

VALUE ADDITION AND BENEFICIATION CLUSTER

Ongoing research

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Research topic: Evaluation of biological treatment of yeast processing waste-water using up flow anaerobic sludge bed (UASB) reactors

Research Description

Yeast and dairy products have very strong organic waste from the processing plant. In Zimbabwe, the wastewater produced from a single dairy processing plant may reach 1 600m³/d and yeast processing produces as much as 600 000m³/ month . Preliminary studies have indicated that the chemical oxygen Demand (COD) of yeast processing wastewater as a local plant may reach as high as 25 050 mg/L. The samples failed to comply with local wastewater specification requirements. (ZWS 588:1999) and S.I. 6 OF 2007) Effluents generated as a result of operations in yeast processing are characterised by high organic matter resulting in high Biological Oxygen demand (BOD) and high COD. The wastewater is also characterised by high level of nitrates, phosphates ,total solids and detergents used for cleaning in place (CIP). High level of Permanganate value (> 160mg/L) attracts heavy fines from Environment management Agency (EMA) since the pollutants are responsible for water pollution. In view if the current problems in Zimbabwe, both in protection of the environment and the search for sources of renewable energy, anaerobic digestion appear to be favourable biotechnological process to dispose of organic waste through bioconversion into energy. Anaerobic digestion is a complex biochemical process carried out by microorganisms in the absence of oxygen to produce biogas. The up flow anaerobic sludge blanket (UASB) process has been proposed for the biological treatment of wastewaters from food and beverage processing (Wolmarans and De Villiers, 2002; Hampannavar and Shivayogimath, 2010). Research work on UASB reactors in Zimbabwe has been fragmentary, with potential applications in the food industry. Currently evaluations for characterisation and biological treatment have been done on opaque brewery and potato processing wasterwater (Parawira et 11., 2005; Manhokwe, 2009). The main objective of the proposed research is to evaluate the potential application of anaerobic reactors (UASB and packed bed reactors for efficient reduction of water pollution at a local yeast processing factory. Research work would involve characterisation of wastewater from a yeast processing plant and development of a laboratory scale anaerobic treatment systems (UASB and Packed bed reactors) for wastewater treatment . Laboratory work also involves determining the treatment efficiency of the biological treatment systems by evaluating the physic-chemical and biochemical parameters as well optimising organic loading and hydraulic retention times.