Comparative Study of Lead and Cadmium Compounds Capture by Sorbents

Author(s)

Hong Yao1), Noboru Saito1), Iddi S. N. Mkilaha1), Ichiro Naruse1

Abstract

Trace metal compounds, which are emitted from combustion systems such as waste incinerators, coal combustors, and so forth, enrich in fine particulates, usually formed during various stages of combustion. Owing to the difficulties of capturing fine particulates by conventional particulate dust collection systems, these are exhausted in the atmosphere. Fundamentals of the emission and control of trace metal compounds of lead and cadmium were studied at relatively low temperature (1073-1273 K), using a thermobalance. In order to capture these trace metal compounds, seven types of sorbent, namely alumina, silica, kaolin, limestone, scallop, zeolite and apatite, were used. As a result, the natural aluminosilicate materials like kaolin and zeolite were found to be effective in capturing lead and cadmium chemically. Although the presence of HCl decreases capture efficiencies, the products didn't react with HCl. The types of kaolin had a little influence on the capture efficiency and processes in general. On the other hand, the calcium-based sorbents like limestone, scallop and apatite, could capture both the trace metals and chlorine. On the presence of HCl, the capture efficiencies of these sorbents decreased sharply. Both alumina and silica have low ability to capture trace metal compounds. Moreover, in reducing atmosphere, all sorbents showed low capture abilities since the products were reduced.