

Use of Yeast-Chitosan Bio-Microcapsules with Ultrafiltration Membrane to Remove Ammonia Nitrogen and Organic Matter in Raw Water

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Abstract : This study reports the preparation of a new type yeast-chitosan bio-microcapsule coating sodium alginate and chitosan, with good biocompatibility and mechanical strength. Focusing on the optimum preparation conditions of bio-microcapsule, a dynamic test of yeast-chitosan bio-microcapsule combined with ultrafiltration membrane was established to evaluate both the removal efficiency of major pollutants from raw water and the applicability of this system. The results of orthogonal experiments showed that the optimum preparation procedure are as follows: mix sodium alginate solution (3%) with bacteria liquid in specific proportion, drop in calcium chloride solution (4%) and solidify for 30 min; put the plastic beads into chitosan liquid (1.8%) to overlay film for 10 min and then into glutaraldehyde solution (1%) to get cross-linked for 5 min. In dynamic test, the microcapsules were effective as soon as were added in the system, without any start-up time. The removal efficiency of turbidity, ammonia nitrogen and organic matter was 60%, 80%, and 40%. Besides, the bio-microcapsules were prospective adsorbent for heavy metal; they adsorb Pb and Cr⁶⁺ in water while maintaining high biological activity to degrade ammonia nitrogen and small molecular organics through assimilation. With the presence of bio-microcapsules, the internal yeast strains' adaptability on the external environment and resistance ability on toxic pollutants will be increased.

Keywords : ammonia nitrogen, bio-microcapsules, ultrafiltration membrane, yeast-chitosan

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