ADSORPTION OF CADMIUM ONTO AERATED LIGHTWEIGHT CONCRETE (ALC) FINES

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Aerated lightweight aerated concrete (ALC), which is also named autoclaved aerated concrete (AAC), has been gradually used for the building work and its production amount increases year by year all over the world including Vietnam. However, most of ALC scrap generated through the manufacturing process is dumped without any proper treatment and recycling. In order to propose an effective use of the ALC scrap, this study examined the utilization of ALC scrap as a low-cost and locally available adsorbent to remove heavy metals in wastewater. Two different ALC materials produced in Vietnam and Japan were used. ALC fines less than 0.105 mm were prepared by crushing and sieving. As a typical heavy metal detected in wastewater, Cadmium was used in this study. A series of batch adsorption tests were carried out by changing initial concentration of Cd^{2+} solution (C_i) from 25 to 5000 mg/L at natural pH. The solid/liquid ratio was set to be 1/10 (3g/30mL) in the tests. For both tested ALC fines, the percentage removals of Cd^{2+} reached over 80% in the C_i range from 25 to 2000 mg/L. On the other hand, the percentage removals became 50-70% in the C_i range from 3000 to 5000 mg/L. Measured adsorption isotherms were fitted by typical adsorption models such as linear, Freundlich, and Langmuir models. Results showed that Langmuir model was more applicable for expressing the measured adsorption isotherm of Vietnamese ALC, and Freundlich model well captured the measured Japanese ALC. Both tested ALC fines gave high values of maximum adsorption capacity of Cd^{2+} (26.3 mg g^{-1} for Vietnam ALC fine and 24.3 mg g^{-1} for Japanese ALC fine), suggesting those ALC fines would be useful adsorbents to treat heavy metals in wastewater.

Keywords: aerated lightweight concrete, cadmium removal, wastewater

