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PONGDEJ EKWANIJCHA: ADSORPTION OF COPPER(II) AND ZINC(II) IN 0.01 M  
HYDROCHLORIC ACID SOLUTION BY CHITOSANS. THESIS ADVISORS: DUANGJAI  
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Chitosan or deacetylated chitin, is obtained from crab or shrimp shell. Recently, chitosan capsules have been produced and sold as a dietary supplement for weight control. Chitosan is taken to reduce the absorption of fats and cholesterol. However, chitosan and some derivatives of chitosan have been reported as having capacities to adsorb metal ions, including ions of essential minerals such as copper(II) and zinc(II) ions.

In this work, three chitosan samples, denoted as chitosan S, chitosan L and chitosan M, respectively, were studied for adsorption of Cu(II) and Zn(II) in 0.01 M HCl, the pH of gastric juice. Chitosan S is a sample containing no fillers, approximately 98%(w/w). Chitosan L and chitosan M contained fillers, such as ascorbic acid (5%w/w) and carbohydrate (32.6%w/w), respectively. Adsorption capacities of Cu(II) and Zn(II) ions on chitosans were measured after two hours in contact with solutions. The capacities were calculated based on Langmuir adsorption isotherm. The order of capacities for Cu(II) ion were: chitosan S ( $59.8 \pm 3.0$  mg/g) > chitosan L ( $52.2 \pm 3.2$  mg/g) > chitosan M ( $24.9 \pm 1.4$  mg/g). The order of capacities for Zn(II) ion were: chitosan S ( $20.3 \pm 2.8$  mg/g)  $\approx$  chitosan L ( $19.8 \pm 1.6$  mg/g) > chitosan M ( $13.6 \pm 1.1$  mg/g). The adsorption capacities of Cu(II) ion for all chitosans were greater than Zn(II) ion. The adsorption of both metal ions on chitosans may take place via chemisorption at the  $-\text{NH}_2$  group.

Effect of competing cation on metal adsorption in 0.01 M HCl were studied in binary system of Cu(II) and Zn(II). The amount of metal of interest and chitosan were chosen to be equal to a meal intaking, 1.34 mg Cu/g chitosan and 6.63 mg Zn/g chitosan. The adsorption of Cu(II) ion for all the chitosans did not change as the concentration of added Zn(II) ion increased. However, the adsorption of Zn(II) ion decreased as Cu(II) ion was added to the solution.

From the capacity data obtained in this work, chitosan L and chitosan M which are used as meal supplement, may inhibit gastric absorption of Cu(II) and Zn(II) ions. However, the experiments were not carried out in the exact condition of the stomach condition. An in vivo study should be carried out to confirm this.