The Advanced Removal Effects of Hazardous Heavy Metals by Alum, Ion Exchange Resin and Activated Carbon

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Waters added with humic acid (10 mg/L) and heavy metals (Cu^{2+}, Pb^{2+}, As^{3+}, Cd^{2+}, Cr^{6+}) were investigated the advanced removal effects of heavy metals by alum, ion exchange resin and activated carbon.

Based on the results, the removal rates of heavy metals in optimum alum coagulation (5 mg/L) were As^{3+}, 38.7 % ; Cr^{6+}, 35.5 % ; Pb^{2+}, 34.8 % ; Cu^{2+}, 19.7 % ; Cd^{2+}, 4.3 %. And the removal effect series of heavy metals were Pb^{2+} > Cd^{2+} > Cu^{2+} > Cr^{6+} > As^{3+} for contact time 1hr in batch with ion exchange and Pb^{2+}, Cd^{2+} > Cu^{2+} > Cr^{6+} > As^{3+} for filtration time 1hr in column packed with ion exchange ,and Pb^{2+} > Cr^{6+} > Cu^{2+} > As^{3+} > Cd^{2+} for contact time 1hr in batch with activated carbon and Pb^{2+}, Cr^{6+} > Cu^{2+} > As^{3+} > Cd^{2+} for filtration time 1hr in column packed with activated carbon.

The removal effects of heavy metals by continuous treatment by column packed with ion exchange and activated carbon after alum coagulation were more increase than those of each treatment, was a marked increase as contact time was increased.