

# Adsorption removal of anthocyanins from red cabbage extracts by bentonite: statistical analysis of main and interaction effects

L.M. Soldatkina, V.O. Novotna

*Odessa I.I. Mechnikov National University,  
2 Dvoryanskaya Str., Odessa 65082, Ukraine,  
soldatkina@onu.edu.ua*

During the last years, numerous studies about biological activities of anthocyanins have been published. Red cabbage has high anthocyanin content. In comparison to other common plants (berries, fruits, and vegetables) rich in anthocyanins this vegetable can be to become the very cheap source of anthocyanins, because it yields quickly and its cultivation, harvest, and storage are not difficult.

Adsorption is an efficient method that achieves the high yield of anthocyanins from plant extracts while preserving the biological activity and colour of anthocyanin molecules.

The aim of current study is to establish how contact time ( $\tau$ ), temperature ( $t$ ), initial anthocyanin concentration ( $C$ ), adsorbent mass ( $m$ ) ultimately affected on anthocyanin removal efficiency from red cabbage extracts by bentonite. A factorial design  $2^4$  was used to analyze main and interaction effects of the factors on anthocyanin removal.

Anthocyanin extract of red cabbage leaves was prepared by maceration using 0.1 M HCl. The adsorbent was bentonite from Dashukovsky deposit (Ukraine).

Studies have shown that the factorial design analysis is an important tool and can be used in order to obtain a mathematical model to predict the adsorption removal of anthocyanins from red cabbage extracts. It was determined that all investigated factors and their interactions affect the efficiency of adsorption removal of anthocyanins from red cabbage extract. In this study, we obtained the mathematical model that defines the connection between the removal efficiency of anthocyanins from red cabbage extracts and four control factors. The model can be used for prediction of the adsorption removal of anthocyanins considering optimal conditions of adsorption.

It was concluded the time and adsorbent mass have positive influence whereas initial anthocyanin concentration and temperature have the negative influence on the adsorption removal of red cabbage anthocyanins. Interactions effects are essential for 2-way interactions  $\tau t$  and 3-way interactions  $\tau Cm$  and  $tCm$  that have the negative influence on the anthocyanin adsorption from red cabbage extract on bentonite.