

## Supplementary Data

### Anti-bacterial efficacy of *N*-(4-methylpyridin-2-yl) thiophene-2-carboxamide analogues against extended-spectrum- $\beta$ -lactamase producing clinical strain of *Escherichia coli* ST 131

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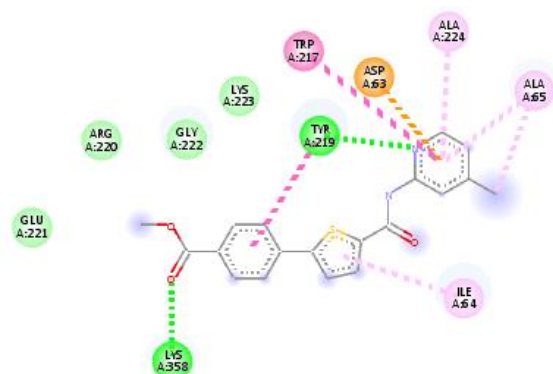
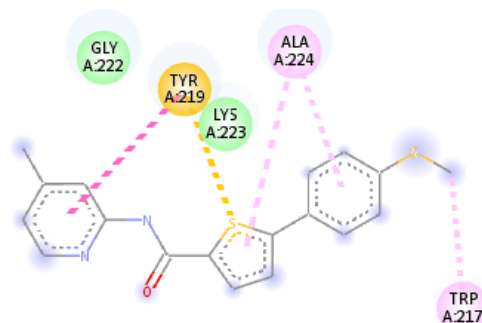
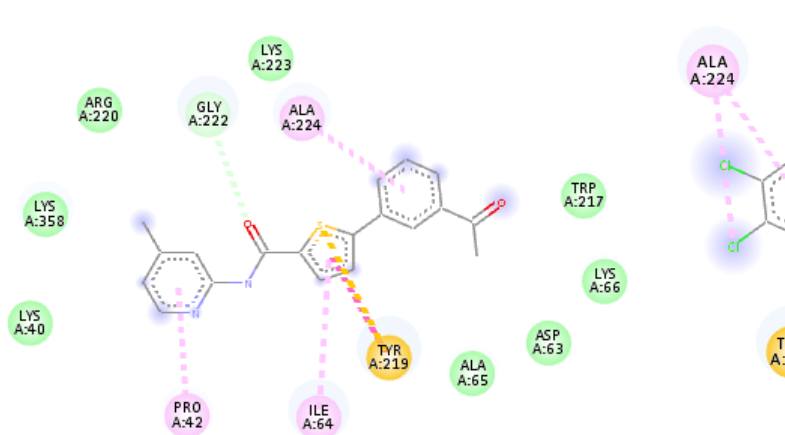
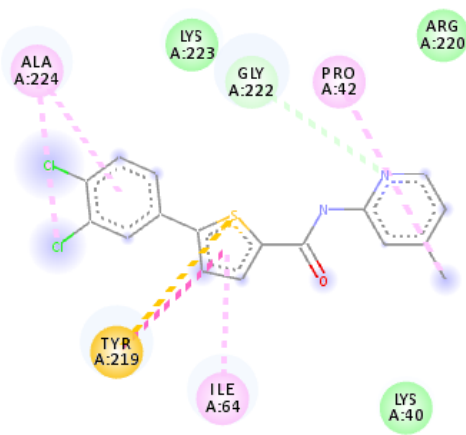
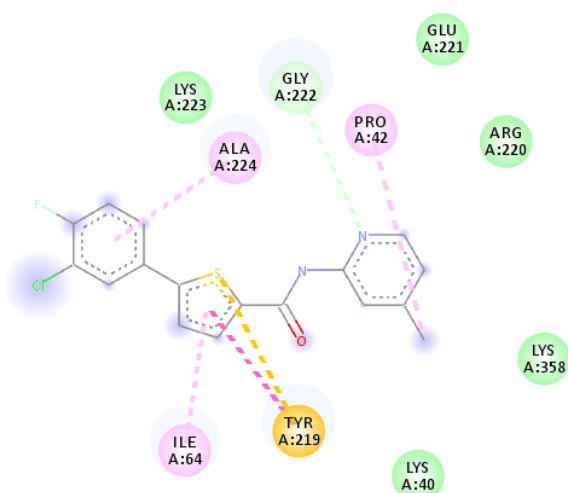
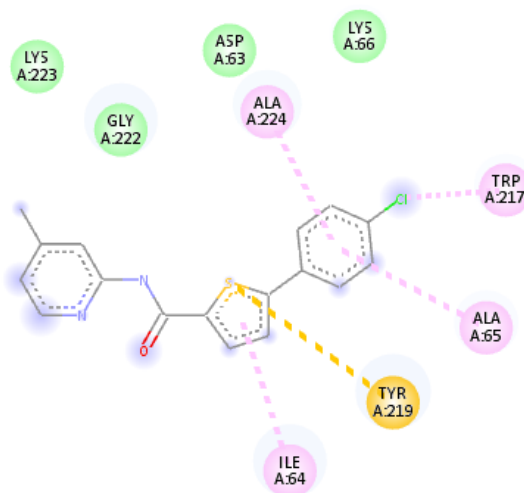
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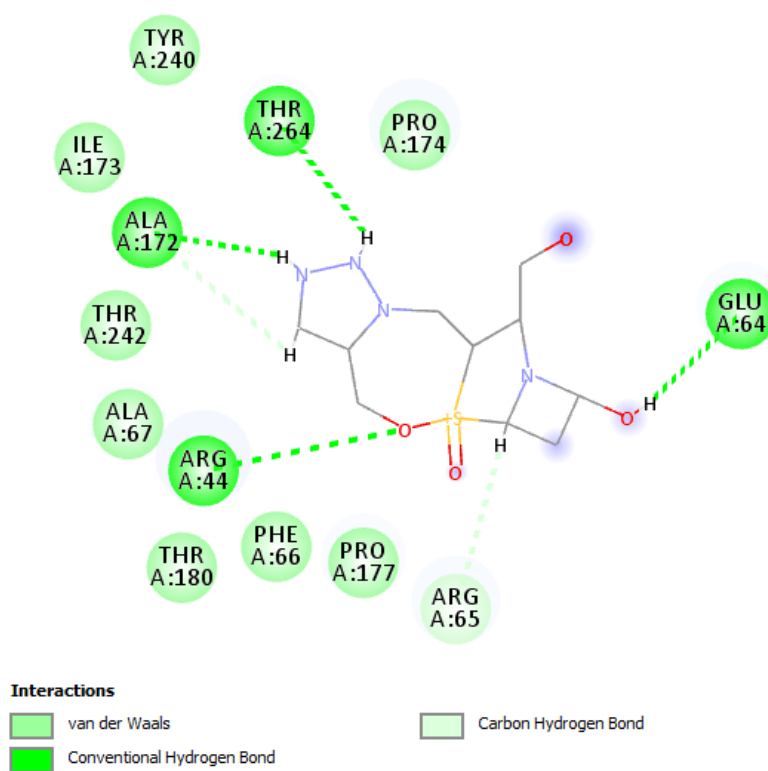
**Table S1:** Energy score and Root Mean Square Deviations (RMSDs) of selected docked poses

Ligands	6N9K		
	S-score	RMSD	Interacting Residues
<b>4a</b>	-5.2	3.3	Hydrogen bonding: R257 Hydrophobic: N255, D258
<b>4b</b>	-4.6	1.5	Hydrogen bonding: Y219, K358 Hydrophobic: D63, A65, A224, W217
<b>4c</b>	-5.3	1.6	Hydrogen bonding: Y219, K358 Hydrophobic: T219, W217, A224
<b>4d</b>	-4.7	2.08	Hydrogen bonding: K358 Hydrophobic: P42, I64
<b>4e</b>	-4.8	3.0	Hydrogen bonding: G222 Hydrophobic: P42, Y219, I64, A224
<b>4f</b>	-4.6	2.8	Hydrophobic: P42, I64, Y219, A224
<b>4g</b>	-4.2	1.9	Hydrophobic: P42, I64, Y219, A224
<b>4h</b>	-5.0	2.0	Hydrophobic: I64, A65, W217, Y219, A224
7BDS			
<b>Tazobactam</b>	-5.4	2.78	Hydrogen bonding: R44, E64, R65, A172, T264
<b>4a</b>	-6.6	1.5	Hydrogen bonding: S130, S220, G236 Hydrophobic: Y105, A219, R274
<b>4b</b>	-6.4	2.7	Hydrogen bonding: S130, S220, G236 Hydrophobic: Y105, A219, S237, R274
<b>4c</b>	-6.5	1.3	Hydrogen bonding: S130, P167 Hydrophobic: S237
<b>4d</b>	-6.5	1.6	Hydrogen bonding: S130 Hydrophobic: Y105, A219, S237
<b>4e</b>	-6.4	3.6	Hydrogen bonding: N132 Hydrophobic: Y105, N170, S237, G238,
<b>4f</b>	-6.4	1.9	Hydrogen bonding: P167, N170, T216 Hydrophobic: S237, G238
<b>4g</b>	-6.3	2.3	Hydrogen bonding: K73, N132 Hydrophobic: Y105, A219, S237, R274
<b>4h</b>	-6.4	3.0	Hydrogen bonding: S130, G236, S220 Hydrophobic: Y105, P167, A219, S237, R274

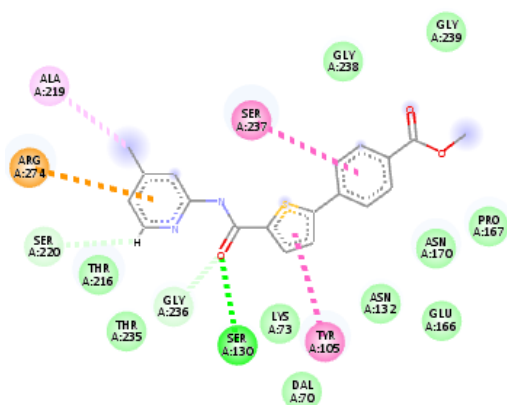
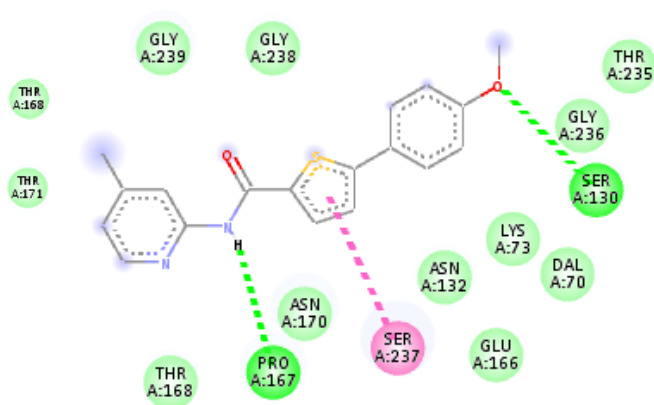
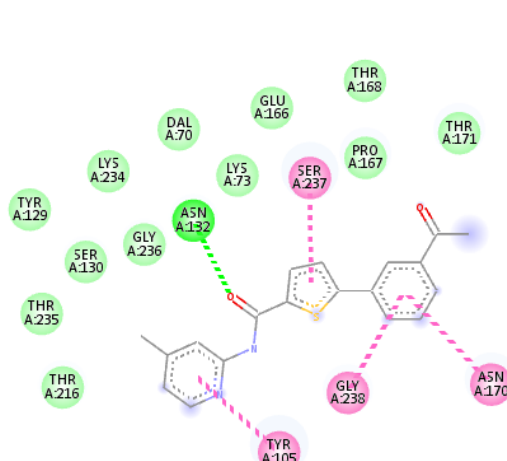
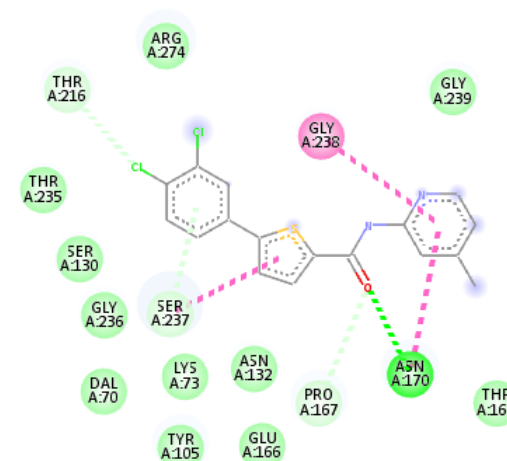
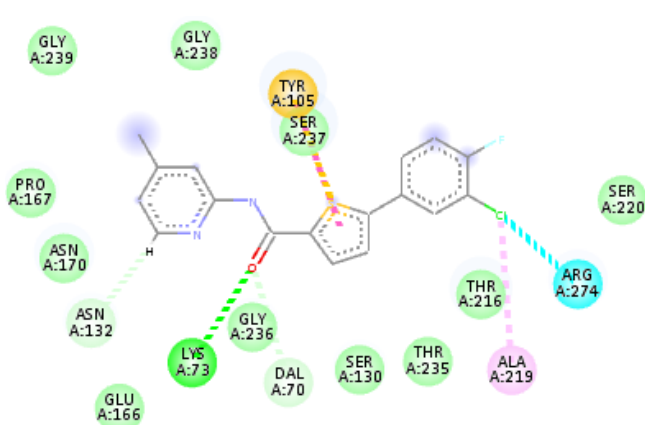
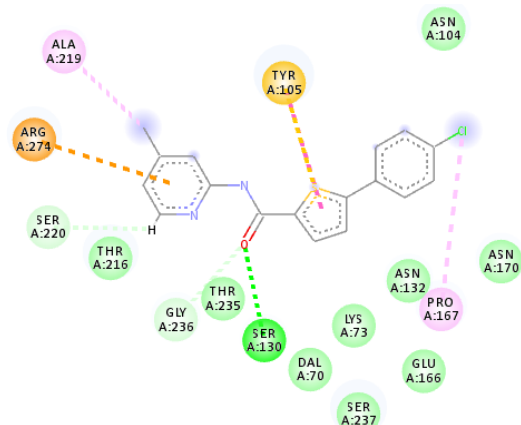
\*S-score represents the binding energy of the protein-ligand complex

**A****B****C****D****E****F**

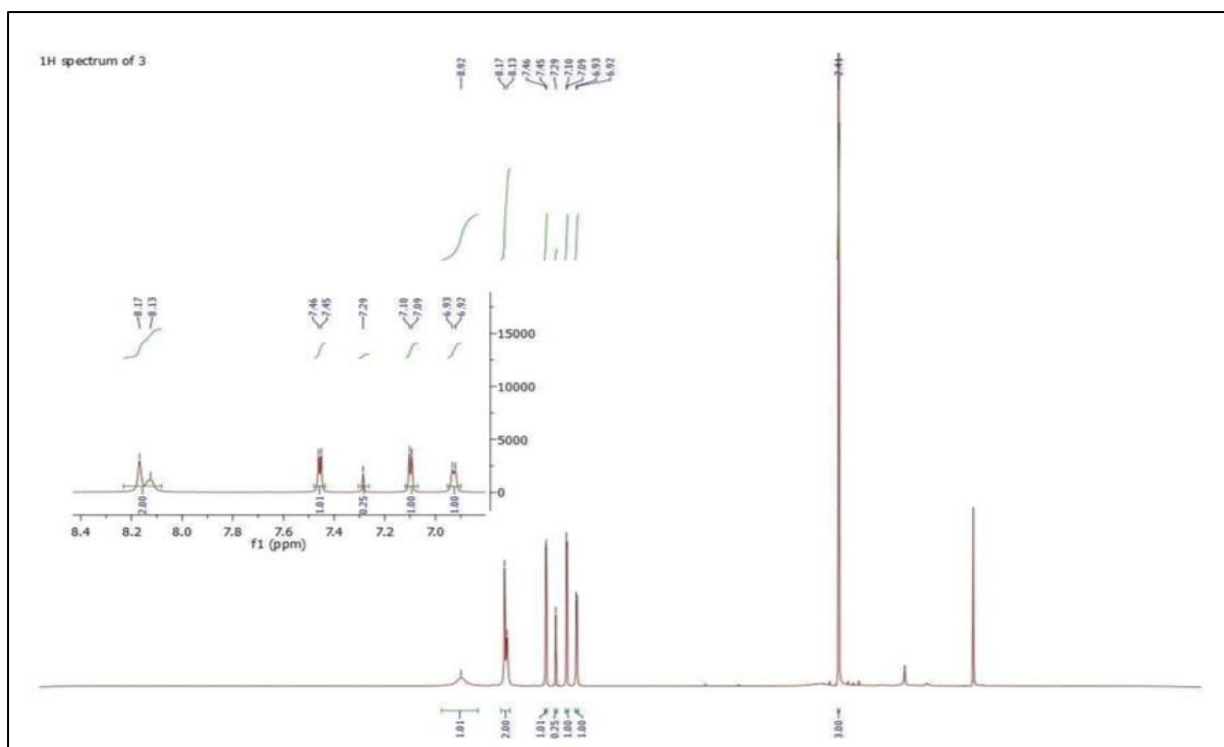
**Figure S1:** Protein ligand interaction analysis of ligands with Beta-lactamase from Escherichia coli (6N9K) protein (A) 6N9K interactions with **4b** compound (B) 6N9K interactions with **4d** compound (C) 6N9K interactions with **4e** compound (D) 6N9K interactions with **4f** compound (E) 6N9K interactions with **4g** compound (F) 6N9K interactions with **4h** compound



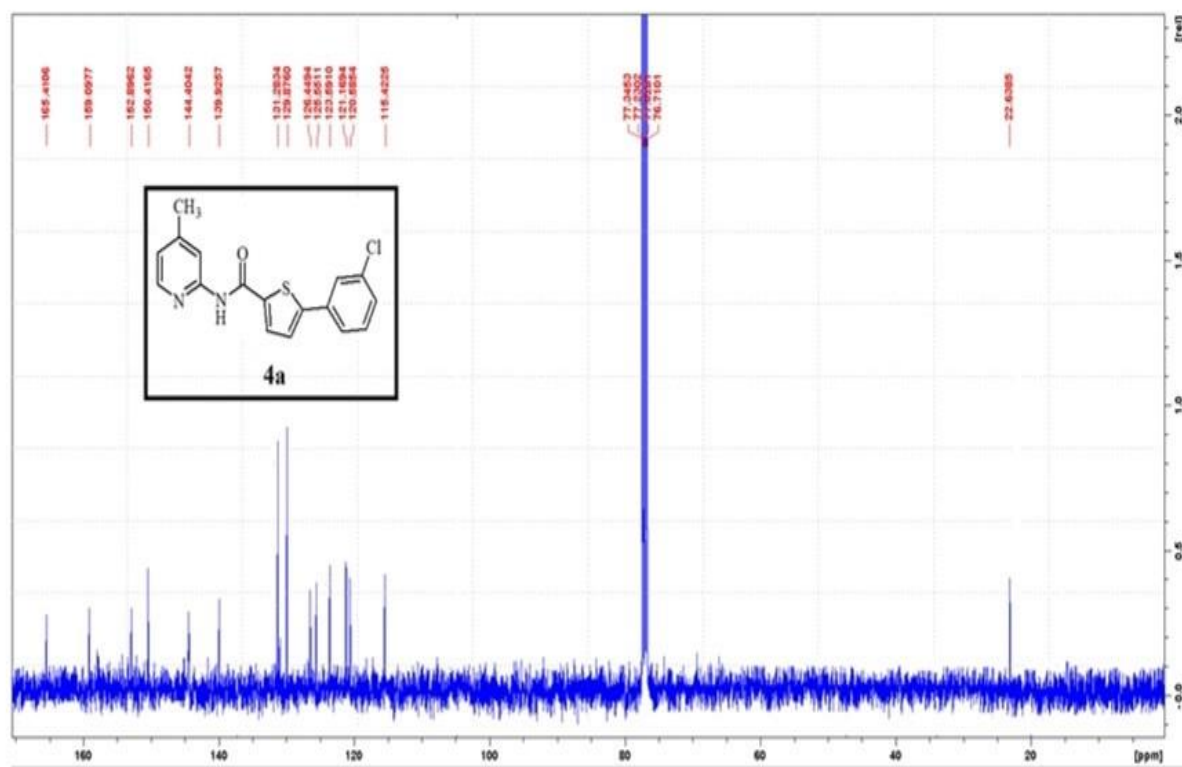
**Figure S2:** Docking interaction of tazobactam reported as  $\beta$ -lactamase inhibitors with CTX-M-15 enzyme (PDB ID: 7BDS).

**A****B****C****D****E****F**

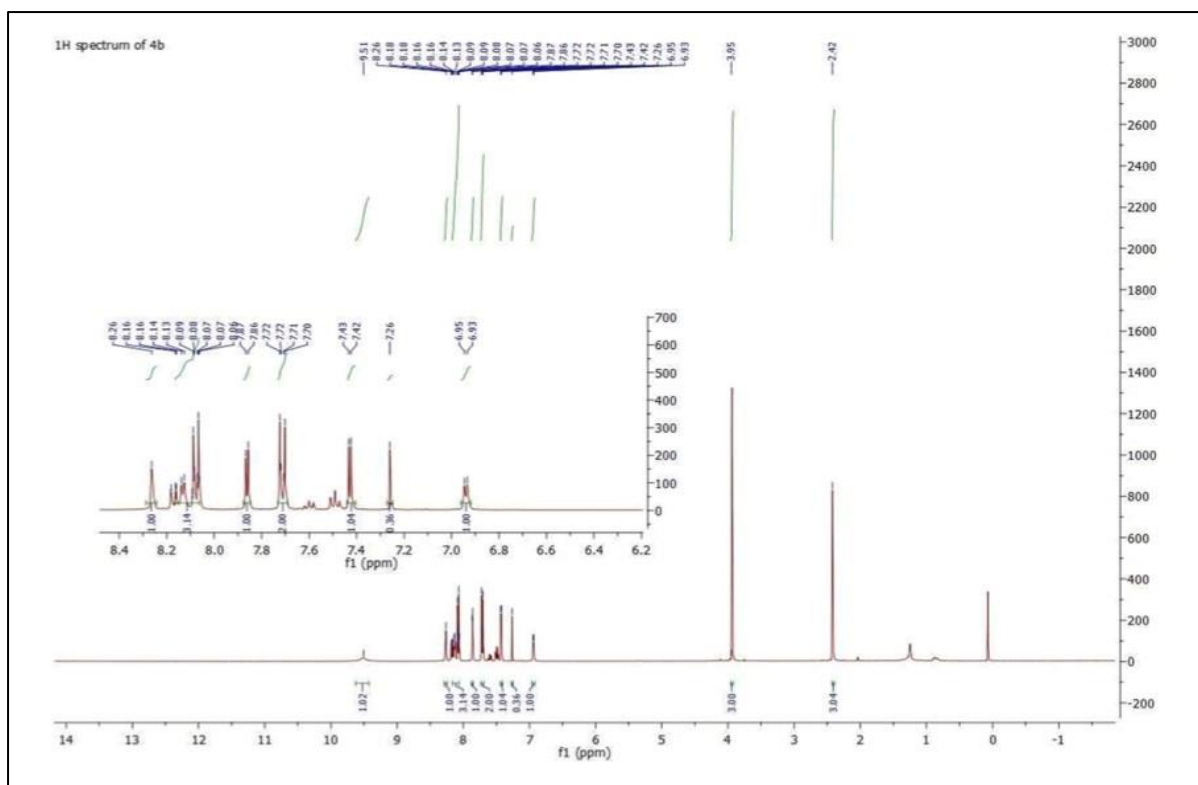
**Figure S3:** Protein ligand interaction analysis of ligands with Beta-lactamase from *Klebsiella pneumoniae* having expression in *Escherichia coli* (7BDS) protein (A) 7BDS interactions with **4b** compound (B) 7BDS interactions with **4d** compound (C) 7BDS interactions with **4e** compound (D) 6N9K interactions with **4f** compound (E) 7BDS interactions with **4g** compound (F) 7BDS interactions with **4h** compound



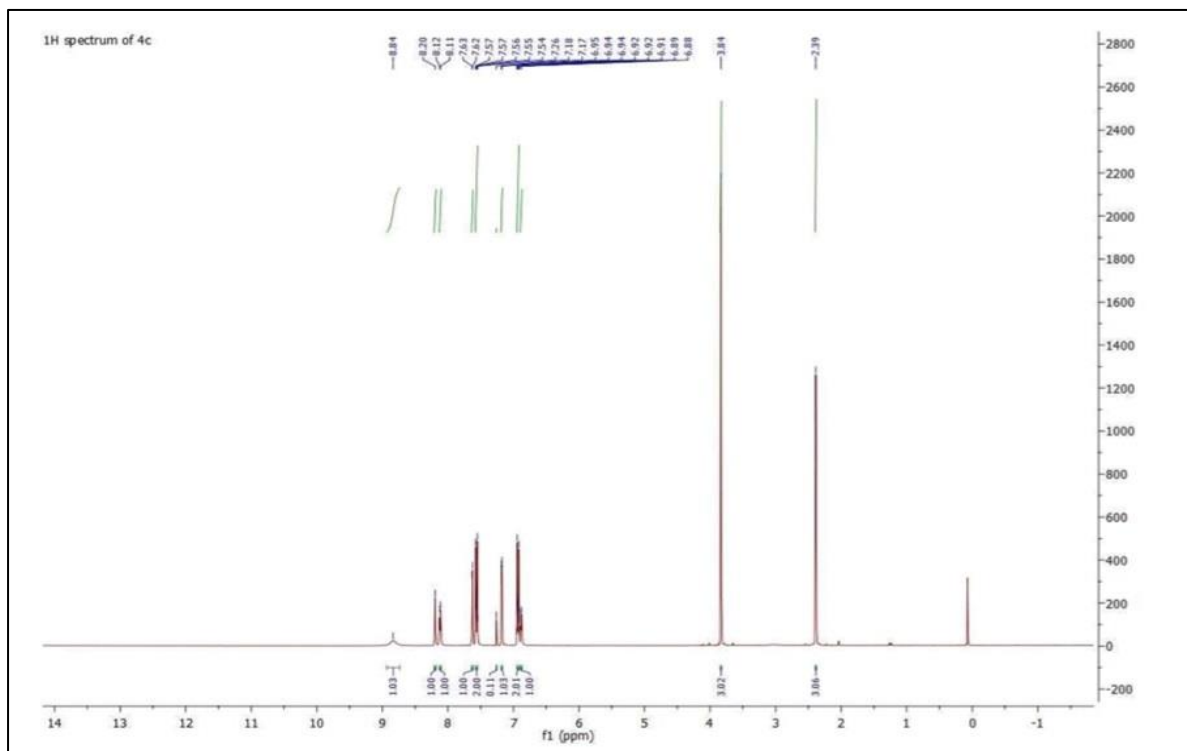
**Figure S4:** <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) of compound **3**.



**Figure S5:** <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) of compound **4a**.



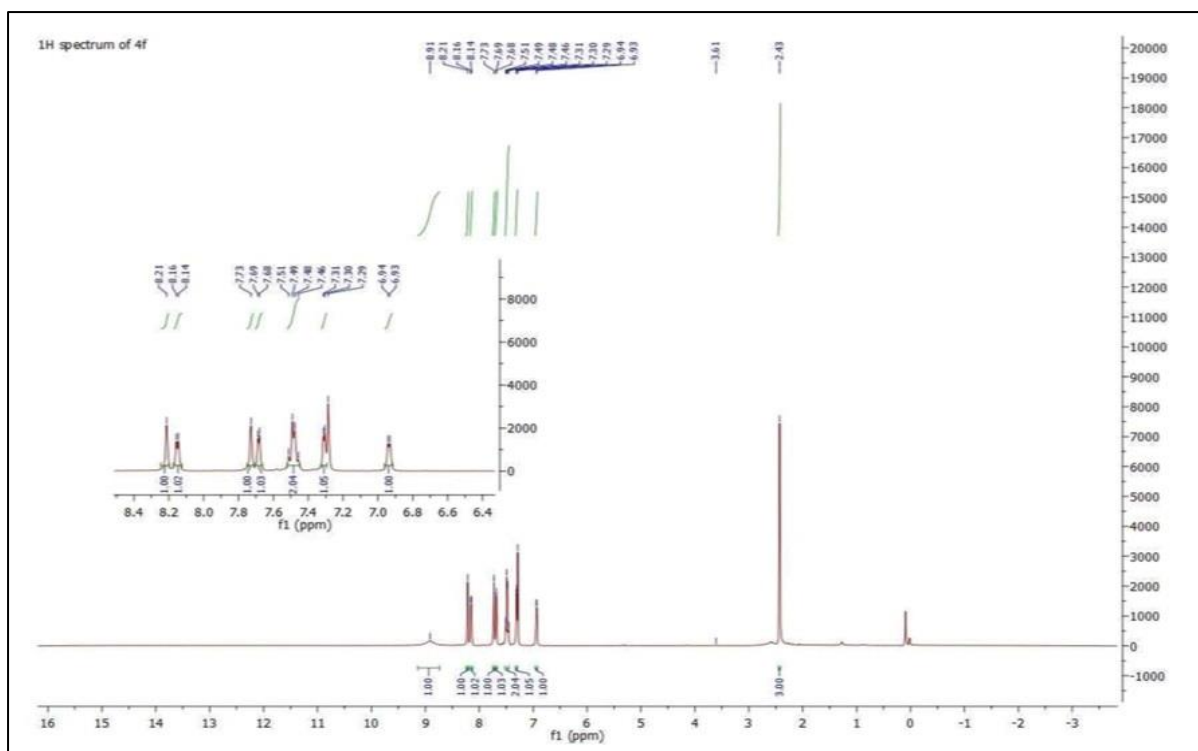
**Figure S6:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) of compound **4b**.



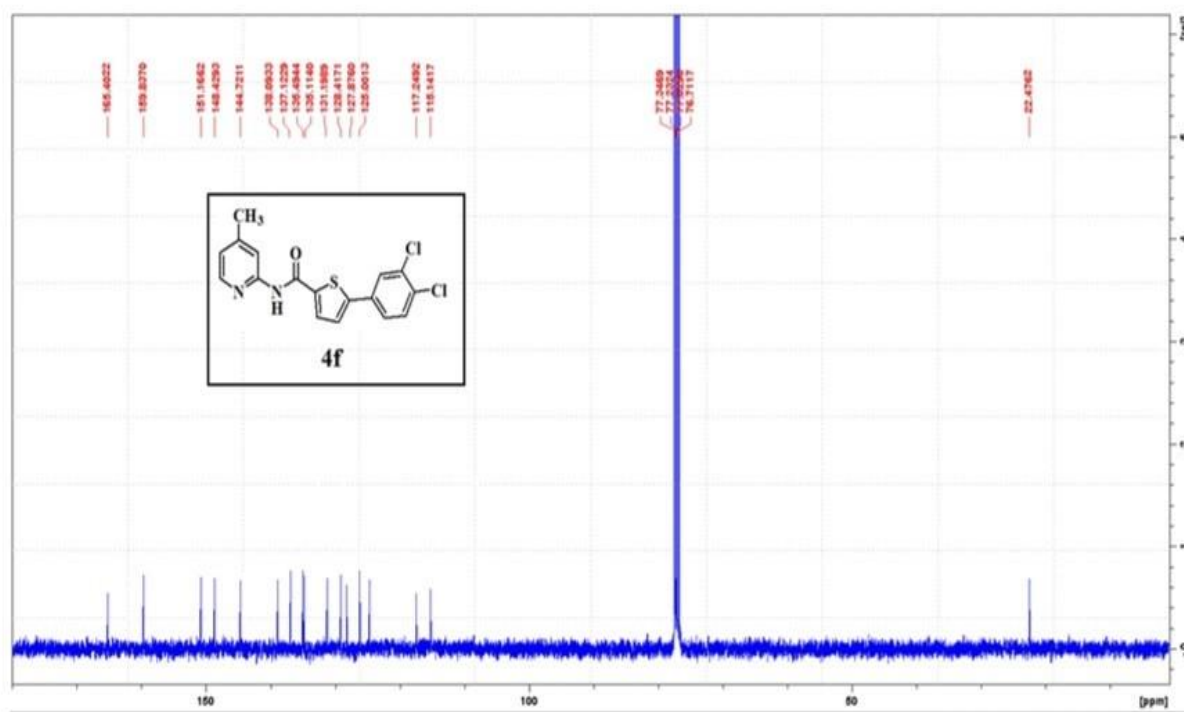
**Figure S7:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) of compound **4c**.



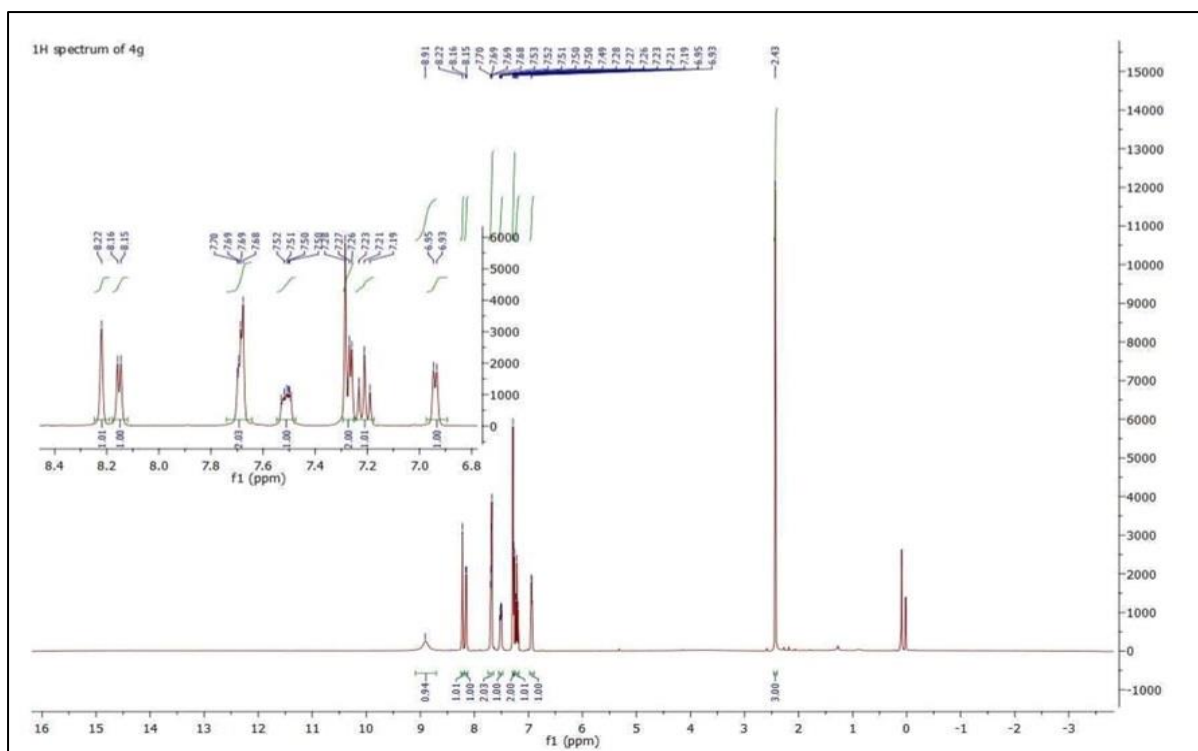


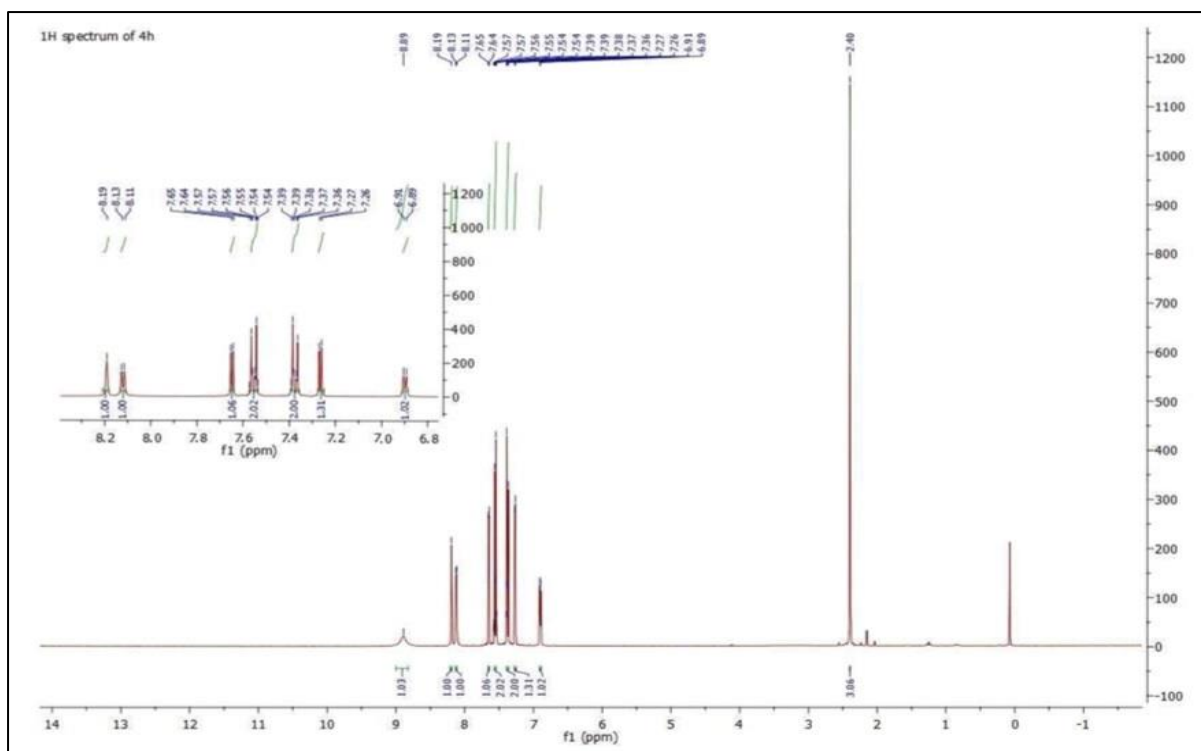


**Figure S10:** <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) of compound **4f**.



**Figure S11:** <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) of compound **4f**.





**Figure S14:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) of compound **4h**.