

# Exploring Solid Form 0 of Clarithromycin †

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**Abstract:** Some polymorphic drugs may undergo solid-state transformations during production and/or storage processes, which are a problem in their performance characteristics affecting the mechanical and physical drug properties, such as solubility and stability. Therefore, a profound characterization to identify each solid form of a drug is essential to monitor any physical transition utilizing quality control techniques. The present study was conducted to provide information on solid form 0 of clarithromycin, an ethanol solvate. The structural characterization was carried out using various techniques, such as solid-state nuclear magnetic resonance, X-ray powder diffraction, infrared spectroscopy, thermo analytical methods, and confocal microscopy. In addition, solubility, stability, and microbiological studies were performed. These studies showed characteristic patterns and morphological particularities, which allowed the unequivocal identification of this solid form. Interestingly, the solid showed good antimicrobial activity, although it is less soluble than the form II currently used on the market. The physical stability under normal storage conditions revealed a desolvation process and a subtle polymorphic transformation. Therefore, the properties determined in our study represent specific data that could be useful tools to recognize aspects of routine laboratory testing of quality control to ensure that the solid form used remains stable in the final therapeutic dosage form.

**Keywords:** polymorphism; clarithromycin; solubility; microbiological activity; physical stability; solid-state NMR spectroscopy; X-ray powder diffraction; quality control.

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## **Conflicts of Interest**

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.