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Magnetic, spectral, thermal, electrical, and antimicrobial properties of 1:1 chelates derived from S and N donor ligands

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Metal chelates of Ni(II), Co(II), Zn(II), Mn(II), Hg(II), Cd(II) and dioxouranium(VI), with α-oximinoacetoacet-*o*/*p*-chloroanilide-β-thiosemicarbazone were synthesised. Elemental analyses of the metal chelates indicate 1:1 metal to ligand ratio. The diffuse reflectance spectra and magnetic moments suggest octahedral structure for Mn(II) and UO_2(II) metal chelates, square planar structure for Ni(II) metal chelates and tetrahedral structure for Co(II), Zn(II), Hg(II) and Cd(II) metal chelates. Infrared spectral studies show that the metals are coordinated through the nitrogen of oximino group and sulphur of thiosemicarbazone group. Thermal studies of metal-chelates have been carried out to determine their thermal stabilities and activation energies. The relative decreasing order of thermal stability is: OAOCATS > Zn > UO_2 > Ni > Mn > Cd > Hg > Co and OAPCATS > Zn > UO_2 > Mn > Ni > Hg > Cd > Co. The removal of water above 150°C in case of Mn(II) and UO_2(II) metal chelates indicate the presence of coordinated water molecules. Semiconducting behaviour of the ligand and its metal chelates was also studied by electrical conductivity measurements at different temperatures. The electrical conductivity at room temperature in the decreasing order is: OAOCATS > Ni > Zn > Co > Hg > Cd > UO_2 > Mn and OAPCATS > Zn > Ni > Co > Cd > Hg > UO_2 > Mn. The activation energy decreases in the order: Co > Zn > OAOCATS > UO_2 > Mn > Cd > Ni > Hg and OAPCATS > Ni > Co > UO_2 > Cd > Hg > Mn. Antimicrobial activities of ligand and its metal chelates were also studied for their effect on the growth of various microbial cultures.

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