

MS14-1-2 Synthesis, crystal structure and physico-chemical studies of two new nickel complexes used as precursor for preparation of Ni/NiO nanoparticles

#MS14-1-2

M. Akouibaa ¹, N. Hamdi ¹, S. Chaouch ¹, A. Bouayad ¹, S. Rakib ¹, M. Lachkar ¹, B. El Bali ²

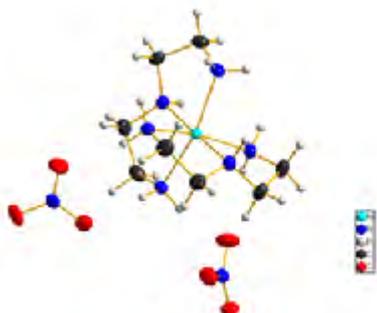
¹University Sidi Mohamed Ben Abdellah, Faculty of Sciences, Chemistry Department - Fez (Morocco),

²Independent Scientist - Oujda (Morocco)

Abstract

Two nickel complexes, namely, mer-[Ni(dien)₂](NO₃)₂ (I) and mer-[Ni(dien)₂]Cl₂·H₂O (II), have been synthesized under ambient conditions, where (dien = diethylenetriamine = bis(2-aminoethyl) amine and mer = meridional coordination). Their crystal and molecular structures have been determined by single-crystal X-ray diffraction methods. The complex (I) crystallizes in the orthorhombic system, space group, Pbc_a (no, 61), Z = 8, with a = 8.8117(6) Å, b = 14.0023(8) Å, c = 26.7603(17)Å, V = 3301.79 Å³ for (I), The complex (II) crystallizes in the monoclinic system, space group P2₁/c (no 14) a = 13.5000(4) Å, b = 8.7170(3) Å, c = 13.9430(4) Å, V = 1604.41 Å³ for (II). Meridional (mer) coordination promotes the generation of larger and lower-symmetry prismatic structures, in contrast with the facial (fac) coordination and higher-symmetry. For the complexes (I) and (II), the structures are formed by the cation [Ni(C₄H₁₃N₃)₂]²⁺, two nitrate anions for (I) and two chloride anions and water molecule for (II). The nickel (II) atom is coordinated to six nitrogen donors from two neutral dien ligands, adopting a slightly distorted octahedral geometry. The newly complexes were also characterized by Infrared, TGA-DTA analysis and UV-Vis spectroscopy. Vibrational analysis of the two complexes was realized by infrared spectroscopy, which confirmed the characteristic bands of diethylenetriamine and nitrate groups. The morphology and the size of the two nickel complexes were monitored by scanning electron microscopy (SEM). Moreover, the thermal behaviour of the complexes was investigated, and the calcination of the two complexes under air has led to the production of Ni/NiO nanoparticles.

ORTEP drawing of the asymmetric unit of mer-[Ni(di



ORTEP drawing of the asymmetric unit of mer-[Ni(di

