Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Nanoparticle-supported and magnetically recoverable organic–inorganic hybrid copper (II) nanocatalyst: a selective and sustainable oxidation protocol with high turnover number

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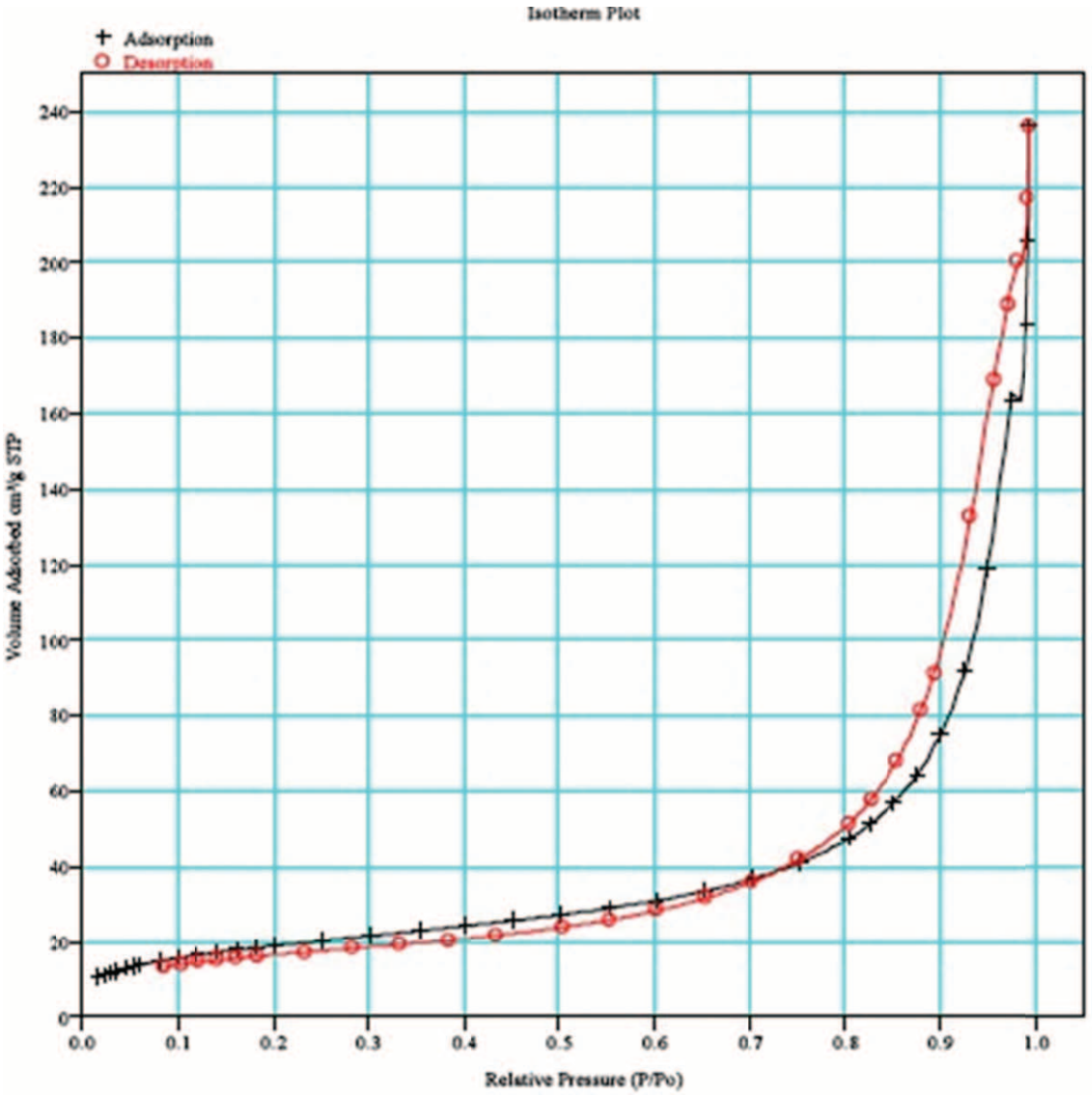

Fig. S1 BET Isotherm Plot for Fe_3O_4-LD-Cu nanocatalyst

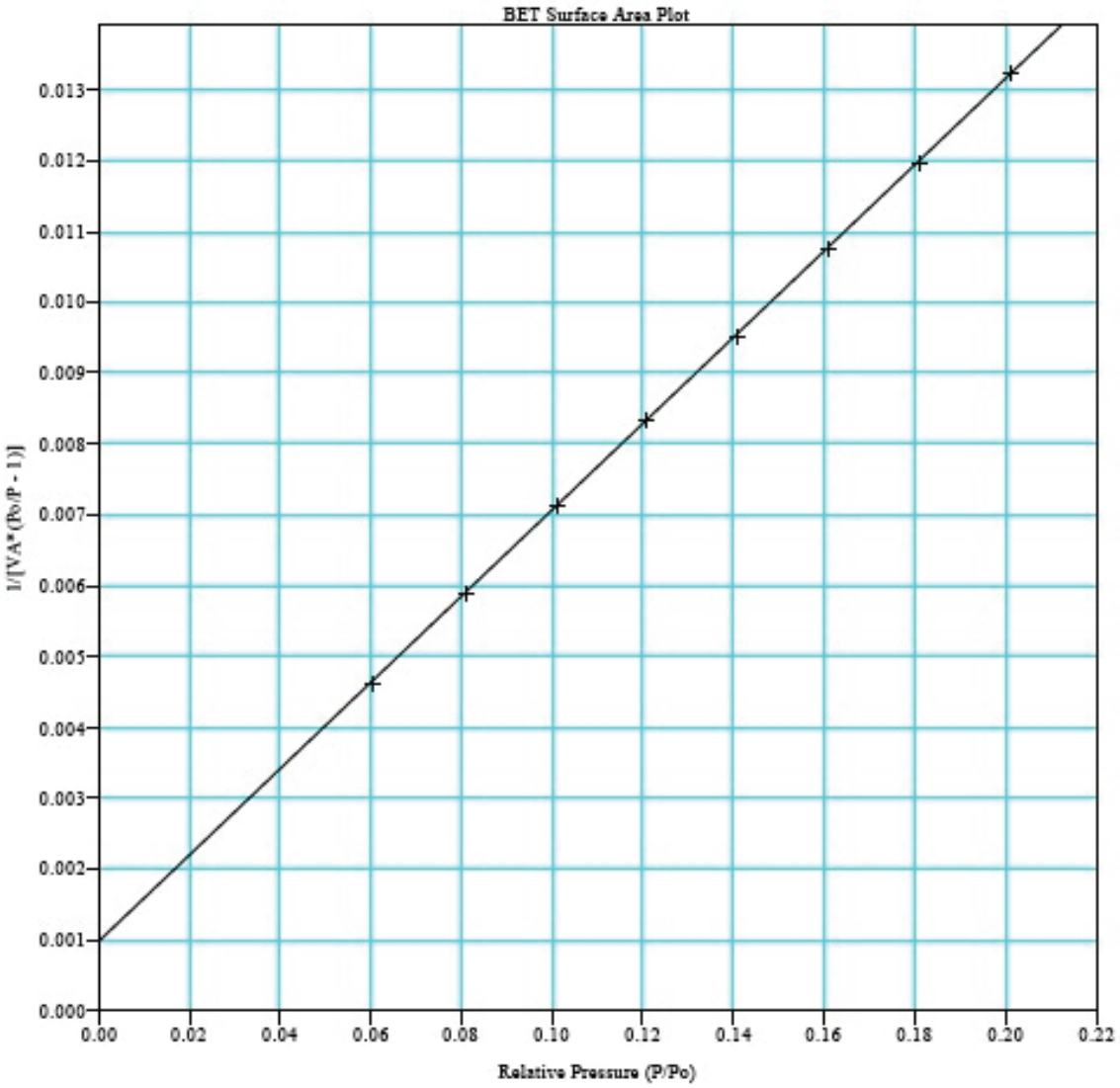

Fig. S2 BET Surface area Plot for Fe_3O_4-LD-Cu nanocatalyst

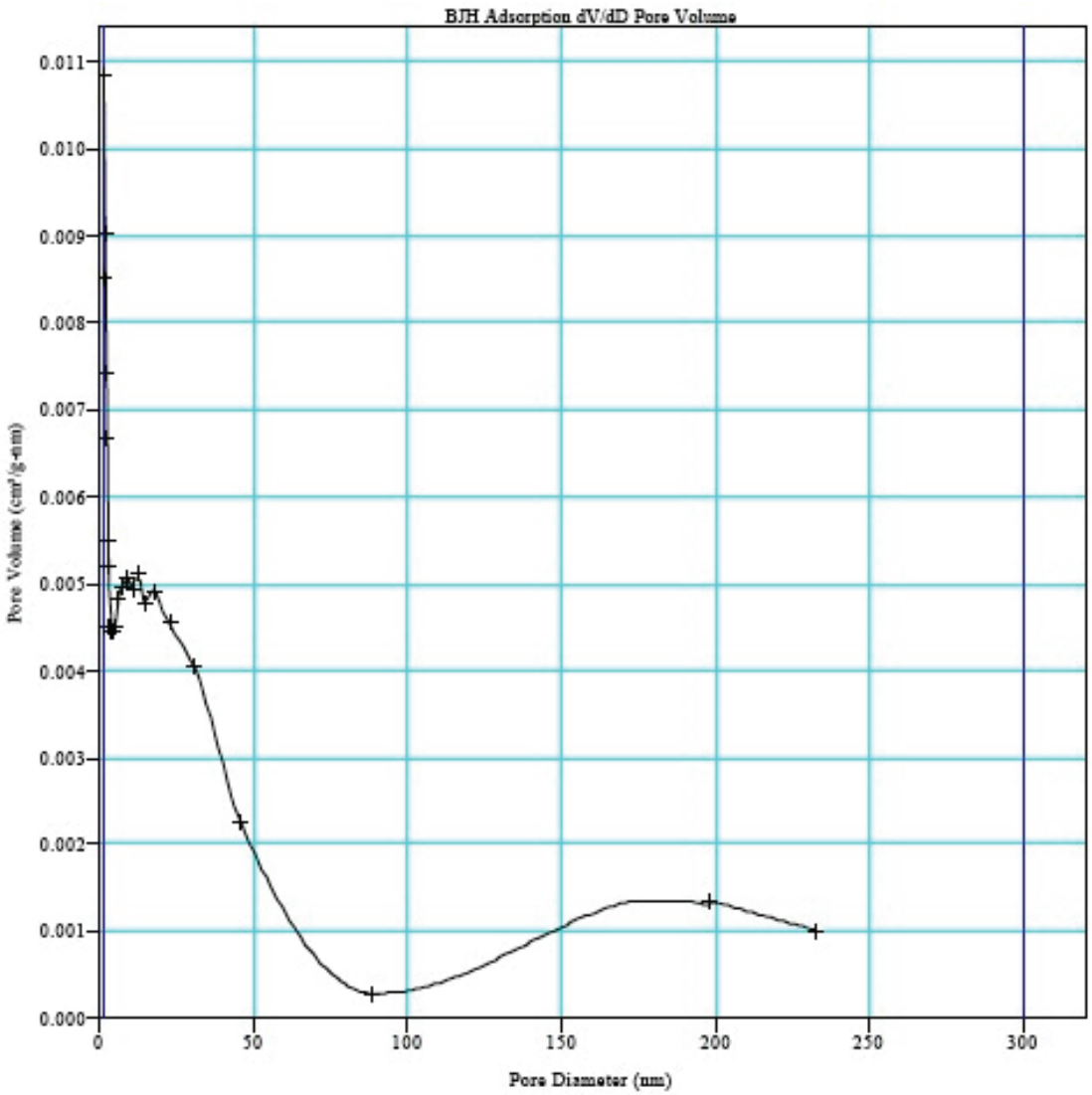

Fig. S3 BJH Adsorption dV/dD Pore Volume for Fe_3O_4-LD-Cu nanocatalyst

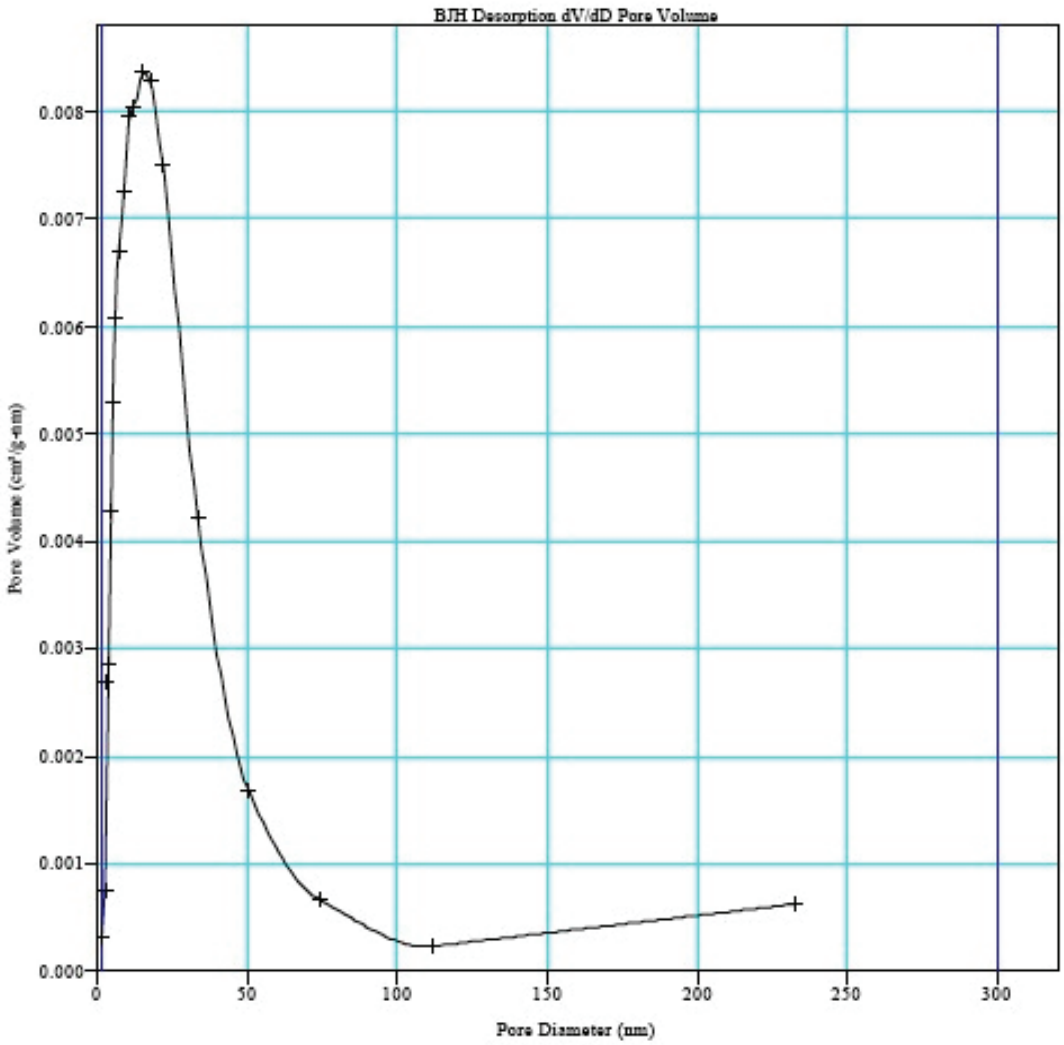

Fig. S4 BJH Desorption dV/dD Pore Volume for Fe_3O_4-LD-Cu nanocatalyst

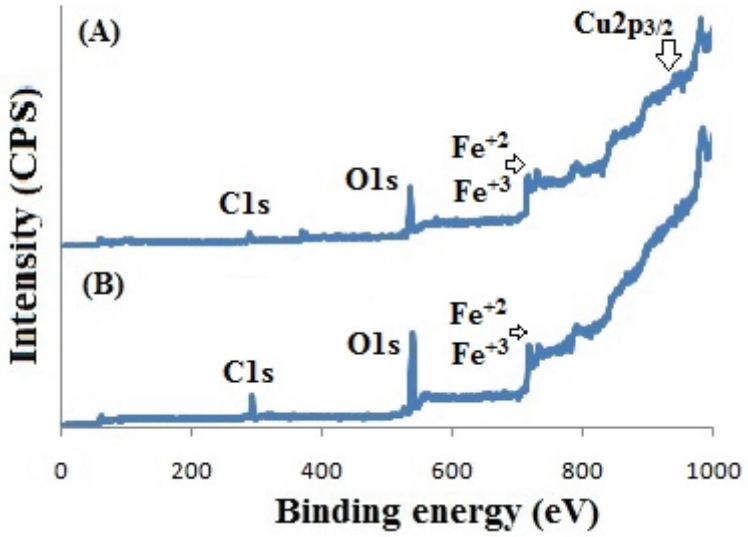

Fig.S5 XPS analysis of $Fe_3O_4$and Fe_3O_4-LD-Cu nanocatalyst

Table-S1 Oxidation of Benzyl alcohol at different Benzyl alcohol /H_2O_2 ratios.[a]

Entry	Benzyl alcohol / H_2O_2(mmol)	T(h)	Yield(±1,by GC)
1	1:1	24	76
2	1:1.1	5	95
3	1:1.2	12	95
4	1:1.4	3.0	90
5	1:1.5	1.5	90
6	1:2	0.5	90

(a) All reaction carried out at 70° C by using Fe_3O_4-LD-Cu nanocatalyst (25 mg).

Table-S2 Yield of product at different time interval by oxidation of Benzyl alcohol to benzaldehyde

Entry	Air oxidation[a]		H_2O_2 oxidation[b]	
	T (h)	Yield(±1, by GC)	T (h)	Yield(±1, by GC)
1	0.5	30	0.5	40
2	1	35	1	56
3	1.5	42	1.5	68
4	2	45	2	75
5	2.5	48	2.5	80
6	3	50	3	85
7	3.5	52	3.5	89
8	4	55	**4**	**96**
9	4.5	58	4.5	96
10	**5**	**60**	5	96
11	5.5	60	5.5	96
12	6	60	6	96

(a) All reaction carried out at 25-30 °C by using Fe_3O_4-LD-Cu nanocatalyst (25 mg) and air as oxidant. (b) All reaction carried out at 70 °C by using Fe_3O_4-LD-Cu nanocatalyst (25 mg) and H_2O_2 as oxidant (Benzyl alcohol: H_2O_2 (30% v/v) mole ratio = 1: 1.1)

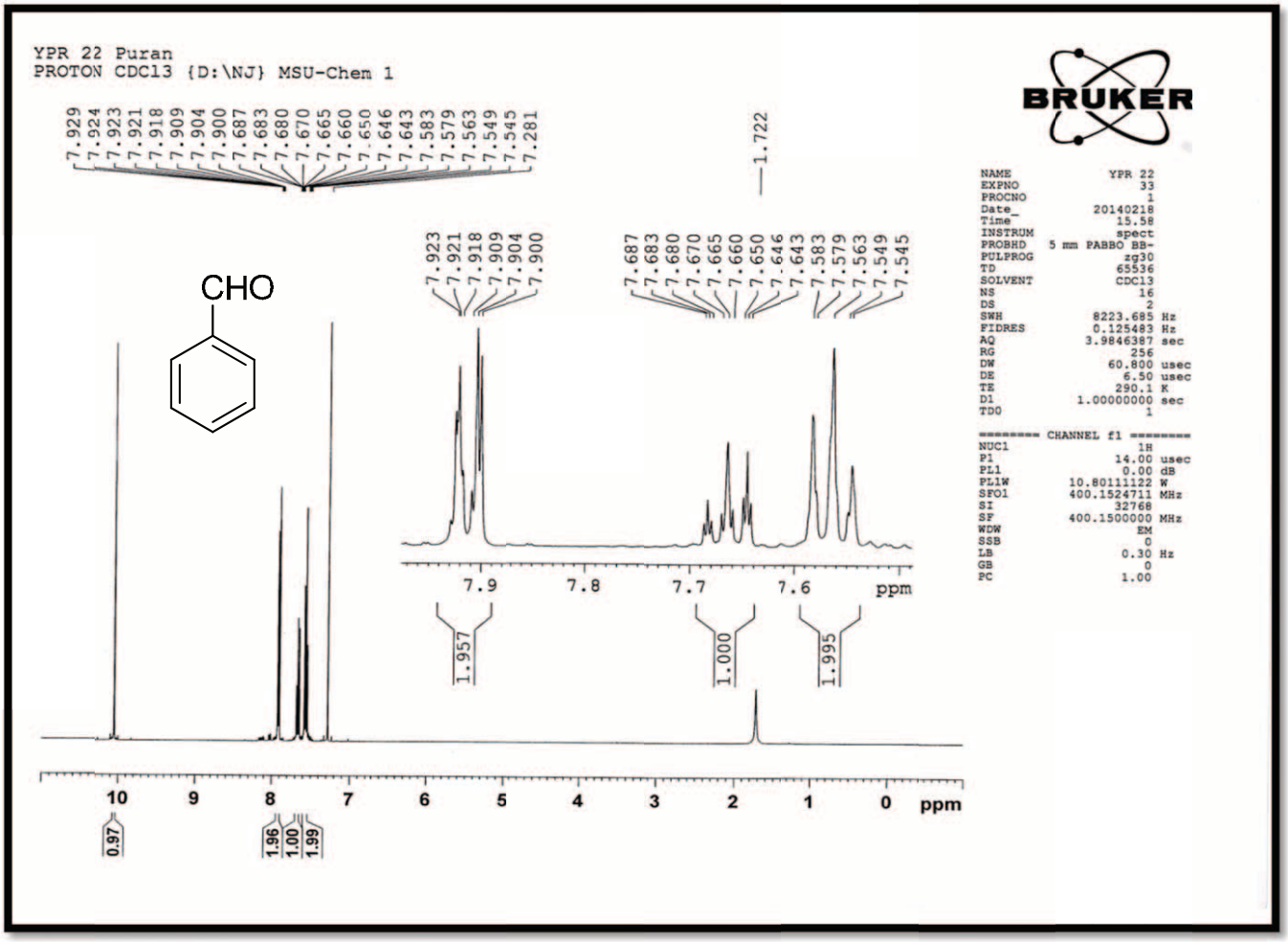

Fig. S6 ^{1}HNMR spectra of benzaldehyde ($CDCl_3$, Table-2, Entry-1)

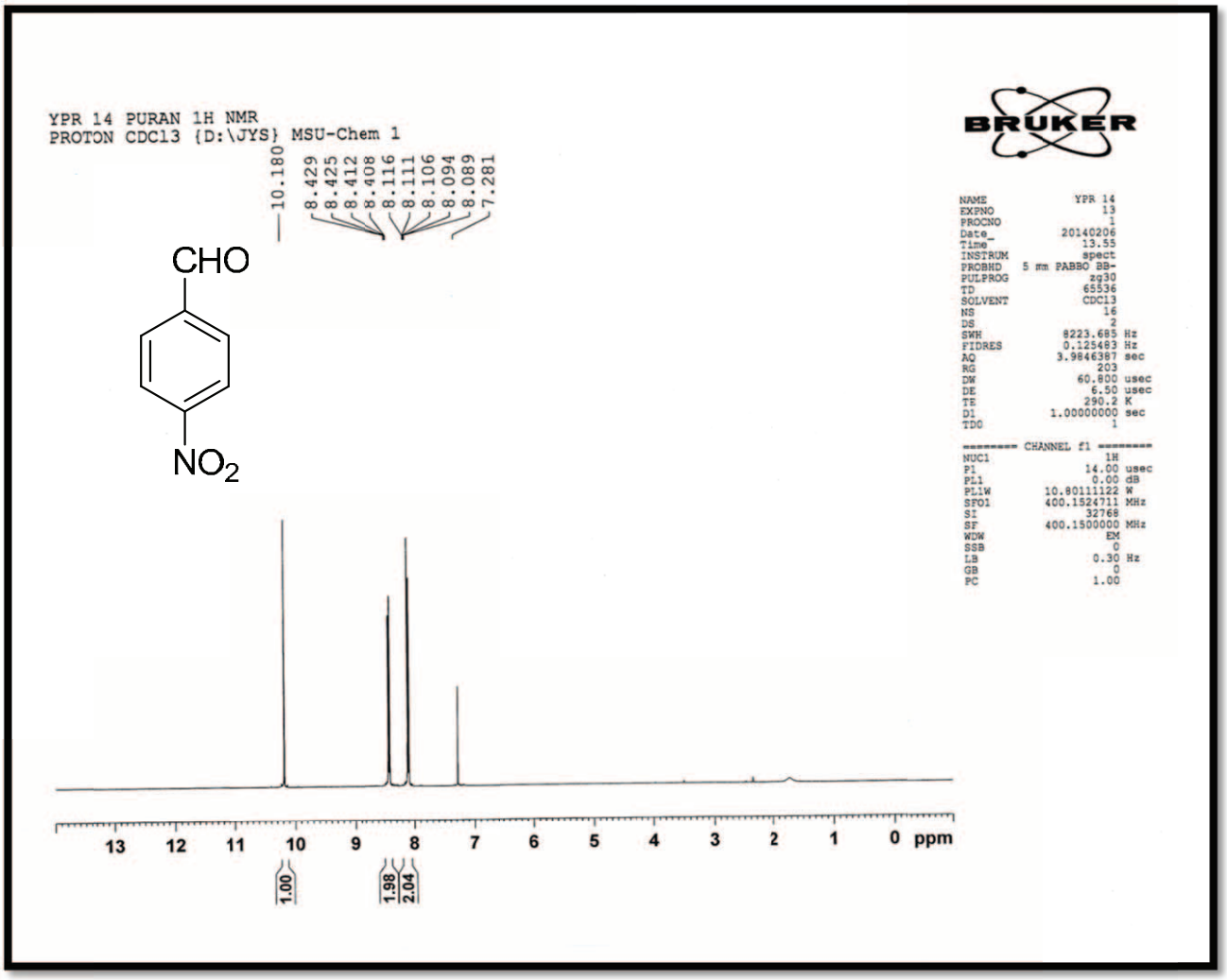

Fig. S7 ^{1}HNMR spectra of 4-nitrobenzaldehyde ($CDCl_3$, Table-2, Entry-2)

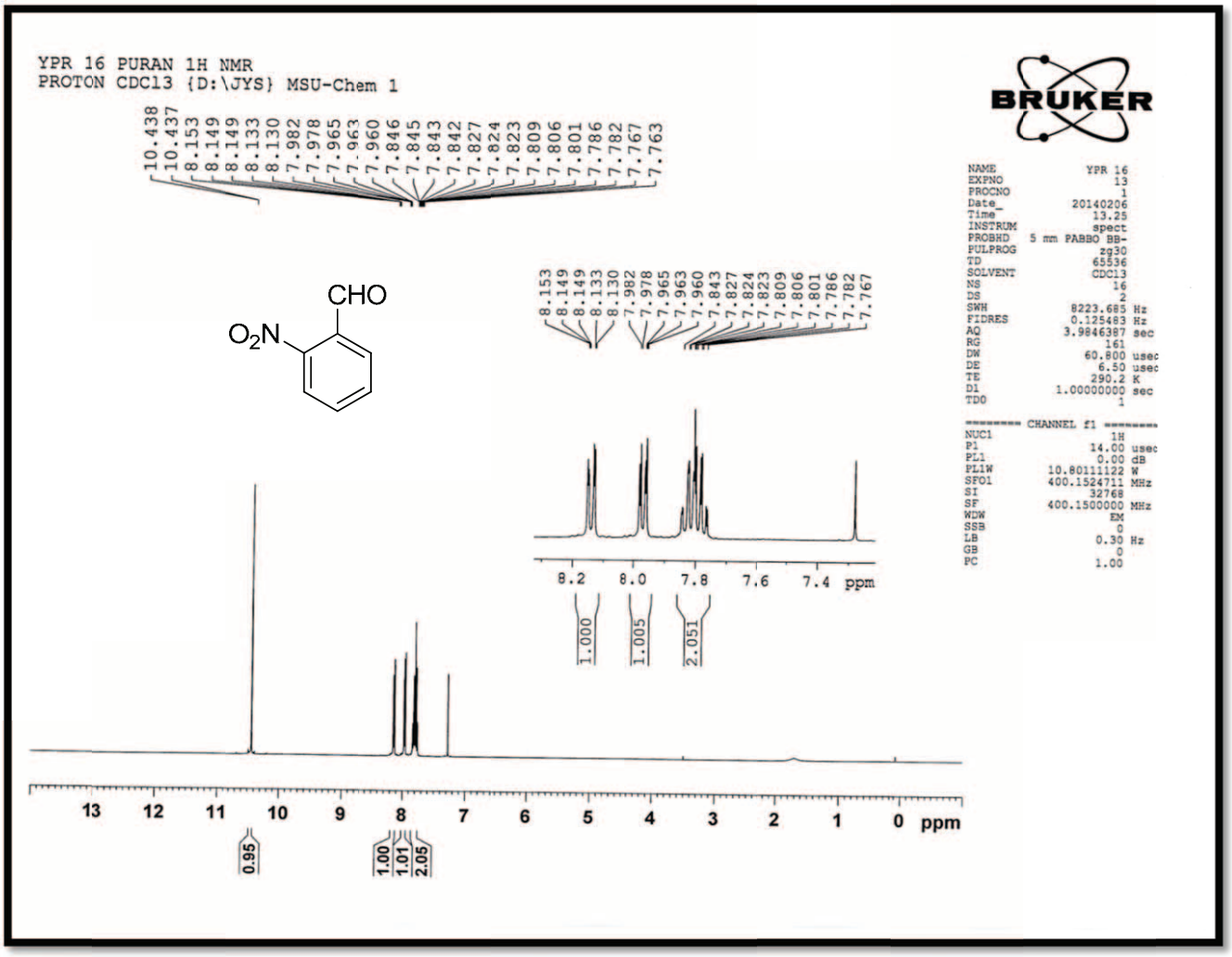

Fig. S8 ^{1}HNMR spectra of 2-nitrobenzaldehyde ($CDCl_3$, Table-2, Entry-3)

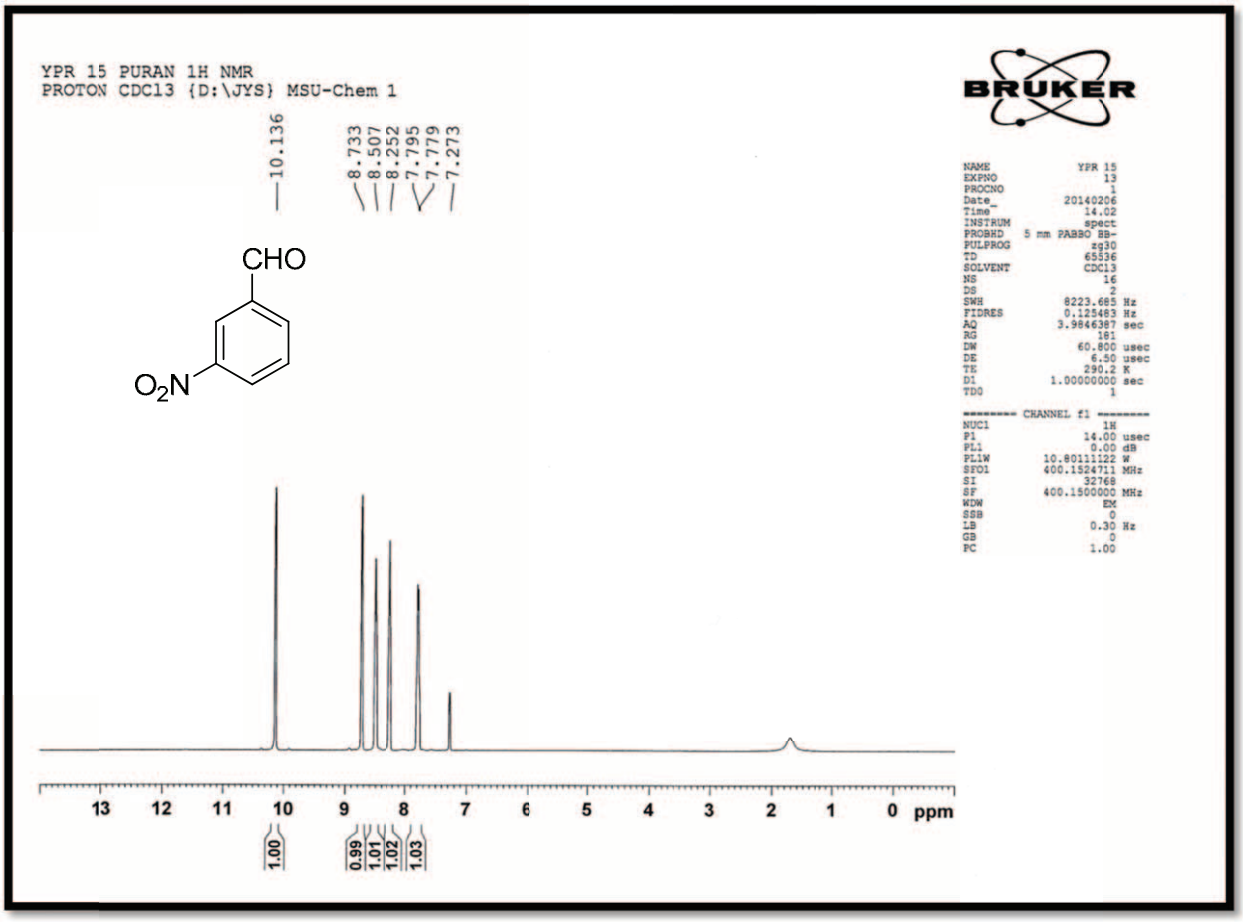

Fig. S9 ^{1}HNMR spectra of 3-nitrobenzaldehyde ($CDCl_3$, Table-2, Entry-4)

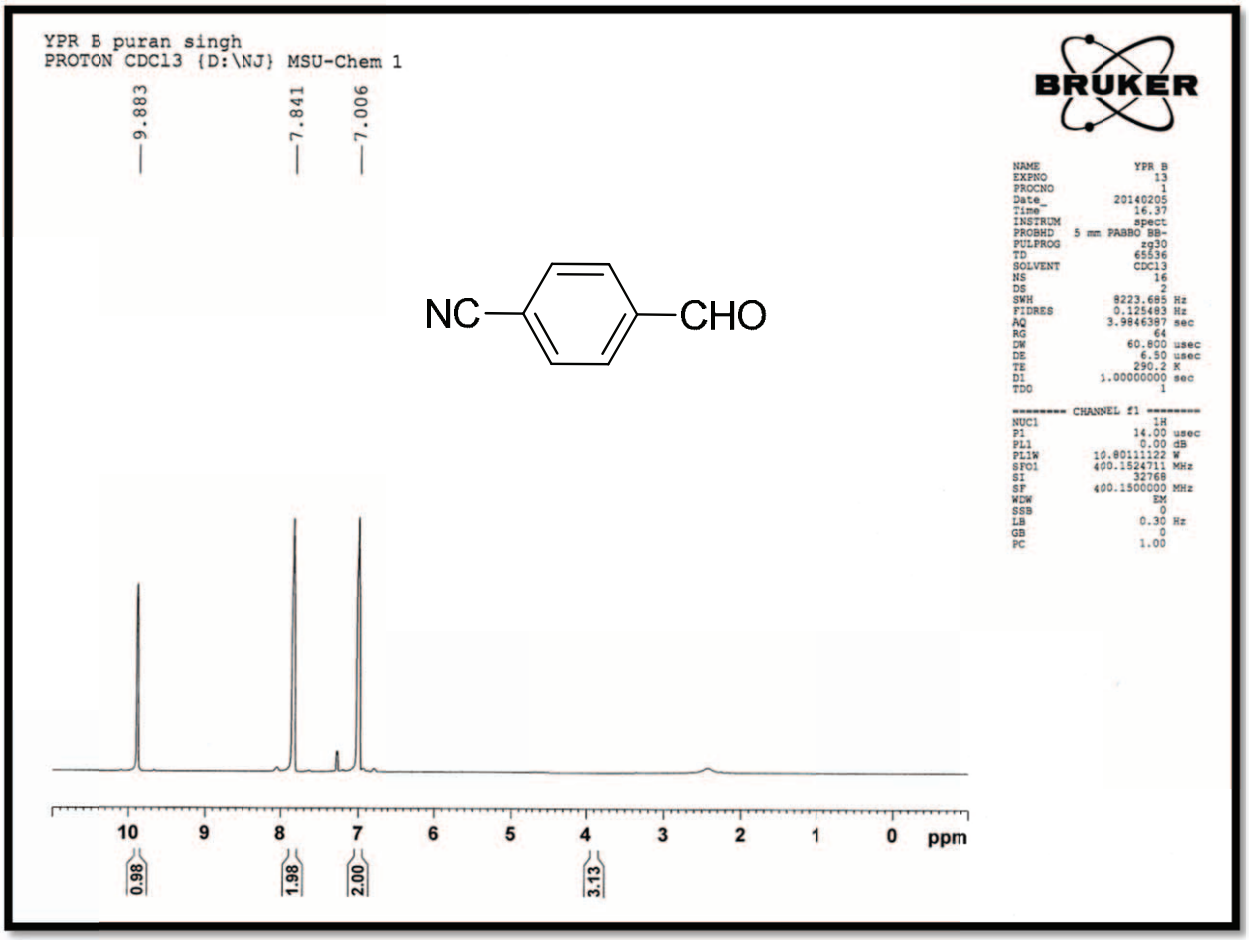

Fig. S10 ^{1}HNMR spectra of 4-cynobenzaldehyde ($CDCl_3$, Table-2, Entry-5)

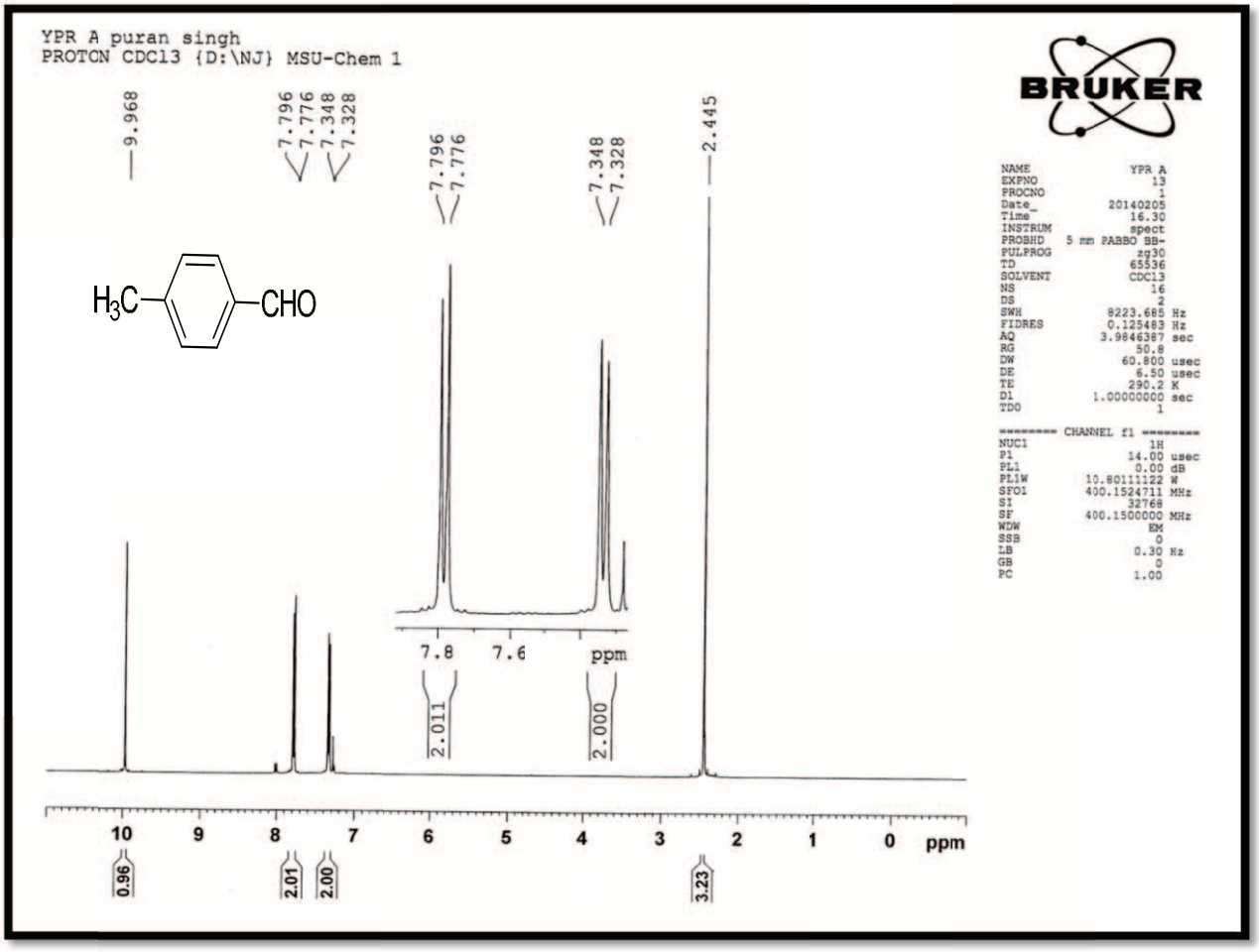

Fig. S11 ^{1}HNMR spectra of 4-methylbenzaldehyde ($CDCl_3$, Table-2, Entry-6)

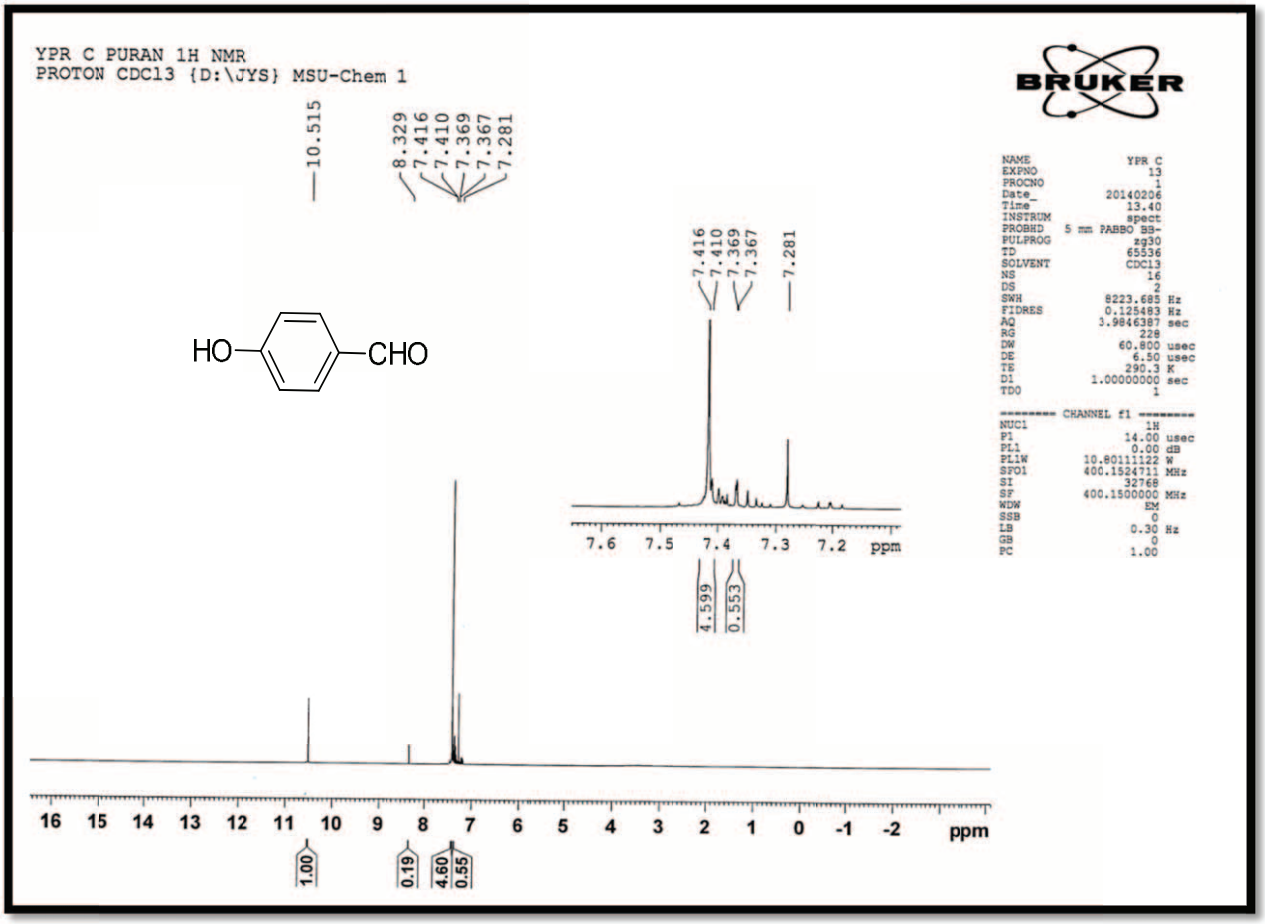

Fig. S12 ^{1}HNMR spectra of 4-hydroxybenzaldehyde ($CDCl_3$, Table-2, Entry-7)

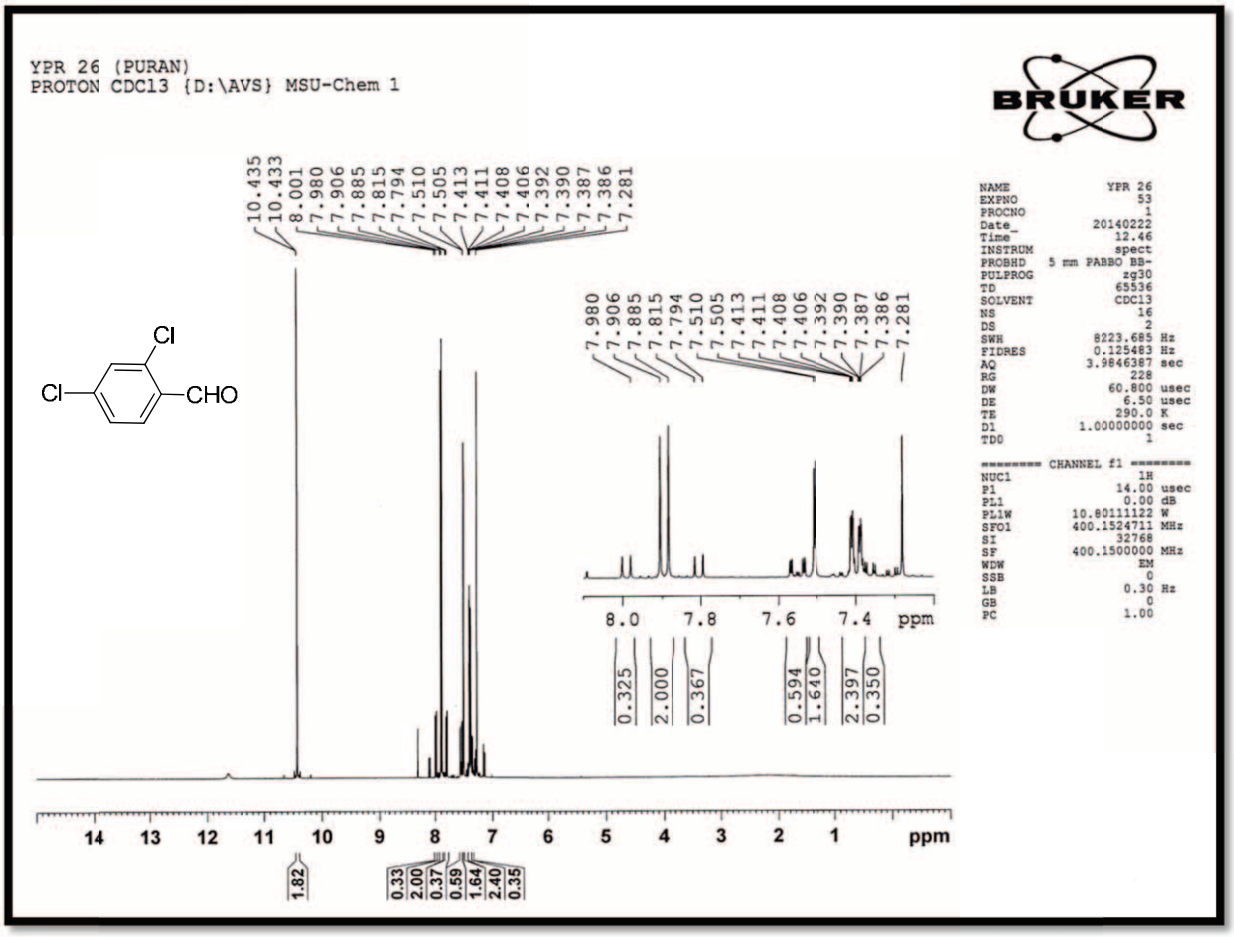

Fig. S13 ^{1}HNMR spectra of 2,4-dichlorobenzaldehyde ($CDCl_3$, Table-2, Entry-8)

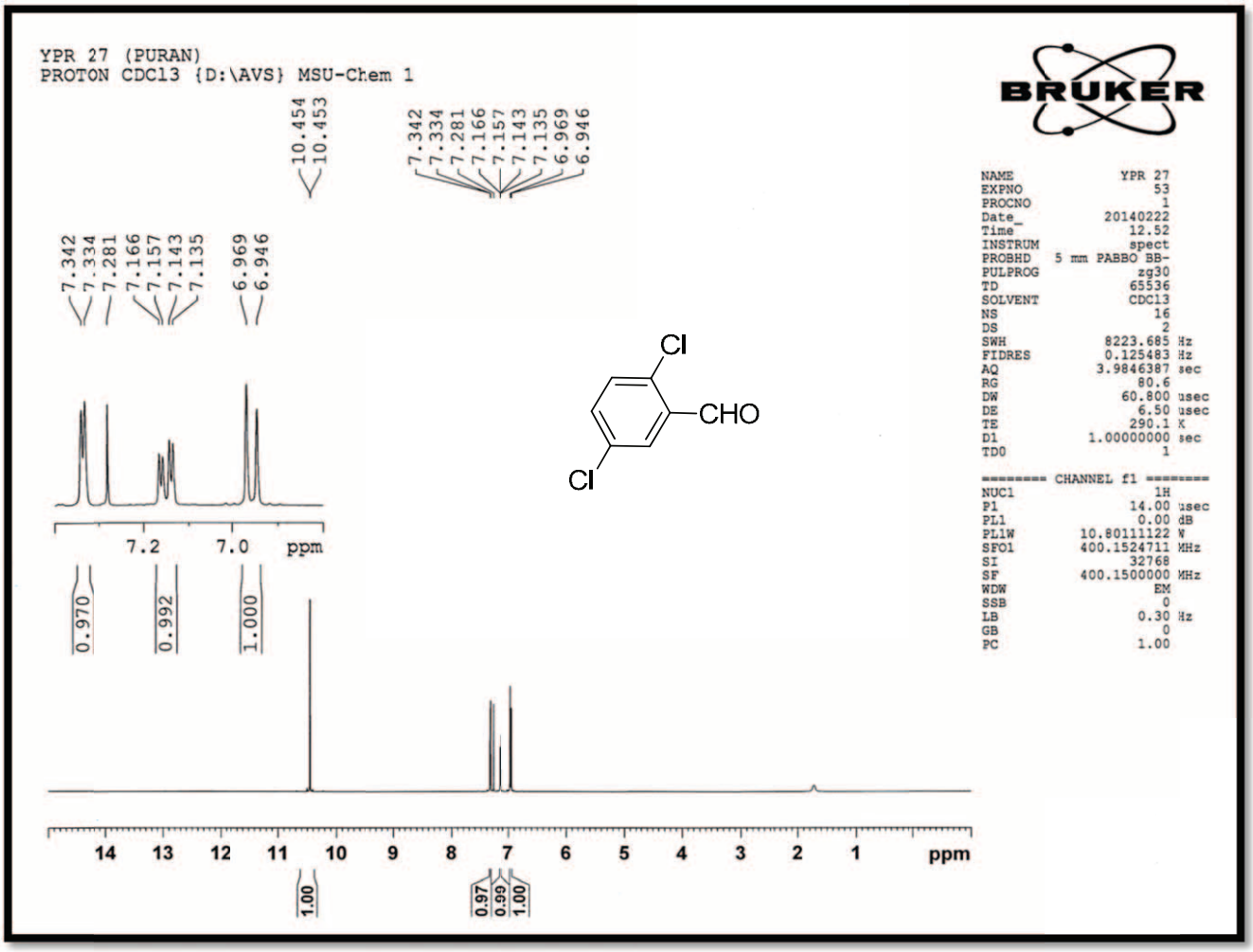

Fig. S14 ^{1}HNMR spectra of 2,5-dichlorobenzaldehyde ($CDCl_3$, Table-2, Entry-9)

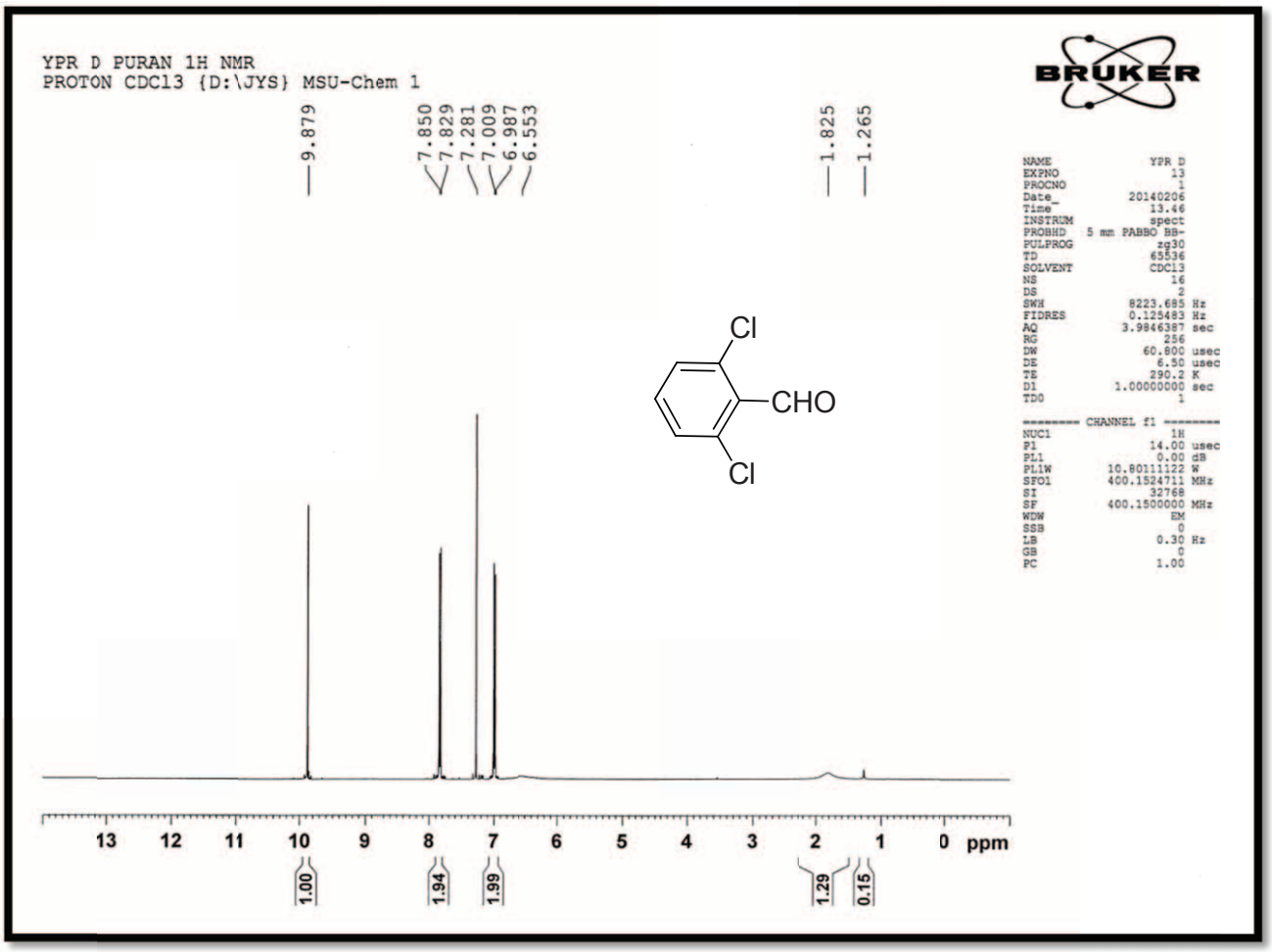

Fig. S15 ^{1}HNMR spectra of 2,6-dichlorobenzaldehyde ($CDCl_3$, Table-2, Entry-10)

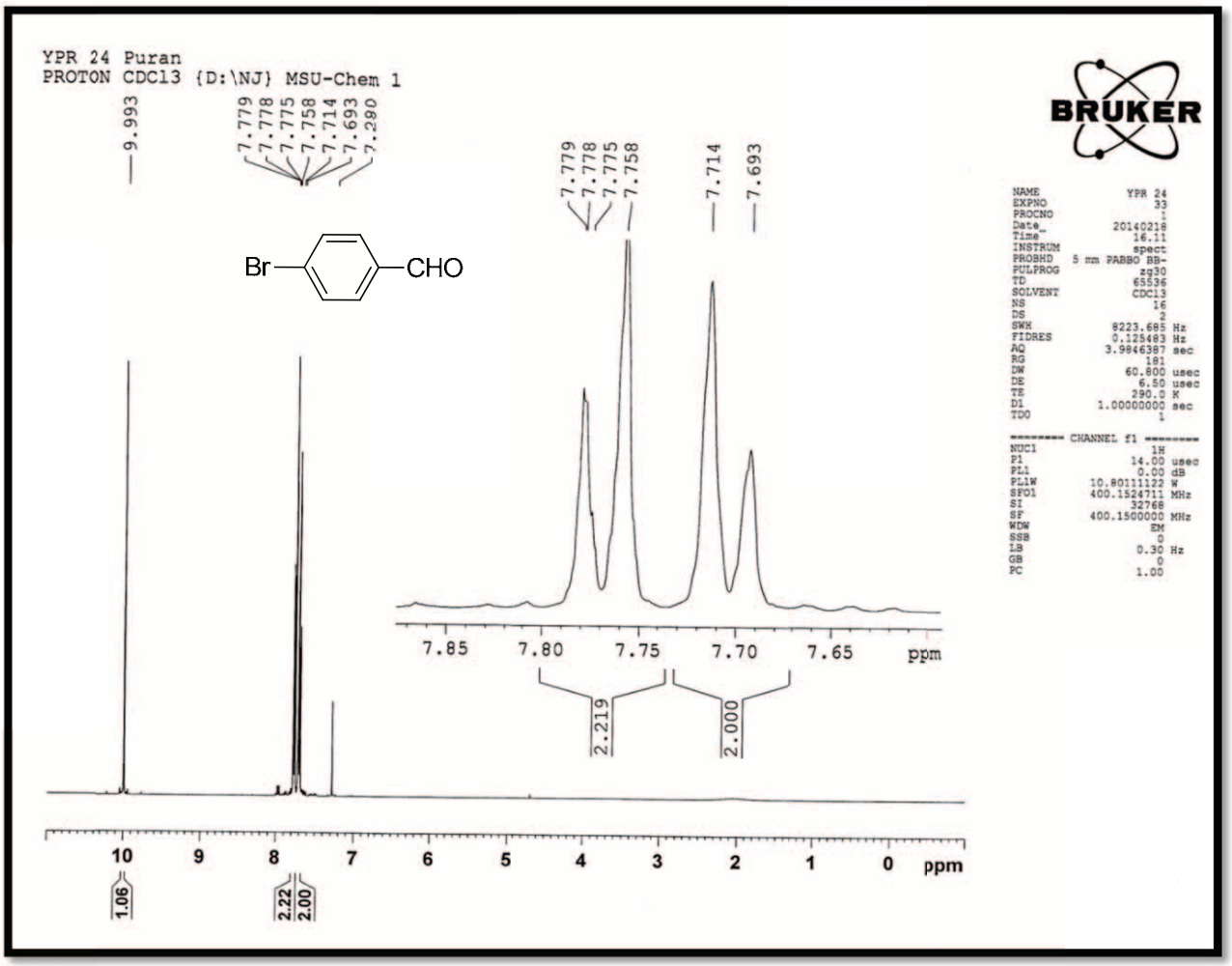

Fig. S16 ^{1}HNMR spectra of 4-bromobenzaldehyde ($CDCl_3$, Table-2, Entry-11)

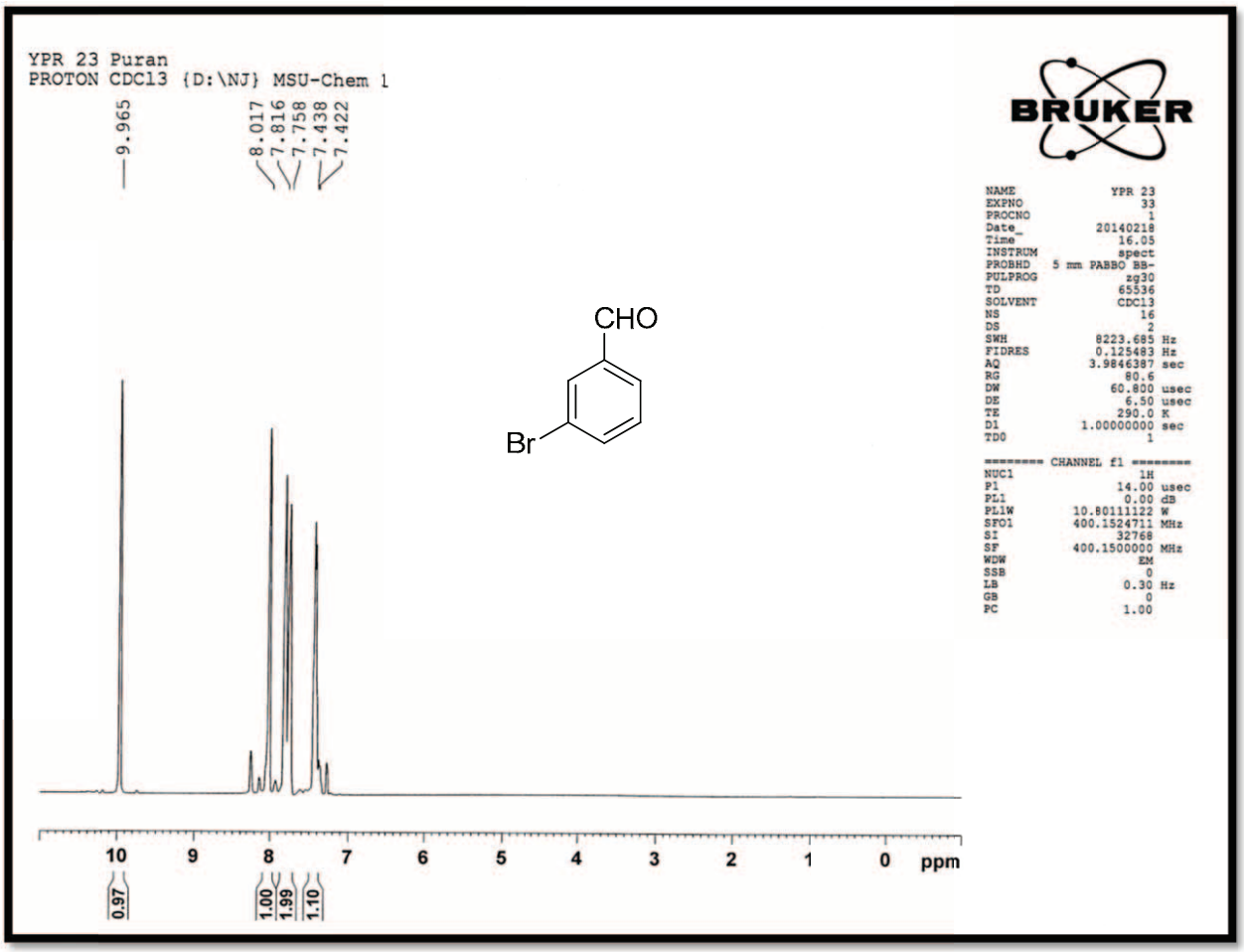

Fig. S17 ^{1}HNMR spectra of 3-bromobenzaldehyde ($CDCl_3$, Table-2, Entry-12)

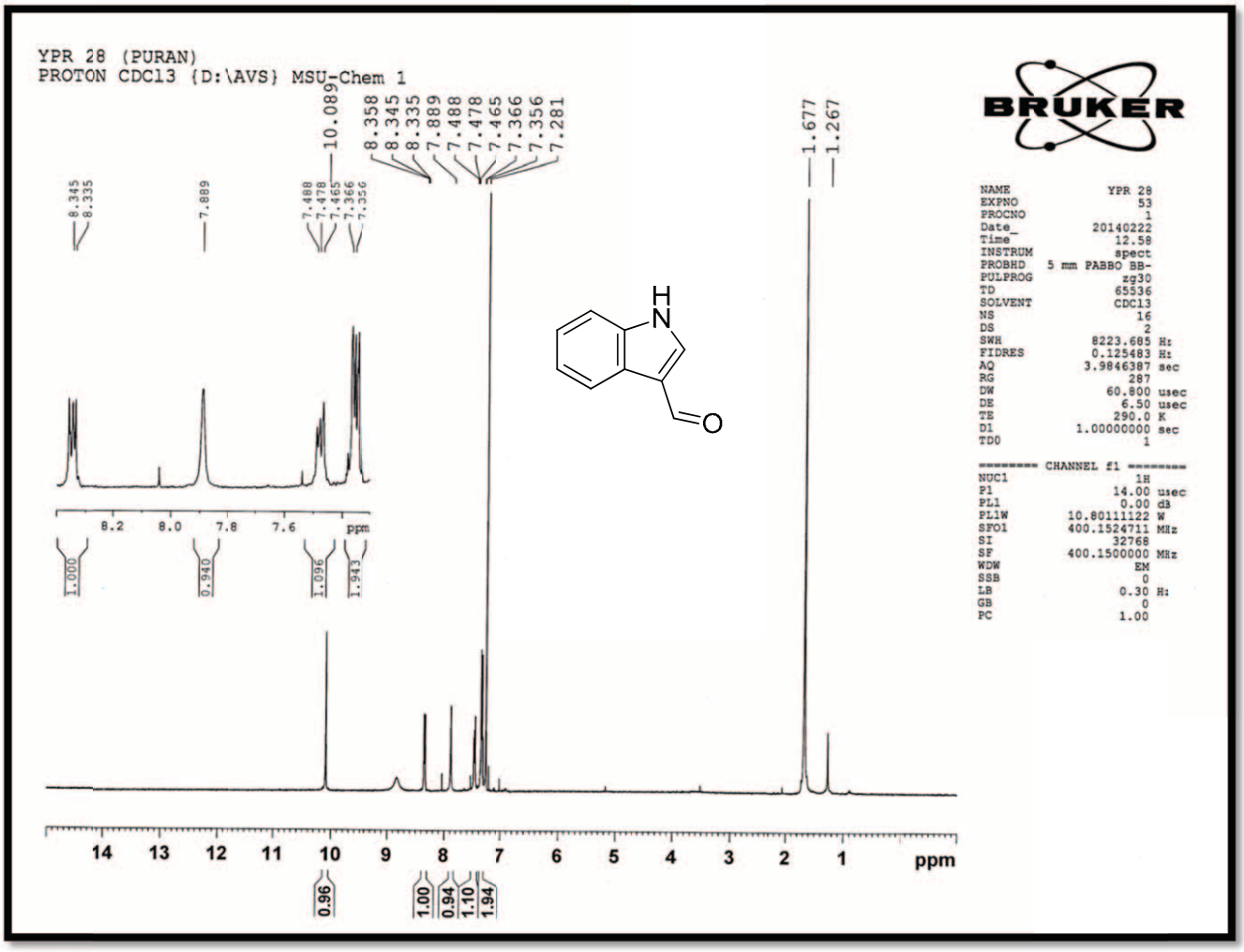

Fig. S18 ^{1}HNMR spectra of Indole-3-carboxyaldehyde ($CDCl_3$, Table-2, Entry-13)