FULL-TEXT

Comparison of nanoparticles effects on biogas and methane production from anaerobic digestion of cattle dung slurry

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ABSTRACT

Nanoparticles (NPs) of trace metals such as Co, Ni, Fe and Fe_3O_4 were implemented in this study to compare their effects on biogas and methane production from anaerobic digestion of livestock manure. The most effective concentrations of NPs additives were determined based on our previous studies, and were 1 mg/L Co NPs, 2 mg/L Ni NPs, 20 mg/L Fe NPs and 20 mg/L Fe_3O_4 NPs. These concentrations of NPs additives were further investigated and compared to each other in this study and were found to significantly (p<0.05) increase the biogas yield by 1.7, 1.8, 1.5 and 1.7 times in comparison with control, respectively. The methane yield significantly (p<0.05) increased by 2, 2.17, 1.67 and 2.16 times the methane volume of the control, respectively. The results of this study showed that the Ni NPs yielded the highest biogas and methane production compared to Co, Fe and Fe_3O_4 NPs.

Keywords: nanoparticles, biogas, methane production, anaerobic digestion, trace metals, slurry treatment.

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