

Removal of Cd (II) cation by glycidyl methacrylate- methyl acrylate copolymer modified with benzoic acid from aqueous solutions

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Abstract

In this work the copolymers of glycidyl methacrylate (GMA) with methyl acrylate (MA) were synthesized by free radical polymerization using azobis (isobutyronitrile) (AIBN) as initiator at 70 ± 1 . Then, copolymers of glycidyl methacrylate have been modified by benzoic acid. The polymers were characterized by H-NMR and FT-IR. Removal of Cd(II) from aqueous solutions by glycidyl methacrylate- methyl acrylate copolymer (GMA-CO-MA) has been performed. Adsorption behavior of Cd onto copolymer was studied by varying the parameters such as contact time, metal ion concentration, solution pH and adsorbent dose. The temperature of 25°C was used throughout. Sorption was rapid. Furthermore, the (GMA-CO-MA) could efficiently remove Cd (II) with high maximum adsorption capacity at pH=7

Key words: Adsorption, Cd(II), Removal, Benzoic acid, glycidyl methacrylate- methyl acrylate

1. Introduction

Cadmium can mainly be found in the earth's crust. It always occurs in combination with zinc [1]. Cadmium also consists in the industries as an inevitable by-product of zinc, lead and copper extraction [2]. After being applied it enters the environment mainly through the ground, because it is found in manures and pesticides [3]. Human uptake of cadmium takes place mainly through food [1]. Foodstuffs that are rich in cadmium can greatly increase the cadmium concentration in human bodies [4]. Examples are liver, mushrooms, shellfish, mussels, cocoa powder and dried seaweed [4]. An exposure to significantly higher cadmium levels occurs when people smoke. Tobacco smoke transports cadmium into the lungs. Blood will transport it through the rest of the body where it can increase effects by potentiating cadmium that is already present from cadmium-rich food. Other high exposures can occur with people who live near hazardous waste sites or factories that release cadmium into the air and people that work in the metal refinery industry. When people breathe in cadmium it can severely damage the lungs [5]. This may even cause death. Cadmium is first transported to the liver through the blood. There, it is bonded to proteins to form complexes that are transported to the kidneys. Cadmium accumulates in kidneys, where it damages filtering mechanisms. This causes the excretion of essential proteins and sugars from the body and further kidney damage [6]. It takes a very long time before cadmium that has accumulated in kidneys is