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Abstract

Poster

Major: Forensic Chemistry

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Charge Transfer Complex Formed Between Antioxidants and Tetracyanoethylene

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Antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals. Free radical damage leads to a wide variety of conditions, including cardiovascular disease, cancer, neurodegenerative diseases, and aging. Antioxidants work by becoming oxidized themselves before other things become oxidized. Naturally occurring antioxidants include vitamin A, vitamin C, vitamin E, beta carotene and some sulfur and selenium-containing compounds. Synthetic antioxidants include butylated hydroxytoluene and butylated hydroxyanisole.

In this project we are going to study the interaction between tetracyanoethylene (TCNE) and some of the aforementioned naturally occurring and synthetic antioxidants. A charge-transfer complex (CT complex) is expected to form between TCNE and the antioxidant.

A CT complex is also called an electron-donor-acceptor complex. This describes an association of two or more molecules held together through electrostatic attractions. One of them is electron rich and has at least partial negative charge, acting as the electron donor, and the partner is electron deficient and has partial positive charge, acting as the electron acceptor. In some cases, the degree of charge transfer is "complete," such that the CT complex can be classified as a salt. In other cases, the charge-transfer association is weak, and the interaction can be disrupted easily by polar solvents.

The antioxidants will be acting as electron donors to react with TCNE which is commercially available. TCNE is highly electron deficient and therefore can act as a very good electron acceptor. The CT complex will be formed between them and be evaluated by observation of the color change, measuring the maximum wavelength absorption using UV-vis spectroscopy and NMR spectroscopy.