The Study of Hemoglobin – Tannic Acid Interactions by Fluorescence Spectroscopy Method

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At the present fluorescence quenching has become a popular tool to study various aspects of ligand binding. Polyphenols have received much attention because of their potential health benefits, especially for antioxidant properties. These antioxidant properties on plants due to the fact, that polyphenols inhibit the growth of certain micro-organisms which are harmful for plants. On the human organism before describing the antioxidant properties of polyphenols, it is necessary to study transport of polyphenols by carrier proteins.

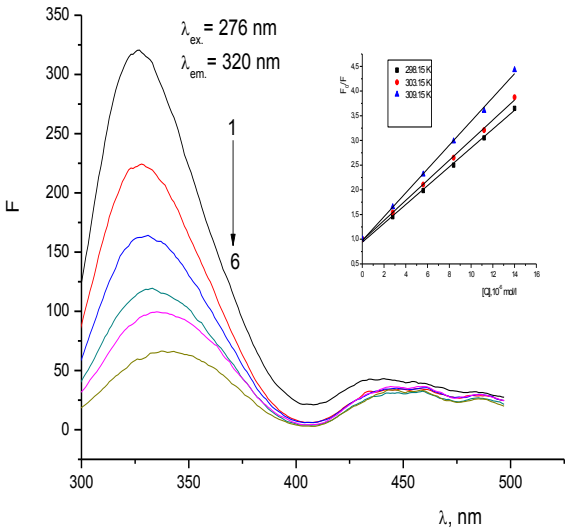

Fig. The fluorescence quenching spectra of Hb-TA. $C_{Hb,}$ $4x10^{-6}$ M; $C_{TA,}$ 10^{-6} – 10^{-5} M. T=298.15-309.15 K

We present the results of fluorescence spectroscopy studies on the transport protein-hemoglobin (Hb) and antioxidant polyphenol compound - tannic acid (TA) interactions in 298.15 – 309.15K temperature range. The quenching of Hb fluorescence by TA is presented in Fig. Quenching temperature dependence agreement with Stern-Volmer equation and UV/vis studies indicate that essentially the observed quenching is a dynamic process. The physicochemical and thermodynamic parameters of Hb – TA binding are summarized in Table.

Table. Binding and thermodynamic parameters of Hb-TA interaction.

T, K	K_{SV}, 10^5, $l \cdot mol^{-1}$	K_b, 10^4, $l \cdot mol^{-1}$	E_a, $kJ \cdot mol^{-1}$	ΔH, $kJ \cdot mol^{-1}$	ΔS, $J \cdot mol^{-1} \cdot K^{-1}$	ΔG, $kJ \cdot mol^{-1}$	n
298.15	1.906	1.62	19.39	121.81	489.523	-24.144	1.32
303.15	2.015	6.02				-26.592	1.21
309.15	2.414	9.27				-29.529	1.22

Data presented in the table show, that the interaction between Hb and TA is spontaneous, and hydrophobic force plays a major role in stabilizing the complex.