Biodegrading Acid: A Novel Approach Using Bacteria

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During bitumen extraction, a mixture of fine silts, hydrocarbons, salts, and soluble organic compounds called oil sands tailings is produced. In Oil Sand Tailing Ponds, crude oil is present. Crude oil is made up of various chemicals that make it difficult to clean up. In this project, I wanted to test and determine which method is most effective at degrading the harmful acids that are spilled into the environment, such as naphthenic acid. I tested which method of biodegradation is more effective in breaking down naphthenic acid: slow sand filters or planktonic batch cultures. I used four types of bacteria that are present in tailing ponds; E.Coli, Pseudomonas, Acidovorax, or all three combined. I hypothesized that the slow sand filter biodegrades the acids more efficiently with the combined bacteria, compared to The Plankton Batch Culture, because of their tendency to form biofilms, which will provide a better environment to break down the harmful acids. I also hypothesized that the bacteria will biodegrade the harmful acids found in crude oil, as it has biodegradable qualities. In conclusion, both hypothesis were correct. The slow sand filter biodegraded the acid more effectively with the average number of colonies after 4 weeks being 152, and the average pH level after 4 weeks being 6. I also proved that bacteria has biodegradable qualities and is able to break down acids located in crude oil. In the future, I can use the studies found in this experiment for future upkeep of oil Tailing Ponds.

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