

**Spectroscopic Evidence for the pH Sensitivity, Anion Trapping and CO<sub>2</sub> Binding Properties of N, N'-ethylenebis (acetylacetoniminato) Nickel(II) hemihydrate Complex**

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N,N-ethylenebis (acetylacetoniminato) nickel (II) hemihydrate complex was synthesised using template synthesis and characterised using UV-visible spectroscopy, cyclic voltammetry and FT-IR techniques. CO<sub>2</sub> trapping capacity was studied with Vernier CO<sub>2</sub> gas sensor which is capable of measuring the transmitted amount of CO<sub>2</sub> (in ppm) from a sample within specific period of time (in seconds). The solid Ni(II) complex shows about 50% more CO<sub>2</sub> absorbance compared with the solid starting material Ni(CH<sub>3</sub>COO)<sub>2</sub>, at a level of  $1 \times 10^{-4}$  moles of each solid sample. Ni(II) complex in methanol shows bands between 200-900 nm with the extinction coefficients ranging from  $1.84 \times 10^4 \text{ M}^{-1}\text{cm}^{-1}$  to  $104 \text{ M}^{-1}\text{cm}^{-1}$ . The band at 267 nm shows a red shift with the addition of 0.05 M HCl acid and disappears with the addition of 0.05 M NaOH. With continuous addition of acid and the base, an intensity decrease was observed for the band at 235 nm while an intensity increase was observed for the band at 307 nm giving isobestic points at 278 nm and 339 nm. This is observed when a chromophoric precursor is quantitatively converted into a single product.

When comparing the FT-IR spectra of Ni(II) solid samples, the sample exposed to CO<sub>2</sub> for 5 hours shows a new band which arises around  $2900 \text{ cm}^{-1}$ . Though the interpretation of this mode is not that straightforward, it may be due to the vibrational changes of the CO<sub>2</sub> molecule, after association with the Ni(II) complex.

Cyclic Voltammetric studies were carried out to reveal the catalytic activity of Ni(II) complex towards CO<sub>2</sub>. Under N<sub>2</sub> atmosphere CV of the Ni(II) complex showed a reversible band corresponding to Ni(II)/Ni(I) redox couple. When the DMF solution of the complex is saturated with CO<sub>2</sub>, the current intensity of the oxidation peak disappeared with increasing current intensity of the reduction band. The reappearance of the original reversible redox band corresponding to Ni(II)/Ni(I) redox couple by passing N<sub>2</sub> may be indicative of its catalytic activity towards CO<sub>2</sub>.