

Harvesting of Rhodotorula glutinis via polyaluminium chloride or cationic polyacrylamide using the extended DLVO theory

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Abstract

Polyaluminium chloride (PAC) and cationic polyacrylamide (CPAM) play a crucial role for separating microorganisms from bulk media. However, the mechanism of adsorption between cells and flocculants remain to be further defined to improve the flocculation efficiency (FE) in extreme conditions. This study conducted the flocculation process of Rhodotorula glutinis induced by PAC and CPAM, firstly. The result demonstrated that CPAM possessed more efficient harvesting ability for R. glutinis compared to PAC. The difference of flocculation capacity was then thermodynamically explained by the extended DLVO (eDLVO) theory, it turned out that the poor harvesting efficiency of PAC was attributed to lacking of binding sites as well as low adsorption force within particles. Based on this, the FE of PAC to R. glutinis was mechanically enhanced to 99.84% from 32.89% with 0.2 g/L CPAM modification at an optimum pH of 9.

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