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Comparative study of different dissolution apparatus used in pharmaceutical quality control

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ABSTRACT: Dissolution testing plays a crucial role in assessing the performance, stability, and bioavailability of solid oral dosage forms. It serves as a key quality control parameter ensuring batch-to-batch uniformity and predicting in vivo drug release behavior. Various dissolution apparatuses, as described in pharmacopeial standards such as USP, BP, and IP, are employed depending on the dosage form and drug characteristics. This comparative study aims to evaluate and differentiate between commonly used dissolution apparatuses—Apparatus I (Basket type), Apparatus II (Paddle type), Apparatus III (Reciprocating cylinder), and Apparatus IV (Flow-through cell)—based on their design, operating principles, hydrodynamics, applications, and suitability for specific dosage forms. The analysis highlights the advantages and limitations of each system in terms of reproducibility, sensitivity to agitation speed, and ability to simulate physiological conditions.

Keywords: Dissolution testing, Pharmaceutical quality control, USP Apparatus I–IV, Drug release, Bioavailability

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