

# INVESTIGATION OF INTERACTIONS BETWEEN CHITOSAN AND CAFFEOYLQUINIC ACID DERIVATIVES OF GREEN COFFEE BEAN EXTRACT

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Polyphenols are abundant secondary metabolites in plants and are known to prevent diseases associated with oxidative stress and its related complications. Chlorogenic acid is the main phenolic compound in green coffee bean extract (GCBE) (approximately 60%). It can exist in the form of three different isomers, namely, i.e. 3-*O*-caffeoylquinic acid, 5-*O*-caffeoylquinic acid and 4-*O*-caffeoylquinic acid [1, 2]. The effectiveness of caffeoylquinic acid derivatives (CQ) depends on preserving their stability, bioactivity and bioavailability. One of the ways to protect those anionic phenolics could be their immobilization on cationic polymers such as chitosan (ChS).

In the present study, the formation of water insoluble complexes between ChS and phenolic compounds such as CQ, present in the green coffee bean extract (GCBE) has been investigated and the adsorption of GCBE on ChS has been studied. The Langmuir adsorption model has been used to describe the equilibrium adsorption of GCBE components from the initial aqueous solution on ChS at different temperatures (Fig. 1a).

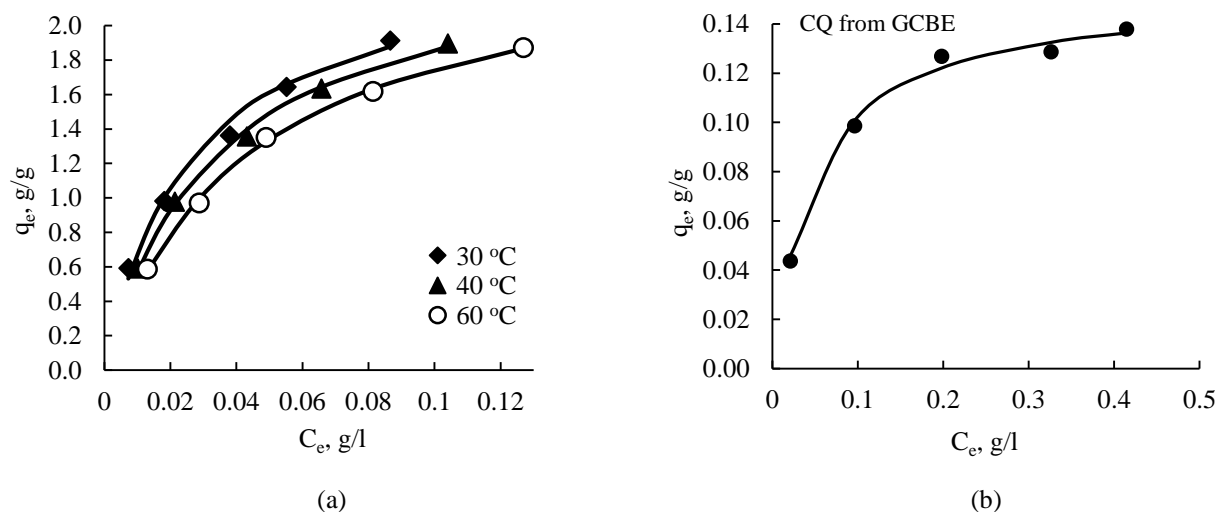


Fig. 1. Adsorption isotherms of: (a) – GCBE on ChS at different temperatures, (b) – CQ adsorbed from GCBE on ChS at temperature of 30 °C. Symbols represent experimental data and lines represent fitted curves of the Langmuir adsorption model.

The UPLC and HPLC procedures were used to determine the composition of GCBE as well as to estimate the amounts of CQ adsorbed on ChS (Fig. 1b). The chromatographic analysis results clearly proved that not only CQ, but also various other phenolic compounds were adsorbed on ChS.

The antioxidant activity of the formed GCBE/ChS complexes was studied. It was demonstrated that the immobilization of active components of the natural extract effectively prevented the rapid loss of antioxidant activity over the time.

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[2] N. Nakatani, S.I. Kayano, H. Kikuzaki, K. Sumino, K. Katagiri, T. Mitani, Identification, quantitative determination, and antioxidative activities of chlorogenic acid isomers in prune (*Prunus domestica L.*), *Journal of Agricultural and Food Chemistry* **48** 5512-5516 (2000).