

Investigation of thermal behavior of the antiviral Famciclovir by Thermogravimetry and Differential Thermal Analysis

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Highlights

Thermal behavior of famciclovir was investigated by thermogravimetric techniques. Thermal events were described.

Abstract

Famciclovir ([2-(acetyloxymethyl)-4-(2-aminopurin-9-yl)butyl, C₁₄H₁₉N₅O₄) is an antiviral prodrug obtained synthetically from the nitrogenous base guanine, with molar mass 321.33 g mol⁻¹.

TG/DTG and DTA curves were obtained in a simultaneous SDT Q600 modulus (TA Instruments) using sample mass of c.a. 7.0 ± 0.1 mg, heating rate of 10 °C min⁻¹, under dynamic N₂ and air atmospheres (flow 50 mL min⁻¹) in open α-alumina sample holders.

Under nitrogen atmosphere, TG/DTG curves of famciclovir present one stage of mass loss, Figure (1.a). The famciclovir was stable up to 204.4 °C. The single mass loss represents 97.2% of the sample. After decomposition of the drug undergone pyrolysis of the carbonized material with a final residue of 0.66% at 1000°C.

Famciclovir TG/DTG curves under air atmosphere (Figure 1.c), revealed that the sample decomposition occurs in two stages. In the first stage of mass loss of 85.9% in the temperature range of 206.6 °C to 393.6 °C. While the second stage occurs from 293.6 °C to 682.9 °C with a loss of 9.44%. In the sequence, another loss between 682.9 °C and 1000.0 °C referring to the burning of the carbonized material, with a final residue of 4.38% at the end of the experiment. In the DTA curve (Figure 1.b), one exothermic event and three endothermic events. The first event is characterized by melting of the drug 103.5 °C (*T_{peak}*). The exothermic events referred to the thermal decomposition of the drug and that the oxidation of the material is accompanied the by burning of the carbonized, the peaks 354.9 °C, 550.6 °C and 680.1 °C, respectively.

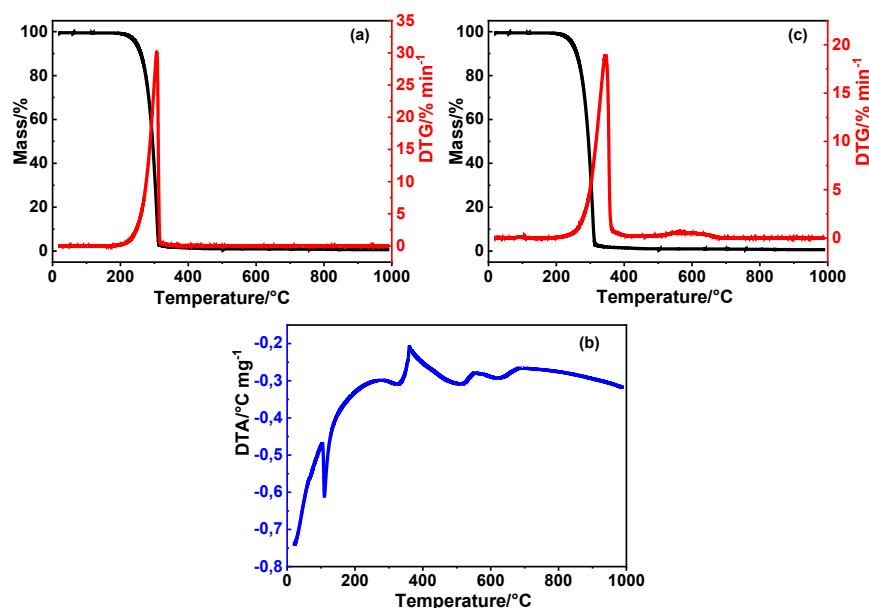


Figure 1: Famciclovir TG/DTG curves under dynamic N₂ atmosphere (a) TG/DTG, (b) DTA and in air atmosphere (c) TG/DTG in air atmosphere (flow rate: 50 mL min⁻¹) and heating rate 10 °C min⁻¹, in open α-alumina sample holder with mass of 6.89 mg and 6.76 mg, respectively.

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