

## Usage of Biosorbent Material for the Removal of Nitrate from Wastewater

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**Abstract :** Nitrate can cause serious environmental and human health problems. Effluent from different industries and excessive use of fertilizers have increased the level of nitrate in ground and surface water. Nitrate can convert to nitrite in the body, and as a result, can lead to Methemoglobinemia and cancer. Therefore, different organizations have set standard limits for nitrate and nitrite. The United States Environmental Protection Agency (USEPA) has set a Maximum Contaminant Level Goal (MCLG) of 10 mg N/L for nitrate and 1 mg N/L for nitrite. The removal of nitrate from water and wastewater is very important to ensure the availability of clean water. Different plant materials such as banana peel, rice hull, coconut and bamboo shells, have been studied as biosorbents for the removal of nitrates from water. The use of abundantly existing plant material as an adsorbent material and the lack of energy requirement for the adsorption process makes biosorption a sustainable approach. Therefore, in this research, the fruit of the plant was investigated for its ability to act as a biosorbent to remove the nitrate from wastewater. The effect of pH on nitrate removal was studied using both the raw and chemically activated fruit (adsorbent). Results demonstrated that the adsorbent needs to be chemically activated before usage to remove the nitrate from wastewater. pH did not have a significant effect on the adsorption process, with maximum adsorption of nitrate occurring at pH 4. SEM/EDX results demonstrated that there is no change in the surface of the adsorbent as a result of the chemical activation. Chemical activation of the adsorbent using NaOH increased the removal of nitrate by 6%; therefore, various methods of activation of the adsorbent will be investigated to increase the removal of nitrate.

**Keywords :** biosorption, nitrates, plant material, water, and wastewater treatment

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