



## Study on the adsorption of $Pb^{2+}$ from aqueous solution by D113-III resin

Xiong Chunhua\*, Chen Xinyi, Yao Caiping

*Department of Applied Chemistry, School of Food and Biotechnology, Zhejiang Gongshang University, Hangzhou, 310012, China*

*Tel. +86 571 88932083; Fax: +86 571 88071024-8591; email: xiongch@163.com*

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### ABSTRACT

The adsorption and desorption behaviors of  $Pb^{2+}$  on D113-III resin were investigated with various chemical methods. The influence of operational conditions such as contact time, initial concentration, initial pH of solution, and temperature on the adsorption of  $Pb^{2+}$  has also been examined. The results show that the maximum uptake capacity of  $Pb^{2+}$  is 476.2 mg/g on D113-III resin at 298 K at pH=4.5 in HAc–NaAc medium. The adsorption of  $Pb^{2+}$  fitted the Langmuir isotherm better than the Freundlich isotherm. And kinetics on the adsorption of  $Pb^{2+}$  has been studied. The apparent activation energy  $E_a$  and adsorption rate constant  $k_{298}$  values are 5.22 kJ/mol and  $5.82 \times 10^{-5} s^{-1}$ , respectively. The data of thermodynamic parameters whose  $\Delta S$  value is 0.255 kJ/molK and  $\Delta H$  value is 45.29 kJ/mol indicate the endothermic nature of the adsorption process. And the negative value of  $\Delta G$  showed that the adsorption of  $Pb^{2+}$  ions onto D113-III resin was spontaneous. The Thomas model was applied to experimental data obtained from column adsorption experiments. Finally,  $Pb^{2+}$  can be eluted by using 0.5 mol/L HCl solution and the resin can be regenerated and reused. And the sorption of  $Pb^{2+}$  on D113-III resin from simulated seawater is studied.

*Keywords:* D113-III resin;  $Pb^{2+}$ ; Adsorption; Sorption kinetics; Thermodynamic

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\*Corresponding author.