratios using DRIFTS, *Appl. Catal. Ind. Eng. Chem. Res.*, 42, 5988-5992.
- Radwan N.R.E., Hagar M., Afifi T.H., Al-Wadaani F., Okasha R.M., 2018, Catalytic Activity of Sulfated and Phosphated Catalysts Towards The Synthesis of Substituted Coumarin, *Catalysts*, 8, 1-12.
- Rizka, A.B. dan Triwikantoro, 2014, Pengaruh Temperatur Kalsinasi dan Waktu Penahanan Terhadap Pertumbuhan Kristal Nanosilika, *Jurnal Teknik Pomits*, 1, 1-5.
- Rosalia, R., Asmi, D. dan Ginting, E., 2016, Preparasi dan Karakterisasi Keramik Silika ( $\text{SiO}_2$ ) Sekam Padi dengan Suhu Kalsinasi 800 °C-1000 °C, *Jurnal Teori dan Aplikasi Fisika*, 4, 101-106.
- Rosdiansono, Trisunaryanti, W., Triyono, 2007, Pengaruh Pengembangan Logam Ni dan  $\text{Nb}_2\text{O}_5$  pada Karakter Katalis Ni/Zeolit dan Ni/Zeolit - $\text{Nb}_2\text{O}_5$ , *Sains dan Terapan Kimia*, 1, 1-12.
- Rozi, T.Y. and Astuti, A., 2016, Pengaruh Temperatur Kalsinasi pada Sintesis Nanopartikel Silika Pantai Purus Kota Padang, *J. Fis. Unand.*, 5, 351-356.

- Ruslan, Triyono. and Wijaya, K., 2013, Study of Physico-Chemical Properties of  $\text{SiO}_2\text{-Al}_2\text{O}_3\text{/Bentonite}$  Nanocomposite: Thermal and Acid Stability, *Intern. J. of Appl. Chem.*, 9, 15-36.
- Saber, O. and Gobara H.M., 2014, Optimization of Silica Content in Alumina-Silica Nanocomposites to Achieve High Catalytic Dehydrogenation Activity of Supported Pt Catalyst, *Egypt. J. Petrol.*, 23, 445-454.
- Said, A.E.E., El-Wahab, M.M.A. and El-Aal, M.A., 2014, The Catalytic Performance of Sulfated Zirconia in The Dehydration of Methanol to Dimethyl Ether, *J. of Mol. Catal. Chem.*, 394, 40-47.
- Salman, M.N., Krisdiyanto, D., Khamidinal. dan Arsanti, P., 2015, Preparasi Katalis Silika Sulfat dari Abu Sekam Padi dan Uji Katalitik Pada Reaksi Esterifikasi Gliserol Dengan Anhidrida Asam Asetat, *Reaktor*, 15, 231-240.
- Sarve, D.T., Singh, S.K. and Ekhe, J.D., 2020, Kinetic and Mechanistic Study of Ethanol Dehydration to Diethyl Ether Over Ni-ZSM-5 in a Closed Batch Reactor, *React. Kinet. Mech. Catal.*, 131, 261-281.
- Sa'diyah, H., Nurhimawan, S., Fatoni, S.A., Irmansyah, Irzaman, 2016, Ekstraksi Silikon Dioksida dari Daun Bambu, *Seminar Nasional Fisika*, 5, 13-16.
- Sembiring, S., Manurung, P. dan Karo-Karo, P., 2011, Pengaruh Suhu Tinggi Terhadap Karakteristik Keramik Cordierite Berbasis Silika Sekam Padi, *Jurnal Fisika dan Aplikasinya*, 5, 1-3.
- Smallman, R.E. and Bishop, R. J., 2000, *Metalurgi Fisik Modern dan Rekayasa Material*, Erlangga, Jakarta.
- Socrates, G., 2001, *Infrared and Roman Characteristic Group Frequencies*, T. Ch., New York.
- Sriyanti, Taslimah, Nuryono, dan Narsito, 2005, Sintesis Bahan Hibrida Amino Silika dari Abu Sekam Padi Melalui Proses Sol Gel, *Jurnal Kimia Sains dan Aplikasi*, 8, 1-10.
- Sunajadevi, K.R., Sugunan, S., 2004, Synthesis, Characterization and Benzylolation Activity of Nanocrystalline Chromia Loaded Sulfated Titania Prepared Via Sol-Gel Route, *Catal Commun*, 5, 575-581.
- Thommes, M. K., Kaneko, V.N., Alexander, J.P., Oliver, F., Rodriguez-Renoso, J., Rouquerol, K.S.W., Sing., 2015, Physisorption of Gases, With Special Reference to The Evaluation of Surface Area and Pore Size Distribution, *Pure. Appl. Chem.*, 87, 1051-1069.
- Van, Vlack, dan Lawrench, H., 1992, *Ilmu dan Teknologi Bahan (Ilmu Logam dan Non Logam)*, Erlangga, Jakarta.
- Wijaya, K., Ariyanti, A.D., Tahir, I., Syoufian, A., Rachmat, A., Hasanudin, 2018, Synthesis of  $\text{Cr/Al}_2\text{O}_3$  Bentonite Nanocomposites as Hydrocracking Catalyst of Castor oil, *Nano. Hybrid. Compos.*, 19, 46-54.
- Yang, X. and GuO, S., 2020, Pure Characterization of Marine-Continental Transitional Shale in Permian Shanxi Formation of The Southern North China Basin, *Energy Exploration and Exploitation*, 38, 2199-2216.
- Zarei, A., Khazdooz, L., Aghaei, H., Gheisary, M.M., Alizadeh, S. and Golestanifar, L., 2017, Synthesis of Phenols by Using Aryldiazonium Silica Sulfate Nanocomposites, *Tetrahedron*, 73, 6954-6961.



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**Silika Tersulfatasi sebagai Katalis untuk Proses Konversi Metanol Menjadi Dimetil Eter**

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Zhuang, Q. and Miller, J.M., 2001, One-Pot Sol-Gel Synthesis of Sulfated  $\text{ZrO}_2$ - $\text{SiO}_2$  Catalyst for Alcohol Dehydration, *Can. J. of Chem.*, 79, 1220-1223.