

Principles of Municipal Sewage Sludge Bioconversion into Biomineral Fertilizer

Authors : K. V. Kalinichenko, G. N. Nikovskaya

Abstract : The efficiency of heavy metals removal from sewage sludge in bioleaching with heterotrophic, chemoautotrophic (sulphur-oxidizing) sludge cenoses and chemical leaching (in distilled water, weakly acidic or alkaline medium) was compared. The efficacy of heavy metals removal from sewage sludge varied from 83 % (Zn) up to 14 % (Cr) and followed the order: Zn > Mn > Cu > Ni > Co > Pb > Cr. The advantages of metals bioleaching process at heterotrophic metabolism was shown. A new process for bioconversion of sewage sludge into fertilizer at middle temperature after partial heavy metals removal was developed. This process is based on enhancing vital ability of heterotrophic microorganisms by adding easily metabolized nutrients and synthesis of metabolites by growing sludge cenoses. These metabolites possess the properties of heavy metals extractants and flocculants which provide sludge flocks sedimentation and concentration. The process results in biomineral fertilizer with immobilized sludge bioelements with prolonged action. The fertilizer obtained satisfied the EU limits for the sewage sludge of agricultural utilization. High efficiency of the biomineral fertilizers obtained has been demonstrated in vegetation experiments.

Keywords : fertilizer, heavy metals, leaching, sewage sludge

Conference Title : ICESE 2014 : International Conference on Environmental Sciences and Engineering

Conference Location : Zurich, Switzerland

Conference Dates : January 14-15, 2014