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**Physicochemical characterization of the inclusion compounds of eugenol and  $\beta$ -caryophyllene in  $\beta$ -cyclodextrin**

**ABSTRACT.** The present work was carried out to encapsulate the essential oil (EO) constituents (i.e., eugenol and  $\beta$ -caryophyllene) inside  $\beta$ -cyclodextrin. Encapsulates were subjected to physicochemical characterization. Absorption  $\lambda_{\max}$  for eugenol and  $\beta$ -caryophyllene were observed at 280 nm and 230 nm, respectively. Scanning electron microscopy (SEM) analysis of encapsulates revealed rough surfaces, cracks and sharp edges; the particles were in the micrometre size range and are, therefore, referred to as microparticles. Characteristic peaks of eugenol were recorded at 3516  $\text{cm}^{-1}$  (OH), 2842–3000  $\text{cm}^{-1}$  (C-H stretching) and 1511  $\text{cm}^{-1}$ , 1611  $\text{cm}^{-1}$  and 1638  $\text{cm}^{-1}$  (C=C aromatic ring) via Fourier transform infrared (FTIR) spectroscopy. The FTIR spectrum of  $\beta$ -caryophyllene showed peculiar bands at 3067–2856  $\text{cm}^{-1}$  and 1671–885  $\text{cm}^{-1}$ . Thermogravimetric analysis (TGA) data showed complete weight loss for eugenol and  $\beta$ -caryophyllene in the range of 30–215  $^{\circ}\text{C}$ . In contrast, encapsulated eugenol and  $\beta$ -caryophyllene showed weight loss in the range of 300–580  $^{\circ}\text{C}$ .

**Keywords:** encapsulation, eugenol,  $\beta$ -caryophyllene, FTIR, SEM, TGA

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