The grown crystals of composition made up by d-block metals (Cu, Ni, Fe) and p-dimethylaminobenzaldehyde and o-phenylenediamine ligand by Solvent Evaporation (SE) Method for Solid Crystal Growth or Flux Technique has been thoroughly investigated by the author using various techniques and characterizations. The size of crystals of Cu and Ni are smaller and nearly about 0.80 mm whereas size of crystal of Fe is nearly about 2.7 mm. In present investigation, IR spectroscopy, Reflectance spectroscopic, thermogravimetric analysis of the crystals was carried out. Activation energy and various thermal parameters such as ΔH, ΔG and ΔS also obtained in current research work. Racah parameter and Geometry of all the crystal from IR and Reflectance spectra carried out by author. Electrical and Magnetic characterization also studied by the author on the same crystal. As a part of chemical study, elemental analysis and molar conductivity carried out. Antibacterial assay studied as a part of biological characterization.