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Modification of Synthetic Resin Adsorbents

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Extended Abstract

Synthetic resin adsorbents are widely used separation/recovery process, such as removing organic substances, purifying antibiotics, extracting polyphenols and so on. The most useful resin adsorbents are styrene-divinylbenzen copolymers type and acrylic ester polymer type. Those resin macro particles are composed of agglomeration of numerous micro particles and hence have huge capacity (came from wide pore distribution) to adsorb many kinds of molecules. According to Sederel and Dejong (1973), there are three porosities in synthetic resin adsorbents: gel porosity, macro porosity and micro porosity. Gel porosity exists only in the swollen state of macro molecular network. Macro and micro porosity were defined as the pore diameters exceed 250 Å and below 50 Å, respectively.

Amount adsorbed onto resin adsorbents, however, cannot be recovered perfectly and adsorbate molecules were increased with increasing solution concentration (Kinoshita et al., 2014). The irreversible adsorption is due to slow molecular diffusion within micro pore particles and/or dissolute molecules in the micro gel particles. This phenomenon might be responsible for disadvantages of industrial separation/recovery processes. Therefore, it is preferable to reduce irreversible amount adsorbed within synthetic resin adsorbents.

This study was focused on the modification to reduce the irreversible amount adsorbed within synthetic resin adsorbents. With the aid of styrene monomer polymerization in micro pore particles of styrene type resin adsorbents, micro pore volumes could be decreased. Additionally, the suitable condition to modify resins was become apparent. Micro pore volumes and irreversible amounts adsorbed of resin adsorbents were tested by carbon tetrachloride vaporization technique and static adsorption/desorption method. These determination procedures were same as previous work (Kinoshita et al., 2014) and could be determined macro/micro pore volumes including gel porosity. Then irreversible amount adsorbed of modified resin adsorbents were about 60 percent reduced than that of before modification. This result indicated that the tailing behavior, which was caused by slow mass transfer onto

micro pore particles, might be decreased by the modification. Therefore, this modification technique might be useful for increasing efficiency of industrial separation/recovery process.

The details will be presented at the conference.

Sederel, W.L., & Dejong, G.J. (1973). Styrene-Divinylbenzene Copolymers. Construction of Porosity in Styrene Divinylbenzene Matrices. *J. Applied Polymer Sci.*, 17, 2835-2846.

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