Electronic Supplementary Material (ESI) for Dalton Transactions.

Electronic Supporting Information

Synthesis and Structural Characterisation of Bismuth(III) Hydroxamates and their Activity against *Helicobacter pylori*.

Amita Pathak, Victoria L. Blair, Richard L. Ferrero, Peter C. Junk, Richard F. Tabor

and Philip C. Andrews

Contents

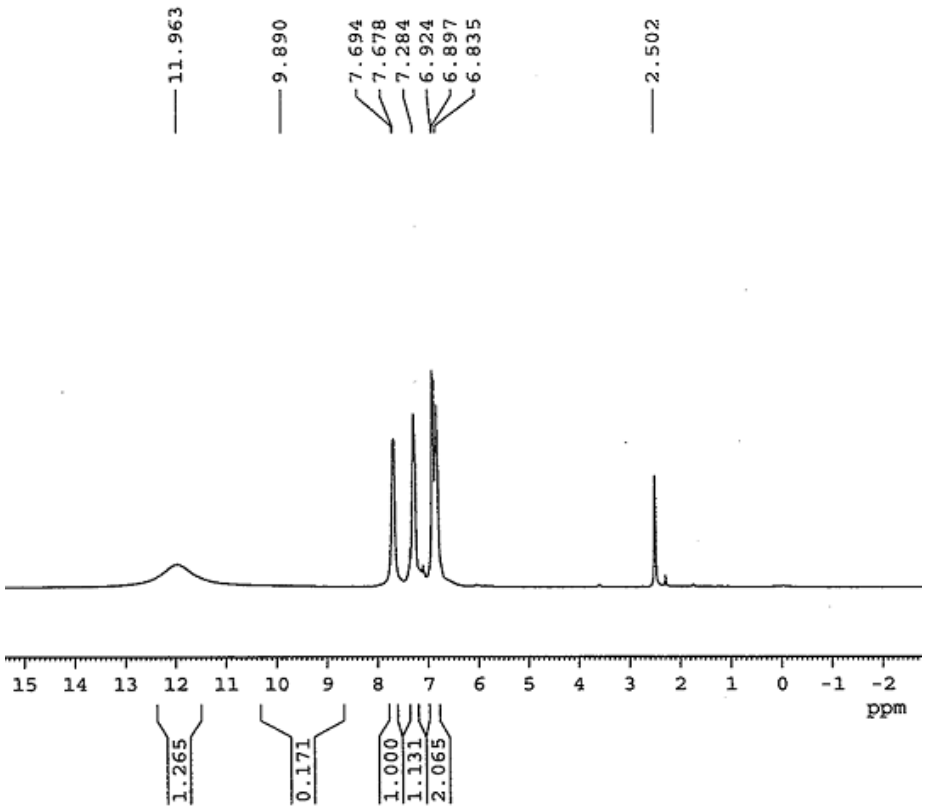

Figure S1: ^{1}H NMR (400 MHz, d_6-DMSO) spectrum of complex [Bi(H-SHA)$_3$] **1**

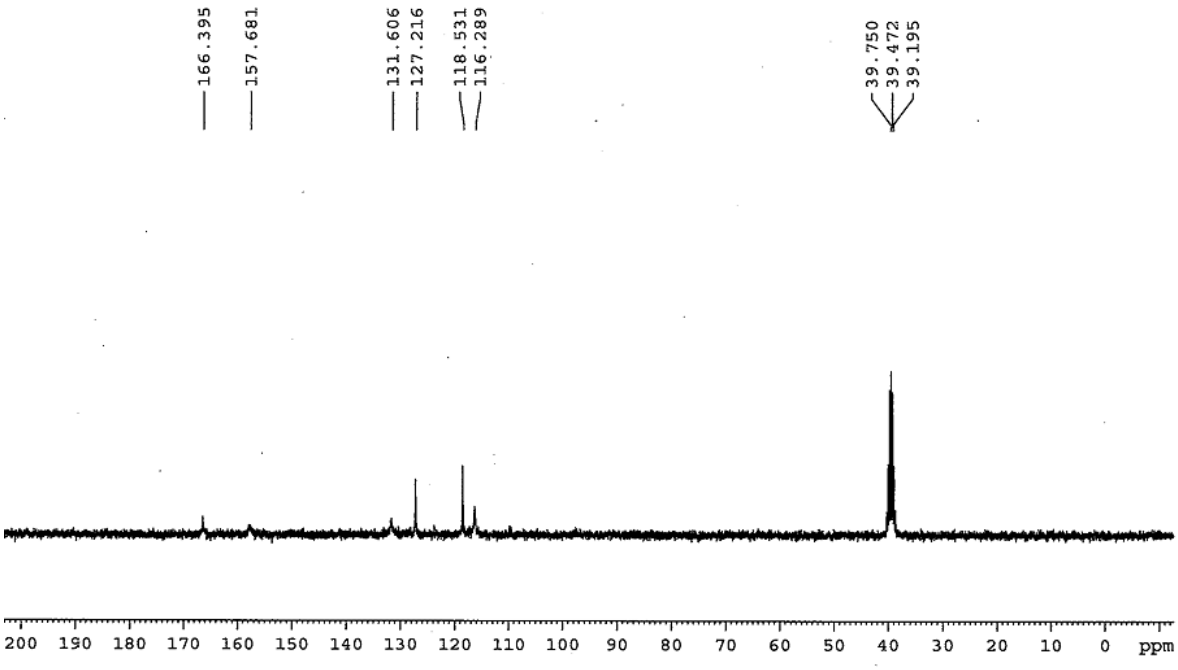

Figure S2: ^{13}C NMR (400 MHz, d_6-DMSO) spectrum of [Bi(H-SHA)$_3$] **1**

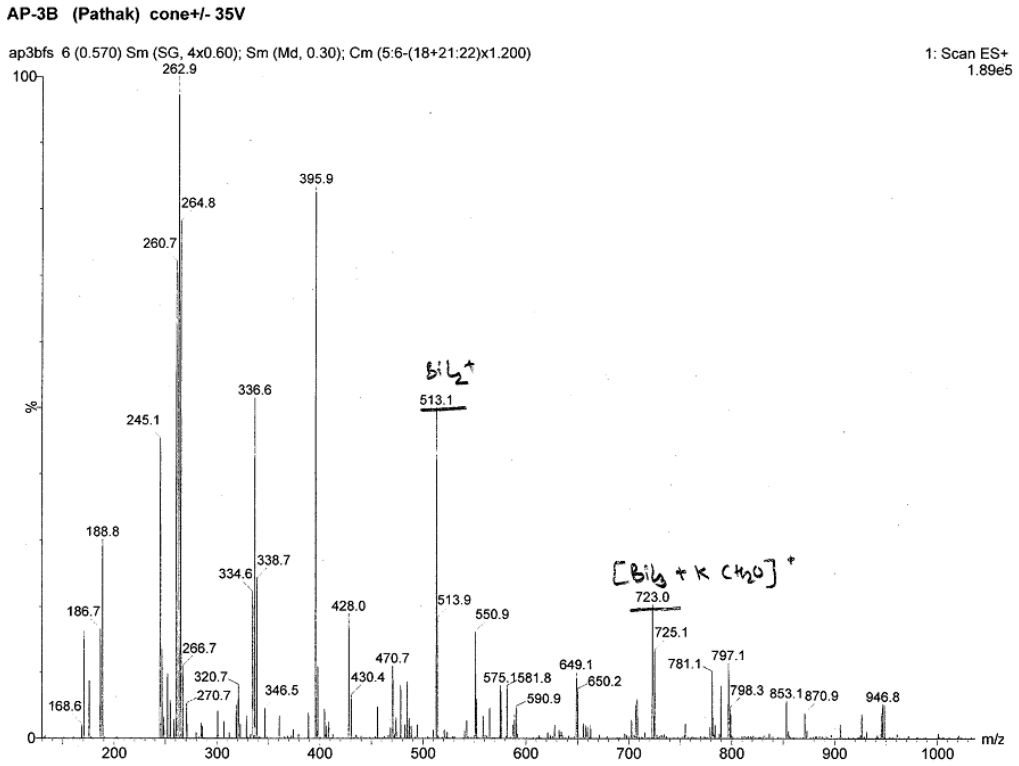

Figure S3: Mass-spectrum (ESI^+) of complex $[Bi(H\text{-}SHA)_3]$ **1**

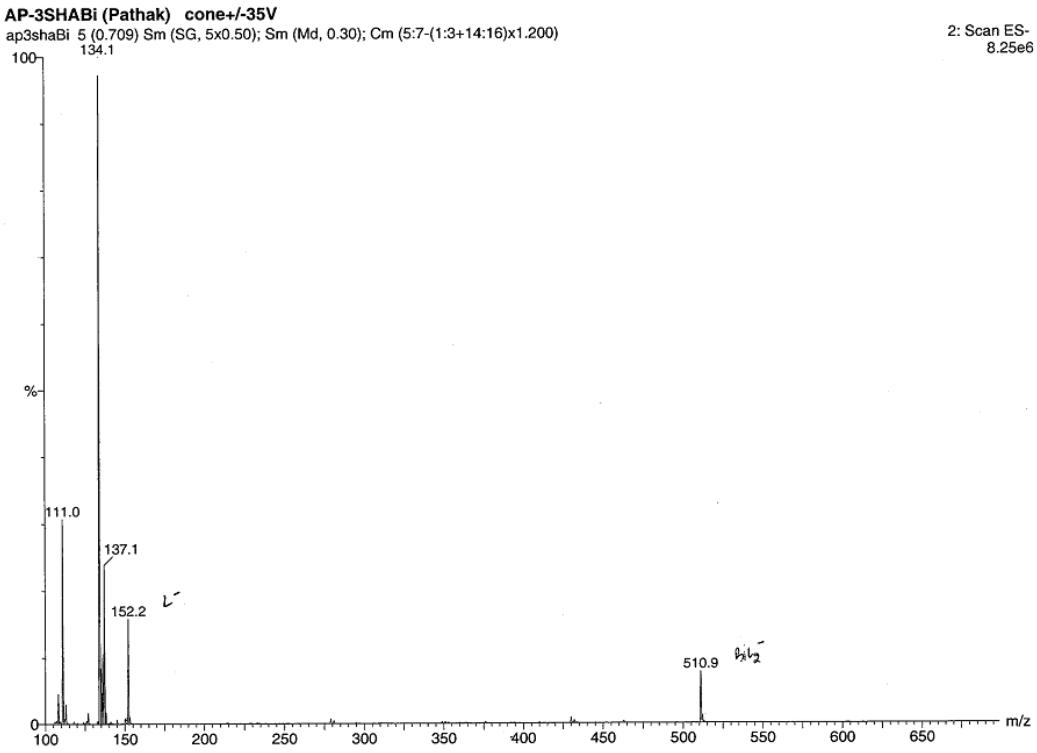

Figure S4: Mass-spectrum (ESI^-) of complex $[Bi(H\text{-}SHA)_3]$ **1**

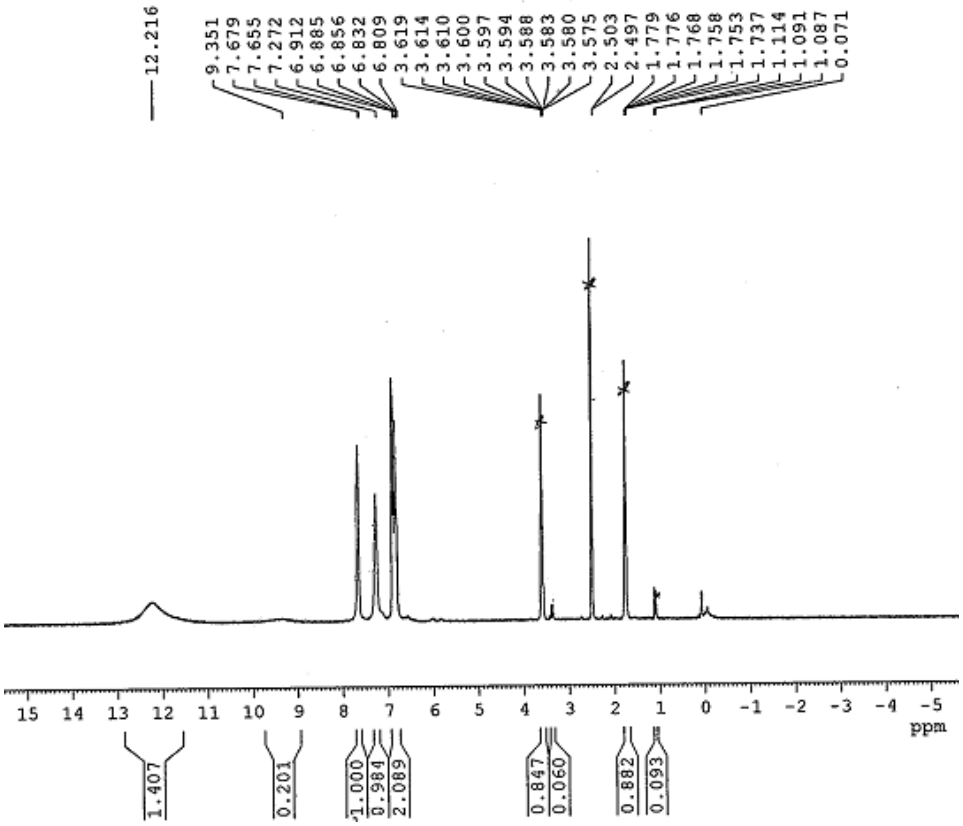

Figure S5: ^{1}H NMR (300 MHz, d_6-DMSO) spectrum of complex Bi(SHA)(H-SHA)] **4**

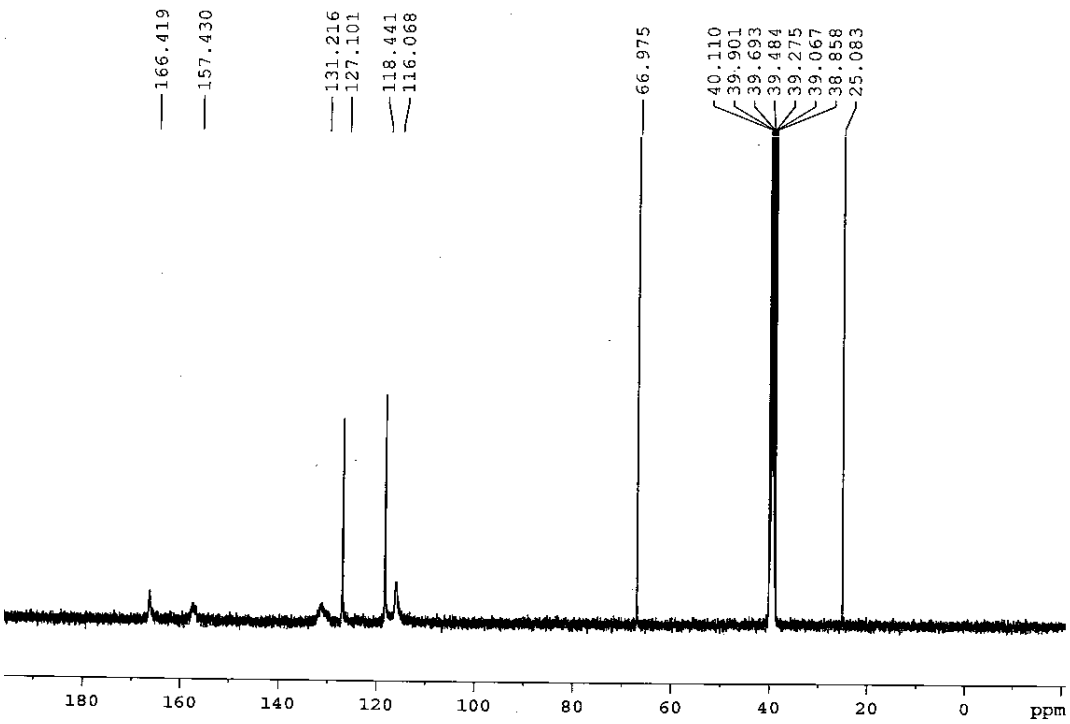

Figure S6: ^{13}C NMR (400 MHz, d_6-DMSO) spectrum of complex Bi(SHA)(H-SHA)] **4**

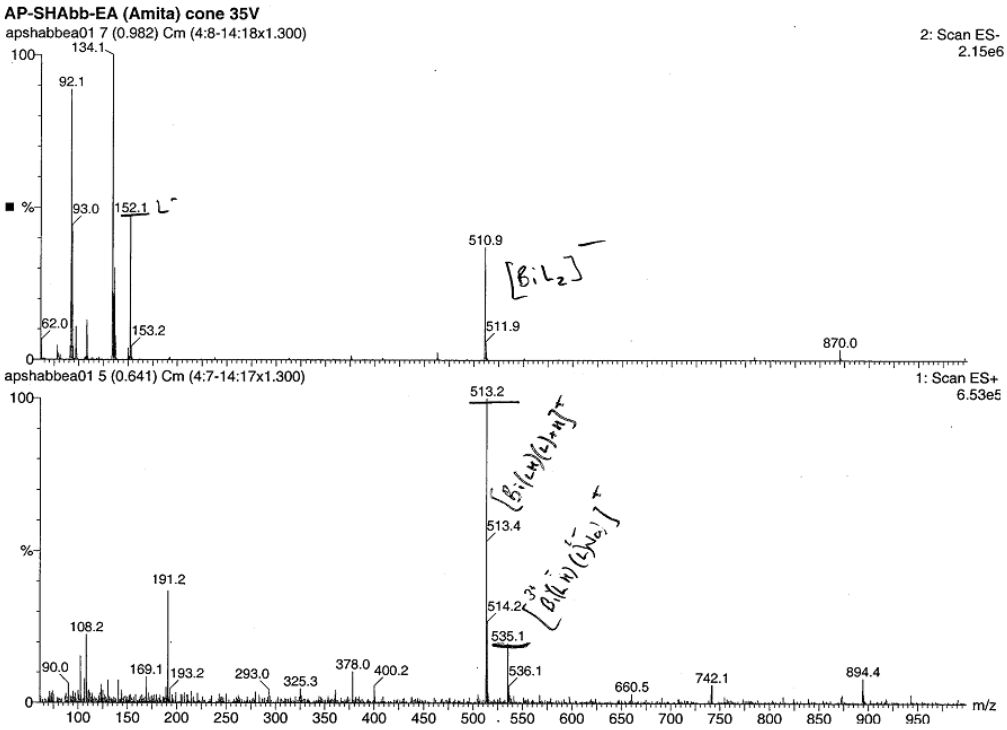

Figure S7: Mass-spectrum (ESI^-) and (ESI^+) of complex Bi(SHA)(H-SHA)] **4**

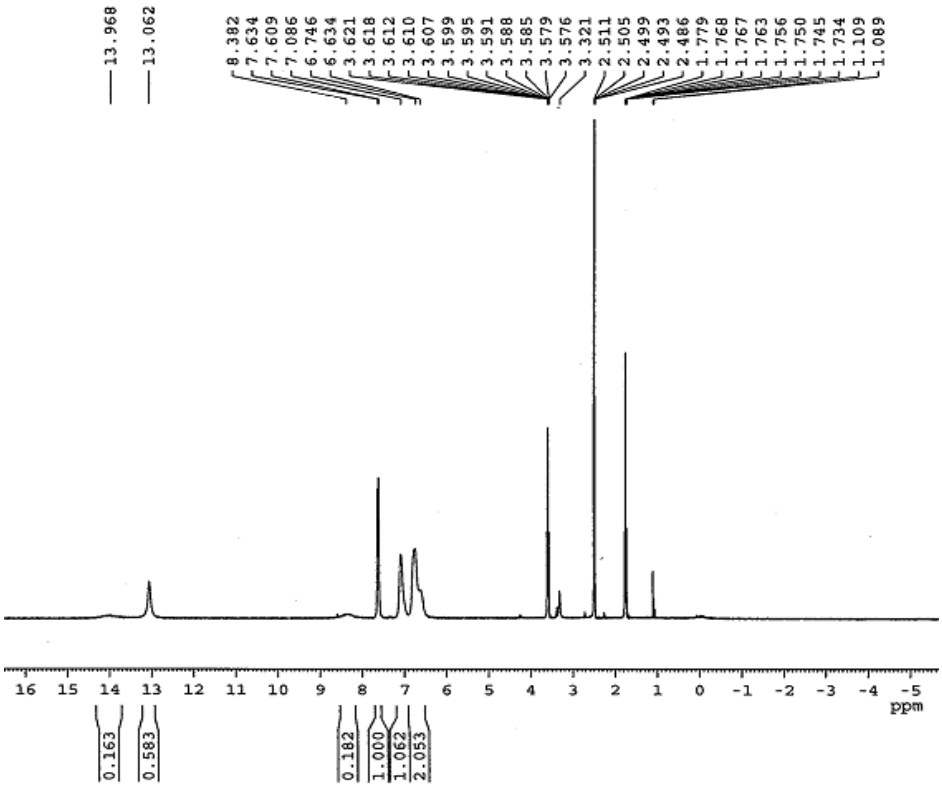

Figure S8: ^1H NMR (300 MHz, d_6-DMSO) spectrum of complex $K[Bi(SHA)_2]$ **8**

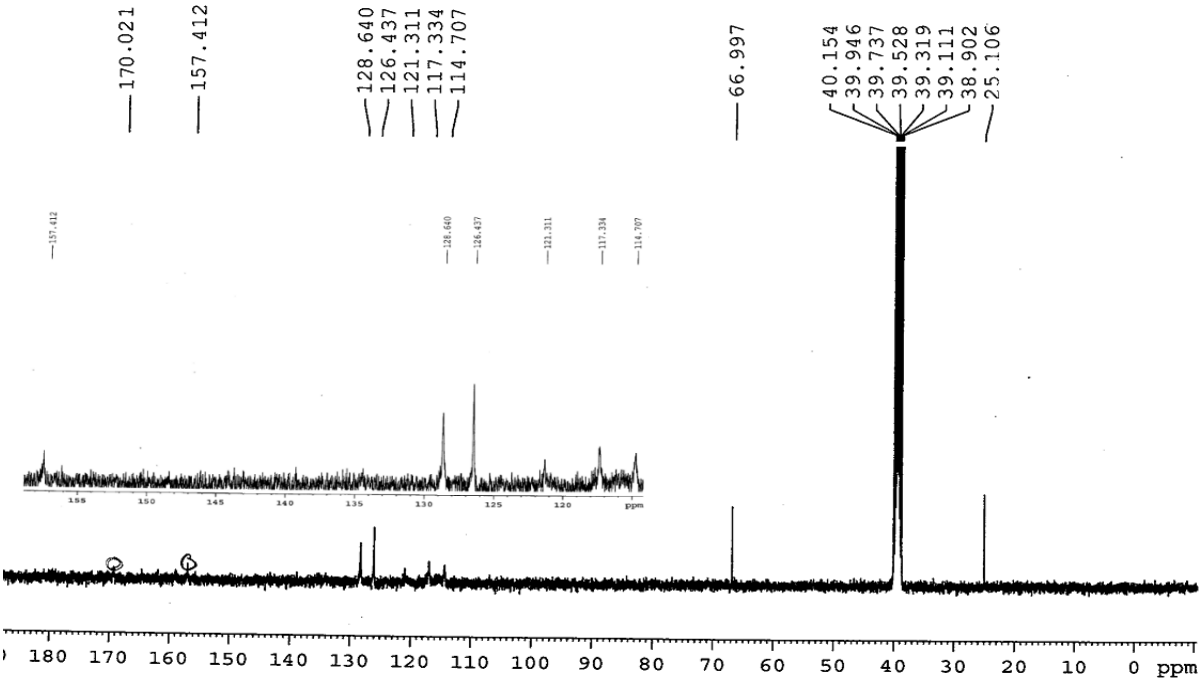

Figure S9: ^{13}C NMR (400 MHz, d_6-DMSO) spectrum of complex K[Bi(SHA)$_2$] **8**

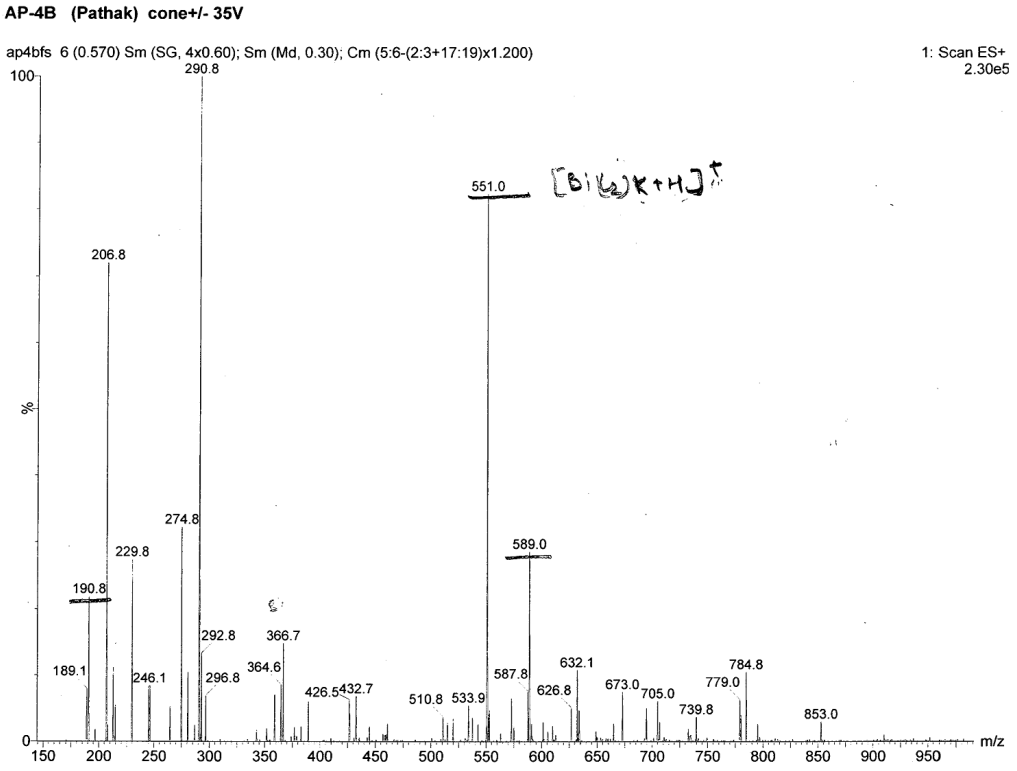

Figure S10: Mass-spectrum (ESI$^+$) of complex K[Bi(SHA)$_2$] **8**

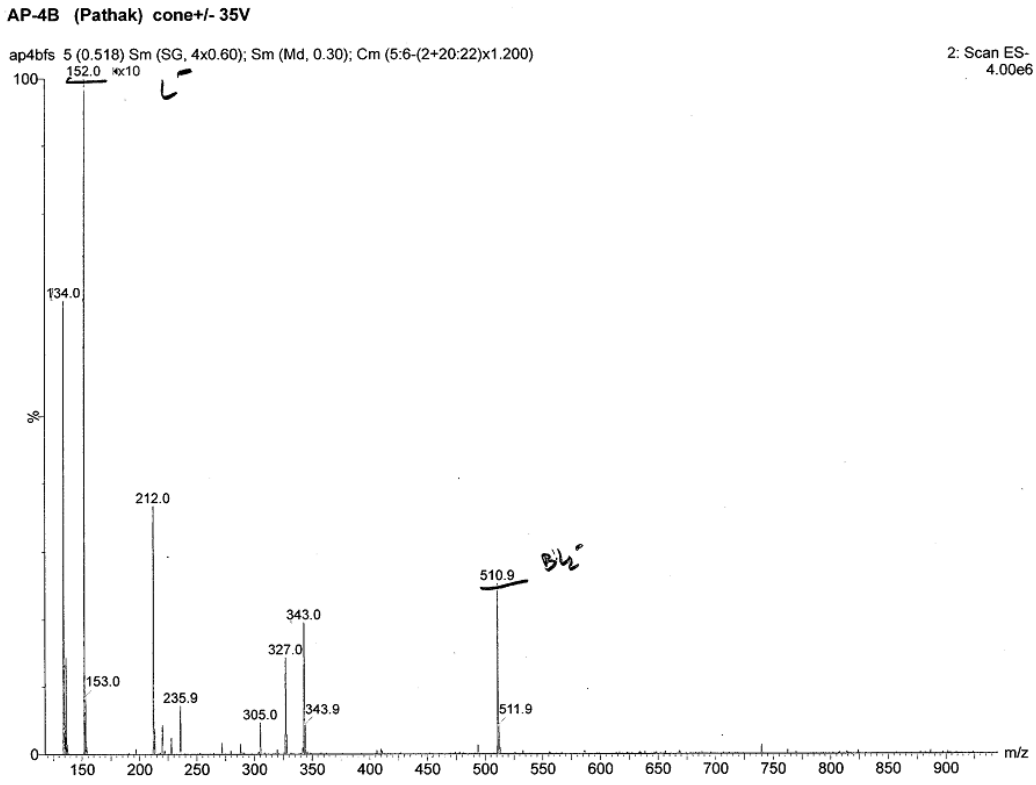

Figure S11: Mass-spectrum (ESI^-) of complex $K[Bi(SHA)_2]$ **8**

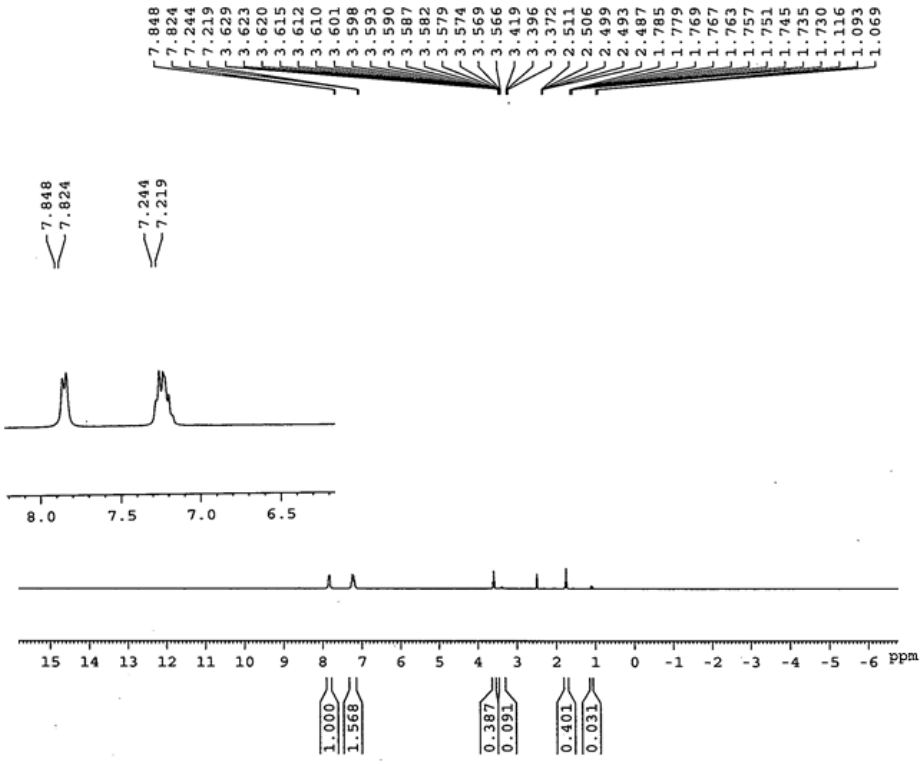

Figure S12: ^1H NMR (300 MHz, d_6-DMSO) spectrum of complex $K[Bi(BHA)_2]$ **9**

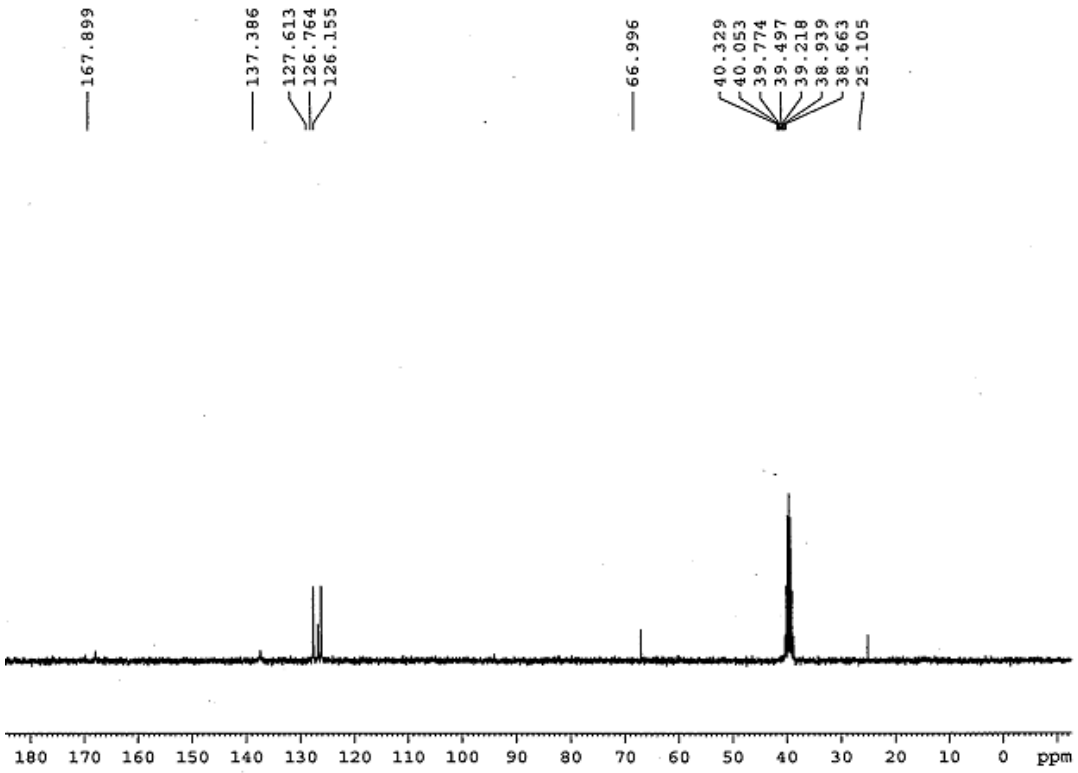

Figure S13: ^{13}C NMR (300 MHz, d_6-DMSO) spectrum of complex K[Bi(BHA)$_2$] **9**

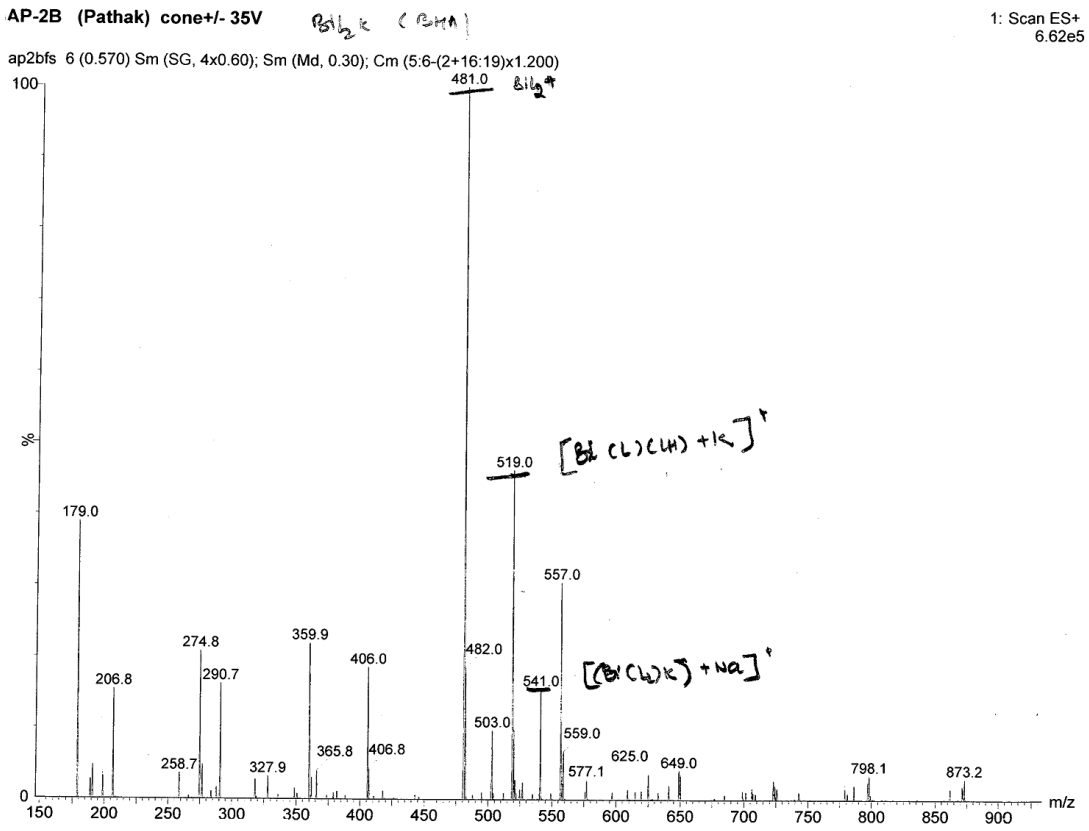

Figure S14: Mass-spectrum (ESI$^+$) of complex K[Bi(BHA)$_2$] **9**

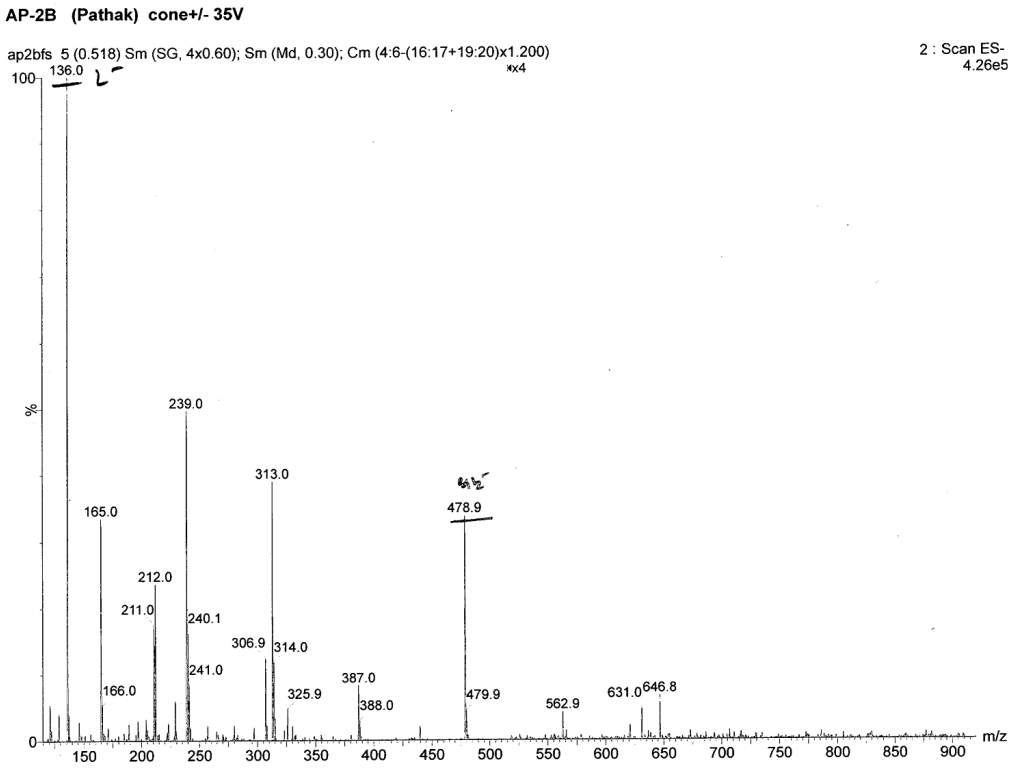

Figure S15: Mass-spectrum (ESI^-) of complex $K[Bi(BHA)_2]$ **9**

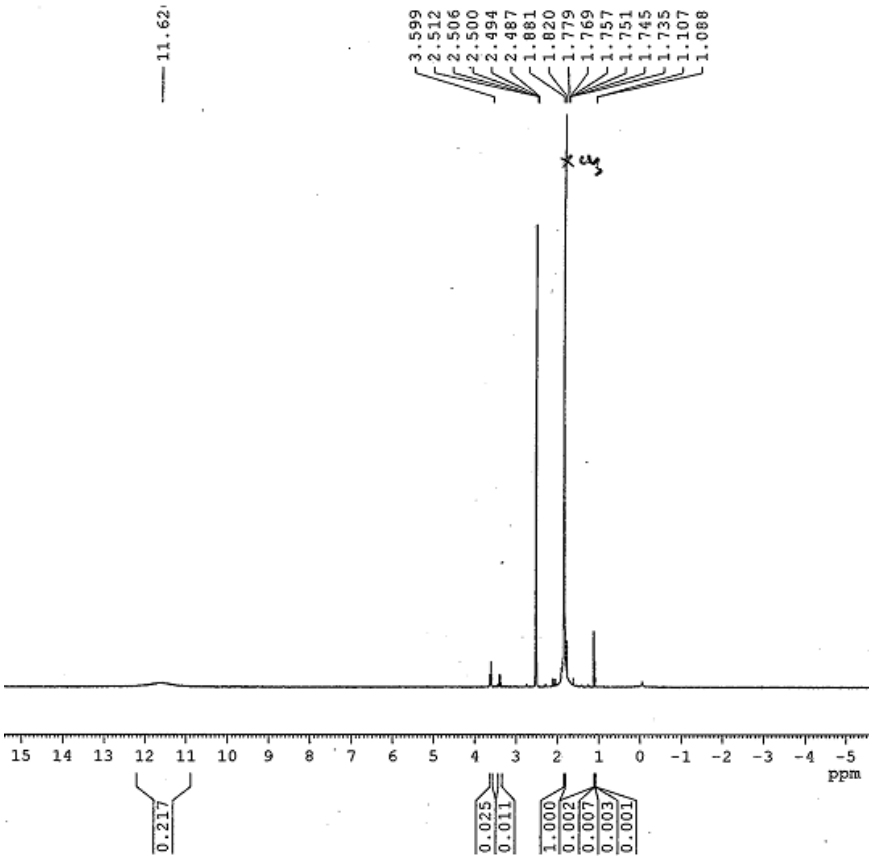

Figure S16: ^1H NMR (300 MHz, d_6-DMSO) spectrum of complex [Bi(AHA)(H-AHA)] **5**

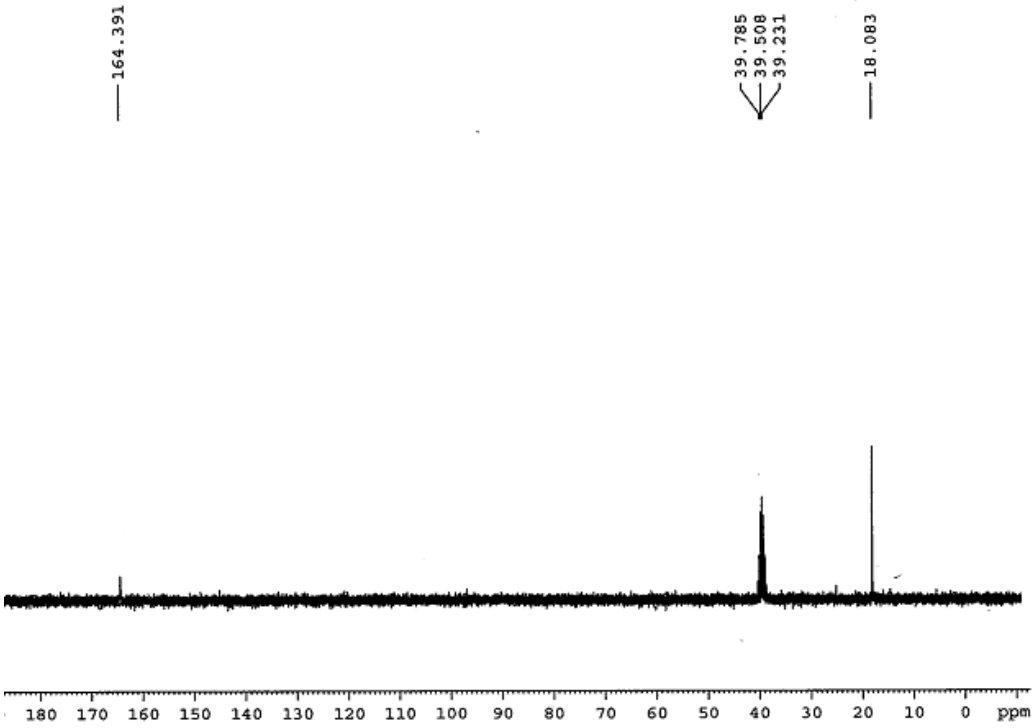

Figure S17: ^{13}C NMR (300 MHz, d_6-DMSO) spectrum of complex [Bi(AHA)(H-AHA)] **5**

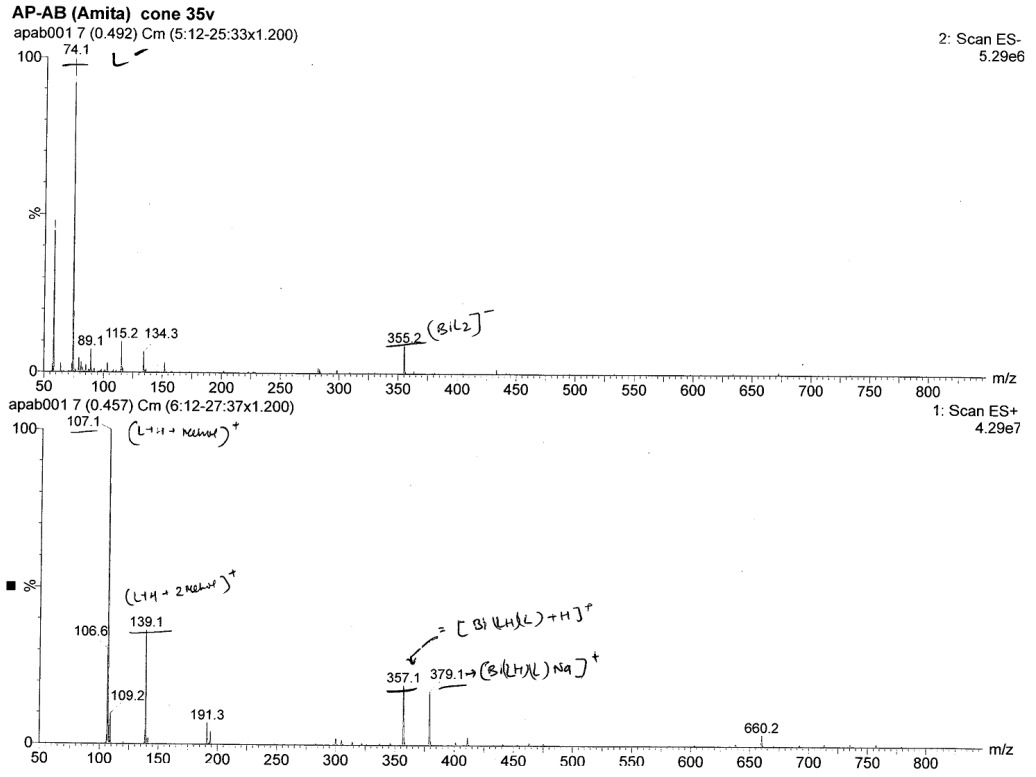

Figure S18: Mass-spectrum (ESI^-) and (ESI^+) of complex [Bi(AHA)(H-AHA)] **5**

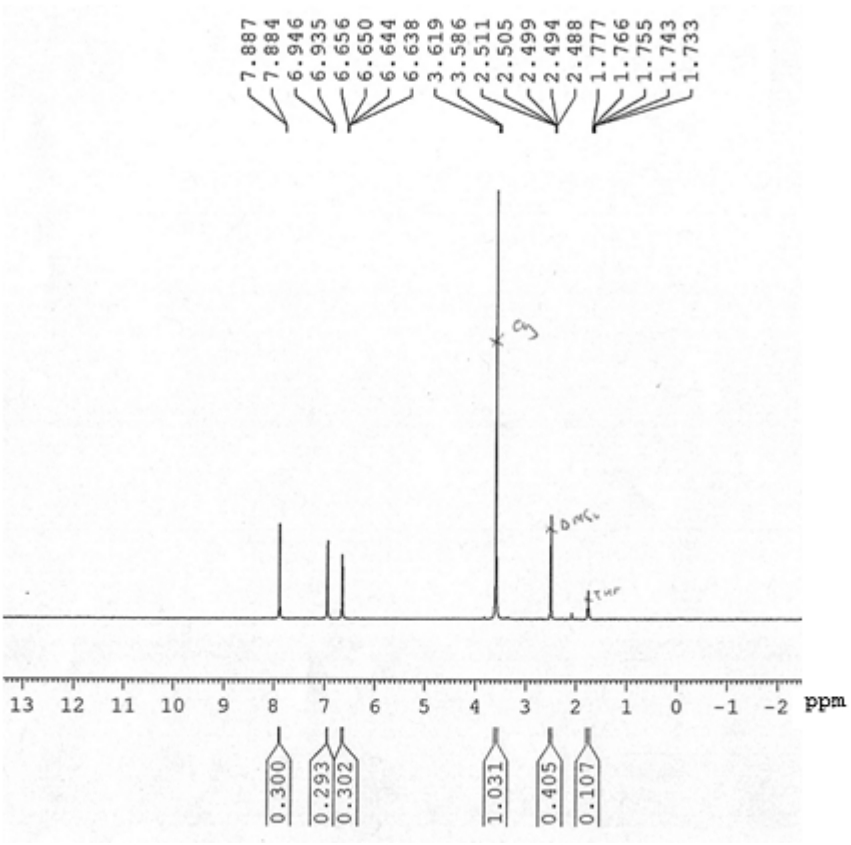

Figure 19: ^{1}H NMR (300 MHz, d_6-DMSO) spectrum of complex [Bi(MFHA)$_3$] **3**

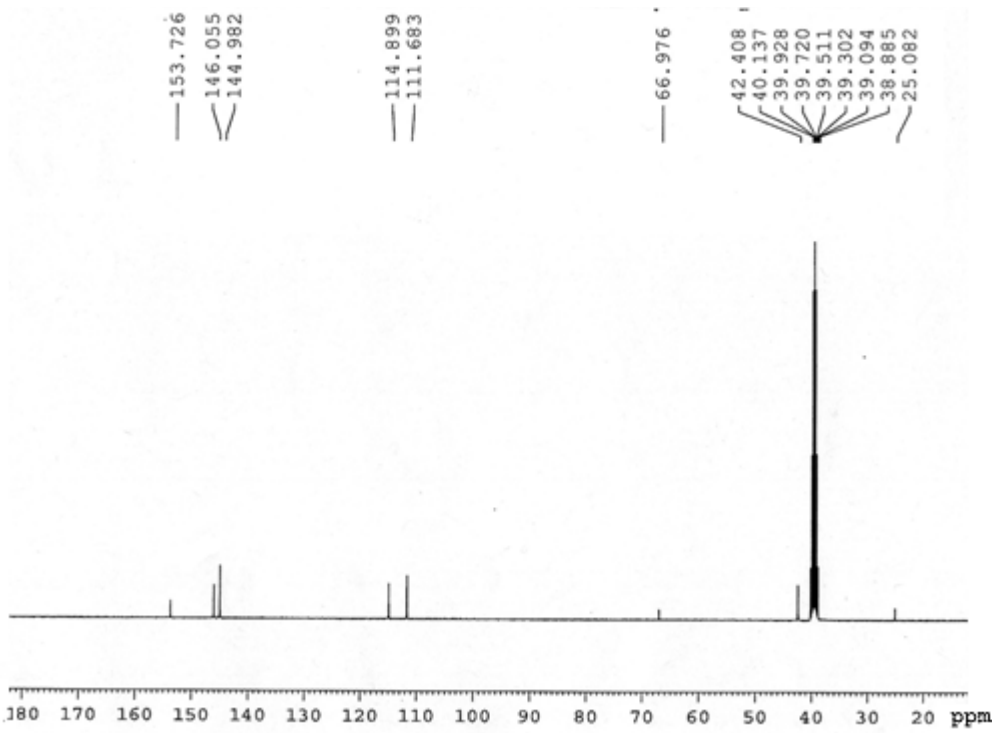

Figure 20: ^{13}C NMR (400 MHz, d_6-DMSO) spectrum of complex [Bi(MFHA)$_3$] **3**

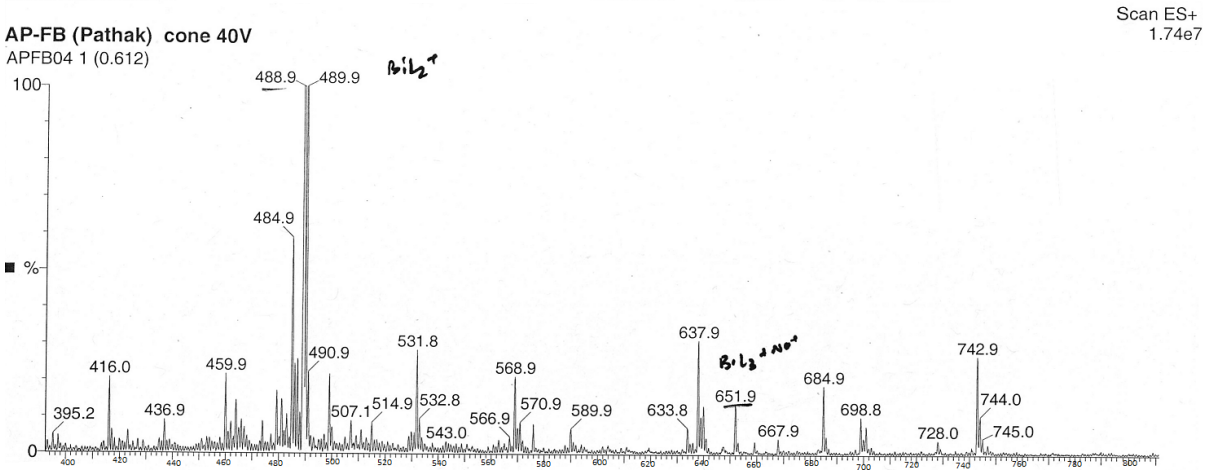

Figure S21: Mass-spectrum (ESI^+) of complex $[Bi(MFHA)_3]$ **3**

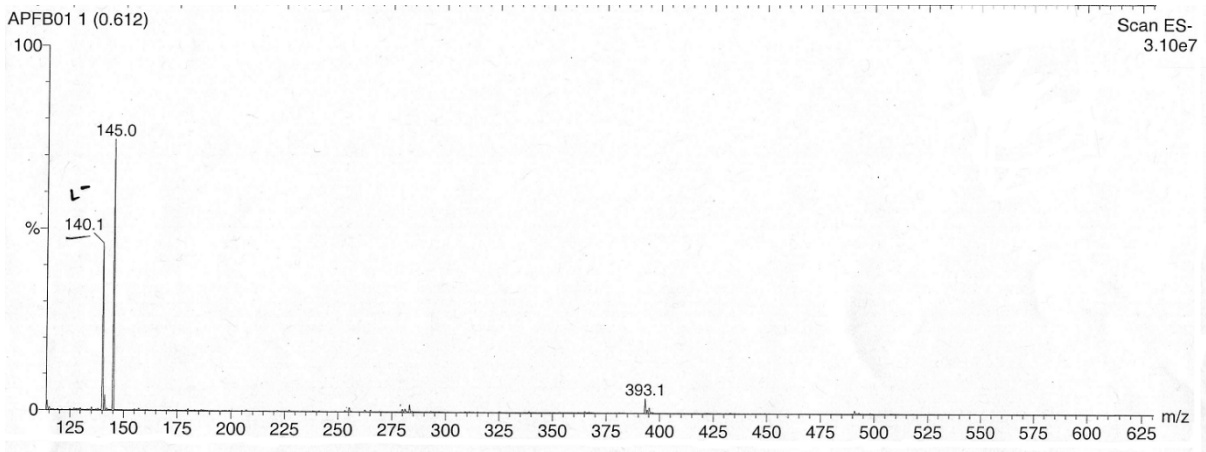

Figure S22: Mass-spectrum (ESI^-) of complex $[Bi(MFHA)_3]$ **3**

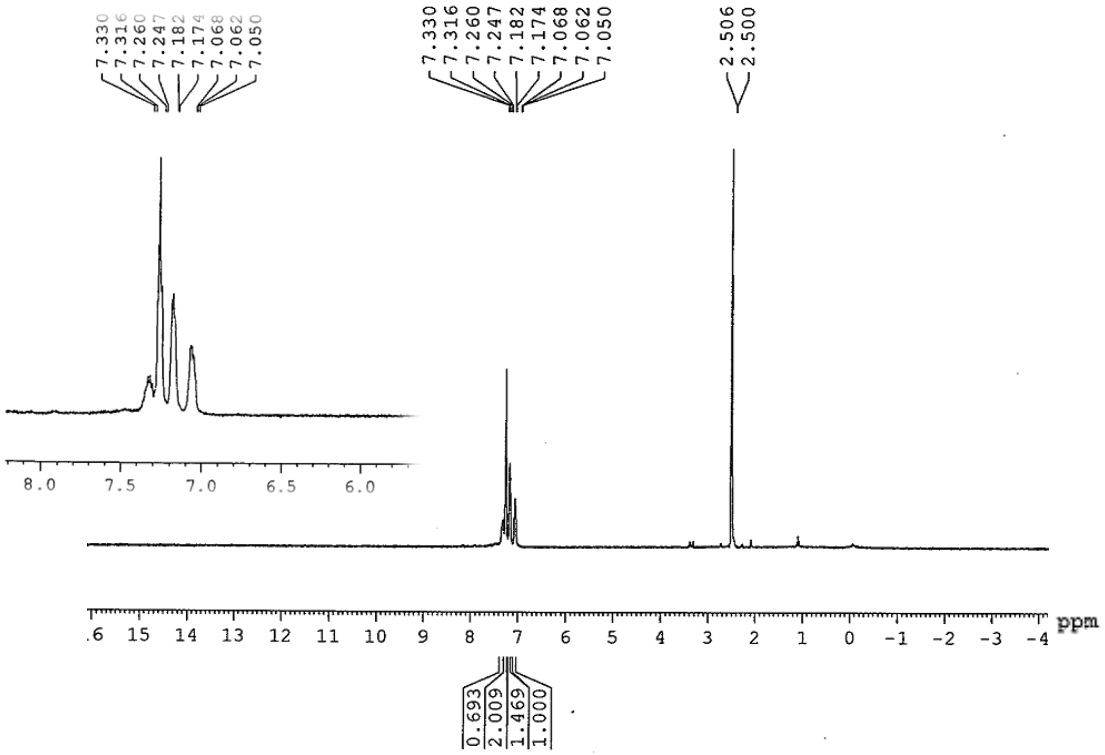

Figure S23: ^{1}H NMR (300 MHz, d_6-DMSO) spectrum of complex [Bi(BPHA)$_3$] **7**

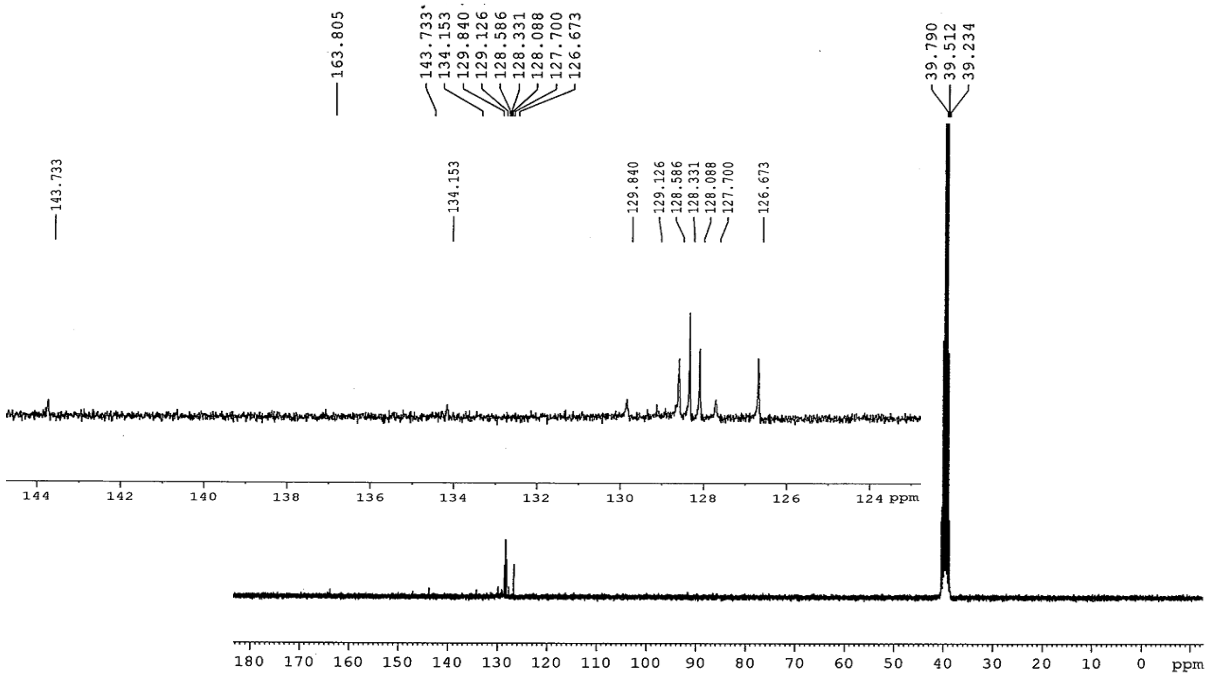

Figure S24: ^{13}C NMR (300 MHz, d_6-DMSO) spectrum of [Bi(BPHA)$_3$] **7**

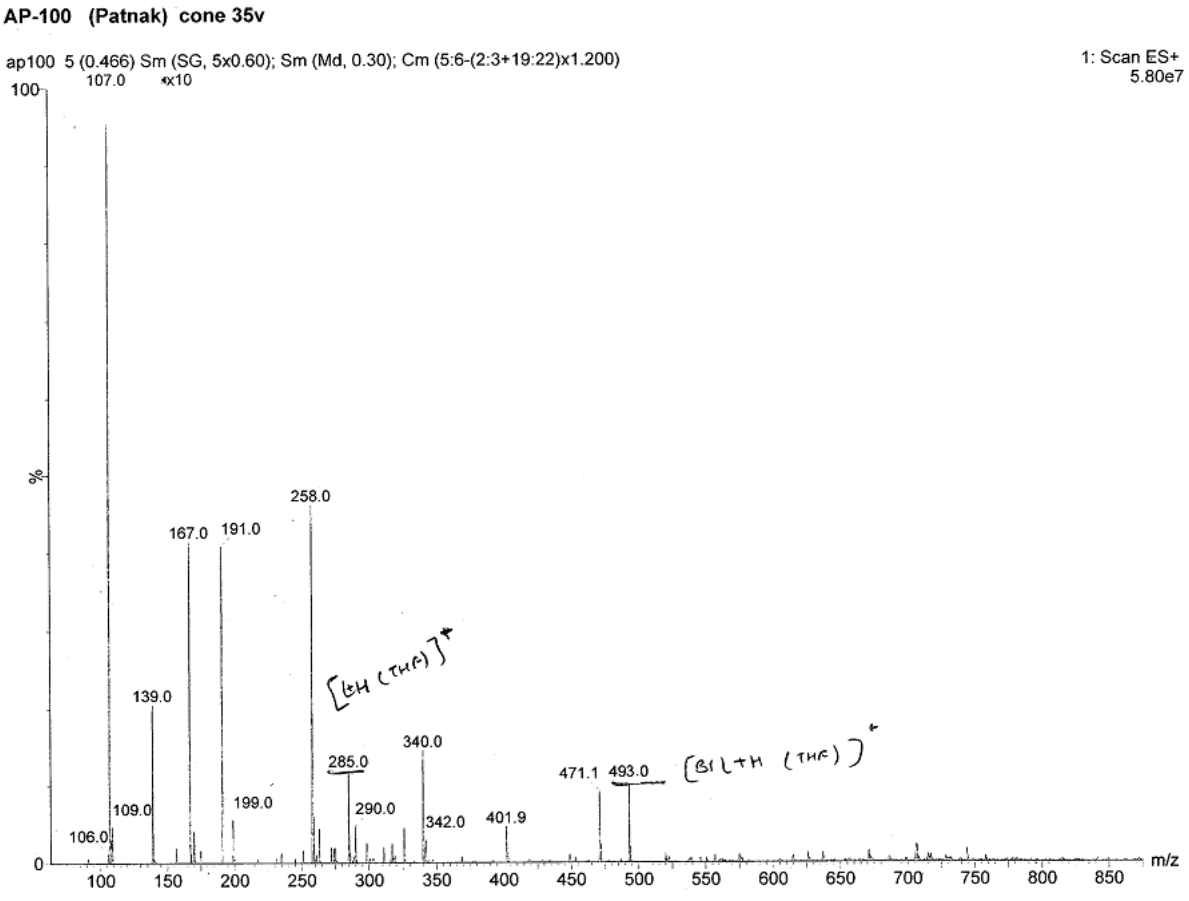

Figure S25: Mass-spectrum (ESI^+) of complex $[Bi(BPHA)_3]$ **7**

Table S1 Summary of IR absorbances (cm^{-1}) of parent hydroxamic acids and their bismuth(III) derivatives **1** – **9**.

		N-H	**O-H**	**C=O**	**C-O**	**C-N**	**C=N**	**N-O**
H_2-SHA		3286	3046	1599		1452		903
[Bi(H-SHA)$_3$]	**1**	3281		1561	1248	1440		909
[Bi(SHA)(H-SHA)]	**4**	3229		1565	1244	1445	1593	910
K[Bi(SHA)$_2$]	**8**				1251		1593	910
H_2-BHA		3286	3019	1640		1450		896
[Bi(H-BHA)$_3$]	**2**	3217		1561	1308	1442		904
[Bi(BHA)(H-BHA)]	**6**	3057		1561	1309	1443	1595	898
K[Bi(BHA)$_2$]	**9**				1306	1442	1596	898
H_2-AHA		3164	3038	1623		1318		1087
[Bi(AHA)(H-AHA)]	**5**	3163		1534	1280	1313	1595	1084
H-MFHA			2863	1603		1431		940
[Bi(MFHA)$_3$]	**3**			1552		1401		959
H-BPHA			3167	1623		1446		921
[Bi(BPHA)$_3$]	**7**			1530		1420		916

Table S2: Summary of results obtained from mass-spectral hydrolysis studies

Mass spectrometry (ESI) hydrolysis studies were performed on a Micromass Platform QMS spectrometer with an electrospray source and a cone voltage of +35 eV using a wet DMSO and MeOH solution as the mobile phase. Mass-range studied was (0-1500).

Complex	**Positive ion mode**	
	m/z	**Assignment**
$[Bi(H\text{-}SHA)_3]$ **1**	373.0, 534.9	$[Bi_4O_2L_2(OH)_2(H_2O)_4]^{4+}$, $[Bi_4O_2L_2(OH)_2(H_2O)_{13}]^{4+}$
Bi(SHA)(H-SHA)] **4**	356.0, 392.0	$[Bi_4O_2L_2(OH)_2(H_2O)]^{4+}$, $[Bi_4O_2L_2(OH)_2(H_2O)_5]^{4+}$
$K[Bi(SHA)_2]$ **8**	305.8, 321.8, 550.9, 588.9, 626.9	$[Bi_3OL(OH)(MeOH)_2(H_2O)_2]^{4+}$, $[Bi_3L_2(OH)(MeOH)(H_2O)_3]^{4+}$, $[Bi_6O_4L_2(MeOH)(DMSO)(H_2O)_2]^{4+}$, $[Bi_8O_6L_2(OH)_4(H_2O)_3]^{4+}$, $[Bi_8O_6L(OH)_6(MeOH)_3(H_2O)_5]^{4+}$
$K[Bi(BHA)_2]$ **9**	213.9, 274.8	$[LH_2+ Na (H_2O)_3]^{+}$, $[LH_2+ Na (MeOH)_3(H_2O)]^{+}$
Bi(BHA)(H-BHA)] **6**	138.0, 270.0, 302.0, 379.9	$[LH_2+H]^{+}$, $[LH_2+H (MeOH)_3(H_2O)]+$, $[LH_2+H (MeOH)_4(H_2O)]+$, $[Bi_4O_2L_2(OH)_2(H_2O)_3(MeOH)]^{4+}$
[Bi(AHA)(H-AHA)] **5**	216.6, 247.0	$[Bi_3L_2(OH)(H_2O)]^{4+}$, $[Bi_3OL(OH)(MeOH)_2]^{4+}$
$[Bi(MFHA)_3]$ **3**	437.1, 595.1, 930.1	$[Bi_4O_2L_2(OH)_2(MeOH)_2(DMSO)]^{4+}$, $[Bi_6O_6L_2(MeOH)(DMSO)_2]^{4+}$,
		$[Bi_8O_6L_2(OH)_6(MeOH)(H_2O)_{20}]^{4+}$
$[Bi(BPHA)_3]$ **7**	449.0, 706.2	$[Bi_4O_2L_2(OH)_2(MeOH)_2(H_2O)_3]^{4+}$, $[Bi_6O_4L_4(MeOH)_4(H_2O)_2]^{4+}$