

عنوان مقاله:

Biodegradation of high concentrations of phenol by baker's yeast in anaerobic sequencing batch reactor

محل انتشار:

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خلاصه مقاله:

Background: Phenol, as a pure substance, is used in many fields because of its disinfectant, germicidal, local anesthetic, and peptizing properties. Aqueous solutions of phenol are produced as waste in industries and discharged into the environment. Therefore, elevated concentrations of phenol may be found in air or water because of industrial discharge or the use of phenolic products. **Method:** The strains of *Saccharomyces cerevisiae* used in this project were natural strains previously purchased from Razavy company. They were grown at 30°C on Petri plates containing yeast extract glucose (YGC) and then purified by being spread onto new plates, and isolated colonies were obtained. These colonies provided the basis of selection. Prepared strains were applied in anaerobic sequencing batch reactors (ASBRs) as first seed. The experiment conditions were optimized using response surface methodology (RSM). After the determined runs were performed using Design-Expert software, data were analyzed using mentioned software as well. **Results:** This study evaluated the capability of baker's yeast to remove phenol in high concentrations. The tested strains showed excellent tolerance to phenol toxicity at concentrations up to 6100 mg/L. Study of the batch degradation process showed that the phenol removal rate could exceed 99.9% in 24 hours at a concentration of 1000 mg/L. The results showed catechol is the first intermediate product of phenol degradation. In survey results of the Design-Expert software, R² and Adeq precision were 0.97 and 25.65, respectively. **Conclusion:** The results demonstrated that ASBR performs robustly under variable influent concentrations of inhibitory compounds. The high removal performance despite the high phenol concentration may be a result of reactor operating strategies. Based on the progressive increase of inlet phenol concentration, allowing for an enhanced biomass acclimation in a short time, results at the microbiological levels showed that the increase of phenol concentration was accompanied by a decrease in the microbial community and a progressive selection of the most adapted phenotypes.

کلمات کلیدی:

Yeast, Phenol, ASBR, Biotransformation, Synthetic solutions, Design of experiments software

