Packed VolcASH: An Inorganic Nature of Heavy Metals Adsorbent

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The objectives of this research were to characterize the Mt. Kelud's volcanic ash (VolcASH) and to utilize it effectively as enviromental friendly material. The activated VolcASH which is packed in Compact Wastewater Treatment (CWT) has been applied for heavy metals purification in batch and semi continuous flow experiments with respect to Cu2+, Zn2+, Cd2+, Mn2+, Fe3+, Cr3+ metal ions of Batik wastewater and Ag+, Cr6+ metal ions of chemical laboratory wastewater respectively. Various activation methods of VolcASH and wastewater flow rate of CWT have been tried to verify their influence on the metal sorption. X-ray diffraction (XRD), X-ray fluorescence (XRF), and surface area analyzer (SAA) techniques were used to determine the mineral distribution, oxides compound content and specific surface area value. Development of active functional groups was determined by Fourier transform infrared (FTIR) spectroscopy. The amount of adsorbed heavy metal ions were determined using Atomic absorption spectroscopy (AAS) and Spectrophotometry. Batch method was used to determine the optimum activation method and adsorption capacity of the VolcASH. The results showed that the activated VolcASH adsorbed 93-99% of 10 ppm initial amount heavy metal ions of Batik wastewater. The adsorption capacity of activated VolcASH was 0.42 mg/g Cr6+ and 0,085 mg/g Ag+ of chemical laboratory wastewater respectively. CWT at 0.3 L/min could adsorbed for about 72.17 ppm of Cr6+ completely. Keywords : volcanic ash, batik wastewater, chemical laboratory wastewater, compact wastewater treatment, heavy metal adsorbent

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