Selective adsorption of lead (II) ions by a manganese dioxides-loaded adsorption resin

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**ABSTRACT**

A new adsorbent SD300-M was successfully synthesized by coating the adsorption resin SD300 with manganese oxide via KMnO\textsubscript{4} modification. The results of X-ray photoelectron spectrometer and nitrogen adsorption measurement revealed that the manganese oxide exists as MnO\textsubscript{2} on the surface and inside the channel of the SD300 resin. The SD300-M resin exhibited higher adsorption capacity to Pb\textsuperscript{2+} with the maximum adsorption capacity as high as 141 mg/g, comparing with original SD300 resin and the other manganese oxide-modified adsorbents, such as cellulose or carbon nanotubes. The increased adsorption of Pb\textsuperscript{2+} on the SD300-M resin arose mainly from the formation of inner-sphere complexes with MnO\textsubscript{2}. In the presence of Ca\textsuperscript{2+} and Mg\textsuperscript{2+}, the SD300-M resin also has excellent adsorption selectivity for Pb\textsuperscript{2+} relative to that of the D301-M and HMO-001 resins, which arises from electrostatic interaction and surface complexation acting together. All the results indicate that the SD300-M resin is an efficient adsorbent to remove Pb\textsuperscript{2+} from aqueous solution.

**Keywords:** Selective adsorption; Manganese dioxides; Heavy metals

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