Study on Adsorption of Heavy Metals Cd and Pb by Poly(γ -glutamic acid)

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ABSTRACT

The objective of this study was to investigate the effects of addition concentration of various poly- γ -glutamic acid (PGA) and pH of Cd and Pb heavy metal solutions on adsorption (chelation) of Cd2+ and Pb2+ by PGA. Three types of PGA, high molecular weight (MW) Na-PGA [Na-PGA(H)], low MW Na-PGA [Na-PGA(L)], 6%1M cross-linked PGA [6%1M PGA], were donated by Vedan Enterprise Co., Taichung County, Taiwan, ROC. One of PGA, [S-PGA], was obtained by my laboratory. The adsorption of Cd2+ in 10ppm Cd aqueous solution (pH ? 9.0) by addition of 40mg/L Na-PGA(H) or Na-PGA(L) was about 9ppm (90%). This result was 0.225g Cd2+/g PGA by another unit. The adsorption percentage of Cd2+ by addition of 4mg/L PGA was also about 90% (another unit was 2.25g Cd2+/g PGA) when pH of Cd aqueous solution was equal to or more than 11.0 or 10.0 for 6%1M PGA or S-PGA, respectively. When pH of Pb aqueous solution was 9.0, the best uptake of Pb2+ on PGA was obtained. The adsorption percentage of Pb2+ by addition of 40mg/L Na-PGA(H) or S-PGA or 4mg/L 6%1M PGA was about 90%, while that by 120mg/L Na-PGA(L) addition was only 80% (another unit was 0.066g Pb2+/g PGA). The uptakes of Cd2+ and Pb2+ on PGA little increased as the molecular weight (MW) of PGA used in heavy metal aqueous solution increased. The adsorption of Cd2+ and Pb2+ on PGA could be affected by the various type and MW of PGA and pH of heavy metal aqueous solution. This may be due to the chemical structure of the various type of PGA.

Keywords : poly- γ -glutamic acid (PGA) ; heavy metal (Cd and Pb) ; adsorption (chelation)

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