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Synthesis and characterization of some metal complexes containing the chromone moiety

A Thesis Submitted

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List of Abbreviations

Hep-G2	Human hepatocellular carcinoma
LD50	Lethal dose
TEM	Transition electron microscope
EAC	Ehrlich Ascites Carcinoma
MCF-7	Human breast cancer cell line
DPPH	2,2' Diphenyl-1-picrylhydrazyl
EDTA	Ethylene diamine tetraacetic acid
DMSO	Dimethylsulfoxide
TGA	Thermal gravimetric analysis
DrTGA	Derivative thermal gravimetric analysis
ΔS	Entropy change
ΔH	Enthalpy change
ΔG	Free energy change
8-HQ	8-Hydroxyquinoline
Phen	1,10-Phenanthroline
Bpy	2,2'-Bipyridyl
AcOH	Acetic acid
α	Weight loss
E_a	Heat of activation
TG	Thermogram
R	Universal gas constant ($8.3144 \text{ J mol}^{-1} \text{ K}^{-1}$)
A	Pre-exponential factor
Φ	Heating rate
r	Correlation coefficient
k	Boltzman's constant ($1.388 \times 10^{-23} \text{ J K}^{-1}$)

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Abstract

Reactions of 3-formylchromone with different salts of copper(II), nickel(II), cobalt(II), zinc(II) and cadmium(II) ions afforded binary complexes. Also, ternary complexes were synthesized by reaction of the ligand with these metal ions in the presence of secondary ligands: [8-hydroxyquinoline, 1,10-phenanthroline and 2,2'-bipyridyl]. The structures of the newly prepared complexes were identified by elemental analyses, IR, electronic, mass, $^1\text{H-NMR}$ and ESR spectra as well as molar conductivity, magnetic susceptibility measurements and thermal gravimetric analysis (TGA). The ligand acts as a neutral bidentate ligand and the metal complexes exhibited octahedral and square planar geometrical arrangements. The obtained complexes include neutral and cationic mononuclear complexes with different molar ratios; 1:3, 1:2 and 1:1; M:L for binary complexes and 1:2:1, 1:1:1 and 1:1:2; M:L:L' for ternary complexes. Kinetic parameters (E_a , A , ΔH , ΔS and ΔG) of the thermal decomposition stages have been evaluated using Coats–Redfern equations. The structural parameters of the ligand and its metal complexes have been calculated and correlated with the experimental data. The ligand and its metal complexes showed antibacterial activity towards Gram–positive bacteria, Gram–negative bacteria, yeast and fungus.