



# A Novel UV-Vis Spectrophotometric Method for Quantifying Rifaximin: Method Development and Validation

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**Abstract**— This study evaluated the standardization and method validation of rifaximin using different acid and phosphate buffer conditions (pH 1.2, 6.8 and 7.4). Although all tested conditions showed excellent precision (less than 2% RSD), limitations in linearity and precision were observed. Although the correlation coefficients were high (0.9898 to 0.9972), they deviated from the ideal (1.0), indicating possible nonlinearities. Accuracy ranged from 89.45% to 94.16%, indicating slight under- or overestimation of rifaximin concentration. These limitations compromise the reliability of the rifaximin quantification method. Other optimization strategies are recommended, including exploring different pH conditions, refining the concentration range of the standard curve, and considering alternative analytical methods such as HPLC when possible. By addressing these limitations, a more robust and reliable method for rifaximin standardization can be achieved.

**Keywords**— Rifaximin, Spectrophotometer, Standardization and method validation, Robustness, RSD



## I. INTRODUCTION

Rifaximin is an antibiotic that is semi-synthetic and produced from rifampycin. It is commonly used to treat gastrointestinal diseases, including hepatic encephalopathy, irritable bowel syndrome, and traveler's diarrhoea. Targeting pathogenic bacteria in the stomach is made easier by its broad-spectrum antibacterial action and low systemic absorption. The analytical techniques available for rifaximin's quantification and quality control are few and frequently intricate, despite its therapeutic importance. Thus, the development of an easy-to-use, trustworthy, and verified analytical technique is necessary for the regular analysis of rifaximin.

The majority of laboratories choose to use spectrophotometry, especially UV-Visible (UV-Vis) spectrophotometry, since it is an easy and affordable analytical technique. With this technique, the amount of medication present may be ascertained by measuring how much UV or visible light the analyte absorbs.

UV-Vis spectrophotometry has been shown in several studies to be useful in the study of different medicinal substances. For example, Bhavsar et al. (2015) demonstrated the sensitivity and specificity of their UV-Vis spectrophotometric approach for the accurate measurement of cefixime in pharmaceutical formulations[1]. Similar to this, Patel et al. (2017) proved the accuracy and strong linearity of a UV-Vis spectrophotometric approach for olmesartan medoxomil determination[2]. These investigations highlight UV-Vis spectrophotometry's promise as a trustworthy analytical instrument.

Prior analytical approaches for rifaximin have mostly relied on chromatographic techniques, such high-performance liquid chromatography (HPLC), which are accurate but need complex gear and thorough sample preparation. While HPLC techniques offer great sensitivity and specificity, Kumar et al. (2018) claim that they are frequently more difficult to use and require more time than

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## **Difference Spectrophotometric Method Development For The:**

*Analytical Procedure Development by Quality by Design* Galla Rajitha, V. Ramalinga Swamy, Gireesh Kumar Eri, 2025-12-01 The Analytical Procedure Development by Quality by Design is an essential resource for anyone navigating the complex world of analytical chemistry. This comprehensive guide not only covers the fundamentals of analytical procedure development but also introduces the innovative principles of Quality by Design (QbD), revolutionizing the field. From classical to advanced techniques, this book explores a wide range of methodologies, providing readers with a thorough understanding of the subject. It delves into both Minimal and Enhanced approaches, giving readers insight into different strategies for analytical procedure development. One of the standout features of this book is its in-depth analysis of AQbD components, principles, and regulatory perspectives. With a chapter dedicated to Design of Experiments (DoE), readers will gain practical insights into how to effectively implement this method in their work. Furthermore, this book offers a detailed roadmap for QbD principles and analytical development, making it an invaluable resource for those looking to apply these concepts in their own research and projects. The book also includes practical examples in UV-Visible spectrophotometric, HPLC, GC, HPTLC, and bioanalytical methods, allowing readers to see these principles in action. With its reader-friendly elements, this book caters to a diverse audience, including students, researchers, and professionals in analytical chemistry. It provides comprehensive guidance and serves as a reliable companion for analytical procedure development and QbD understanding. In summary, the Analytical Procedure Development by Quality by Design is a must-have for anyone seeking to excel in the field of analytical chemistry. Its comprehensive coverage of analytical procedure development and QbD principles, coupled with practical examples and clear explanations, make it an indispensable resource.

- 1 Analytical Procedure Development
- 2 Analytical Quality by Design (AQbD)
- 3 Design of Experiments (DoE)
- 4 Implementation of QbD in Analytical Procedure Development
- 5 AQbD for UV-Visible spectrophotometric method development
- 6 AQbD for HPLC Method Development
- 7 AQbD for GC Method Development
- 8 AQbD for HPTLC Method Development
- 9 QbD for Bio-analytical Method Development

**Nutritional analysis of different plant parts among black pepper (*Piper nigrum*) varieties in Kerala: an overview** Prem Jose Vazhacharickal, K.R. Anilakumar, Deepthi James, 2017-11-21 Black pepper (*Piper nigrum*) the flowering vine belongs to the family Piperaceae, cultivated for its fruit, which is usually dried and used as a spice and seasoning. The black pepper's high variability was also noticed for yield-contributing characters like runner shoot production, holding capacity, adventitious root production, lateral branch habit, spike length, number of spikes per lateral branch, fruit set, dry weight, pharmacological, toxicological, clinical applications, and general uses of pepper are bioavailability enhancement, carminative, anti-cancer, natural antioxidant, black pepper as an anti-inflammatory drug, cholesterol lowering, and immune enhancer, anti-pyretic, anti-periodic, and rubefacient. Black pepper improves digestion and promotes intestinal health preservation of the flavour content. Four different pepper varieties in Kerala were selected based on a baseline survey. The

proximate composition includes estimation of dry matter and moisture content estimation of crude protein estimation of crude fibre estimation of crude ash and insoluble ash ether extract determination of dietary fibre gross energy analysis of component of different varieties of Piper nigrum were determined The sample Munthirimunda fruit has high moisture content The sample Chengannor leaf has high dry matter content The sample Chenganoor leaf has high crude protein content The sample Panniyor leaf has high crude fibre content Ether Extract is high in sample Chenganoor leaf The sample Munthirimunda leaf has high comparatively high Total Ash content Gross Energy is high in sample Panniyor fruit A wide gap in the nutritional properties of Piper nigrum varieties exist in Kerala which could be further explored

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