

### Electronic Supplementary Information

#### Zeolite Encapsulated Ni(II) and Cu(II) Complexes with Tetradentate N<sub>2</sub>O<sub>2</sub> Schiff Base Ligand: Catalytic Activity Towards Oxidation of Benzhydrol and Degradation of Rhodamine-B

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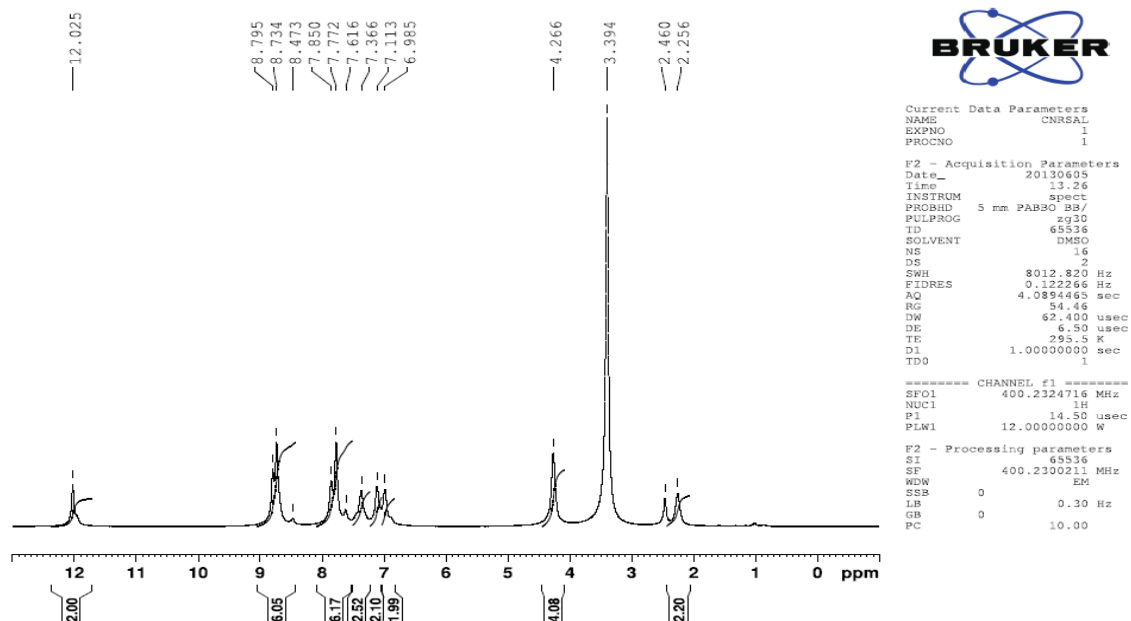


Figure .S1: <sup>1</sup>H spectra of H<sub>2</sub>L

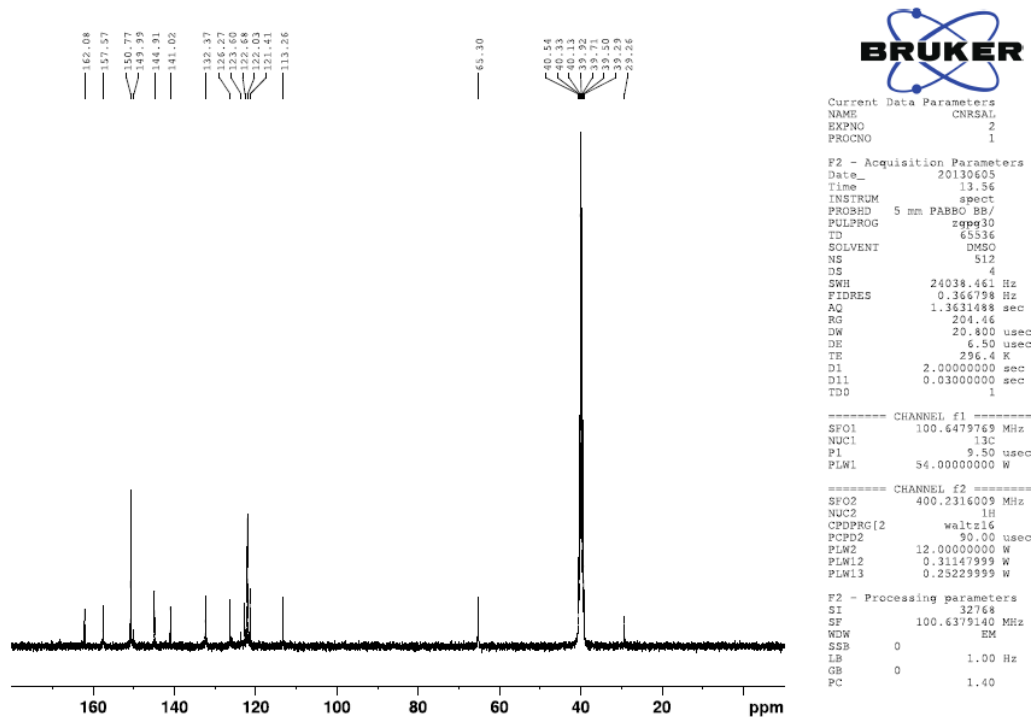


Figure .S2: <sup>13</sup>C-NMR spectra of H<sub>2</sub>L.

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R1

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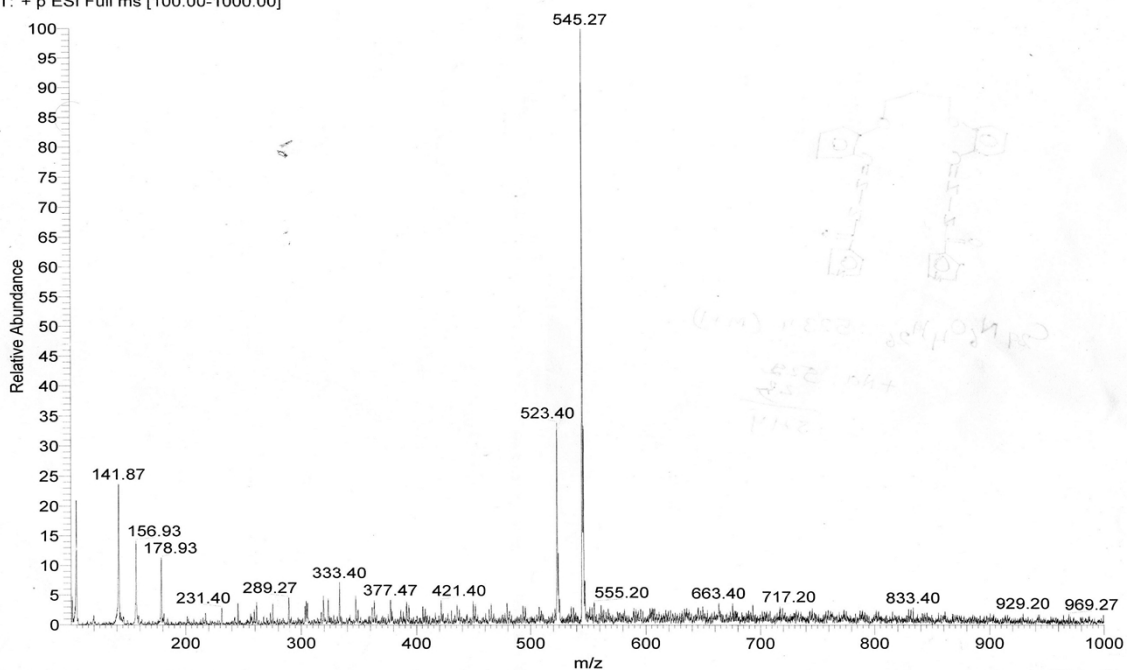


Figure S3:ESI-mass spectra of H<sub>2</sub>L

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CNR-NI

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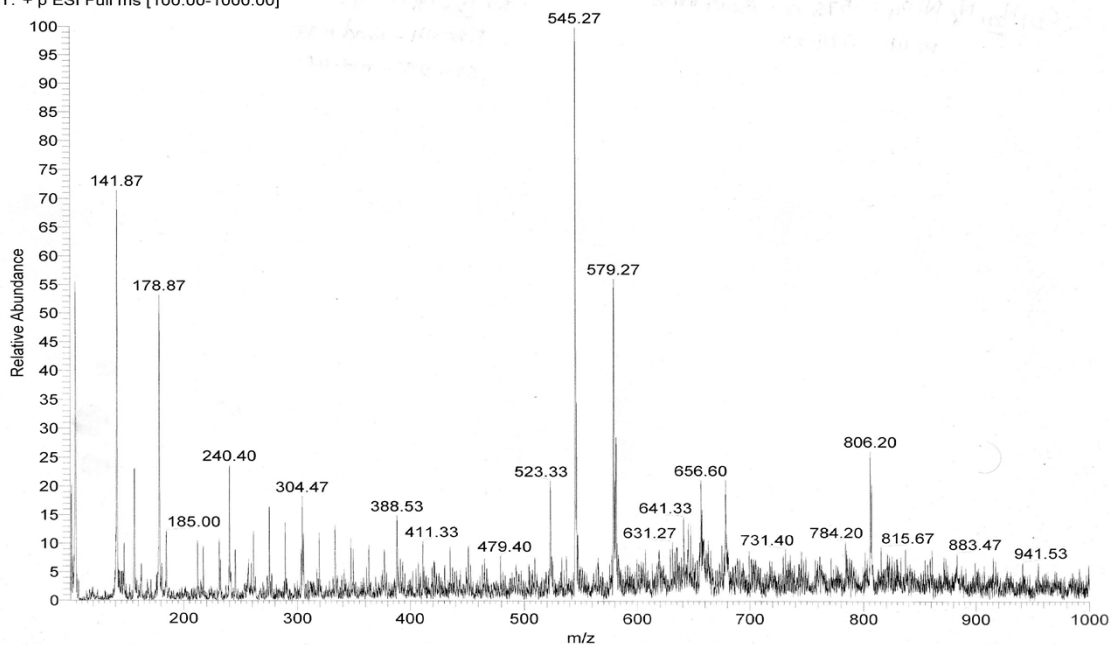


Figure S4:ESI-mass spectra of Ni(II)L.2ClO<sub>4</sub>

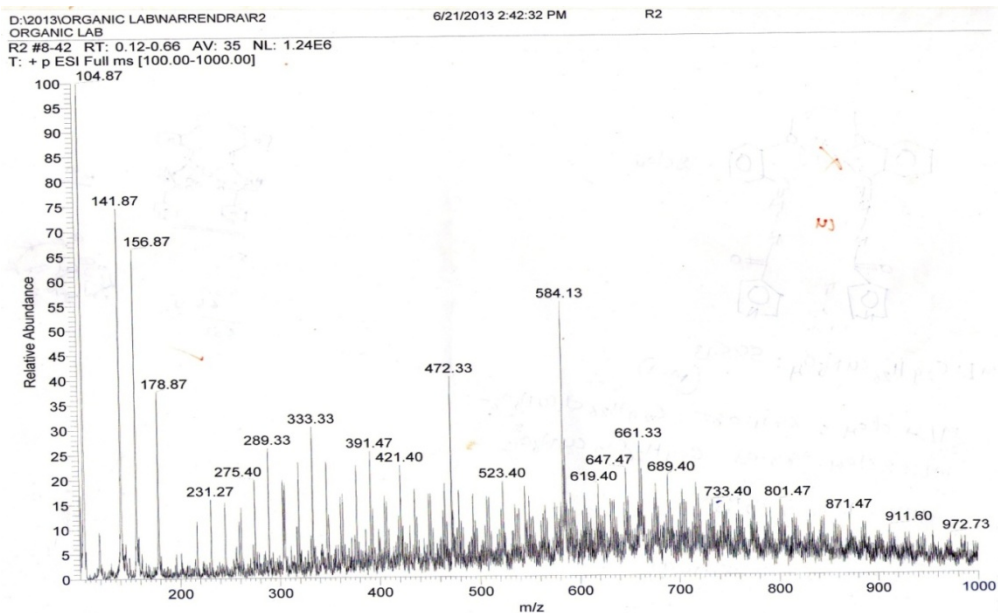


Figure S5: ESI-mass spectra of  $\text{Cu(II)L.2ClO}_4$

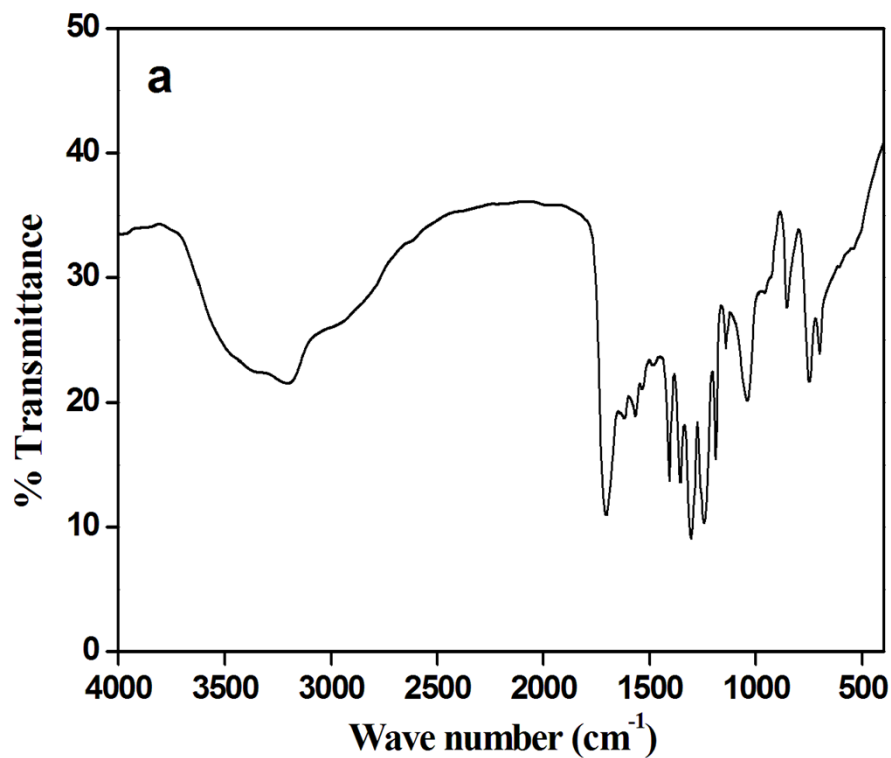


Figure S6: FTIR spectra of the SAL

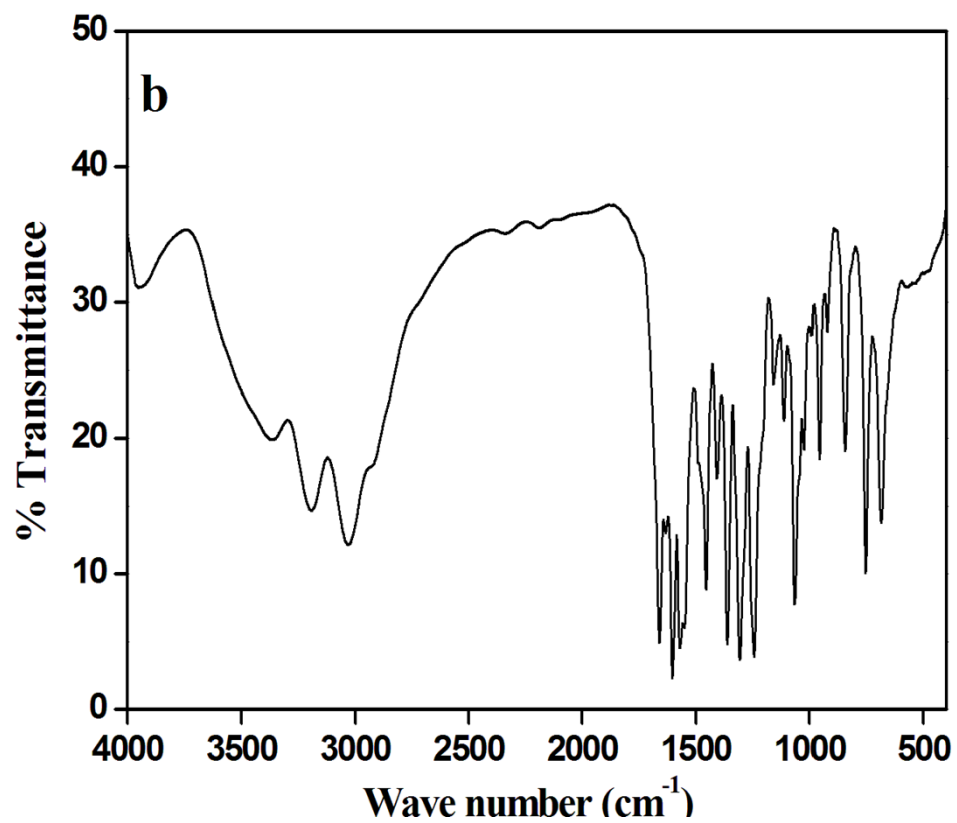


Figure S7: FTIR spectra of the H<sub>2</sub>L

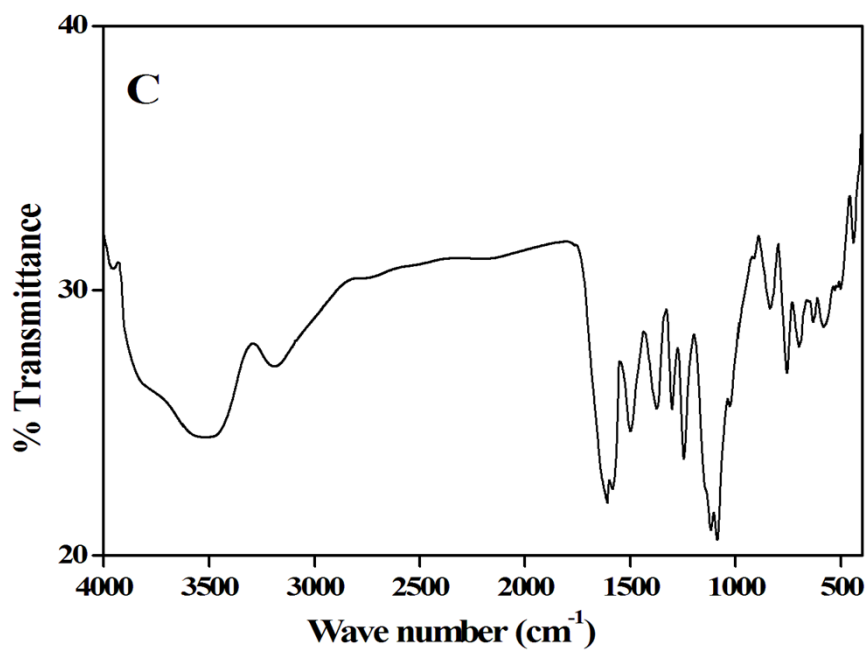


Figure S8: FTIR spectra of the Ni(II)L.2ClO<sub>4</sub>

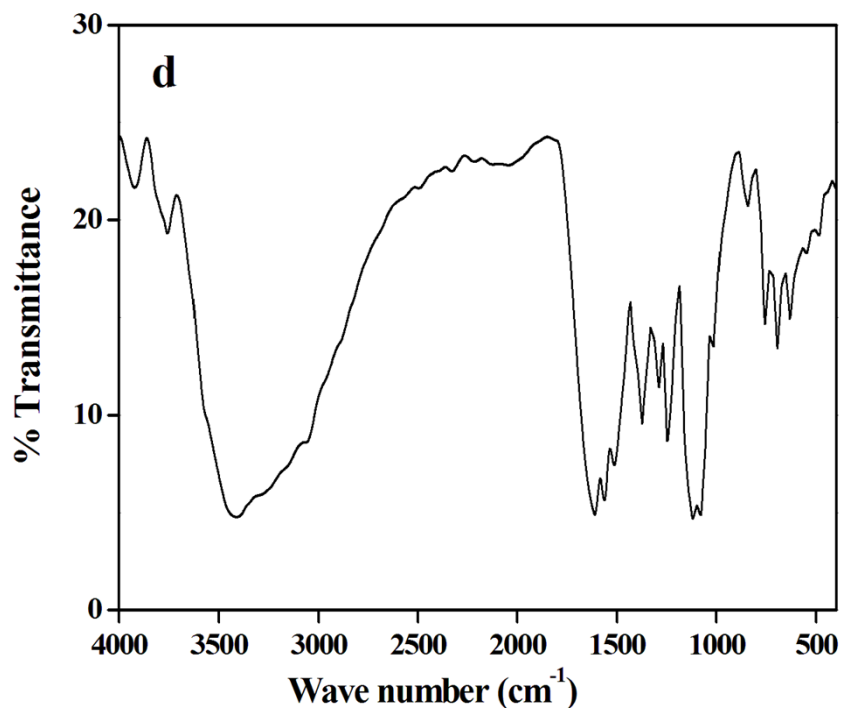


Figure S9: FTIR spectra of Cu(II)L.2ClO<sub>4</sub>

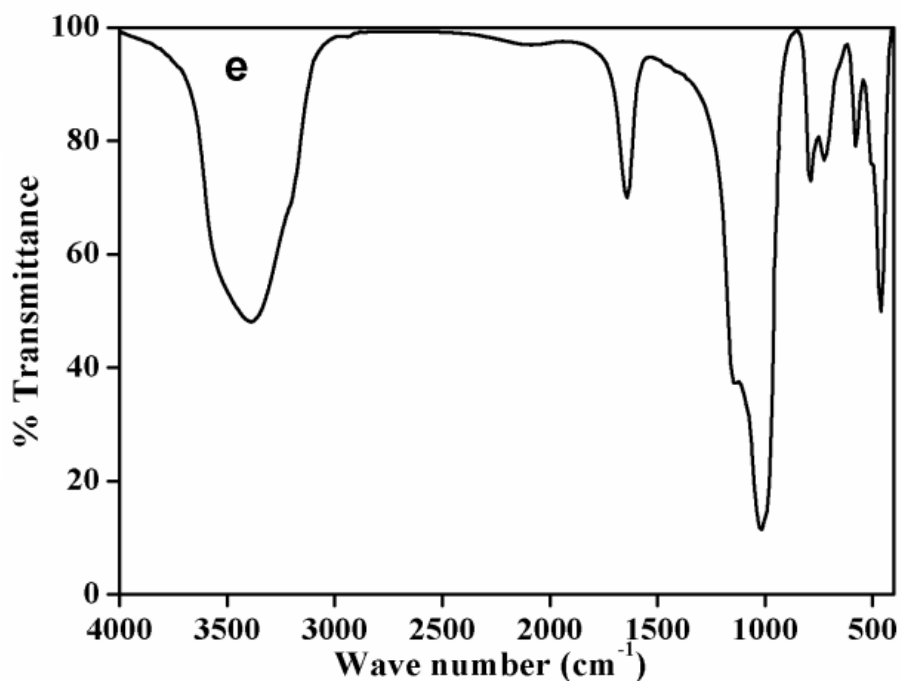


Figure S10: FTIR spectra of the Na-Y

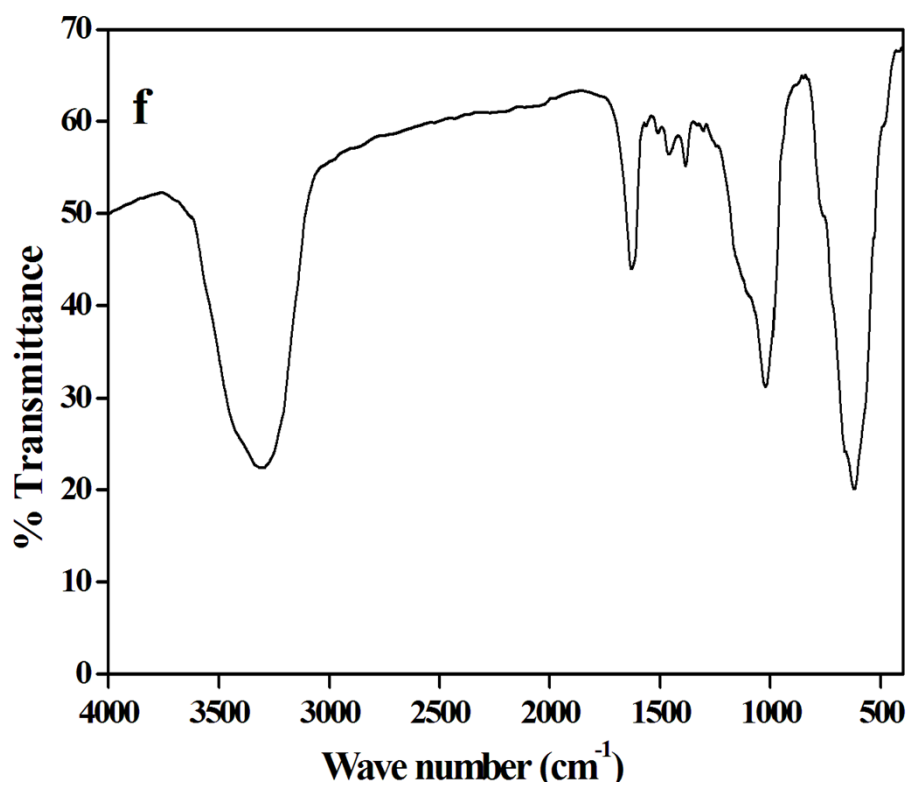


Figure S11: FTIR spectra of the Ni(II)L-Y

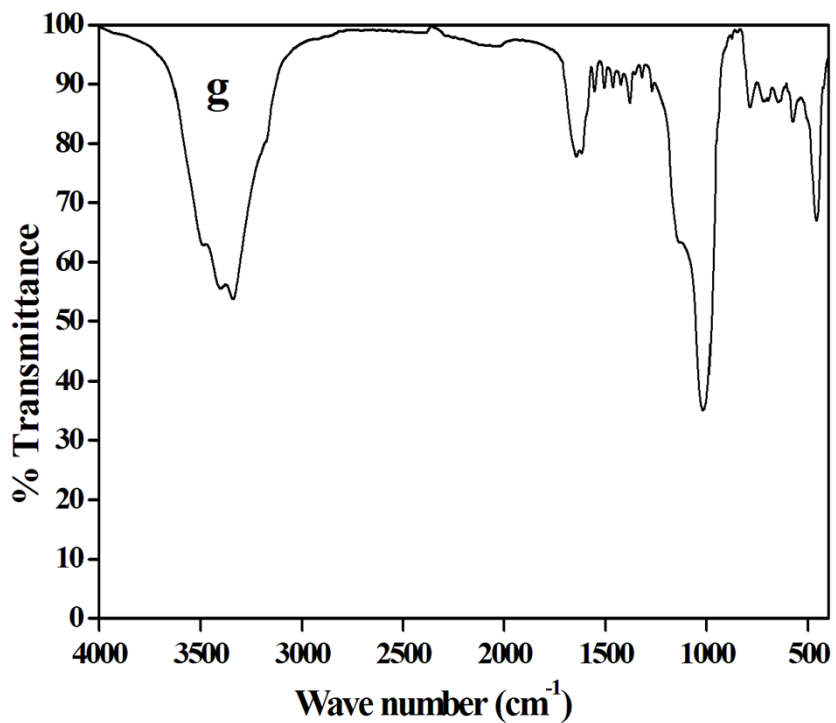
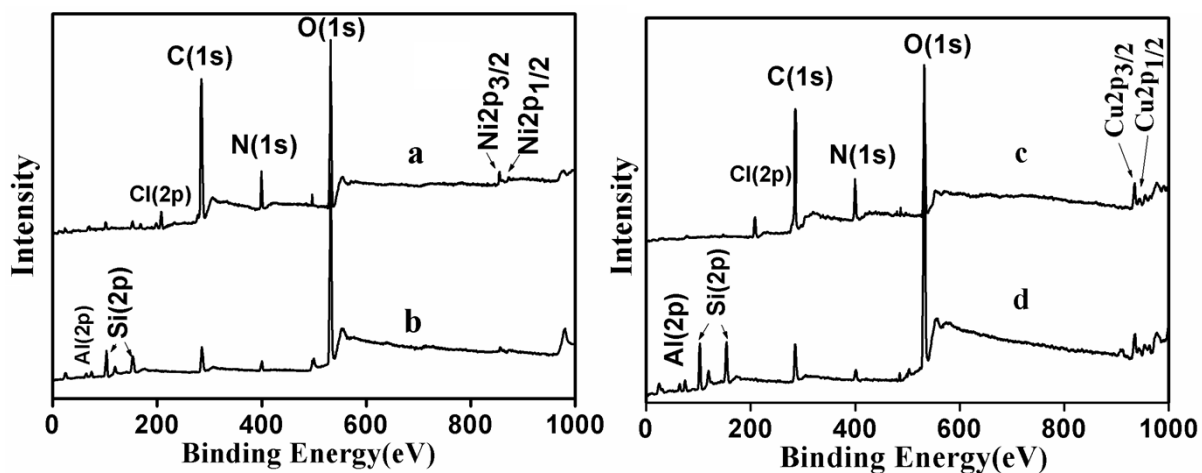
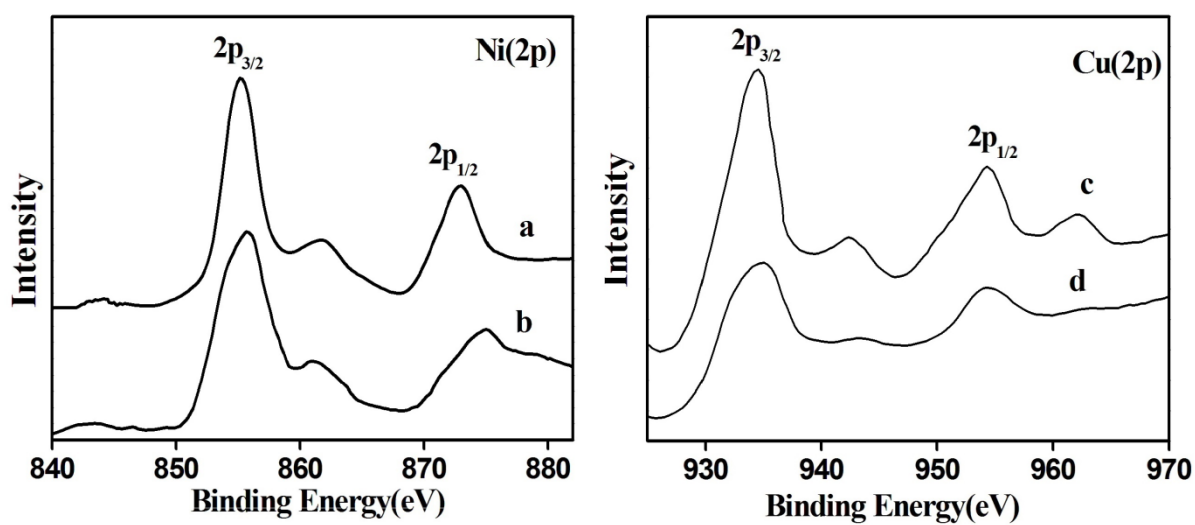


Figure S12: FTIR spectra of the Cu(II)L-Y

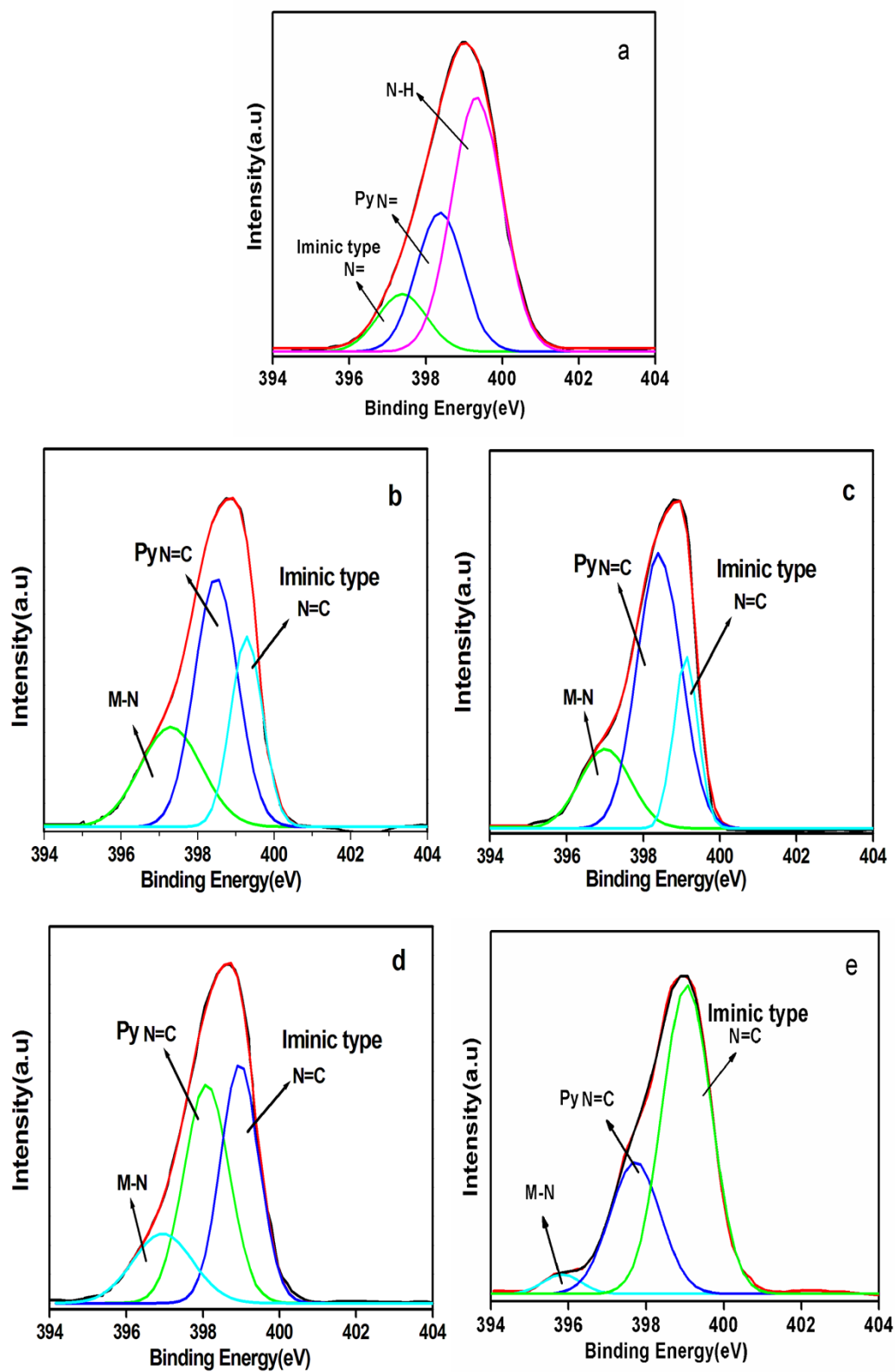




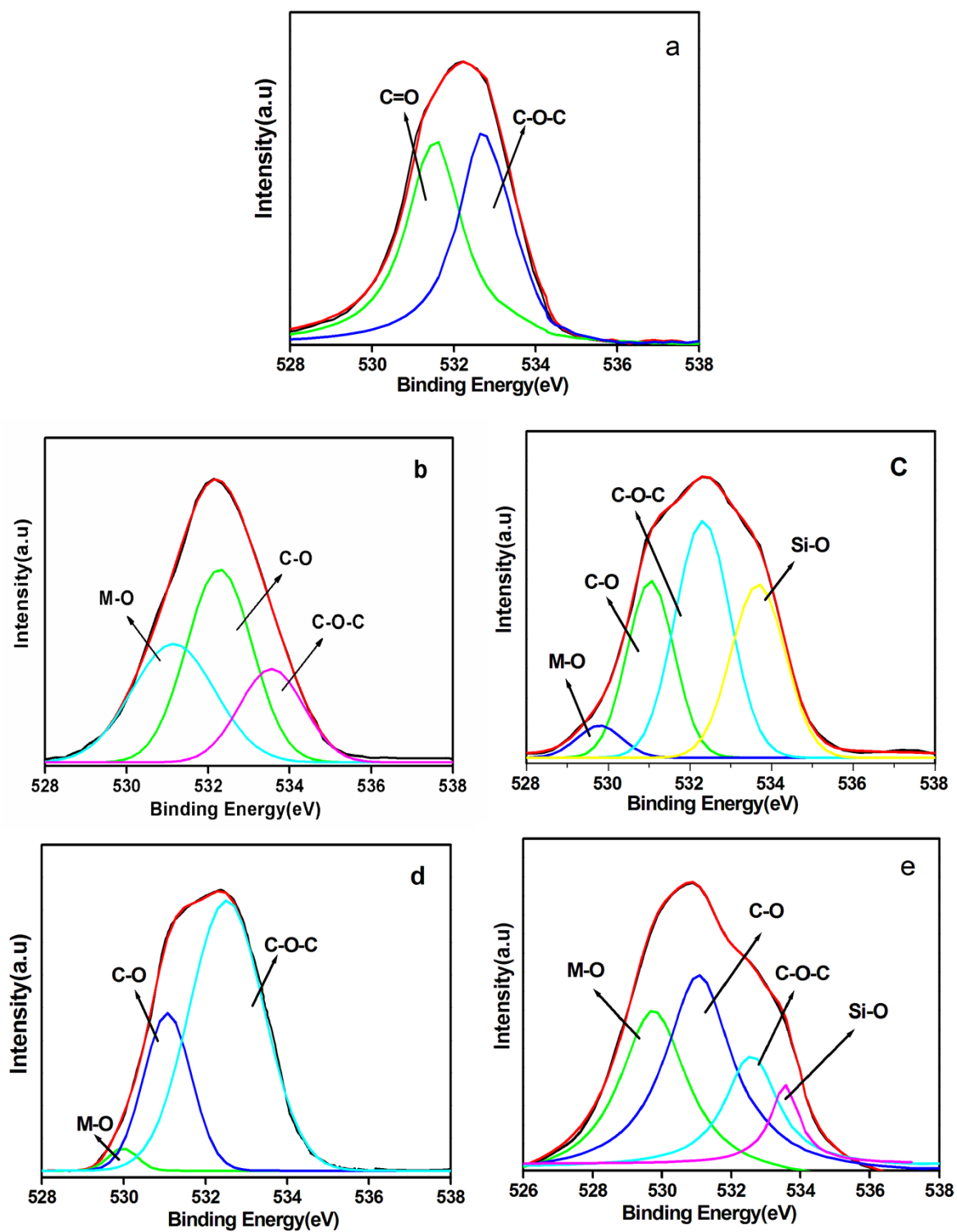
**Figure S13:(a-d):** XPS patterns (survey image) of the (a) Ni(II)L.2ClO<sub>4</sub> (b) Ni(II)L-Y (c) Cu(II)L.2ClO<sub>4</sub> and (d) Cu(II)L-Y



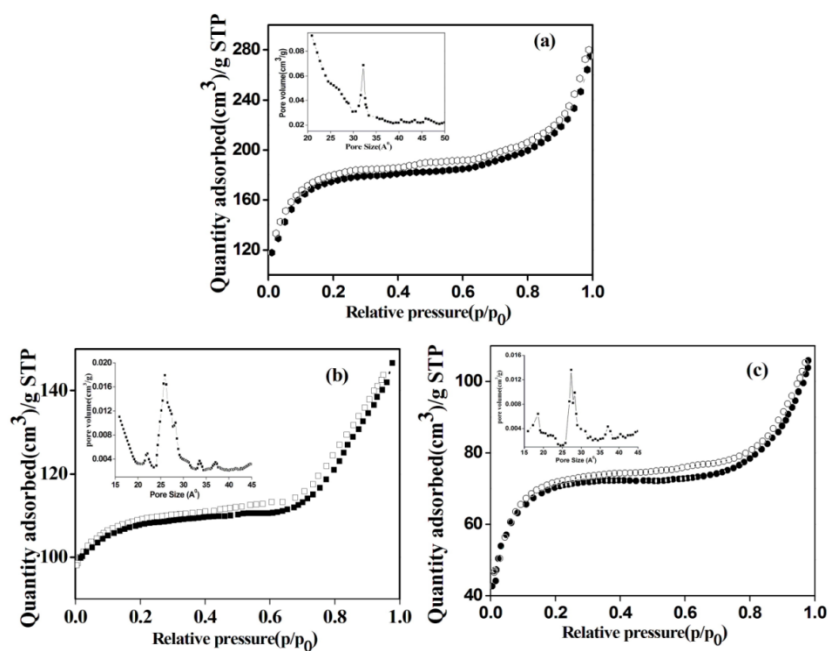
**Figure.S14(a-d):**M(II)(2P<sub>3/2</sub>) patterns of the (a) Ni(II)L.2ClO<sub>4</sub> (b) Ni(II)L-Y (c) Cu(II)L.2ClO<sub>4</sub> and (d) Cu(II)L-Y



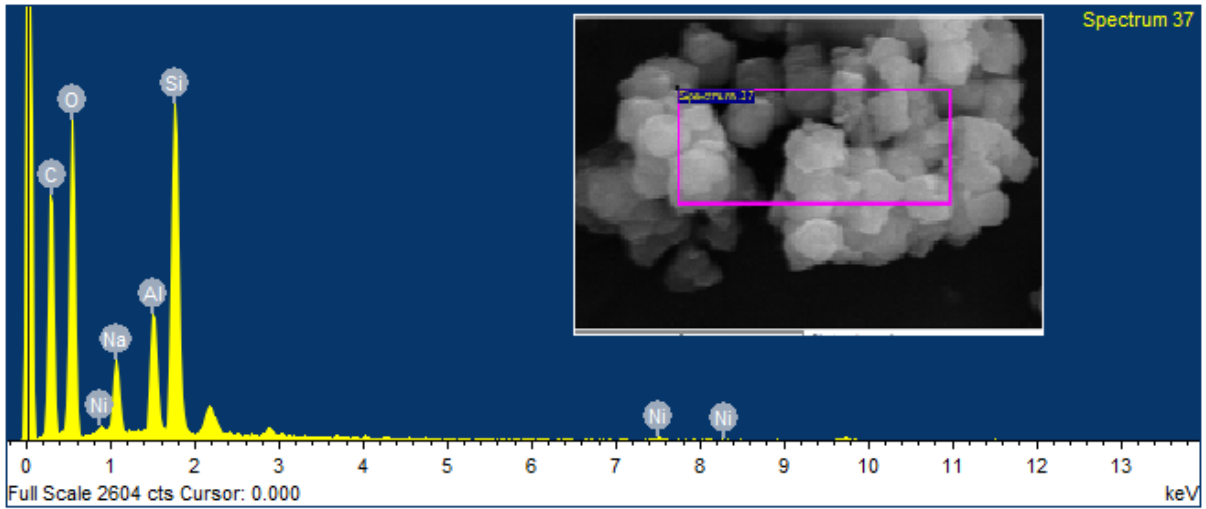
**Figure.S15(a-e):**Deconvoluted XPS of the N<sub>1s</sub> region for H<sub>2</sub>L, Ni(II)L.2CLO<sub>4</sub>, Cu(II)L.2CLO<sub>4</sub>, Ni(II)L-Y and Cu(II)L-Y.



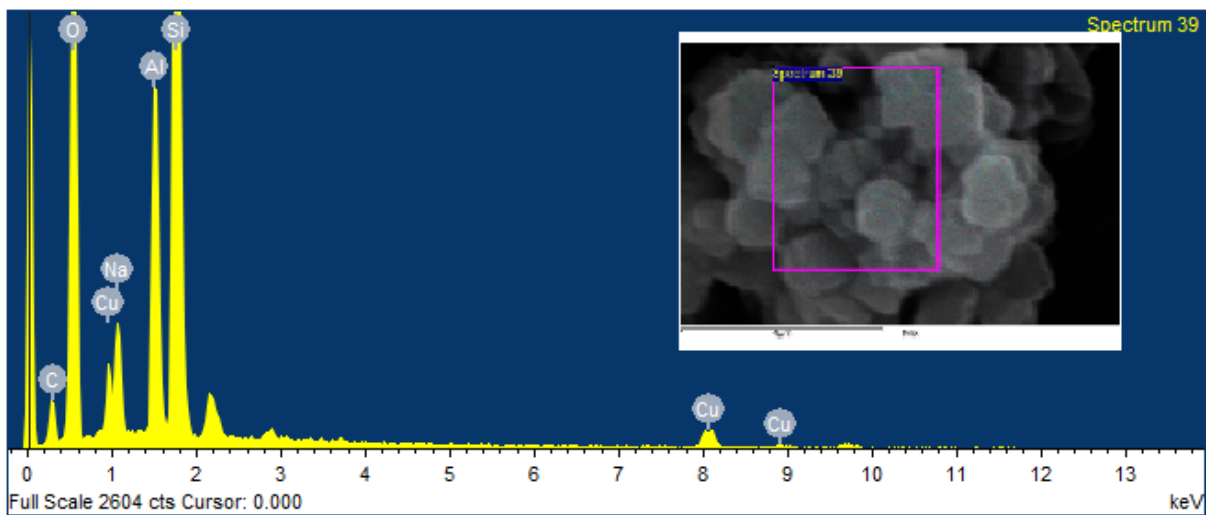
**Figure:S16(a-e)** Deconvoluted XPS of the O<sub>1s</sub> region for H<sub>2</sub>L, Ni(II)L.2CLO<sub>4</sub>, Cu(II)L.2CLO<sub>4</sub>, Ni(II)L-Y and Cu(II)L-Y.



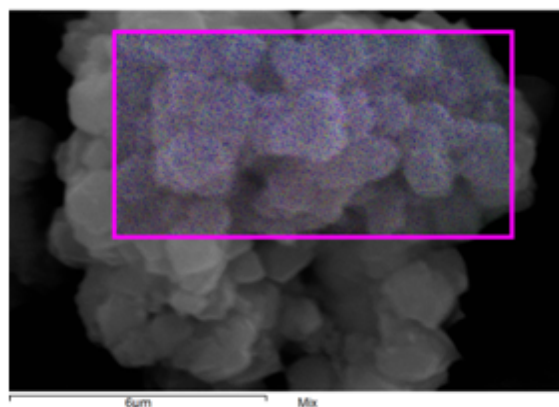
**Figure: S17(a-c)** N<sub>2</sub> isotherms of a) NaY, (b) Ni(II)L-Y and (c) Cu(II)L-Y (filled loops are absorption and unfilled loops are desorption)



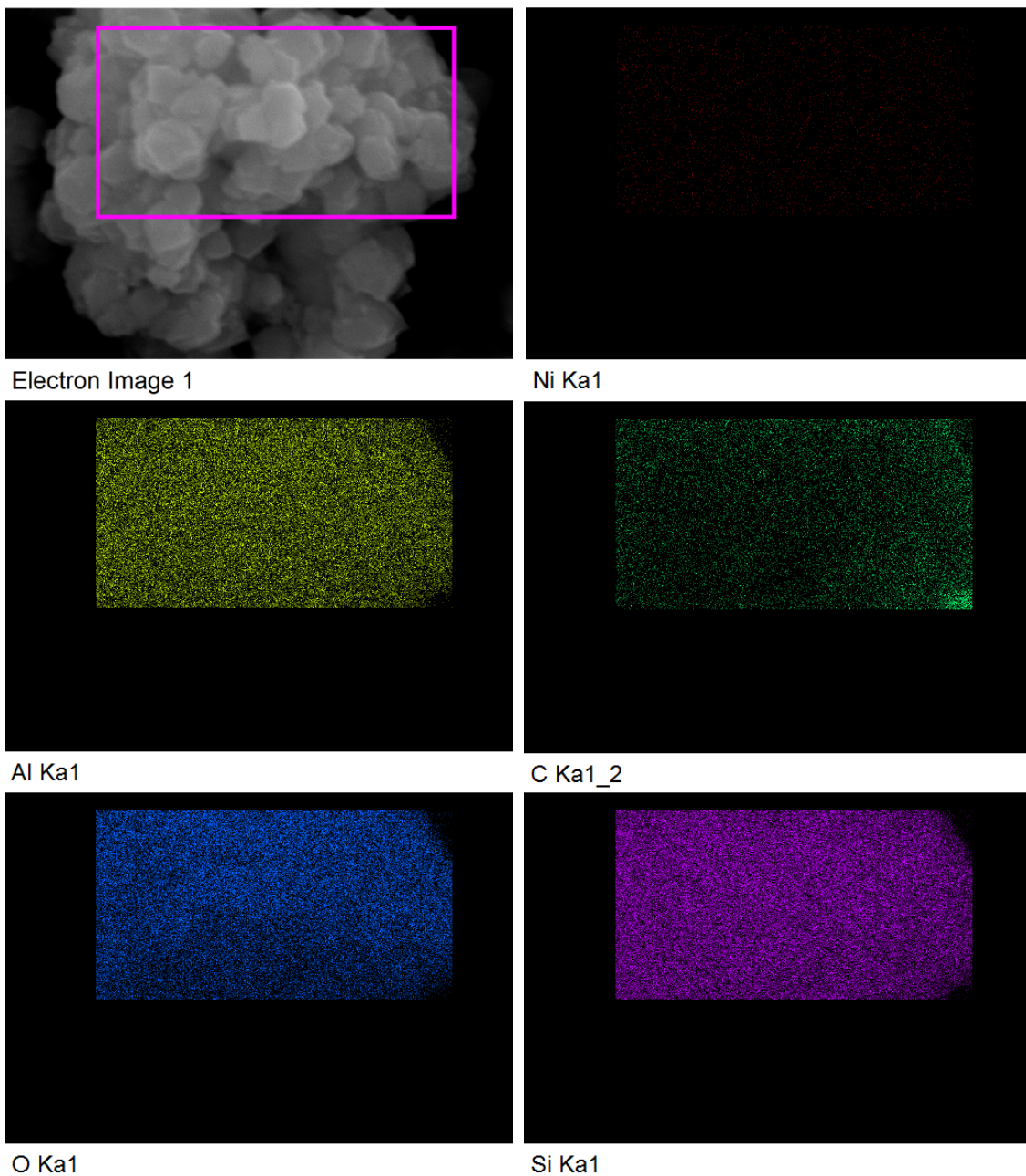
**Figure 18:** SEM-EDAX of the Ni(II)L-Y



**Figure 19:** SEM



**EDAX of the Cu(II)L-Y**



**Figure S20:**  
the Ni(II)L-Y

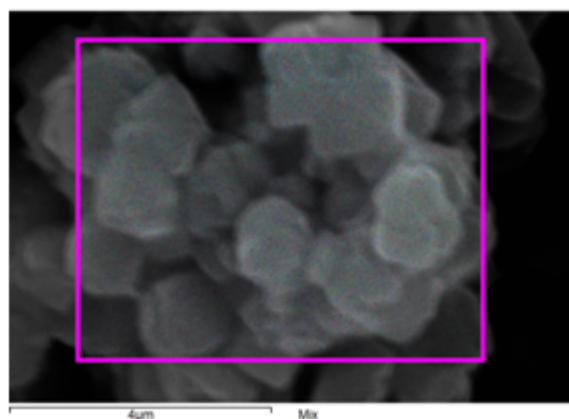
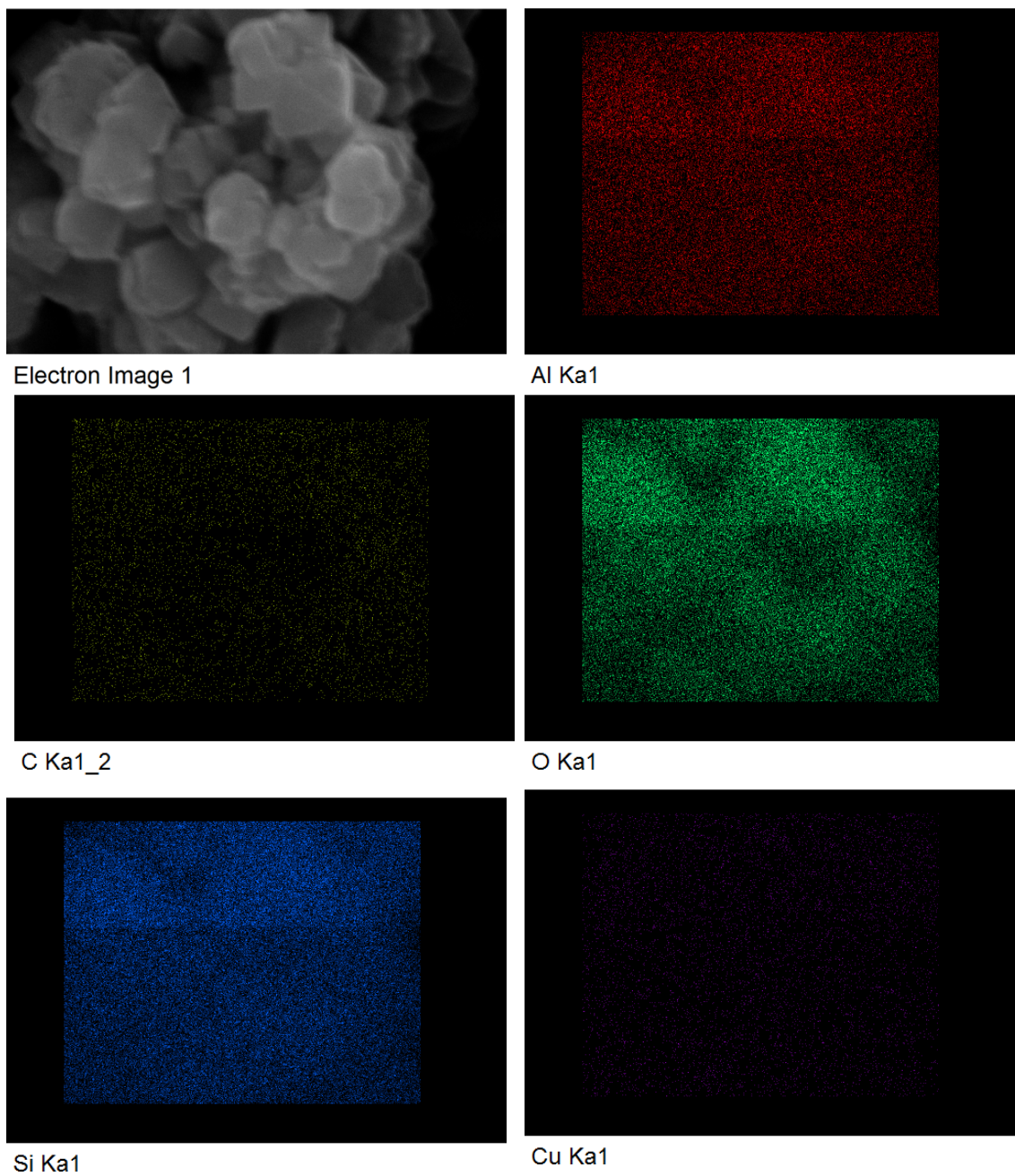
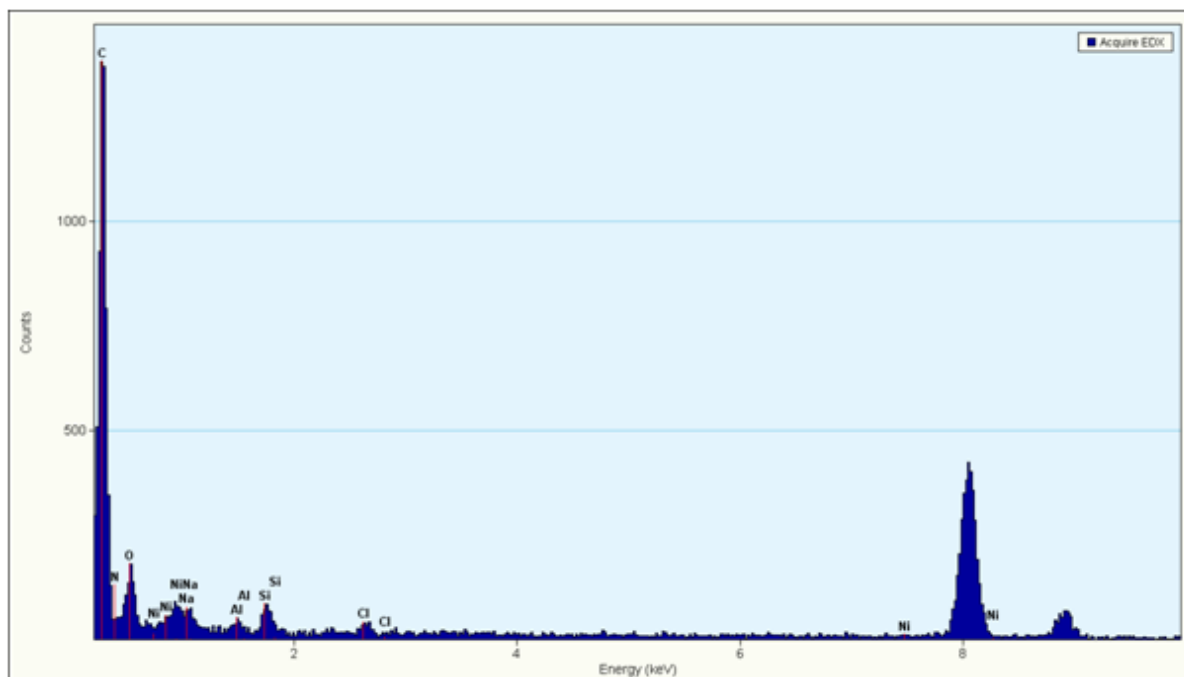


Image mapping studies of

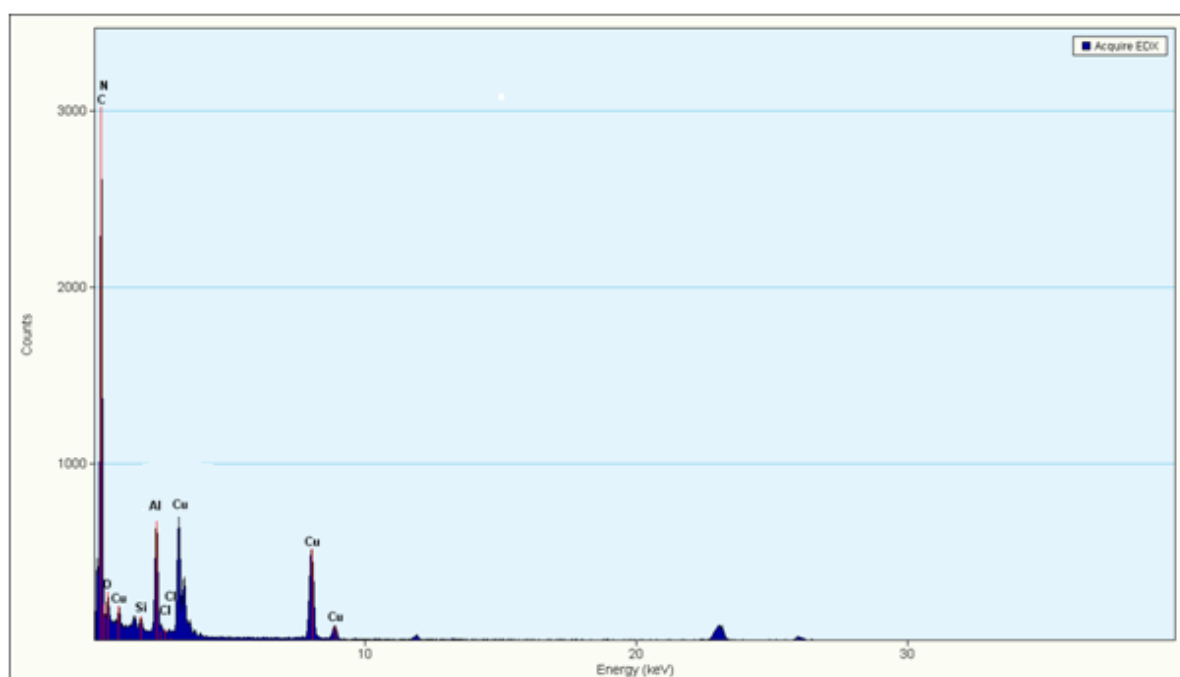




**Figure S21:** Image mapping studies of the Cu(II)L-Y

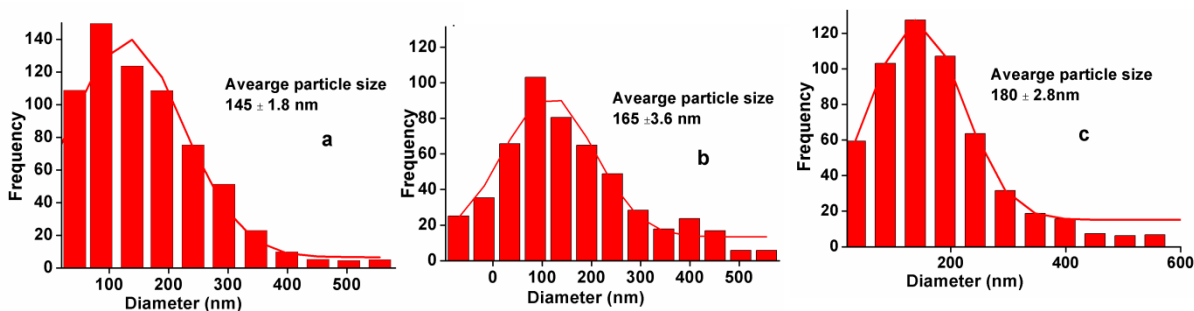


**Figure S22:** TEM-EDAX of the Ni(II)L-Y

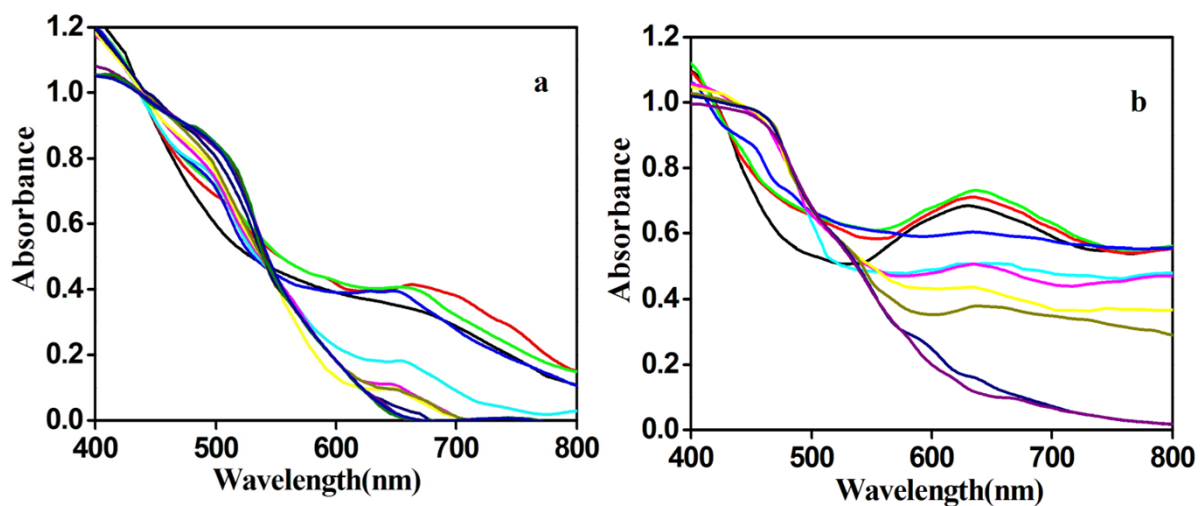


**Figure S23:** TEM-EDAX of the Cu(II)L-Y

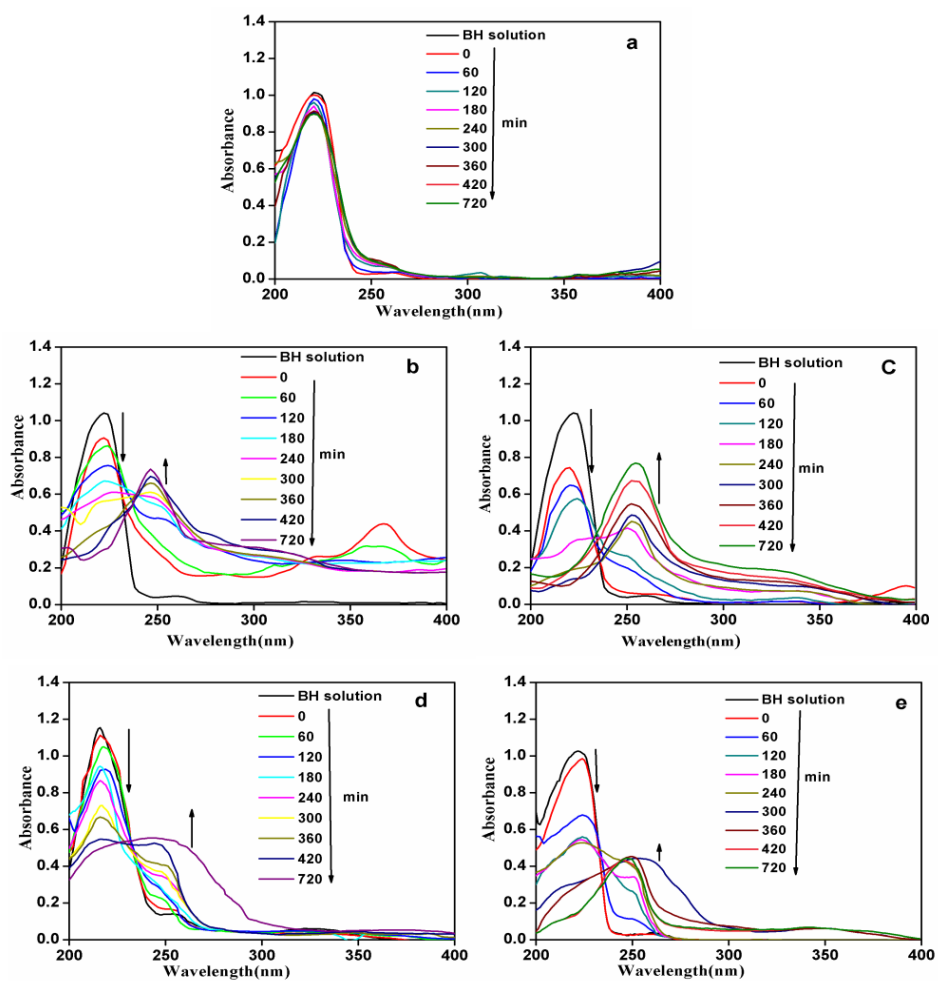




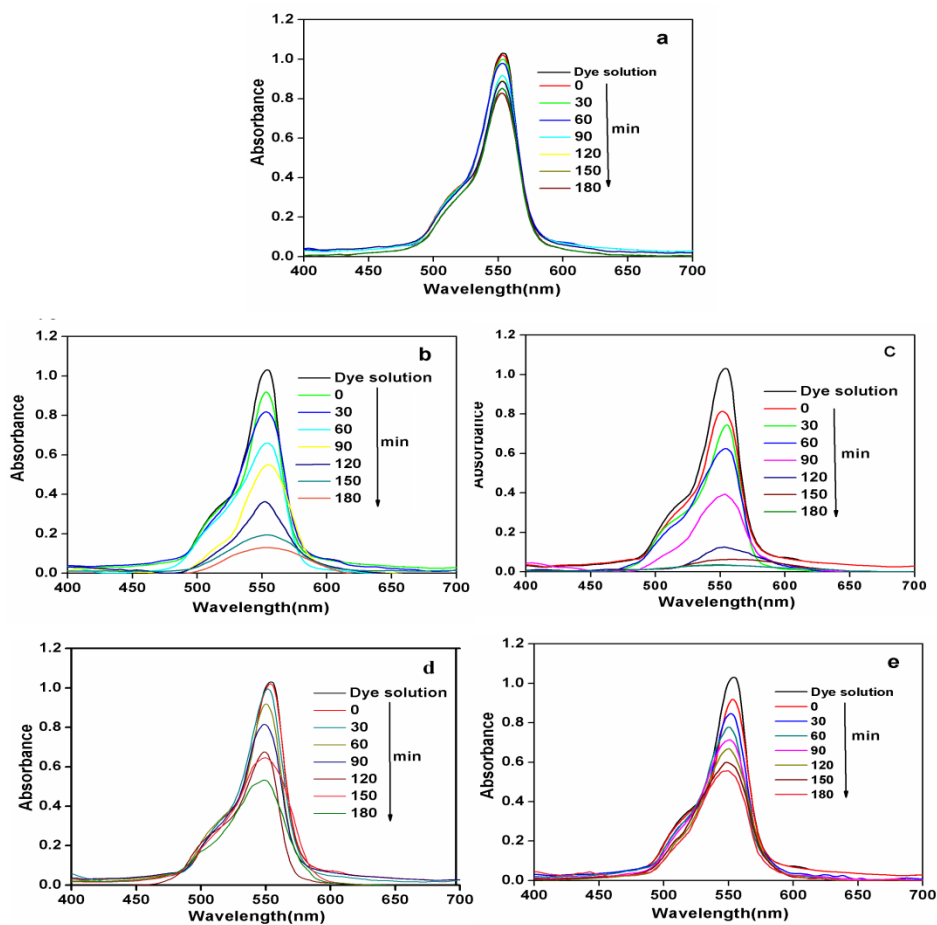
**Figure S24 (a-c):** The average particle size obtained from from the SEM micrograph analysis for a) NaY, b) Ni(II)L-Y and c) Cu (II)L-Y.



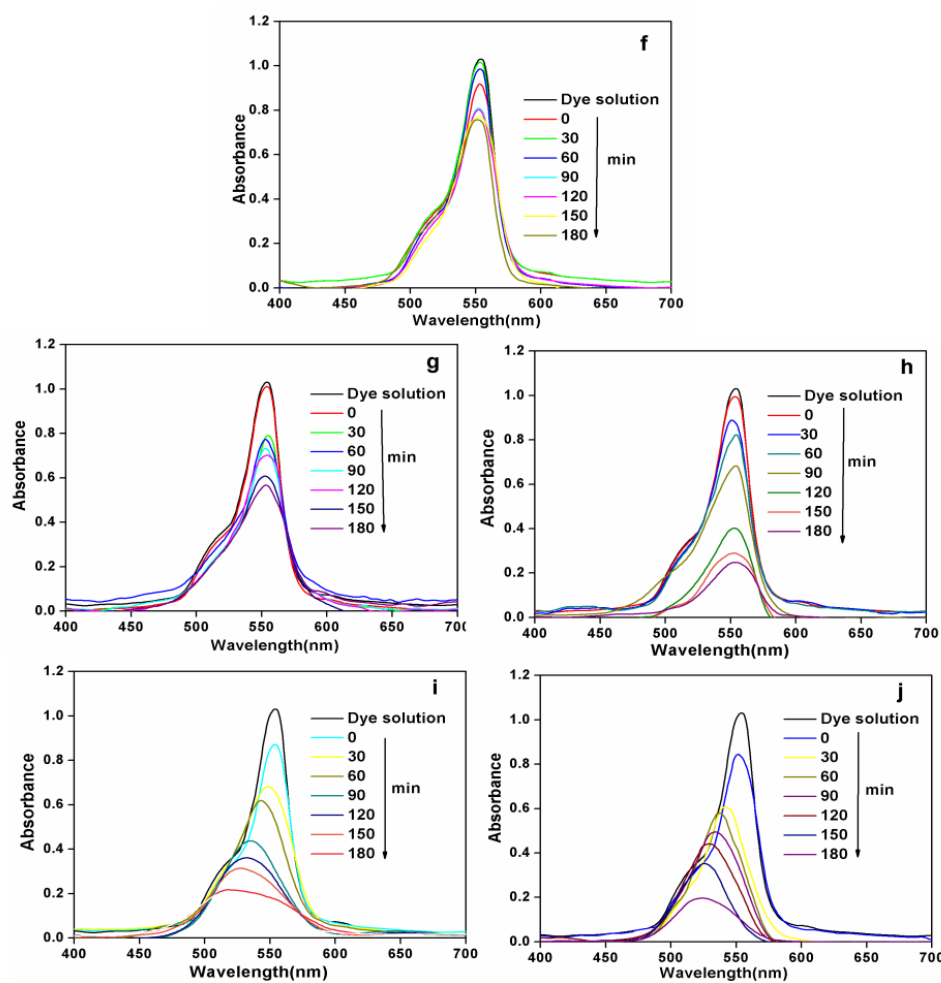
**Figure S25:**The absorption plots for benzhydrol oxidation (a) NaY, (b) Ni(II)L.2ClO<sub>4</sub>, (c) Cu(II)L.2ClO<sub>4</sub>, (d) Ni(II)L-Y and (e)Cu(II)L-Y.



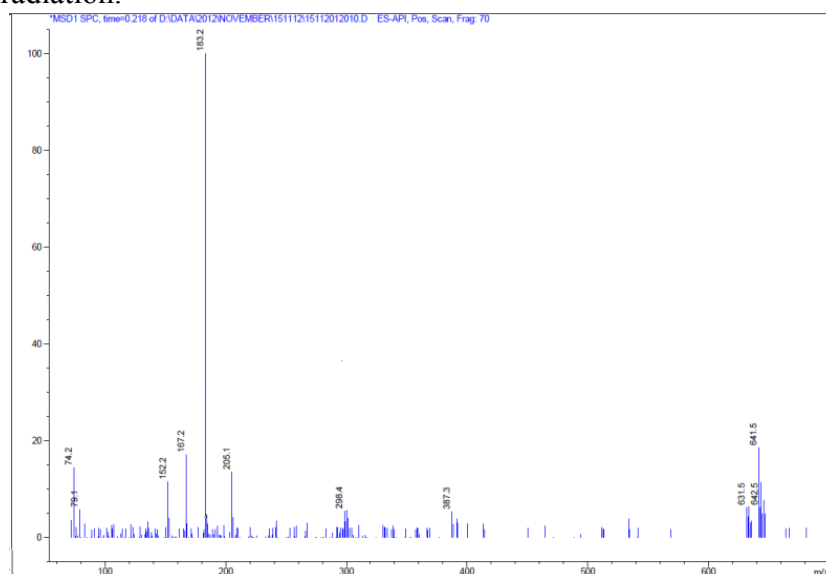
**Figure S26:** The absorption plots for benzhydrol oxidation (a) NaY, (b) Ni(II)L<sub>2</sub>ClO<sub>4</sub>, (c) Cu(II)L<sub>2</sub>ClO<sub>4</sub>, (d) Ni(II)L-Y and (e)Cu(II)L-Y.



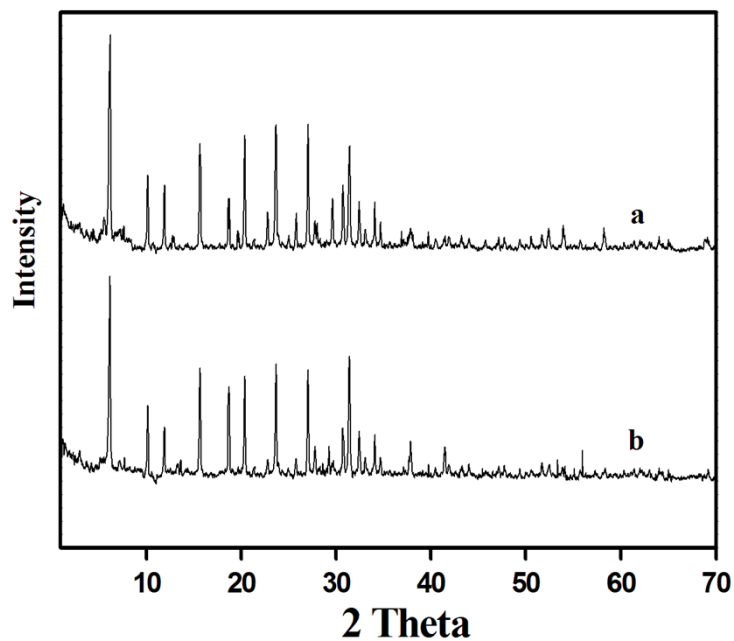
**Figure 27:**The absorption plots showing the photo degradation of RhB in the presence of (a) NaY, (b) Ni(II)L-Y, (c) Cu(II)L-Y, (d)Ni(II)L.2ClO<sub>4</sub> and (e)Cu(II)L.2ClO<sub>4</sub> under UV irradiation.



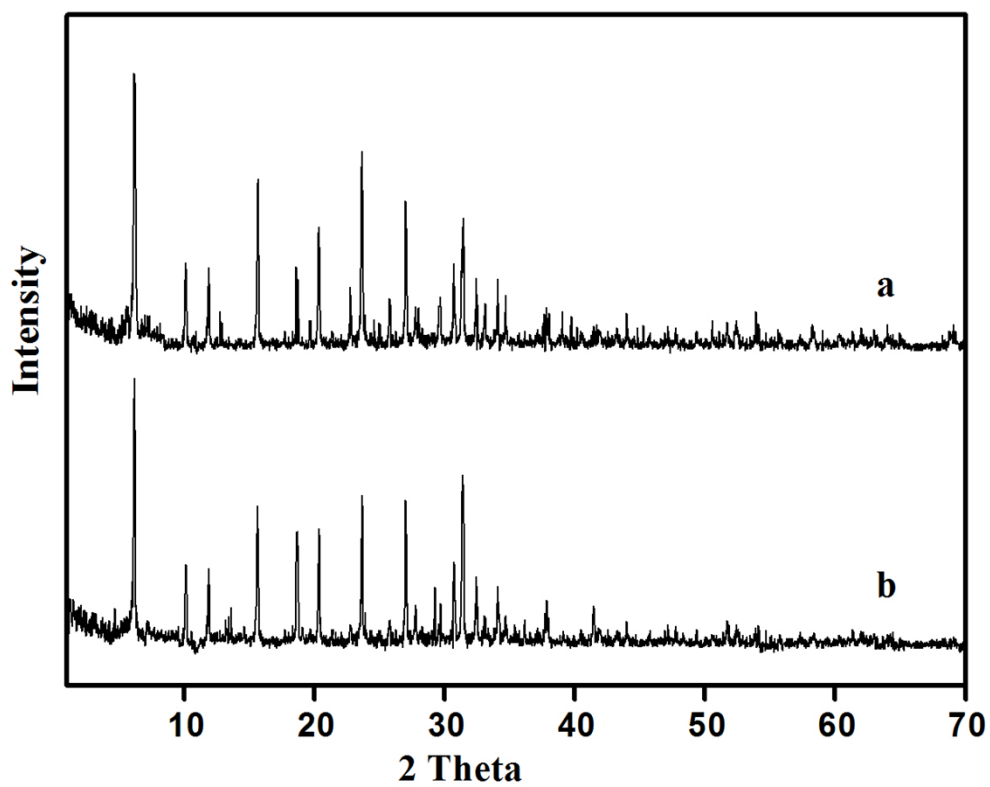
**Figure 29:** The absorption plots showing the photo degradation of RhB in the presence of (f) NaY, (g) Ni(II)L-Y, (h) Cu(II)L-Y, (i) Ni(II)L.2ClO<sub>4</sub> and (j) Cu(II)L.2ClO<sub>4</sub> under visible/H<sub>2</sub>O<sub>2</sub> irradiation.



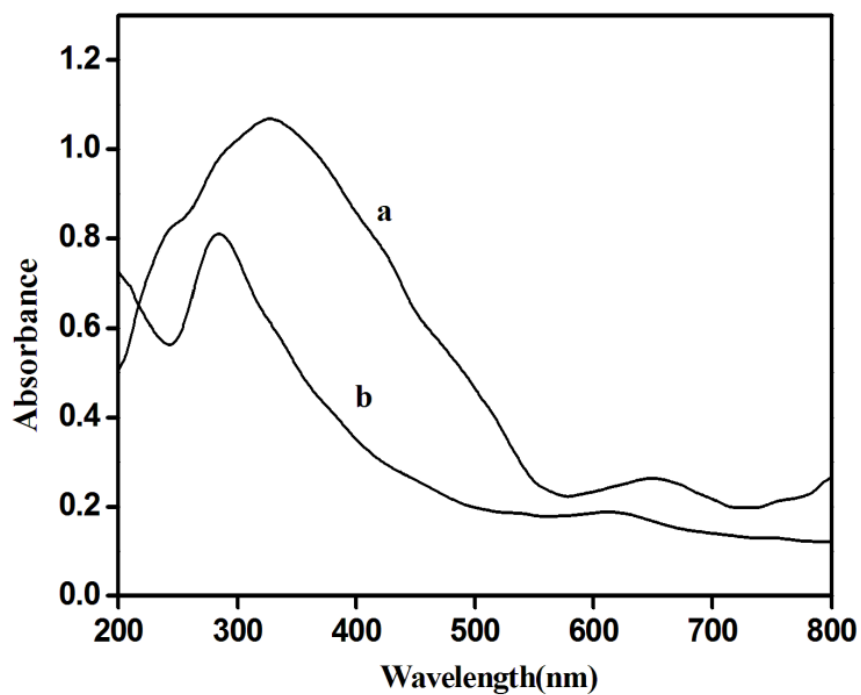
**Figure S29:** LC-MS spectra of the benzhydrol oxidation products encapsulated complexes



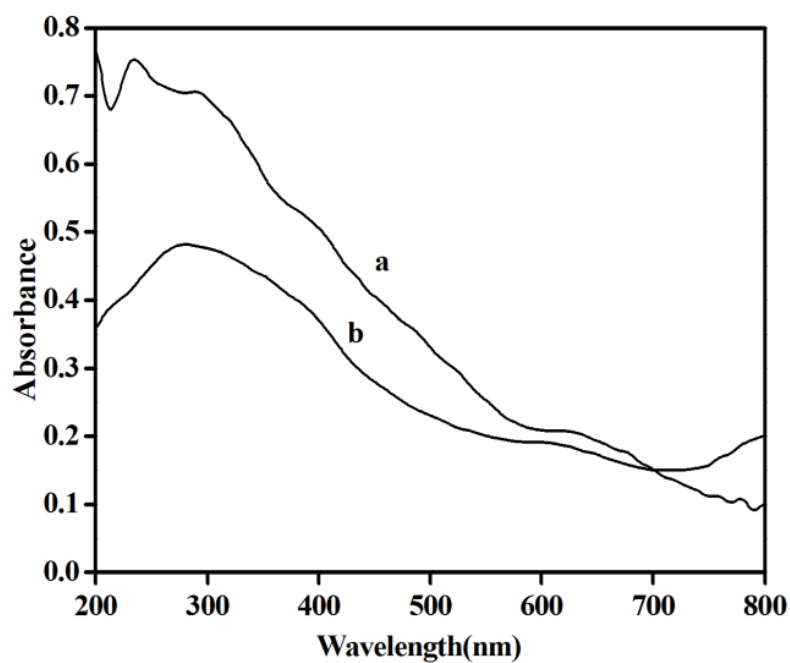
**Figure S30:** After reaction the recovered catalyst (a) Ni(II)L-Y and (b) Cu(II)L-Y in BH oxidation



**Figure S31:** After reaction the recovered catalyst (a) Ni(II)L-Y and (b) Cu(II)L-Y in RhB degradation.



**Figure S32** : Rh B degradation (a)Ni(II)L-Y and (b) Cu(II)L-Y



**Figure S33**: RhB oxidation  $H_2O_2$  (a)Ni(II)L-Y and (b) Cu(II)L-Y



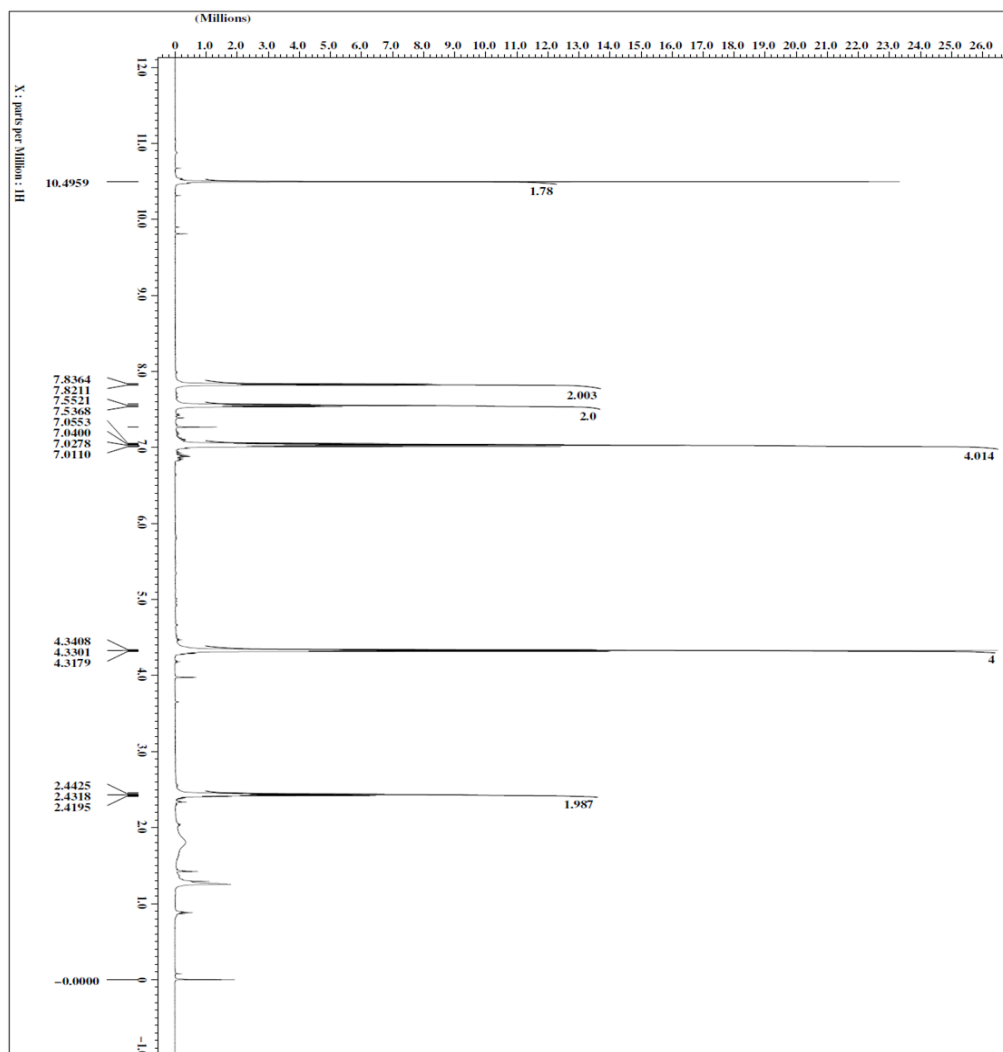
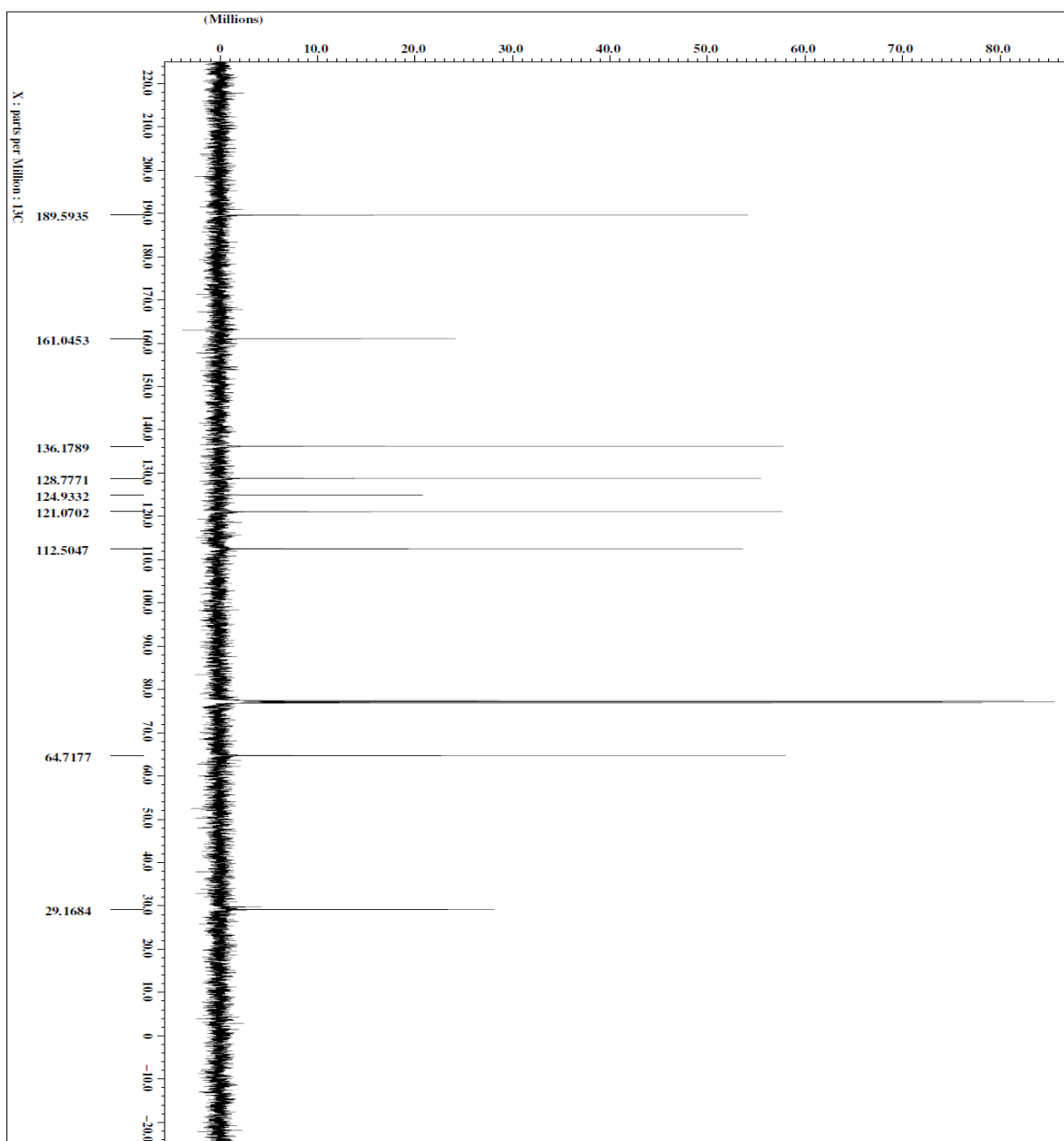
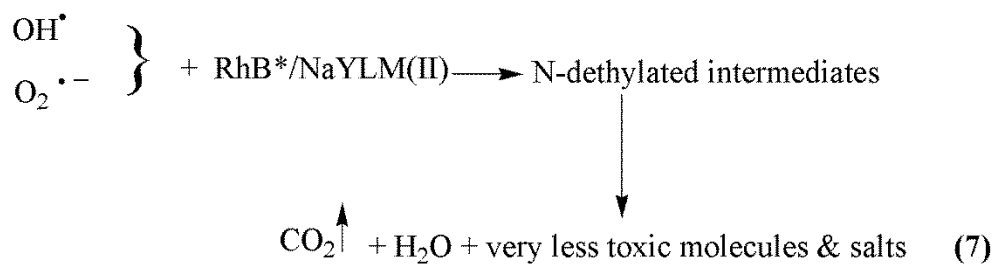
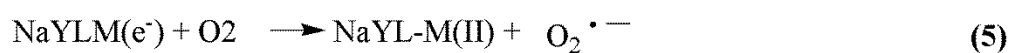
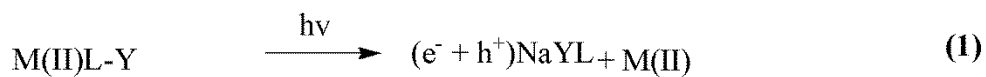


Figure S35:  $^1\text{H}$  NMR spectral data of SAL





**Figure S36:**  $^{13}\text{C}$  NMR spectral data of SAL



**Figure S38:** Proposed mechanism for the RhB degradation

**Table A:**

<b>Compound</b>	<b>Cu(%)</b>	<b>Ni(%)</b>	<b>Si/Al</b>	<b>Na(%)</b>	<b>Si(%)</b>	<b>Al(%)</b>
<b>NaY</b>	-	-	2.69	7.81	22.12	8.21
<b>Ni(II)-Y</b>	-	2.56(2.94)	2.69	5.23	22.24	8.24
<b>Cu(II)-Y</b>	1.92(2.02)	-	2.69	5.02	22.75	8.45
<b>Ni(II)L-Y</b>	-	0.79(0.95)	2.61	6.16	20.48	7.25
<b>Cu(II)L-Y</b>	1.02(1.10)	-	2.58	6.83	22.39	8.68

**Table B:**

<b>Compound</b>	<b>Colour</b>	<b>%M</b>
<b>NiL (ClO<sub>4</sub>)<sub>2</sub></b>	Yellow	8.2(8.5)
<b>CuL (ClO<sub>4</sub>)<sub>2</sub></b>	Olive green	10.3(10.42)
<b>Ni(II)-Y</b>	Pale green	2.5
<b>Cu(II)-Y</b>	Pale blue	1.9
<b>Ni(II)L-Y</b>	Pale yellow	0.78
<b>Cu(II)L-Y</b>	pale green	1.02
<b>Ni(II)L-Y (Recovered)</b>	Pale yellow	0.75
<b>Cu(II)L-Y (Recovered)</b>	pale green	0.93