

Iron complexes of quercetin in aprotic medium. Redox chemistry and interaction with superoxide anion radical

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Abstract

The redox chemistry of quercetin (Qz) and its iron(II) complexes has been studied in dimethylsulfoxide. In the absence of base an Fe(II):Qz=1:1 complex is formed which presents oxidation processes at 0.28 V vs. S.C.E.; 0.66 V vs. S.C.E. and 0.92 V vs. S.C.E. These processes correspond to the oxidation of Fe(II) to Fe(III), the formation of the quinonic form of the catecholic moiety and the oxidation of the catecholic system regenerated after conjugated addition of an oxygen atom to carbon 6' on ring B. In the presence of base a stable 1:1 complex is formed with oxidation processes that show up at +0.25 V, +0.64 V and +0.88 V vs. S.C.E. Upon interaction of the complex with superoxide anion radical in dimethylsulfoxide the basic character of this radical anion causes the formation of the monoanion of quercetin leading to a more stable complex of iron(II). The protonated superoxide disproportionates to oxygen and peroxide oxidizing the metal ion to iron(III), precluding the presence of peroxide and iron(II) to produce OH radicals through Fenton chemistry.