聚麩胺酸之生物絮凝性質的研究

陳建州、張耀南

E-mail: 9300283@mail.dyu.edu.tw

摘 要

本研究利用不同固體顆粒懸浮液、氯化金屬?類、溶液酸鹼值與聚麩胺酸 (PGA) 濃度對PGA絮凝活性影響之探討，結果顯示，以氧化鋁與氯化鎂分別為固體顆粒與金屬?類之水溶液，而且溶液酸鹼值為pH 8.0及PGA濃度為40 mg/L時，PGA之絮凝活性最佳。另外，本研究亦探討PGA濃度與溶液酸鹼值對PGA吸附螯合鎘 (Cd) 、鉻 (Cr) 、銅 (Cu) 、鉛 (Pb) 、鋅 (Zn) 、鎳 (Ni) 等重金屬之性質。當溶液添加120 mg/L PGA時，其中對鎘與鎳吸附螯合最佳，其重金屬螯合率高達約90 %，其溶液酸鹼值分別為pH 8.0與pH 9.0，但PGA對鋅吸附螯合效果最佳，未能超過75 %以上。

關鍵詞 : 聚麩胺酸、絮凝活性、重金屬螯合

目錄

參考文獻

1. 何守、李演、陳堅。2002。蛋白聚糖類生物絮凝劑REA-11的發酵與絮凝條件。過程工程學報，62-66。 2. 胡筱敏、羅茜、劉述波。1998。微生物絮凝劑的研究與應用。國外金屬礦選礦，16-18。 3. 徐慶源。1994。用於廢水淨化與資源化的新型化學絮凝劑。化工環保，281-283。 4. 宮小燕、弈兆坤、王曙光、黎澤華。2001。微生物絮凝劑絮凝特性的研究。環境化學，550-556。 5. 陶茂林、施大林、王蕾、陳金林。1997。微生物絮凝劑的製備及絮凝條件的研究。食品與發酵工業，26-28。 6. 許世興、顏棋鑫。2003。幾丁聚糖顆粒吸附之有害重金屬之探討。國家圖書館。 7. 張添晉、郭文陽、顏士閔、李冠蓁。酸萃取、淋洗受重金屬污染土壤之研究。第十五屆廢棄物處理技術研討會論文集，2-80～2-88。 8. Bhattacharya, D., J. A. Hestekin, P. Brushaber, L. Cullen, L. G. Bachas, and S. K. Sikdar, 1998, Novel poly-glutamic acid functionalized microfiltration membranes for sorption of heavy-metals at high capacity. J. Memb. Sci. 141(1): 121-135. 9. Cardenas, G., P. Orlando, and T. Edelio, 2001, Synthesis and applications of chitosan mercaptanes as heavy metal retention agent. Intern. J. Bio. Macromol. 28: 167-174. 10. Cheng, C., Y. Asada, and T. Aida, 1989, Production of γ -polyglutamic acid by Bacillus subtilis A35 under denitrifying conditions. Agric. Biol. Chem. 53:2369-2375. 11. Daninippon Parmaceutical Co. Ltd., 1972, Ice cream stabilizer, Japanese Patent 19735/72. 12. Goto, A., and M. Kunioka (1992) Biosynthesis and hydrolysis of Poly(γ -glutamic acid) from Bacillus subtilis IFO3335. Biosci. Biotechnol. Biochem., 56:1031-1035. 13. Konno, A., T. Taguchi, and T. Yamaguchi, 1989, New use of polyglutamic acid for foods. European Patent Application EPO284386A1. 14. Kunioka. M., 1995, Biosynthesis of poly(γ -glutamic acid) from L-glutamine, citric acid and ammonium sulfate in Bacillus subtilis IFO3335. Appl. Microbiol. Biotechnol. 44:501-506. 15. Kunioka., M., 1997, Biosynthesis and chemical reactions of poly(amino acid)s from microorganisms. Appl. Microbial. Biotechnol. 47:469-475. 16. Kurane, R., and H. Matsuyama, 1994, Production of a bioflocculant by mixed culture. Biosci. Biotech. Biochem. 58:1589-1594. 17. Kurane, R. and Y. Nohata, 1991, Microbial flocculation of waste liquids and oil emulsion by a bioflocculant from Alcaligenes latus. Agric. Biol. Chem. 55:1127-1129. 18. Kurane, R., K. Takeda, and T. Suzuki, 1986, Screening and characteristics of microbial flocculants. Agric. Biol. Chem. 50:2301-2307. 19. Lee, S. H., S. O. Lee, K. L. Jang, and T. H.

Lee, 1995, Microbial flocculant from Arcuadendron sp. TS-49. Biotech. Lett. 17: 95-100. 20. Li, C., D. F. Yu, R. A. Newman, F. Cabral, L. C. Stephens, N. Hunter, L. Milas, and S. Wallace, 1998, Complete regression of well-established tumors using a novel water-soluble poly(L-glutamic acid)-paclitaxel conjugate. Cancer Research 58:2404-2409 21. McLean, R. J. C., D. Beauchemin, L. Clapham, and T. J. Beveridge, 1990, Metal-binging characteristics of the gamma-glutamyl capsular polymer of Bacillus licheniformis ATCC 9945. Appl. Environ. Microbiol. 56(12):3671-3677. 22. Mitsuiki, M., A. Mizuno, H. Tanimoto, and M. Motoki, 1998, Relationship between the antifreeze activities and the chemical structures of oligo- and poly(glutamic acid)s. J. Agric. Food Chem. 46(3): 891-895. 23. Multani, A. S., C. Li, M. Ozen, M. Yadav, D. F. Yu, S. Wallace, and S. Pathak, 1997, Paclitaxel and water-soluble poly(L-glutamic acid)-paclitaxel, induce direct chromosomal abnormalities and cell death in a murine metastatic melanoma cell line. Anticancer Research 17:4269-4274. 24. Nestle, N., and R. Kimmich, 1996, Heavy metal uptake of alginate gels studied by NMR microscopy. Colloids & Surface 115: 141-147. 25. Ontni, Y., Y.Tabata, Y. Ikada, 1996, A new biological glue from gelatin and ploy(L-glutamic acid). J. Biomed. Meter. Res.? 31:157-1391. 26. Salehizadeh, A., and S. A. Shojaosadati, 2001, Extracellular biopolymeric flocculants: Recent trends and biotechnological importance. Biotech. Adv. 19:371-385. 27. Salehizadeh, A., M. Vossoughi, and I. Alemzadeh, 2000, Some investigations on bioflocculant producing bacteria. Biochem. Eng. J. 5: 39-44. 28. Shih, I. L., Y. T. Van, L. C. Yeh, H. G. Lin, and Y. N. Chang, 2001, Production of a biopolymer flocculant from Bacillus licheniformis and its flocculation properties. Bioresour. Tech. 78: 267-272 29. Suh, H., G. S. Kwon, C. H. Lee, H. S. Kim, H. M. Oh, and B. D. Yoon, 1997, Characterization of bioflocculant produced by Bacillus sp. DP-152. J. Ferment. Bioeng. 84(2): 108-112. 30. Takagi, H., and K. Kadowaki, 1985, Flocculant production by pacilomyces sp. Taxonomic studies and culture conditions for production. Agric. Biol. Chem. 49:3151-3157. 31. Takeda, M., J. Koizumi, H. Matsuoka, and M. Hikuma, 1992, Factors affecting the activity of a protein bioflocculant produced by Nocardia amarae. Agric. Biol. Chem. 55:2663-2664. 32. Takeda, M., J. Koizumi, H. Matsuoka, and I. Nakamura, 1991, A protein bioflocculant produced by Rhodococcus erythropolis. J. Ferment. Bioeng. 74:408-409. 33. Toeda, K., and R. Kurane, 1991, Microbial flocculant from Alcaligenes cupidus KT201. Agric. Biol. Chem. 55:2793-2799. 34. Troy, F.A., 1993, Chemistry and biosynthesis of the poly(γ -D-gluramy)capsule in Bacillus subtilis, 1. Properties of the membrane-mediated biosynthetic reaction. J. Biol. Chem. 48:305-315. 35. Wang, Z., K. Wang, and Y. Xie, 1995, Bioflocculant-producing microorganisms. Acta Microbiol. Sin. 35(2): 121-129. 36. Yokoi, H., O. Natsuda, J. Hirose, S. Hayashi, and Y. Takasaki, 1995, Characteristics of biopolymer flocculant produced by Bacillus sp. PY-90. J. Ferment. Bioeng. 79: 378-380. 37. Yokoi, H., T. Yoshida, S. Mori, J. Hirose, S. Hayashi, and Y. Takasaki, 1997, Biopolymer flocculant produced by an Enterobacter sp. Biotech. Lett. 19(6): 569-573. 38. Yokoi, H., T. Arima, J. Hirose, S. Hayashi, and Y. Takasaki, 1996, Flocculation properties of poly(γ -glutamic acid) produced by Bacillus subtilis. J. Ferment. Bioeng. 82(1): 84-87.