



## Fixed-Bed Biosorption of Nitrate using Tamarind Fruit Shells

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**Abstract:** This study focuses the removal of nitrate ( $\text{NO}_3^-$ ) from the concocted water environment using Tamarind Fruit Shell (TFS) with Fixed Bed Reactor (FBR) system under room temperature. The settled bed ponders secured the huge analyses, such as, eneration of breakthrough curvess (counting the impacts of beginning  $\text{NO}_3^-$  fixation, TFS size, and stream rate) and bed-profundity benefit time (BDST) approach. From the FBR studies, the pattern of breakthrough curves were almost similar and consistent, but marginally deviated from the typical S-shaped curve. The breakthrough time was inversely proportionate to flow rate, initial  $\text{NO}_3^-$  concentration and size of TFS, but directly proportionate to bed depth. The head loss problem was not encountered in any of the fixed-bed studies. The biosorptive capacity of TFS in FBR was approximately 7 to 8 times higher than those in CMBR studies. BDST approach was highly suitable for  $\text{NO}_3^-$  removal by TFS; and yielded higher bed efficiency of 99%. The biosorptive capacity of TFS was shown to be directly proportionate to the initial  $\text{NO}_3^-$  concentration ( $N_0 = 0.09\text{C}_0$ ).

**Keywords:** Nitrate, Tamarind Fruit Shell, Fixed Bed Reactor, Bed-depth Service Time, Biosorptive Capacity

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