

DAFTAR PUSTAKA

- Anonim, 2014, *Peraturan Menteri Lingkungan Hidup Republik Indonesia Nomor 5 Tentang Baku Mutu Air Limbah*.
- Araujo, P., 2009, Key aspects of analytical method validation and linierity evaluation, *J. Chromatogr.*, 877, 2224-2234.
- Arnolt, M. A. and Ostler, T. J., 1986, Fiber optic ammonia gas sensing probe, *J. Anal. Chem.*, 58, 1137.
- Atoji, M., Richardson, J. W. and Rundle, R. E., 1957, On the crystal structures of the magnus salts, Pt(NH₃)₄PtCl₄, *J. Am. Chem. Soc.*, 79(12), 3017-3020.
- Avnir, D., Levy, D., and Reisfeld, R., 1984, The nature of the silica cage as reflected by spectral changes and enhanced photostability of trapped rhodamine 6G, *J. Phys. Chem.*, 88, 5956-5959.
- Barker, S. L., Kopelman, R., Meyer, T. E. and Cusanovich, M. A., 1998, Fiber-optic nitric oxide-selective biosensors, *J. Anal. Chem.*, 70, 971.
- Boisde, G. and Harmer, A., 1996, *Chemical and biochemical sensing with optical fiber and waveguides*, Artech House Boston-London.
- Brinker, C. J. and Scherer, G. W., 1990, *Sol-gel science*, Academic Press, San Diego.
- Butler, M. A., 1984, Optical fiber hydrogen sensor, *Appl. Phys. Lett.*, 45, 1007.
- Chen, N., Zhang, Y., Liu, H., Ruan, H., Dong, C., Shen, . and Wu, A., 2016, A supersensitive probe for rapid colorimetric detection of nickel ion based on a sensing mechanism of anti-etching, *ACS Sustainable Chem. Eng.*, 4, 6509-6516.
- Choodum, A., Kanatharana, P., Wongniramaikul, W. and NicDaeid, N., 2015, A sol-gel colorimetric sensor for methamphetamine detection, *Sens Actuators B-Chem*, 215, 553-560
- Chu, C. and Chuang, C., 2015, Optical fiber sensor for dual sensing of dissolved oxygen and Cu²⁺ ions based on PdTFPP/CdSe embedded in sol-gel matrix, *Sens Actuators B-Chem*, 209, 94-99.
- Coyle, C. L. and Stiefel, E. I., 1988, *The coordination chemistry of nickel: an introducstory survey*, VCH Publishers Weinheim.

- Crosley, M. S. and Yip, W. T., 2018, Kinetically doped silica sol-gel optical biosensors: Expanding potential through dip-coating, *ACS Omega*, 3, 7971-7978
- Dave, B. C., Dunn, B., Selverstone, J., Valentine, D. and Zink, J. I., 1994, Sol-gel encapsulation methods for biosensors, *Anal. Chem.*, 66, 1120-1127.
- deMarco, B. A., Rechelo, B. S., Totoli, E. G., Kogawa, A. C., and Salgado, H. R. N., 2018, Evolution of green chemistry and its multidimensional impacts: A review, *SAUDI PHARM J.*, 27, 1-8.
- Denkhaus, E., and Salnikow, K., 2002, Nickel essentiality, toxicity, and carcinogenicity, *Crit. Rev. Oncol. Hematol.*, 42, 32-56.
- Dervin, S. and Pillai, S. C., 2017, *An introduction to sol-gel processing for aerogels*. Dalam Pillai, S. C. and Hehir, S., *Sol-gel materials for energy, environment and electronic applications*, Springer Belanda.
- Du, A., Zhou, B., Zhang, Z. and Shen, J., 2013, A special material or a new state of matter: a review and reconsideration of the aerogel, *J. Mater.*, 6, 941-968.
- Effendy, 2011, *Kimia Koordinasi Jilid 1*, Ed. 2, Indonesian Academic Publishing Indonesia
- Egneus, B., 1972, Investigations of dioximes and their metal complexes, *Talanta*, 19, 1387-1419.
- Feng, L., Zhang, Y., Wen, L., Shen, Z., and Guan, Y., 2011, Colorimetric determination of copper(II) ions by filtration on sol-gel membrane doped with diphenylcarbazide, *Talanta*, 84, 913-917.
- Floch, H. G. and Belleville, P. F., 1992, Scratch-resistant single-layer antireflective coating by a low-temperature sol-gel route, *SPIE Proc*, 1758, 135-150.
- Fu, G., Hu, Z., Xie, L., Jin, Z., Xie, Y., Wang, Y., Zhang, Z., Yang, Y., and Wu, H., 2009, Electrodeposition of Nickel Hydroxide Films on Nickel Foil and Its Electrochemical Performances for Supercapacitor, *Int. J. Electrochem. Sci.*, 4, 1052-1062.
- Garret, R. G., 2000, *Natural sources of metals to the environment*. In Centeno, J. A., Collery, P., Fernest, G., Finkelman, R. B., Gibb, H., and Ettienne, J. A., *Metal ions in biology and medicine*, vol. 6, John Libbey Eurotext Paris.
- Ghaedi, M., Ahmadi, F., and Shokrollahi, A., 2007, Simultaneous preconcentration and determination of copper, nickel, cobalt, and lead

ions content by flame atomic absorption spectrometry, *J. Hazard. Mater.*, 142, 272-278.

Gilchrist, A., and Nobbs, J., 2017, *Encyclopedia of Spectroscopy and Spectrometry*, Edisi III, University of Leeds UK.

Gonzales, A. G. and Herrador, M. A., 2007, A practical guide to analytical method validation, Including measurement uncertainty and accuracy profile, *Trends Anal. Chem.*, 26, 227-238.

Guo, Y., Zhao, H., Han, Y., Liu, X., Guan, S., Zhang, Q., and Bian, X., 2017, Simultaneous spectrophotometric determination of trace copper, nickel, and cobalt ions in water sampels using solid phase extraction coupled with partial least squares approaches, *Spectrochim. Acta A*, 173, 532-536.

Harmita, 2004, Petunjuk Pelaksanaan Validasi, *Majalah Ilmu Kefarmasian*, I, 117-135.

Harris, D. C., 2010, *Quantitative Chemical Analysis*, Ed 8, W. H. Freeman and Company, New York.

Hench, L. L. and West, J. K., 1990, The sol-gel process, *Chem. Rev.*, 90, 33-72.

Herreros-Chavez, L., Morales-Rubio, A., Cervera, M. L., de la Guardia, M., 2019, Partial least aquares modilization of energy dispersive X-ray flourescence, *Talanta*, 194, 158-163.

Hua, S., Ma, H., Li, X., Yang, H. and Wang, A., 2010, pH-sensitive sodium alginate/poly(vinyl alcohol) hidrogel beads prepared by combined Ca²⁺ crosslinking and freeze-thawing cycles for controlled release of diclofenac sodium, *Int. J. Biol. Macromol.*, 46, 517-523

Jun-jie, L., Chang-Jun, H., Dan-qun, H., Cai-hong, S., Xiao-gang, L., Huan-bao, F., Mei, Y. and Jun, Z., 2017, Detection of trace nickel ions with a colorimetric sensor based on indicator displacement mechanism, *Sens. Actuator B-Chem*, 241, 1294-1302.

Kang, J. H., Lee, S. Y., Ahn, H. M., and Kim C., 2017, A novel colorimetric chemosensor for the sequential detection of Ni²⁺ and CN⁻ in aqueous solution, *Sens. Actuator B-Chem*, 242, 25-34.

Kasprzak, K. S., Bal, W., and Karaczyn, A., 2003, The role of chromatin damage in nickel-induced carcinogenesis. A review of recent developments, *J. Environ. Monit.*, 5, 183-187.

- Kawabata, Y., Kamichika, T., Imusaka, T. and Ishibashi, N., 1987, Fiber-optic sensor for carbon dioxide with a pH indicator dispersed in a poly(ethylene glycol) membrane, *Anal. Chim. Acta*, 219, 223.
- Kim, J., Yoo, H., Ba, V. A. P., Shin, N. and Hong, S., Dye-functionalized sol-gel matrix on carbon nanotubes for refreshable and flexible gas sensors, *Sci. Rep.*, 8, 11958
- Kirkbir, F. and Chaudhuri, R., 1992, Optical fiber from sol-gel-derived germania-silica glasses, *SPIE Proc.*, 1758, 160-172.
- Kong, F., and Ni, Y., 2009, Development of cellulosic paper-based test strips for Cr(VI) determination, *BioResources*, 3, 1088-1097.
- Lev, O., Tsionsky, L., Rabinovich, V., Glezer, S., Sampath, I., Pankratov, J. and Gun, J., Organically modified sol-gel sensors, *Anal. Chem.*, 67, 22-30
- Mahapoonyonoat, N., Mahapoonyonoat, T., Pengkaew, N. and Kamhangkit, R., 2010, Power of the test of one-way anova after transforming with large sample size data, *Procedia Soc Behav Sci*, 9, 933-937
- McDonagh, C., Sheridan, F., Butler, T., and MacCraith, B. D., 1996, Characterisation of sol-gel-derived silica films, *J. Non-Cryst. Solids*, 194, 72-77.
- Milne, A., Landing, W., Bizimis, M., and Morton, P., 2010, Determination of Mn, Fe, Co, Ni, Cu, Zn, Cd and Pb in seawater using high resolution magnetic sector inductively coupled mass spectrometry (HR-ICP-MS), *Anal. Chim. Acta.*, 665, 200-207.
- Mitchell, A. M. and Mellon, M. G., 1945, Colorimetric determination of nickel with dimetilgloxime, *Ind. Eng. Chem. Res.*, 17(6), 380-382.
- Mitsubishi, Y., Matsuda, A. and Matsuno, Y., 1992, Sol-gel technology for optical disc application, *SPIE Proc.*, 1758, 105-112.
- Mizuguchi, H., Zhang, Y., Onedera, H., Nishizawa, S., and Shida, J., 2008, On-site determination of trace nickel in liquid samples for semiconductor manufacturing by highly sensitive solid-phase colorimetry with α -furyl dioxime, *Chem. Lett.*, 37, 792-793.
- Moersilah, Siswanta, D., Roto, R., dan Mudasir, M., 2017, Optical chemical sensor of Cd(II) in water based on 1-(2-pyridilazo)-2-naphthol immobilized on poly(methyl methacrylate) and 2-nitrophenyl octyl ether matrix, *MJAS*, 21, 784-792.

- Norseth, T. and Piscator, M., 1979, *Nickel*. In Friberg, L., Nordberg, G. F. and Vouk, V. B., *Handbook on the toxicology of metals*, Elsevier/North-Holland Biomedical Press, Amsterdam.
- Peralta-Dominguez, D., Rodriguez, M., Ramos-Ortiz, G., Maldonado, J. L., Menenez-Nava, M. A., Barbosa-Garcia, O., Santillan, R and Farfan, N., 2015, A schiff base derivative from cinnamaldehyde for colorimetric detection of Ni²⁺ in water, *Sens. Actuator B-Chem*, 207, 511-517.
- Peters, F. T., Drummer, O. H. and Musshoff, F., 2007, Validation of new methods, *J. Forensic Sci. Inter.*, 165, 216-224
- Podbielska, H., Ulatowska-Jarza, A., Muller, G. and Eichler, H. J., 2006, *Sol-gels for optical sensors*. In Baldini, F., Chester, A. N., Homola, J. and Martellucci, S., *Optical chemical sensors*, 224, Springer, Belanda.
- Prabhu, J., Velmurugan, K., Raman, A., Duraipandy, N., Kiran, M. S., Easwaramoorthi, S. and Nandhakumar, R., 2017, A simpel calcione based ratiometric chemosensor for sensitive and selective detection of Nickel ion and its imaging in live cells, *Sens. Actuator B-Chem*, 238, 306-317.
- Rohman, A. dan Ganjar, I. G., 2007, *Kimia Farmasi Analisis*, Pustaka Pelajar, Yogyakarta.
- Samadi-Maybodi, A., Rezaei, V. and Rastegaezadeh, S., 2015, Sol-gel based optical sensor for determination of Fe (II): A novel probe for ion speciation, *Spectrochim. Acta A*, 136, 832-837.
- Shahamirifard, S. A., Ghaedi, M. and Hajati, S., 2018, A new silver (I) ions optical sensor based on nanoporous thin films of sol-gel by rose bengal dye, *Sens. Actuator B-Chem*, 259, 20-29
- Shahamirifard, S. A., Ghaedi, M., and Montazerzohori, M., 2018, Design a sensitive optical thin film sensor based on incorporation of isonicotihydrozide derivative in sol-gel matrix for determination of trace amounts of copper (II) in fruit juice: Effect of sonication time on immobilization approach, *Ultrason Sonochem*, 42, 723-730
- Sieminska, L. and Zerda, T. W., 1996, Diffusion of steroids from sol-gel glass, *J. Phys. Chem.*, 100, 4591-4597.
- Smith, D. W., 1968, Solubility behavior of the nickel(II)-,palladium(II)-, and platinum(II)-complexes of some vic-dioximes, *Disertasi*, Kimia analitik Universitas Negeri Iowa, Iowa.

- Soule, B. A., 1925, Alpha-furildioxime as a reagent for the detection and determination of nickel, *J. Am. Chem. Soc.*, 47, 981-988.
- Spinola, V., Llorent-martinez, E. J. and Castilho, P. C., 2014, Determination of vitamin C in foods: Current state of method validation, *J. Chromatogr. A*, 1369, 2-17.
- Stachs, O., Gerber, Th. and Petkov, V., 1999, The structure formation of zirconium oxide gels in alcoholic solution, *J. Sol-Gel Sci. Technol*, 15, 23-30.
- Stanley, R. and Nesaraj, A. S., 2014, Effect of surfactants on the wet chemical synthesis of silica nanoparticles, *Int. J. Appl. Sci. Eng.*, 1, 9-21.
- Susanto, N. C. A., 2015, Pembuatan Beads i/k-Karaginan Sebagai Deteksi Kolorimetri Logam Fe Dengan Imobilisasi fenantrolin, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Tang, Y., Tehan, E. C., Tao, Z., and Bright, F. V., 2003, Sol-gel-derived sensor material that yield linier calibration plots, high sensitivity, and long-term stability, *Anal. Chem*, 75, 2407-24-13.
- Urrutia, A., Goicoechea, J., Rivero, P. J., Pildain, A. and Arregui, F. J., 2017, Optical fiber sensors based on gold nanorods embedded in polymeric thin films, *Sens Actuators B Chem*, 255, 2105-2112.
- Vogel, A. I., 1979, *Textbook of macro and semimacro qualitative inorganic analysis*, Edisi 5, Logman Inc New York.
- Wang, L., Ye D., and Cao, D., 2012, A novel coumarin Schiff-base as a Ni(II) ion colorimetric sensor, *Spectrochim. Acta A*, 90, 40-44.
- Weast, R.D., 1971, *Handbook of chemistry and physics*, Edisi 52, Cleveland: The Chemical Rubber.
- Wolfbeis, O. S. and Weidgans, B. M., 2006, *Fiber optic chemical sensors and biosensors: A view back*. In Baldini, F., Chester, A. N., Homola, J. and Martellucci, S., *Optical chemical sensors*, 224, Springer Belanda.
- Xiao-bo, M., Min, Z., Li-yuan, C., Yun-yan, W. and Yu-de, S., 2009, Treatment of nickel-ammonia complex ion-containing ammonia nitrogen wastewater, *T Nonferr Metal Soc.*, 19, 1360-1364
- Yamini, K., Renganathan, B., Ganesan, A. R. and Prakash, T., 2017, Clad modified optical fiber gas sensors based on nanocrystalline nickel oxide embedded coatings, *Opt. Fiber Technol*, 36, 139-143.