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## Brewing Spent Yeast as a Sustainable Solution for Tannin Adsorption

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This study explored the potential of brewing spent yeast (BSY) as an adsorbent for tannins from a chestnut shell extract (CS-tannin extract). The extract was obtained through an alkaline treatment (5% NaOH (v/v)) to recover cellulosic material from chestnut shells, which requires further valorisation. Various BSY treatments, including lyophilization, immobilization in calcium alginate beads, and alkaline and acid treatments, were tested to determine the best tannin adsorption capacity. The BSY material underwent characterization before and after the experiments, including point of zero charge (pHPZC) determination, Fourier transform infrared (FT-IR) analysis, and scanning electron microscopy with energy dispersive spectroscopy (SEM/EDS).

Equilibrium was achieved within 10 minutes, with the highest biosorption capacity of CS-tannin extract observed in lyophilized BSY, which showed a value of  $31.81 \pm 3.08$  mg Tannic Acid Equivalents  $g^{-1}$  yeast. The Sips isotherm model fitted well to the data, suggesting that tannin biosorption onto residual yeast cells is a chemisorption process. FT-IR analysis revealed several functional groups in the BSY, particularly carboxyl, amino/hydroxyl, and amide groups, which play a key role in tannin biosorption.

These results demonstrate that BSY, a valuable by-product of the brewing industry, is an effective biosorbent for tannins from the disposal solution resulting from chestnut shell cellulosic material extraction. Further research is needed to better understand the specific interaction mechanisms and explore the practical applications of tannin-enriched BSY.

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### References:

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