ADSORPTION ISOTHERM OF VAPOR-PHASE MERCURY CHLORIDE ONTO SPHERICAL ACTIVATED CARBONS VIA THERMOGRAVIMETRIC ANALYSIS

C.S. Yuan, H.Y. Lin, W.C. Chen
Institute of Environmental Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan

The objective of this study was to investigate the adsorptive capacity and isotherm of HgCl2 onto spherical activated carbons (SAC) via thermogravimetric analysis (TGA). Mercury emitted from the incineration of municipal solid wastes (MSW) could cause severely adverse effects on human health and ecosystem since it exists mainly in vapor phase due to high vapor pressure. There are two major forms of vapor-phase mercury, Hgo and Hg2+, in which HgCl2 accounts for 60-95% of total mercury. Activated carbon injection (ACI) is the best available control technology (BACT) for mercury removal from flue gas. Although the adsorptive capacity of HgCl2 onto activated carbon has been studied in previous adsorption column tests, only a few studies have thoroughly investigated the adsorption isotherms of HgCl2 onto SAC. In this study, TGA was applied to determine the adsorptive capacity of HgCl2 onto SAC via adsorption breakthrough tests at various adsorption temperatures (30-150ºC) and influent HgCl2 concentration (50-1,000μg/m3). Experimental results indicated that the adsorptive capacity of HgCl2 onto SAC was 2.79 and 0.18 mg/gC at 30 and 150ºC, respectively. Further comparing experimental data with four well-known isotherm models showed that Freundlich model was the best in the modeling of adsorption isotherm of HgCl2 onto SAC.