

Adsorption of BDE-47 on Aluminium Hydroxide Colloid

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Brominated flame retardant polybrominated diphenyl ethers (PBDEs) is found having toxic effects on neurological, thyroid, and liver. 2,2',4,4'-tetrabrominated biphenyl ether (BDE-47) is an important monomer of PBDEs which is widely found in environmental media. As an important carrier in the migration of pollutants, colloid can adsorb pollutants, to some extent, and affect its migration capacity and distribution in media.

The results show that the adsorption of BDE-47 on aluminium hydroxide colloid matches with Sips equation ($R^2_{adj}=0.94394$) which shows best fitting effect among several equations. Saturated adsorption capability is 609.37mg/g measured by Sips equation. Adsorption kinetics result indicates the adsorption kinetics match well with pseudo-second-order equation ($R^2_{adj}>0.95$). Pseudo-first-order results show reaction rate of adsorption process decrease with the concentration level rise of BDE-47.

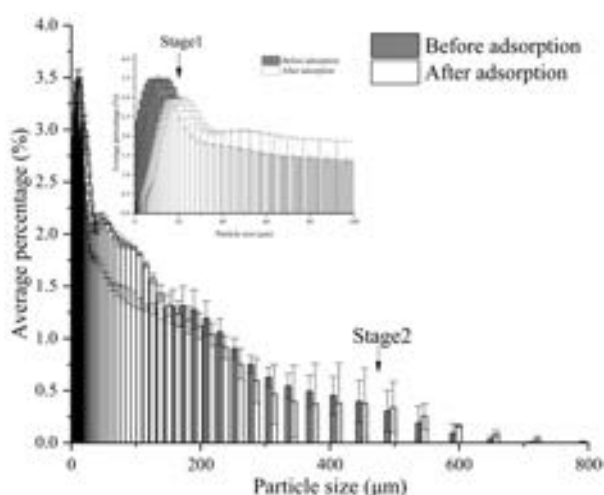


Figure 1: Particle size before and after the adsorption of BDE-47 on aluminium Hydroxide colloid

Furthermore, particle size experiment shows some interesting results. Adsorption of BDE-47 on aluminium hydroxide colloid not only exists in small particles (about 20µm, stage 1) but also occurs in larger ones (from 180µm to 450µm, stage 2). Different stages may indicate several processes in the adsorption. And the activity ratio of large and small particles demonstrates smaller colloid particles contribute more during the adsorption. Stage2 may corresponding with the slow adsorption.

On account of widespread distribution of aluminum in soil, this research aims to provide a theoretical basis for the migration of PBDEs in soil-groundwater system.