Concentrations of Some Metallic Trace Elements in Twelve Sludge Incineration Ashes

Authors : Lotfi Khiari, Antoine Karam, Claude-Alla Joseph, Marc Hébert

Abstract : The main objective of incineration of sludge generated from municipal or agri-food waste treatment plant is to reduce the volume of sludge to be disposed of as a solid or liquid waste, whilst concentrating or destroying potentially harmful volatile substances. In some cities in Canada and United States of America (USA), a large amount of sludge is incinerated, which entails a loss of organic matter and water leading to phosphorus, potassium and some metallic trace element (MTE) accumulation in ashes. The purpose of this study was to evaluate the concentration of potentially hazardous MTE such as cadmium (Cd), lead (Pb) and mercury (Hg) in twelve sludge incineration ash samples obtained from municipal wastewater and other food processing waste treatments from Canada and USA. The average, maximum, and minimum values of MTE in ashes were calculated for each city individually and all together. The trace metal concentration values were compared to the literature reported values. The concentrations of MTE in ashes vary widely depending on the sludge origins and treatment options. The concentrations of MTE in ashes were found the range of 0.1-6.4 mg/kg for Cd; 13-286 mg/kg for Pb and 0.1-0.5 mg/kg for Hg. On average, the following order of metal concentration in ashes was observed: Pb > Cd > Hg. Results show that metal contents in most ashes were similar to MTE levels in synthetic inorganic fertilizers and many fertilizing residual materials. Consequently, the environmental effects of MTE content of these ashes would be low.

Keywords : biosolids, heavy metals, recycling, sewage sludge
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020