

Advancements in RP-HPLC Method Development and Validation: A Comprehensive Review

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Abstract: Reverse-phase high-performance liquid chromatography (RP-HPLC) has emerged as a cornerstone technique in analytical chemistry, offering high sensitivity, selectivity, and efficiency in separating and quantifying a wide range of compounds. This comprehensive review explores recent advancements in RP-HPLC method development and validation, focusing on key strategies, challenges, and emerging trends. The review encompasses a detailed examination of critical parameters such as column selection, mobile phase optimization, detection techniques, and validation protocols. Furthermore, it discusses innovative approaches and technologies that enhance the robustness, speed, and accuracy of RP-HPLC analyses. Through a thorough analysis of current literature and case studies, this review provides valuable insights for researchers and practitioners engaged in method development and validation in the field of chromatography.

Keywords: RP-HPLC, method development, method validation, chromatography, analytical chemistry, column selection, mobile phase optimization, detection techniques