CHARACTERISATION OF PIT LATRINE SLUDGE FROM INFORMAL SETTLEMENTS IN MZUZU CITY IN MALAWI

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This study was carried out to understand the chemical and biological processes that occur in pit latrines. To date, there is very little knowledge on the sludge characteristics in Malawi. The study was performed from October 2014 to March 2015 and aimed to provide scientific data on the characteristics of faecal sludge in Malawi. Pit latrine sludge samples were collected from four depths (0.0m, 0.5m, 1.0m and 1.5m from the sludge surface) to better understand the degradation process and from 20 pit latrines in five informal settlements namely Salisbury Lines, Luwinga, Chibanja, Chibavi and Katoto. The parameters explored in the study included pH, moisture content, electrical conductivity, biochemical oxygen demand, chemical oxygen demand, total ammonia, total Kjeldhal nitrogen, phosphorous, potassium, total solids, total volatile solids, fixed solids, E.coli and Ascaris.

Variation of individual parameters at the four study depths was examined using ANOVA. The study established mean ranges of 7.20-7.40 for pH, 91.7-94.8% for moisture content, 23338-26728 µS/cm for electrical conductivity, 2.82-3.11 mg/g for biochemical oxygen demand, 20.18-22.31 mg/g for chemical oxygen demand, 0.255-0.331 mg/g for total ammonia, 14.90-18.00 mg/g for total Kjeldhal nitrogen, 0.249-0.359 mg/g for phosphorous, 15.88-20.29 mg/g for potassium, 51.69-88.50 mg/g for total solids, 28.63-44.82 mg/g for total volatile solids, 21.81-45.85 mg/g for fixed solids, 17755-31615 CFU/100mL for E.coli and 0.8-2.1 eggs/g for Ascaris. An apparent pH increase was noted with pit latrine depth while for E.coli the count decreased with depth. BOD and COD values decreased with depth for the first three depths from 0m to 1m and then went up at 1.5m depth. No generic trends were observed for the rest of the parameters.

No significant difference with respect to depth was found for pH (p=0.653), moisture content (p=0.448), electrical conductivity (p=0.944), biochemical oxygen demand (p=0.629), chemical oxygen demand (p=0.789), total ammonia (p=0.830), total Kjeldhal nitrogen (p=0.712), potassium (p=0.162), total solids (p=0.325), total volatile solids (p=0.300), fixed solids (p=0.244), E.coli count (p=0.070) and Ascaris egg count (p=0.362). Only phosphorous values found to be significantly different for the four depths (p=0.003). The study highlighted the variable nature of faecal sludge which makes management of this waste stream difficult. This study was funded through the Sanitation Research Fund for Africa Project of the South African Water Research Commission.

Keywords: faecal sludge management, pit latrines.