

Study on radioactivity components, water quality and microstructure characteristic of volcano ash as geopolymer artificial aggregate

Abstract

The assessments of radioactivity, water quality testing and microstructure characteristic of volcano ash have been examined. The measurement of the ^{226}Ra , ^{232}Th , ^{40}K , and ^{238}U were carried out using radioactive concentration value. The results showed that $^{226}\text{Ra} = 39 \text{ Bq/kg}$, $^{232}\text{Th} = 36 \text{ Bq/kg}$, $^{40}\text{K} = 337 \text{ Bq/kg}$ which are within acceptable limit for construction building. The radium equivalent activity for volcano ash is $116 \pm 1 \text{ Bq/kg}$, means the exposure of γ radiation is safe. Water from volcano ash may affected the aquatic ecosystem and human health which is not safe to be used as effluent due to high zinc, cadmium, lead, cyanide and sulphide and exceed the allowable limits. The mean particle size of the volcano ash was 121 pm. This volcano ash is almost dominated by quartz phase. SEM analysis showed that volcano ash had a plate-like structure similar to kaolin. The FTIR adsorption band showed the OH-, H-O-H, Si-O, Al-OH, and Si-O-Si and Si-O-M vibrations appeared in this volcano ash. The average total percentage of weight loss after being heated to 100WC was 15.85%.

Keywords

Geopolymer; Radioactivity; Water quality; XRD; XRF