

DAFTAR PUSTAKA

- Abd Razak, N.F., Shamsuddin, M., and Lee, S.L., 2018, Adsorption kinetics and thermodynamics studies of gold(III) ions using thioctic acid functionalized silica coated magnetite nanoparticles, *Chem. Eng. Res. Des.*, 130, 18–28.
- Adamson, A.W. and Gast, A.P., 1990, *Physical Chemistry of Surfaces Sixth Edition*, Wiley Interscience, United States.
- Adhayuda, L., 2014, Studi daya adsorpsi bentonit alam tapanuli terinterkalasi monosodium glutamat terhadap ion logam berat kadmium dan timbal pada berbagai variasi pH, *Skripsi*, Universitas Indonesia, Depok.
- Afifi, M.M. and Abbas, A.M., 2011, Monosodium glutamate versus diet induced obesity in pregnant rats and their offspring, *Acta Physiol. Hung.*, 98, 177–188.
- Ahangaran, F., Hassanzadeh, A., and Nouri, S., 2013, Surface modification of Fe₃O₄@SiO₂ microsphere by silane coupling agent, *Int. Nano Lett.*, 3, 3–7.
- Akpa, J.G. and Nmegbu, C.G.J., 2014, Adsorption of benzene on activated carbon from agricultural waste materials, *Res. J. Chem. Sci.*, 4, 34–40.
- Al-Saidi, H.M., 2016, The fast recovery of gold(III) ions from aqueous solutions using raw date pits: kinetic, thermodynamic and equilibrium studies, *J. Saudi Chem. Soc.*, 20, 615–624.
- Anastopoulos, I., Bhatnagar, A., and Lima, E.C., 2016, Adsorption of rare earth metals: A review of recent literature, *J. Mol. Liq.*, 221, 954–962.
- Ault, A., 2004, The monosodium glutamate story: The commercial production of MSG and other amino acids, *J. Chem. Educ.*, 81, 347–355.
- Awual, R., Khaleque, A., Ferdows, M., Chowdhury, A.M.S., and Yaita, T., 2013, Rapid recognition and recovery of gold (III) with functional ligand immobilized novel mesoporous adsorbent, *Microchem. J.*, 110, 591–598.
- C.J. Brinker, 1988, Hydrolysis And Condensation Of Silicates: Effects On Structure, *J. Non. Cryst. Solids*, 100, 31–50.
- Cardiano, P., Giacobello, F., Giuffrè, O., and Sammartano, S., 2017, Thermodynamic and spectroscopic study of Al³⁺ interaction with glycine, L-cysteine and tranexamic acid in aqueous solution, *Biophys. Chem.*, 230, 10–19.
- Denton, J.K., Kelleher, P.J., Johnson, M.A., Baer, M.D., Kathmann, S.M.,

- Mundy, C.J., Wellen Rudd, B.A., Allen, H.C., Choi, T.H., and Jordan, K.D., 2019, Molecular-level origin of the carboxylate head group response to divalent metal ion complexation at the air–water interface, *Proc. Natl. Acad. Sci. U. S. A.*, 116, 14874–14880.
- Dong, Z., Liu, J., Yuan, W., Yi, Y., and Zhao, L., 2016, Recovery of Au(III) by radiation synthesized aminomethyl pyridine functionalized adsorbents based on cellulose, *Chem. Eng. J.*, 283, 504–513.
- Edwina, L., 2013, Interkalasi dan karakterisasi bentonit tapanuli dengan monosodium glutamat sebagai adsorben ion logam berat Cd⁺² dan Zn²⁺, *Skripsi*, Universitas Indonesia, Depok.
- Eksteen, J.J. and Oraby, E.A., 2015, The leaching and adsorption of gold using low concentration amino acids and hydrogen peroxide: Effect of catalytic ions, sulphide minerals and amino acid type, *Miner. Eng.*, 70, 36–42.
- Fan, R., Xie, F., Guan, X., Zhang, Q., and Luo, Z., 2014, Selective adsorption and recovery of Au (III) from three kinds of acidic systems by persimmon residual based bio-sorbent: A method for gold recycling from e-wastes, *Bioresour. Technol.*, 163, 167–171.
- Farimani, M.H.R., Shahtahmasebi, N., Rezaee Roknabadi, M., Ghows, N., and Kazemi, A., 2013, Study of structural and magnetic properties of superparamagnetic Fe₃O₄/SiO₂ core-shell nanocomposites synthesized with hydrophilic citrate-modified Fe₃O₄ seeds via a sol-gel approach, *Phys. E Low-Dimensional Syst. Nanostructures*, 53, 207–216.
- Feng, B., Yao, C., Chen, S., Luo, R., Liu, S., and Tong, S., 2018, Highly efficient and selective recovery of Au(III) from a complex system by molybdenum disulfide nanoflakes, *Chem. Eng. J.*, 350, 692–702.
- Geng, Y., Li, J., Lu, W., Wang, N., Xiang, Z., and Yang, Y., 2020, Au(III), Pd(II) and Pt(IV) adsorption on amino-functionalized magnetic sorbents: Behaviors and cycling separation routines, *Chem. Eng. J.*, 381, 122627.
- Ghasemzadeh, M.A. and Abdollahi-basir, M.H., 2015, Fe₃O₄@SiO₂ – NH₂ core-shell nanocomposite as an efficient and green catalyst for the multi-component synthesis of highly substituted chromeno [2,3-b] pyridines in aqueous ethanol media, *Green Chem Letters And Reviews*, 8253.
- Gong, J., Wang, X., Zeng, G., Chen, L., and Deng, J., 2012, Copper (II) removal by pectin – iron oxide magnetic nanocomposite adsorbent, *Chem. Eng. J.*, 185–186, 100–107.
- Gurung, M., Adhikari, B.B., Kawakita, H., Ohto, K., Inoue, K., and Alam, S.,

2011, Recovery of Au(III) by using low cost adsorbent prepared from persimmon tannin extract, *Chem. Eng. J.*, 174, 556–563.

Gurung, M., Adhikari, B.B., Morisada, S., Kawakita, H., Ohto, K., Inoue, K., and Alam, S., 2013, N-aminoguanidine modified persimmon tannin: A new sustainable material for selective adsorption, preconcentration and recovery of precious metals from acidic chloride solution, *Bioresour Technol.*, 129, 108–117.

Hanafiah, M.A.K.M., Hussin, Z.M., Ariff, N.F.M., Ngah, W.S.W., and Ibrahim, S.C., 2014, Monosodium glutamate functionalized chitosan beads for adsorption of precious cerium ion, *Adv. Mater. Res.*, 970, 198–203.

Hastuti, S., Nuryono, and Kuncaka, A., 2015, L-arginine-modified silica for adsorption of gold(III), *Indones. J. Chem.*, 15, 108–115.

He, H.T., Xing, L.C., Zhang, J. Sen, and Tang, M., 2016, Binding characteristics of Cd²⁺, Zn²⁺, Cu²⁺, and Li⁺ with humic substances: Implication to trace element enrichment in low-rank coals, *Energy Explor Exploit.*, 34, 735–745.

Huang, X., Wang, Y., Liao, X., and Shi, B., 2010, Adsorptive recovery of Au³⁺ from aqueous solutions using bayberry tannin-immobilized mesoporous silica, *J. Hazard. Mater.*, 183, 793–798.

Husarova, V. and Ostatnikova, D., 2013, Monosodium glutamate toxic effects and their implications for human intake: A review, *JMED Res.*, 2013, 1–12.

Ji, Y., Gao, H., Sun, J., and Cai, F., 2011, Experimental probation on the binding kinetics and thermodynamics of Au(III) onto *Bacillus subtilis*, *Chem. Eng. J.*, 172, 122–128.

Kaivosoja, E., Tujunen, N., Jokinen, V., Protopopova, V., Heinilehto, S., Koskinen, J., and Laurila, T., 2015, Glutamate detection by amino functionalized tetrahedral amorphous carbon surfaces, *Talanta*, 141, 175–181.

Kim, S., Park, S., Han, S., Han, Y., and Park, J., 2018, Silanol-rich ordered mesoporous silica modified thiol group for enhanced recovery performance of Au(III) in acidic leachate solution, *Chem. Eng. J.*, 351, 1027–1037.

Koch, S., Rütten, M., and Rein, M., 2018, Study of total pressure losses at the engine face of a submerged inlet with an ingested vortex, *Notes Numer. Fluid Mech. Multidiscip. Des.*, 136, 361–371.

Konował, E., Modrzejewska-sikorska, A., Motylenko, M., Klapiszewski, Ł., Wysokowski, M., Bazhenov, V. V, Rafaja, D., Ehrlich, H., Milczarek, G.,

- and Jesionowski, T., 2016, Functionalization of organically modified silica with gold nanoparticles in the presence of lignosulfonate, *Int Journal of Biological Macromolecules*, 85, 74–81.
- Kurihara, K., 2009, Glutamate : from discovery as a food flavor to role as a basic, *Am J Clin Nutr*, 90, 1–3.
- Lin, T.L. and Lien, H.L., 2013, Effective and selective recovery of precious metals by thiourea modified magnetic nanoparticles, *Int. J. Mol. Sci.*, 14, 9834–9847.
- Ma, M., Zhang, Y., Yu, W., Shen, H., Zhang, H., and Gu, N., 2003, Preparation and characterization of magnetite nanoparticles coated by amino silane, *Colloids and Surfaces A: Physicochem. Eng. A*, 212, 219–226.
- Majewski, M., Jurgoński, A., Fotschki, B., and Juśkiewicz, J., 2018, The toxic effects of monosodium glutamate (MSG) – The involvement of nitric oxide, prostanooids and potassium channels in the reactivity of thoracic arteries in MSG-obese rats, *Toxicol. Appl. Pharmacol.*, 359, 62–69.
- Mascolo, M.C., Pei, Y., and Ring, T.A., 2013, Room temperature co-precipitation synthesis of magnetite nanoparticles in a large pH window with different bases, *Materials (Basel)*, 6, 5549–5567.
- Mihăilescu, M., Negrea, A., Ciopec, M., Davidescu, C.M., Negrea, P., Duțeanu, N., and Rusu, G., 2019, Gold (III) adsorption from dilute waste solutions onto Amberlite XAD7 resin modified with L-glutamic acid, *Sci. Rep.*, 9, 1–13.
- Morel, A., Nikitenko, S.I., Gionnet, K., Wattiaux, A., Lai-kee-him, J., Labrugere, C., Chevalier, B., Deleris, G., Petibois, C., Brisson, A., Simonoff, M., Bordeaux, I., Vigneau, L.H., and Faculte, A., 2008, Sonochemical approach to the synthesis of Fe₃O₄@SiO₂ core-shell nanoparticles with tunable propertie, *ACS Nano*, 2, 847–856.
- Nigam, S., Barick, K.C., and Bahadur, D., 2011, Development of citrate-stabilized Fe₃O₄ nanoparticles : Conjugation and release of doxorubicin for therapeutic applications, *J. Magn. Magn. Mater.*, 323, 237–243.
- O'Connor, C.R., Hiebel, F., Chen, W., Kaxiras, E., Madix, R.J., and Friend, C.M., 2018, Identifying key descriptors in surface binding: Interplay of surface anchoring and intermolecular interactions for carboxylates on Au, *Chem. Sci.*, 9, 3759–3766.
- Okube, M. and Sasaki, S., 2014, research papers Site-specific electronic structures of ferrimagnetic Fe₃O₄ measured by resonant X-ray magnetic scattering

research papers, *J. Synchrotron Radiat.*, 19, 759-767.

Paclawski, K. and Sak, T., 2015, Kinetics and mechanism of the reaction of gold(III) chloride complexes with formic acid, *J. Min. Metall. Sect. B Metall.*, 51, 133–142.

Petcharoen, K. and Sirivat, A., 2012, Synthesis and characterization of magnetite nanoparticles via the chemical co-precipitation method, *Mater. Sci. Eng. B Solid-State Mater. Adv. Technol.*, 177, 421–427.

Prasasti, D. , 2012, Studi kapasitas adsorpsi-reduksi ion Au (III) pada asam humat hasil isolasi dari tanah gambut rawa pening, *Tesis*, Universitas Gadjah Mada, Yogyakarta.

Ren, Z.L., Tella, M., Bravin, M.N., Comans, R.N.J., Dai, J., Garnier, J.M., Sivry, Y., Doelsch, E., Straathof, A., and Benedetti, M.F., 2015, Effect of dissolved organic matter composition on metal speciation in soil solutions, *Chem. Geol.*, 398, 61–69.

Robinson, M.R., Abdelmoula, M., Mallet, M., and Coustel, R., 2019, Journal of Solid State Chemistry Starch functionalized magnetite nanoparticles : New insight into the structural and magnetic properties, *J. Solid State Chem.*, 277, 587–593.

Roto, R., Yusran, Y., and Kuncaka, A., 2016, Magnetic adsorbent of Fe₃O₄ @SiO₂ core-shell nanoparticles modified with thiol group for chloroauric ion adsorption, *Appl. Surf. Sci.*, 377, 30–36.

R. Roto, 2016, Surface Modification of Fe₃O₄ as magnetic adsorbents for recovery of precious metals, *Advanced Surface Eng Research*, 1, 127–145.

Saitoh, T., Suzuki, S., and Hiraide, M., 2005, Solid phase extraction of some precious metals from hydrochloric acid to polystyrene-divinyl benzene porous resin impregnated with polyoxyethylene-type nonionic surfactant, *J. Chromatogr. A*, 1097, 179–182.

Santosa, S.J., Sudiono, S., Siswanta, D., Kunarti, E.S., and Dewi, S.R., 2011, Mechanism of the removal of AuCl₄⁻ ions from aqueous solution by means of peat soil humin, *Adsorpt. Sci. Technol.*, 29, 733–746.

Senanayake, G., 2012, Gold leaching by copper (II) in ammoniacal thiosulphate solutions in the presence of additives . Part I : A review of the effect of hard – soft and Lewis acid-base properties and interactions of ions, *Hydrometallurgy*, 115–116, 1–20.

Si, S., Kotal, A., Mandal, T.K., Giri, S., Nakamura, H., and Kohara, T., 2004,

- Size-controlled synthesis of magnetite nanoparticles in the presence of polyelectrolytes, *Chem. Mater.*, 16, 3489–3496.
- Sodipo, B.K. and Aziz, A.A., 2014, A sonochemical approach to the direct surface functionalization of superparamagnetic iron oxide nanoparticles with (3-aminopropyl)triethoxysilane, *Beilstein J. Nanotechnol.*, 5, 1472–1476.
- Sonmez, M., Georgescu, M., Alexandrescu, L., Gurau, D., Fikai, A., Fikai, D., and Andronescu, E., 2015, Synthesis and applications Of Fe₃O₄/SiO₂ core-shell materials, *Curr. Pharm. Des.*, 21, 5324–5335.
- Sudiono, S., Yuniarti, M., Siswanta, D., Kunarti, E.S., Triyono, and Santosa, S.J., 2017, The role of carboxyl and hydroxyl groups of humic acid in removing AuCl₄⁻ from aqueous solution, *Indones. J. Chem.*, 17, 95–104.
- Sukma, V.H., 2019, Sintesis nanopartikel Fe₃O₄/SiO₂ termodifikasi kitosan sebagai adsorben ion [AuCl₄]⁻, *Skripsi*, Universitas Gadjah Mada, Yogyakarta.
- Takumi, A., Kawamata, Y., Sakai, R., and Narita, T., 2019, In vitro and in vivo genotoxicity studies on monosodium L-glutamate monohydrate, *Regul. Toxicol. Pharmacol.*, 107, 104399.
- Teja, A.S., 2009, Synthesis, properties, and applications of magnetic iron oxide nanoparticles, *Cryt Growth and Characterization of Materials*, 55, 22–45.
- Wang, J., Zheng, S., Shao, Y., Liu, J., Xu, Z., and Zhu, D., 2010, Amino-functionalized Fe₃O₄@SiO₂ core – shell magnetic nanomaterial as a novel adsorbent for aqueous heavy metals removal, *J. Colloid Interface Sci.*, 349, 293–299.
- Wei, Y., Han, B., Hu, X., Lin, Y., Wang, X., and Deng, X., 2012, Synthesis of Fe₃O₄ nanoparticles and their magnetic properties, *Procedia Eng.*, 27, 632–637.
- Wojnicki, M., Luty-blocho, M., Socha, R.P., Mech, K., and Pe, Z., 2015, Journal of Industrial and engineering chemistry kinetic studies of adsorption and reduction of gold (III) chloride complex ions on activated carbon Norit ROX 0, *J. Indus and Eng Chem* 8,29, 289–297.
- Wu, W., He, Q., and Jiang, C., 2008, Magnetic iron oxide nanoparticles: Synthesis and surface functionalization strategies, *Nanoscale Res. Lett.*, 3, 397–415.
- Xiong, C., Li, Y., Wang, S., and Zhou, Y., 2018, Functionalization of nanosilica via guanidinium ionic liquid for the recovery of gold ions from aqueous solutions, *J. Mol. Liq.*, 7322(17), 167

- Xiong, C., Wang, S., and Zhang, L., 2019, Selective recovery mechanism of Au(III) from an aqueous solution by trimethyl phosphate modified poly(glycidyl methacrylate), *J. Taiwan Inst. Chem. Eng.*, 95, 55–64.
- Xu, W., Mo, X., Zhou, S., Zhang, P., Xiong, B., Liu, Y., Huang, Y., Li, H., and Tang, K., 2019, Highly efficient and selective recovery of Au(III) by a new metal-organic polymer, *J. Hazard. Mater.*, 380, 120844.
- Yamaura, M., Camilo, R.L., Sampaio, L.C., Macêdo, M.A., Nakamura, M., and Toma, H.E., 2004, Preparation and characterization of (3-aminopropyl)triethoxysilane-coated magnetite nanoparticles, *J. Magn. Magn. Mater.*, 279, 210–217.
- Yang, J., Kubota, F., Baba, Y., Kamiya, N., and Goto, M., 2014, Application of cellulose acetate to the selective adsorption and recovery of Au(III), *Carbohydrate Polymers*, 111, 768–774.
- Yang, L., Jia, F., and Song, S., 2017, Recovery of [Au(CN)₂][−] from gold cyanidation with graphene oxide as adsorbent, *Sep. Purif. Technol.*, 186, 63–69.
- Yazdani, F. and Seddigh, M., 2016, Magnetite nanoparticles synthesized by co-precipitation method: The effects of various iron anions on specifications, *Mater. Chem. Phys.*, 184, 318–323.
- Yen, C.H., Lien, H.L., Chung, J.S., and Yeh, H. Der, 2017, Adsorption of precious metals in water by dendrimer modified magnetic nanoparticles, *J. Hazard. Mater.*, 322, 215–222.
- Yi, Q., Fan, R., Xie, F., Min, H., Zhang, Q., and Luo, Z., 2016, Selective recovery of Au(III) and Pd(II) from waste PCBs using ethylenediamine modified persimmon Tannin adsorbent, *Procedia Environ. Sci.*, 31, 185–194.
- Zhang, Y., Xu, Q., Zhang, S., Liu, J., Zhou, J., Xu, H., Xiao, H., and Li, J., 2013, Preparation of thiol-modified Fe₃O₄@SiO₂ nanoparticles and their application for gold recovery from dilute solution, *Sep. Purif. Technol.*, 116, 391–397.