# Extended Kalman filter algorithm for online parameter estimation for a pressure swing adsorption process

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Pressure swing adsorption (PSA) has been employed for a variety of gas separation processes such as the separation of oxygen from air, hydrogen from reformate mixture, and so forth. The operation of a PSA process involves a number of complicated steps, and numerical simulation studies have played a crucial role in finding new operating conditions that improve the feasibility of the process. To this end, a numerical model should be accurate enough to replace or minimize experimental studies. In this study, the extended Kalman filter algorithm has been proposed to accurately estimate the rate parameters of a PSA process such as LDF constants and effective diffusivity and applied to an experimental PSA process for CO2 capturing using zeolite 13X. The method is based on the dynamic responses of bed temperatures during CO2 adsorption and desorption together with the breakthrough curve information. For this, the effects of process parameters on the dynamic responses were investigated first using a numerical simulator and a method to relate key features of the dynamic responses to the process parameters has been proposed and experimentally applied.