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The Use of Polyphenolic Compounds as Green Ligand for Spectrophotometric  
Determination of Iron in Water Samples

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Polyphenolic compounds (PCs) has been known as effective antioxidants in biological systems and also due to the fact that they are capable of supplying specific chelators, which are capable of binding to iron, thus greatly reducing its bioavailability. The antioxidant effect which polyphenolic compounds provide arises partly from the specificity of their interaction with iron (III) [1]. In this work, PC were extracted from green tea using ethanol and then the UV-Vis spectroscopy was used to confirm the complexation between iron(III) and PCs. The absorbance PCs solution at wavelengths of 362 and 424 nm was decreased by addition of Fe(III) ions into the solution and also the formation of a well defined isobestic point at 460 nm indicating the presence of one absorbing complex compound. Plot of  $1/dA$  versus  $1/C_{Fe}$  is linear and interaction constant can be estimated from the ratio of the intercept to the slope. The obtained interaction constant ( $K_{Fe}(PCs) = 3.9 \times 10^4$ ) clearly shows a strong interaction. Due to the specific interaction of PCs with Fe(III) ions a simple and green spectrophotometric method was developed for selective determination of Fe(III) ions in water samples. The effects of pH, temperature, amount of PCs and effect of interfering ions were investigated. Under optimal conditions, the proposed method has a good linear range ( $0.1-10.0 \text{ mg L}^{-1}$ ,  $r^2 = 0.990$ ) with low detection limit ( $0.09 \text{ mg L}^{-1}$ ).

**Reference:**

[1] P. Ryan, M. J. Hynes, *J. Inorg. Sci.* 101 (2007) 585.