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Comparative Analysis of Analytical Methods for Quantifying the Deacetylation Degree in Chitosan Polymer Chains.

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Chitin, chitosan, and their derivatives are biopolymers that have various applications in medicine, particularly in the pharmaceutical industry and drug delivery systems. The main difference between these polymers is their degree of deacetylation. To be considered chitosan, the deacetylation of chitin must exceed 50%, with 55-70% classified as a low degree of chitosan deacetylation. Today, several methods have been developed to determine the degree of deacetylation, including traditional physical-chemical methods and innovative approaches such as spectroscopy and chromatography. This study aims to evaluate the performance of acid-base titration, UV-Vis spectrophotometry, Fouriertransform infrared (FTIR) spectroscopy, and high-performance liquid chromatography (HPLC) methods in measuring the degree of chitosan deacetylation. The methods were assessed based on their popularity, accuracy, and versatility. The sensitivity, specificity, and overall reliability of each method were also evaluated, as well as their practical applicability, considering cost, time, and equipment requirements. The selected methods produced reliable results with relatively straightforward procedures. However, researchers and practitioners may prioritize simplicity and cost-effectiveness for routine analyses, while advanced laboratories might choose more detailed investigations using techniques such as HPLC or FTIR. It is essential to have a comprehensive understanding of the advantages and disadvantages of each method to make informed decisions when selecting the most suitable approach for measuring the degree of chitosan deacetylation.