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Keywords: Biotrickling lter; Dimethyl sulphide; ermophilic bacterial; PCR-DGGE; Degradation mechanism.

Introduction

Wastewater treatment results to the production of large quantities of sewage sludge [1]. ermal drying of sludge makes it possible to stabilize the sludge, reduce its volume and hygienize the product. However, it is inevitable to produce odor compounds, such as dimethyl sul de (DMS), trimethylamine (TMA), NH_3, SO_2, H_2S, volatile fatty acids (VFAs), and PCDD/Fs [2,3]. Hot odours emitting from sewage sludge drying cause an odour problem, ranging from annoyance to documented health e ects [4]. e use of thermophilic microorganisms active at temperatures over 40°C would o er great savings and would greatly extend the applicability of bio lter and biotrickling lter. e high-temperature biotrickling lter exhibited a higher degree of ethanol mineralization to CO_2 and hosted a process culture composed of both mesophilic and thermotolerant or thermophilic microorganisms, whereas the ambient-temperature reactor lacked microorganisms capable of growing at high temperature [5]. H_2S-containing gas at 60°C was successfully treated in a thermophilic bio lter inoculated with Bacillus sp.

ermodesulfovibrio sp. is an anaerobic, thermophilic (45-70°C) sulfate-reducing bacteria (SRB), enhancing the metabolism of DMS in the biotrickling lter. Growth occurred with sulfate as well as thiosulfate as electron acceptors [25,26]. ermodesulfovibrio sp. takes part in the anaerobic degradation of DMS and the reduction of sulfate, the dominant bactrias in the BTF. ermoactinomycetaceae bacterium is an aerobic thermophilic bacteria that can be isolated form compost at 65°C, which contributed to the aerobic degradation of DMS [27]. Arthrobacter sp. is a thermophilic bacteria [28], which has been reported to degrade kinds of persistent organic pollutants and atrazine [29,30].Hydrogenothermophilus hirschii is a rod-shaped thermophilic hydrogen-oxidizing -proteobacterium, average size about 1.0~1.5 × 0.8 m, growth occurred on complex organic substrates such as yeast extract and peptone and on organic acids. e optimum condition of Hydrogenothermophilus hirschii between 50-68°C [31]. Acidobacteria is a thermophilum sulfur oxidation bacterium (SOB), which also occurs in a large variety of other habitat types such as hot springs [32]. Filamentous cyanobacterium are regarded as one of the most successful groups of prokaryotic organisms based on a fossil record that is among the oldest for any group of organisms [33]. Hydrotalea sp. and ermomonas sp., are thermophilic [34]. Since DMS can be metabolized to dimethyl sulfoxide, methyl mercaptan, hydrogen sul de, and sul de (SO_4^{2-}) [35], this predominant bacterias may be attributable to the potential for sulfur oxidation, sulfate-reducing and carbon oxidation processes to occur simultaneously in the biotrickling lter system under thermophilic conditions.

Mechanism of DMS degradation in BTF

e intermediate products were identi ed by analysing them with a GC–MS. e gas-phase intermediate organic products were detected

with a desulfurization and a thermophilic biotrickling lter unit should eliminate SO_2 in uence and run stability.

Bacterial community composition

Microbial community structure in the biotrickling lter is investigated by polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE), when system runs stably at 115 d. Results show that there are nine bands in PCR-DGGE pro le which represents nine species microorganism (Table 1). Nine bands (A, B, C, D, E, F, G, H and I) bacterial group that includes Hydrotalea sp., Acidobacteria bacterium, Filamentous cyanobacterium, ermomonas sp., Arthrobacter sp., ermoactinomycetaceae bacterium, Arthrobacter sp., Hydrogenothermophilus hirschii, ermodesulfovibrio sp.

Citation: