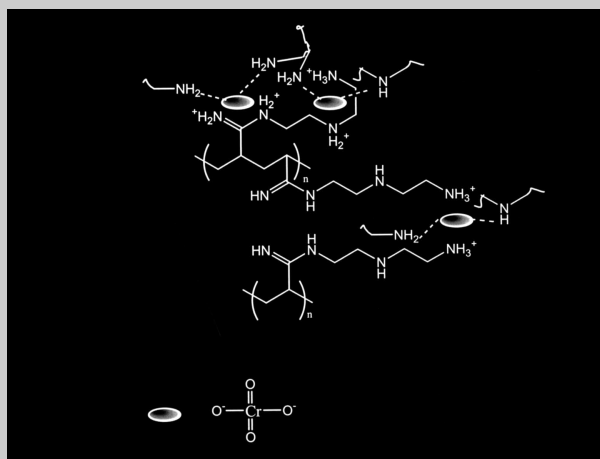


Communication: A new chelating fiber, poly(acrylo-amidino diethylenediamine), was synthesized based on polyacrylonitrile fibers in diethylenetriamine with the aid of AlCl_3 . Complex formation with CrO_4^{2-} was strongly pH-dependent, as complexes formed only in the presence of NH_3^+ and NH_2^+ . In the medium pH region, both ionic and hydrogen bonds were formed between poly(acrylo-amidino diethylenediamine) and the chromate ion, as was confirmed by means of FT-IR spectroscopy.



FT-IR and Isotherm Study on Anion Adsorption onto Novel Chelating Fibers

Young Gun Ko,^{1,2} Ung Su Choi,*¹ Tai Young Kim,² Dong June Ahn,² Yong Jin Chun³

¹ Tribology Research Center, Korea Institute of Science and Technology, P.O. Box 131, Cheongryang, Seoul 130-650, Korea
Fax: +82-2-958-5659; E-mail: uschoi@kist.re.kr

² Department of Chemical Engineering, Korea University, Anamdong 5ga-1, Seoul 136-701, Korea

³ Department of Material Science and Applied Chemistry, Chungwoon University, San 29, Namjang, Hongsung, Chungnam 350-701, Korea

Keywords: chelating fiber; FT-IR; ion exchangers; pH selectivity; polymer/chromate ion complex

Introduction

Chelating polymers are widely used for various applications, such as semi-conductive materials,^[1] organic catalysts,^[2,3] wastewater treatment,^[4,5] and recovery of valuable metal ion traces,^[6,7] etc. Fibrous chelating polymers have gained special attention because of their good adsorption capacity and easy handling in comparison with powder types.^[5] In wastewater treatment, the removal of anionic compounds, such as metal oxide ions, nitrate, phosphate and sulfate ions, is a crucial factor. Many researchers have tried to introduce amino groups into polymers as the anionic compounds listed above form complexes with these groups.^[5,8] Fibrous polyacrylonitrile (PAN) is a superior polymer for introducing amino groups. The formation of an amidine group starting from a cyano group by the reaction with an amino group is a known synthetic procedure.^[9,10] A one-step synthesis based on PAN fibers, however, has not been reported so far. In the previous studies, the reaction

between nitrile and amino groups succeeded only in the case of aromatic compounds and low molecular weights. The amidine compounds synthesized were found to exhibit highly selective in vitro activity against *Mycobacterium tuberculosis*.^[9]

Various metal-chelated complexes were investigated using LB films,^[11] self-assembled monolayers,^[12] biosensors^[13] and chelating resins.^[14] Anion-chelated complexes have been prepared as well.^[15] These studies represent basic concepts of chelation, supramolecular chemistry, etc. Chelate compounds are classified in three categories: corands, cryptands and podands. Corands and cryptands are dominated by the chelate/macrocyclic effects and the chelate/macrobicyclic effects, respectively, whereas podands are dominated by the chelate effect only.^[16] Even though podands show weak chelate bonds, chelate fibers of the podand type show better chelate capacity with respect to its unit mass than any other type. For this reason, diethylenetriamine was coupled to PAN fibers for