Analisis konsentrasi dan spesiasi logam berat pada pengomposan limbah lumpur ipal domestik (studi kasus: IPAL Waduk Setiabudi Jakarta Selatan) = Analysis of concentration and speciation of heavy metal on domestic sewage sludge composting (case study WWTP Setiabudi South Jakarta)

Dini Aryanti, author

Abstrak

[ABSTRAK
Limbah lumpur yang dihasilkan dari Instalasi Pengolahan Air Limbah (IPAL) Domestik dapat dimanfaatkan melalui pengomposan karena mengandung kandungan organik yang tinggi. Namun, kandungan logam berat pada limbah lumpur dapat menjadi penyebab utama timbulnya dampak negatif pada lingkungan dan kesehatan manusia. Tujuan dari penelitian ini adalah untuk menganalisis perubahan parameter fisik-kimia, konsentrasi dan spesiasi kimia logam Cu dan Pb pada dua campuran kompos sebagai penilaian kelayakan kedua kompos untuk digunakan sebagai pupu. Hasil penelitian menunjukkan bahwa parameter suhu, pH, dan rasio C/N pada kedua kompos telah memenuhi kualitas kompos sesuai SNI 19-7030-2004. Konsentrasi logam Cu pada kompos 1 dan kompos 2 berturut-turut adalah 150 mg/kg dan 237 mg/kg, sedangkan konsentrasi logam Pb sebesar 224 mg/kg dan 183 mg/kg. Besar konsentrasi kedua logam pada kedua kompos menghasilkan faktor resiko ekologi yang masuk ke dalam kategori resiko rendah (Er < 40). Selain itu, proses pengomposan pada penelitian ini telah mengurangi efek toksisitas kedua logam. Pada akhir pengomposan, fraksi logam Cu pada kedua kompos dominan pada fraksi organic bound yaitu sebesar 63,50% untuk kompos 1 dan 56,20% untuk kompos 2. Sedangkan logam Pb dominan pada fraksi residual yaitu sebesar 62,10% pada kompos 1 dan 71,50% pada kompos 2. Kedua fraksi ini merupakan fraksi stabil sehingga keberadaan logam Cu dan Pb tidak memberikan dampak negatif bagi lingkungan jika kedua kompos diaplikasikan ke tanah.
<hr>
ABSTRACT
Sewage sludge generated from Waste Water Treatment Plant (WWTP) can be reused by composting because it contains a high organic content. However, the content of heavy metals in sewage sludge can be a major cause negative impacts on the environment and human health. The purpose of this study is to analyze the changes in the physical-chemical parameters, concentration and chemical speciation of Cu and Pb in two compost mixtures as an assessment of the feasibility of both composts to be used as fertilizer. The result showed that the parameters of temperature, pH, and C/N ratio in both compost met the standard quality of compost according to SNI 19-7030-2004. Concentration of Cu in compost 1 and compost 2 were 150 mg/kg and 237 mg/kg respectively, while the concentration of Pb were 224 mg/kg and 183 mg/kg respectively. The concentration of both metals in two composts resulted Ecological Risk factor (Er) that go into a low risk category (Er < 40). In addition, the composting process in this study reduced the toxicity effect of two metals. At the end of composting, fractions of Cu in two composts were dominant in organic bound fraction in amount of 63.50% for compost 1 and 56.20% for compost 2. While Pb were dominant in the residual fraction that is equal to 62.10% for compost 1 and 71.50% for compost 2. These fractions are the stable

fracion so that the existence of Cu and Pb in two compost do not give negative impact to the environment if two composts will be applied to soil.;Sewage sludge generated from Waste Water Treatment Plant (WWTP) can be reused by composting because it contains a high organic content. However, the content of heavy metals in sewage sludge can be a major cause negative impacts on the environment and human health. The purpose of this study is to analyze the changes in the physical-chemical parameters, concentration and chemical speciation of Cu and Pb in two compost mixtures as an assessment of the feasibility of both composts to be used as fertilizer. The result showed that the parameters of temperature, pH, and C/N ratio in both compost met the standard quality of compost according to SNI 19-7030-2004. Concentration of Cu in compost 1 and compost 2 were 150 mg/kg and 237 mg/kg respectively, while the concentration of Pb were 224 mg/kg and 183 mg/kg respectively. The concentration of both metals in two composts resulted Ecological Risk factor (Er) that go into a low risk category (Er < 40). In addition, the composting process in this study reduced the toxicity effect of two metals. At the end of composting, fractions of Cu in two composts were dominant in organic bound fraction in amount of 63.50% for compost 1 and 56.20% for compost 2. While Pb were dominant in the residual fraction that is equal to 62.10% for compost 1 and 71.50% for compost 2. These fractions are the stable fracion so that the existence of Cu and Pb in two compost do not give negative impact to the environment if two composts will be applied to soil., Sewage sludge generated from Waste Water Treatment Plant (WWTP) can be reused by composting because it contains a high organic content. However, the content of heavy metals in sewage sludge can be a major cause negative impacts on the environment and human health. The purpose of this study is to analyze the changes in the physical-chemical parameters, concentration and chemical speciation of Cu and Pb in two compost mixtures as an assessment of the feasibility of both composts to be used as fertilizer. The result showed that the parameters of temperature, pH, and C/N ratio in both compost met the standard quality of compost according to SNI 19-7030-2004. Concentration of Cu in compost 1 and compost 2 were 150 mg/kg and 237 mg/kg respectively, while the concentration of Pb were 224 mg/kg and 183 mg/kg respectively. The concentration of both metals in two composts resulted Ecological Risk factor (Er) that go into a low risk category (Er < 40). In addition, the composting process in this study reduced the toxicity effect of two metals. At the end of composting, fractions of Cu in two composts were dominant in organic bound fraction in amount of 63.50% for compost 1 and 56.20% for compost 2. While Pb were dominant in the residual fraction that is equal to 62.10% for compost 1 and 71.50% for compost 2. These fractions are the stable fracion so that the existence of Cu and Pb in two compost do not give negative impact to the environment if two composts will be applied to soil.]