



Influence of Agricultural Wastes on the Activated Sludge Settleability

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Abstract

Two commonly used measures developed to quantify the settling characteristics of activated sludge are the sludge volume index (SVI) and the zone settling velocity (ZSV). Because of probability of sludge settling improvements by agricultural wastes, their impacts on sludge settling properties were principal objectives of this research. Average values of SVI for control (blank) sample was 823 mL/g. Optimum dosage for different agricultural wastes is defined as that reduced SVI to 100 mL/g (88 percent decrease). Average values of ZSV for control sample was 1.222 m/h. Different agricultural wastes increased ZSV of control samples up to 2 to 3 times.

Keywords: activated sludge, sludge volume index, zone settling velocity, agricultural wastes.

1. INTRODUCTION

The activated sludge process is the most used biological wastewater treatment method in the world [1]. The principal objectives of biological treatment are to stabilize the organic matter and to coagulate and remove the nonsettleable colloidal solids found in domestic wastewater [2]. The separation of solids in the activated sludge process is a very important function in order to provide well-clarified effluent and concentrated solids that are returned to the biological treatment system or are wasted to the solids processing facilities [3].

Previous investigations indicate that many activated sludge systems have experienced various biomass separation problems in the settling tanks. There are two main types of settling problems: (i) sludge bulking due to the proliferation of filamentous bacteria and (ii) poor flocculation properties, e.g. formation of small and light flocs. In most cases, large, dense and strong flocs are desirable for good settling and compaction of activated sludge. Two commonly used measures developed to quantify the settling characteristics of activated sludge are the sludge volume index (SVI) and the zone settling velocity (ZSV)[3].

The sludge volume index (SVI) is the volume in milliliters occupied by 1 g of a suspension after 30 min settling, and calculated as below [4]:

$$SVI = \frac{\text{settled sludge volume index (mL/L)} \times 1000}{\text{suspended solids (mg/L)}} \quad (1)$$

SVI is one of the operating parameters that used for design and operation of secondary sedimentation tanks. SVI values below the 100 mL/g are typically associated with good settling sludge. Also $100 < SVI \leq 150$ would indicate moderate sludge settling and sludge of the SVI over 150 mL/g is often classified as bulking sludge. In systems that contain a high concentration of suspended solids, both hindered (or zone) settling and compression settling usually occur in addition to discrete (free) and flocculent settlings. The ZSV is the settling velocity of the sludge/water interface (V_i) at the beginning of the sludge settleability test [3]. ZSV is a famous method used to describing the sludge settleability and also has used in a lot of researches. The agricultural wastes exist in the environment naturally and frequently enter to the environment as solid wastes.