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SELECTIVE CHELETORS TO COPPER (II): A THERMODYNAMIC APPROACH

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Copper, iron and manganese ions act as cofactors for essential enzymes. Although absolutely essential for biological activity, excess redox-active metal ions have been associated with severe neuro-degenerative diseases [1–4]. Copper ions are essential for biological function, however are severely damaging when present in excess as catalyze the production of hydroxyl radicals that can irreversibly alter essential bio-molecules. Hence, selective copper chelators that can remove excess copper ions and alleviate oxidative stress will help assuage copper-overload diseases. Most currently available chelators are non-specific leading to multiple undesirable side-effects. The objective of this study was to verify the possibility of selectively chelate Cu(II) by using curcumin as ligand. Curcumin (HCur, 1,7-bis-(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione) is a neutral yellow-orange colorant with a wide variety of pharmacological properties, such as anticancer and antitumor activities [5]. In addition, curcumin is thought to have beneficial effects in disorder of the neurological system including Alzheimer's disease [6].
Following our previous studies on the complexation behaviour of biological ligands towards some bioavailable metal cations, here we present an experimental investigation (potentiometric measurements, ^{1}H-NMR and UV-Vis spectroscopy) to obtain thermodynamic and structural properties in aqueous solution of the system whose general equilibrium can be written as follows:

$$p\,Cu^{2+} + q\,(OH)^{-} + r\,Cur^{-} \rightleftarrows Cu_p(OH)_q(Cur)_r^{(2p-q-r)} \qquad \beta_{pqr}$$

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