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Culture conditions optimization and characterization of a bioflocculant produced by *Bacillus* sp. isolated from Algoa Bay, South Africa

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In view of environmental and health concerns consequent to the adverse effects of conventionally used flocculants, hence the need for microbial flocculants which has been adduced with merits including innocuousness, biodegradability and sensitivity under extreme environmental conditions. These salient features possessed by microbial flocculants imply an imperative alternative. This study assessed the bioflocculant (named MBF-W7) production potential of a bacterial isolate obtained from Algoa Bay, Eastern Cape Province of South Africa. The 16S ribosomal ribonucleic acids (rRNA) gene sequences analysis showed 98% sequence similarity to *Bacillus licheniformis* strain W7. The potentials of *Bacillus* sp. for bioflocculant (MBF-W7) were investigated and the culture conditions required for its optimal bioflocculant production were assessed. MBF-W7 production was observed to be associated with cell growth, optimally produced in the presence of excess nutrient with maltose as the carbon source, NH₄NO₃ as the nitrogen source of choice at initial growth medium pH of 6. Purified MBF-W7 was a glycoprotein composed of polysaccharide (73.7% w/w) and protein (6.2% w/w). The flocculating activity for kaolin suspension reached maximal at 0.2 mg/ml over a wide pH range of 3-11 with Mn²⁺ as a flocculating aid. The thermostable MBF-W7 exhibited excellent flocculating activities of 80% at both strong acidic and alkaline conditions; thus indicating that it could be used under extreme environmental conditions. MBF-W7 has good potential in substituting chemical flocculants used in water treatment hence; it's an alternative for consideration in water treatment process.

Biography

Kunle Okaiyeto is currently a PhD research fellow in the Department of Biochemistry and Microbiology at the University of Fort Hare, South Africa. He also obtained his Master's degree from the same University in 2013. He finished his Hons. degree in Biochemistry (2005) from University of Ilorin, Nigeria. He specializes on the production of flocculants from microbes, which can be used as a substitute to the hazardous chemical flocculants that are widely used in water treatment and downstream processes. He has published several papers in leading scientific journals. Mr. Kunle is a Nigerian and he has so many qualities, which make him to be outstanding. These attributes include intellectual curiosity, determination, self-motivation, competitiveness, teamwork capabilities, humbleness, resourceful and inventive, discipline and honesty.

Mr Kunle's quote is: "If education is always to be conceived along the same antiquated lines of a mere transmission of knowledge, there is little to be hoped from it in the bettering of man's future; and the principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done - men who are creative and inventive hold the future."

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