TITLE: OVERGROWTH OF FILAMENTOUS BACTERIA DURING LANDFILL LEACHATE TREATMENT BY AEROBIC GRANULAR SLUDGE

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ABSTRACT:

Aerobic granular sludge has attracted wide interest in recent years for the treatment of landfill leachate. These granules have been applied due to their high metabolic activity promoted by the growth of different guilds of microorganisms in different parts of the granules. The stability of aerobic granules developed in sequencing batch reactors (SBRs) remains a challenge to widespread use of this biotreatment technology, since filamentous bacteria overgrowth, an event called bulking, observed during the operation of a granular sludge in a sequencing batch reactor (SBR) can cause serious operational problems. With some filaments there may be the problem of bulking, where inadequate flocculation and setting of the biomass in the secondary clarifier results in a carryover of solids with the final treated liquid effluent. This study aimed to identify the main causes of the filamentous bacteria overgrowth to suggest a control strategy to avoid this unwanted phenomenon. The bench scale reactor was fed with synthetic effluent, with acetate as the sole carbon source, and inoculated with activated sludge. The granulation process was initially observed after 150 days of reactor operation and the detection of filamentous bacteria occurred after 250 days. The diameter of granular particles along the operating period ranged from 0.3 mm to 2.3 mm. The overgrowth of filamentous bacteria resulted in the disintegration and wash out of aerobic granules leading to the reactor's failure. The main causes of filamentous overgrow may be due to the lower dissolved oxygen as well as solids retention time. Additionally, imagens of fluorescence in situ hybridization (FISH) showed large amounts of denitrifying bacteria, nitrifying bacteria e phosphorus accumulating bacteria within the granules, however, these microbial populations were suppressed by the filamentous bacteria overgrowth along the experiment.

Keywords: aerobic granular sludge, filamentous bacteria, overgrowth