Role of *Nocardia* in Activated Sludge

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Abstract

Activated sludge process is a biological process that is widely used in the domestic and industrial wastewater treatment in over the world. The foam formation is often reported in wastewater treatment plants which are related to this process. Some operational problems can be created by foaming, such as effluent quality deteriorates, the creation of malodorous, increased time requirements in order to plant maintenance, and in extreme cases, hazardous working conditions resulting from foam spilling out of the aeration basin and as well as increased in operational costs. There are different ways to overcome this problem, such as reduce air flows into the aeration basin, reduction in the grease and oil content of the wastewater, surface and return activated sludge (RAS) chlorination, anoxic and anaerobic selectors, solid retention time (SRT) control and antifoams and organic polymer addition. On the other hand, rapid and accurate identification of the foam causes is in the first step to control bulking and foaming. Foam problem is often created by filamentous bacteria, such as *Nocardia* and *Gordonia* species. This bacterium has a role important in activated sludge.

Keywords: wastewater treatment, foaming, Filamentous bacteria, Nocardia
bronchialis (10-12). Wastewater treatment plant operators are commonly investigating methods to improve system design and maintenance by managing or preventing bulking and foaming. Rapid and accurate identification of the foam causes is the first step to control bulking and foaming (2). Identification of Nocardia species is important related to foaming phenomenon. The genus Nocardia first isolated of lymphadenitis from bovine farcy in 1888 and Trevisan named it Nocardia farcinica. This genus of bacteria is gram positive, partially acid fast, growth in the lysozyme broth and naturally are soil microflora. This bacterium enters in the body human via inhalation and skin abrasion. Nocardial infections are more common in the immune disorder disease. The genus Nocardia has more than 104 species that most of them are in complex group, such as Nocardia asteroides complex, Nocardia brevicatena/paucivorans complex, Nocardia nova complex, Nocardia transvalensis complex, and Nocardia otitidiscaviarum. In the past decade, various phenotypic tests were used for Nocardia identification, but these methods (phenotypic tests) are time-consuming. Nowadays, molecular methods have been used for identification of many Nocardia species and are needed to recognize new clinically significant species. These techniques are rapid and accurate (13-16). Petrovski and colleague reported Bacteriophage GTE7 for prevention of Gordonia and Nocardia species of foam (17).

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