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Metal salts of ascorbic acid and their stability at stress conditions

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L-Ascorbic acid, commonly referred to as Vitamin C, is a water-soluble molecule renowned for its remarkable antioxidant properties[1]. In this form it is susceptible to physico-chemical changes caused by a change in temperature, moisture, light and oxygen[2], and can often easily form metal ascorbate salts[3]. Among these salts, magnesium, sodium, and calcium ascorbate are particularly renowned and extensively employed within the cosmetic, food, and pharmaceutical industries due to their potent antioxidant characteristics[1].

The present study aims to investigate the stability of magnesium and sodium salts of ascorbic acid, along with binary mixtures of ascorbic acid and excipients containing magnesium, calcium, and sodium. Under stress conditions (25 °C/60 % RH and 40 °C/75 % RH), noticeable visual changes manifested across all samples, characterized by darker hues. Notably, the magnesium ascorbate sample exhibited complete decomposition after 30 days. FT-IR analyses unveiled broadening of vibrational bands, as well as the emergence of new vibrational bands, potentially indicative of the decomposition of the ascorbate salts. Furthermore, DSC profiles displayed distinct deviations, such as the loss of the melting endotherm or a downward shift in the melting endotherm temperature.

Keywords: ascorbic acid, ascorbate salts, solid-state analysis, FT-IR, DSC

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