Thermal stability of the ceftazidime pentahydrate

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Ceftazidime is a third generation antibiotic of the of the cephalosporin family with activity against gram negative bacteria, especially *P. aeruginosa*, being used in hospitals to treat serious infections [1][2]. Solvation/desolvation phenonema are widely reported in literature, as this structural transitions can occur during processing, handling and storage, and may influence the bioavailability and solubility of the drug. It is essential to understand the mechanism and kinetics of this process. In the case where the solvent stabilizes the lattice, the desolvation process may produce a change in the crystalline lattice, resulting in the formation of either a new crystal form or an amorphous form [3]. Considering that processes involving temperature variations and the use of vacuum are common practices in pharmaceutical manufacturing, it is important to notice that they may alter the physicochemical properties of a solvate. The aim of this work is to investigate the stability of ceftazidime pentahydrate under thermal and vacuum stresses. Raw materials were studied by temperature dependent X-ray powder diffraction and thermal analysis techniques, using thermogravimetric analysis (TG) and differential scanning calorimetry (DSC) coupled to an infrared equipment for the analysis of the evolved gases. The temperature dependent powder diffraction measurements have shown intensity changes, shift and the appearance of new peaks, which indicates changes in the crystalline structure of the original material. During analysis of the thermal behavior of ceftazidime pentahydrate it was possible to check a thermal event related to the water release, confirmed by infrared spectrum of the evolved gases, with onset temperature about 78,4ºC linked to a mass loss of 12.45%. It was also found the decomposition temperature of the drug in approximately 179,2ºC. It was possible to verify the existence of an anhydrous ceftazidime form, easily obtained when the sample is subjected to temperatures above 78° C or to vacuumThe high decomposition temperature is an indicative of the good stability of the product. Therefore, the ceftazidime pentahydrate is a drug that requires care during handling and production, considering that higher temperatures or the use of vacuum in production may affect product characteristics.

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