

Binary-Ternary coordination complexes of flavonoids and trivalent metal ions. Design, synthesis and characterization.

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Flavonoids, found in various consumables, like fruit and vegetables, are a group of natural substances with variable polyphenolic structures.¹ In the pharmaceutical field, flavonoids are believed to have antitumor, antioxidant, antimicrobial, neuroprotective, and cardioprotective properties^{2,3} It is believed that complexation of metal ions with flavonoids may provide new metallodrugs with better clinical profiles and pharmacological activities than parent flavonoids. In fact, such complexes have shown enhanced anticancer and antioxidant activities compared to parent flavonoids. In that context, trivalent metal ions, such as Cr(III), Ga(III), and lanthanides Nd(III), Sm(III), Dy(III), and Er(III), tend to form coordination bonds with oxygen and nitrogen atoms, anchors often encountered in natural donors-ligands much like those in flavonoids. Chrysin and quercetin, two well-known flavonoids, and a few of their derivatives are poised to coordinate with metal ions. In that respect, research was launched in our Lab to probe into the interaction(s) between metal ions and flavonoids, in the presence of aromatic chelators 1,10-phenanthroline and 2,2'-bipyridine. The so arisen binary-ternary products were analyzed physicochemically using elemental analysis, Fourier-Transform Infrared Spectroscopy (FT-IR), and X-ray crystallography. Their electronic properties were studied through UV-Visible and Luminescence spectroscopy. The basic factors probed into included the a) molecular stoichiometry between reagents, b) solvents or mixtures thereof, c) reaction methodology, and d) isolation techniques of the products in crystalline form so that X-ray characterization of their structure may be feasible. Analysis of the data, collected in the Lab, shows that under specific conditions, well-defined crystalline materials emerge from binary and ternary systems, the physicochemical profile of which warrants further perusal into their biology in human physiology and disease.

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