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Synthesis, crystal structure and properties of tris(benzene-1.2-diamine-N,N′)-cadmium naphthalene-1,5-disulfonate trihydrate complex compound

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In this research work, for the first time, tris(benzene-1.2-diamine-N,N′)-cadmium naphthalene-1,5-disulfonate trihydrate ([Cd(*OPD*)$_3$]1,5-NDS·3H_2O) complex has been synthesized. The molecular and crystal structures of the synthesized complex have been studied using the RTT method. In the crystal structure of the [Cd(*OPD*)$_3$]1,5-NDS·3H_2O complex, 3 OPD molecules are chelated to the central Cd(II) ion in the inner sphere. In the outer sphere, there are 1,5-NDS and 3 water molecules. The crystal structure of the complex compound is monoclinic, the spatial group is P21/c, and the spatial shape is distorted octahedral. In the crystal structure of the molecule, there are internal and intermolecular hydrogen bonds of the type O−H...O, N−H...O and C−H...O. For the first time, Hirshfeld surface analysis of this complex compound has been performed using the Crystal Explorer program. In this case, H...H (42%), O...H/H...O (32.6%) and H...N/N...H (23.5%) Van Der Waals forces in the molecule form the main interactions. Also, the physicochemical properties of this complex compound have been studied using IR-spectroscopic and thermal analysis. In the thermal analysis of the complex **2**, endothermic effects are observed, and mass reduction takes place in 4 stages.

Keywords: Complex, *o*-Phenylenediamine, X-ray structure analysis, Hirschfeld surface analysis, Thermal analysis