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Heterogeneous recyclable nano-CeO2 catalyst: Efficient and eco-friendly synthesis of novel fused triazolo and tetrazolo pyrimidine derivatives in aqueous medium

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Supplementary Information

1. **Reusability study of nano-CeO_2 Catalyst……...S2**
2. **Copies of Mass, ^{1}H and ^{13}C NMR spectra of all the compounds…...S2-S25**

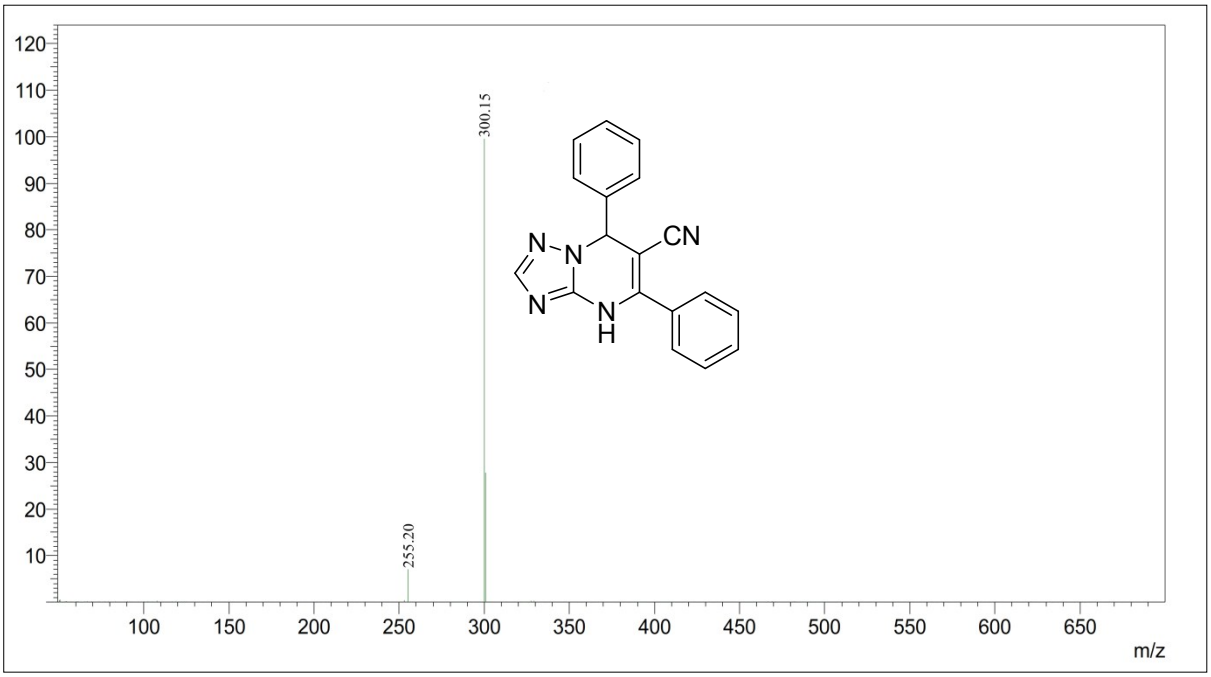
1. Reusability study of nano-CeO_2 Catalyst:

The catalyst recycling experiment was done using the model reaction of the reaction of benzoylacetonitrile **1** (1 mmol), benzaldehyde **2a** (1 mmol) and 5-aminotriazole **3** (1 mmol) and 20 mol% of the catalyst in H_2O at 80 °C. After completion of the reaction, the catalyst was easily separated by filtration and washed with hot ethanol, dried under oven and reused in the subsequent reaction. Almost quantifiable catalyst could be recovered from each run. The reusability of the catalyst was tested up to 5 successive runs (Table 1).

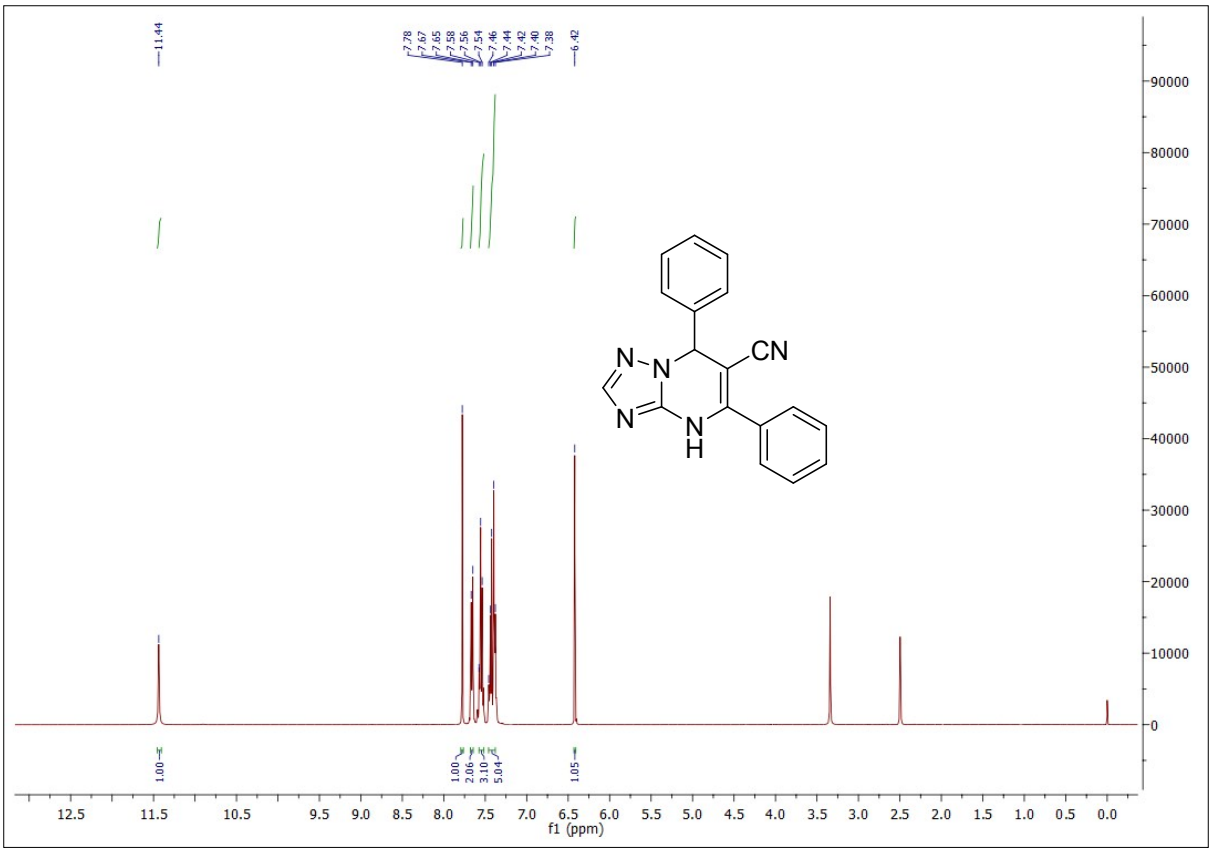
Table 1: Reusability of nano-CeO_2 in the synthesis of title compounds **4a**

Entry	Run	Yields (%)
1	Fresh	92
2	1st	91
3	2nd	89
4	3rd	88
5	4th	86

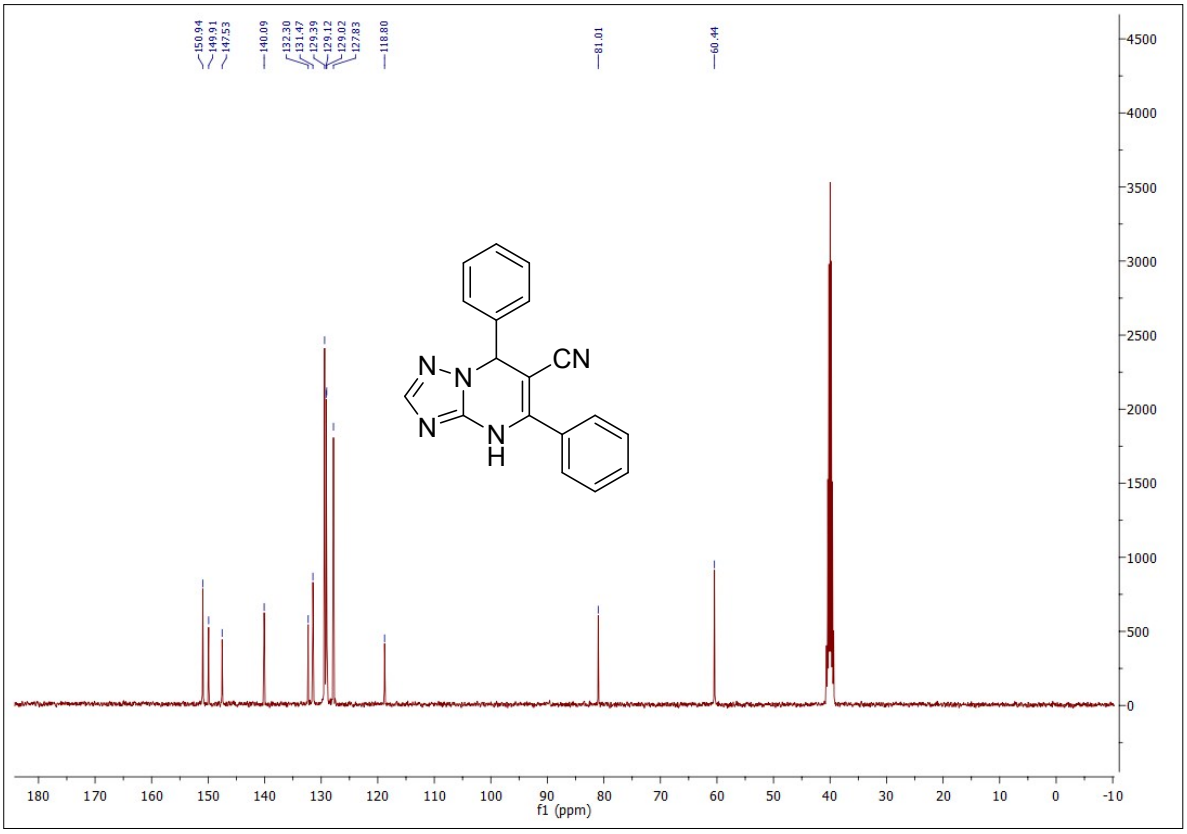
2. Copies of Mass, ^1H and ^{13}C NMR spectra of all the compounds



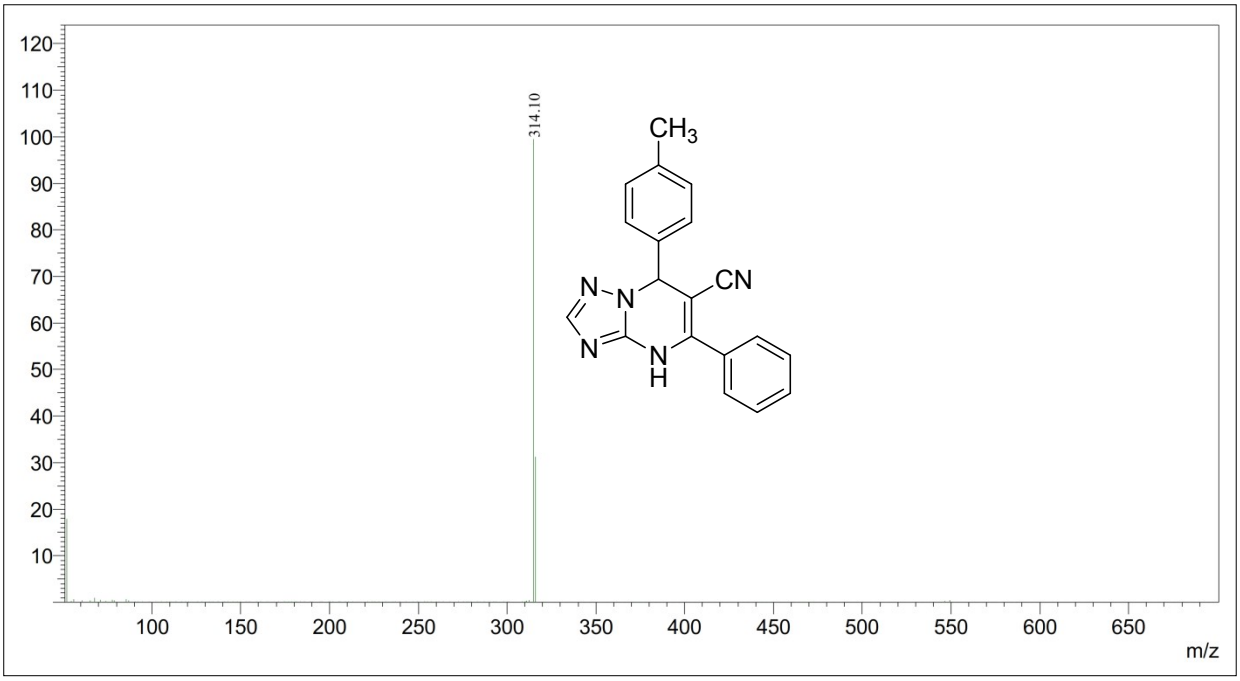
Mass Spectrum of compound **5a**



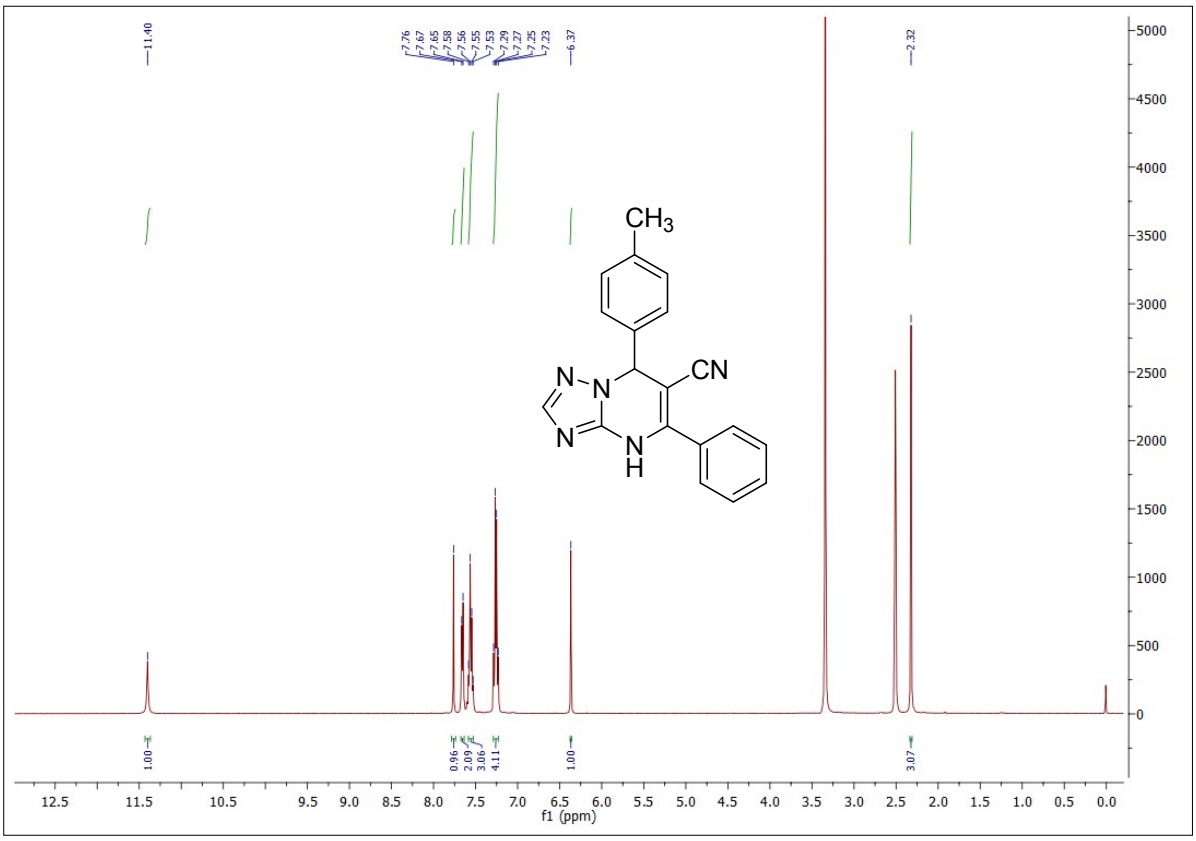
^{1}H NMR Spectrum of compound **5a**



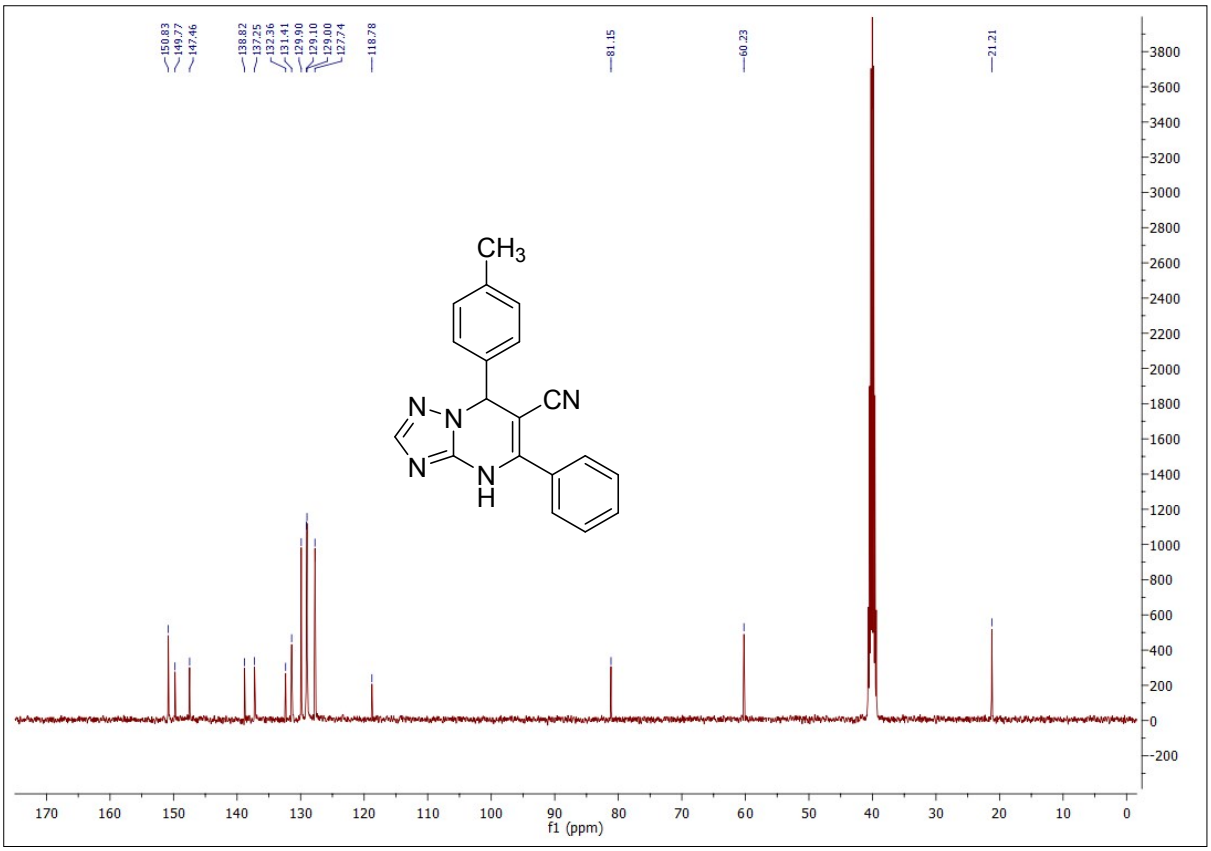
^{13}C NMR Spectrum of compound **5a**



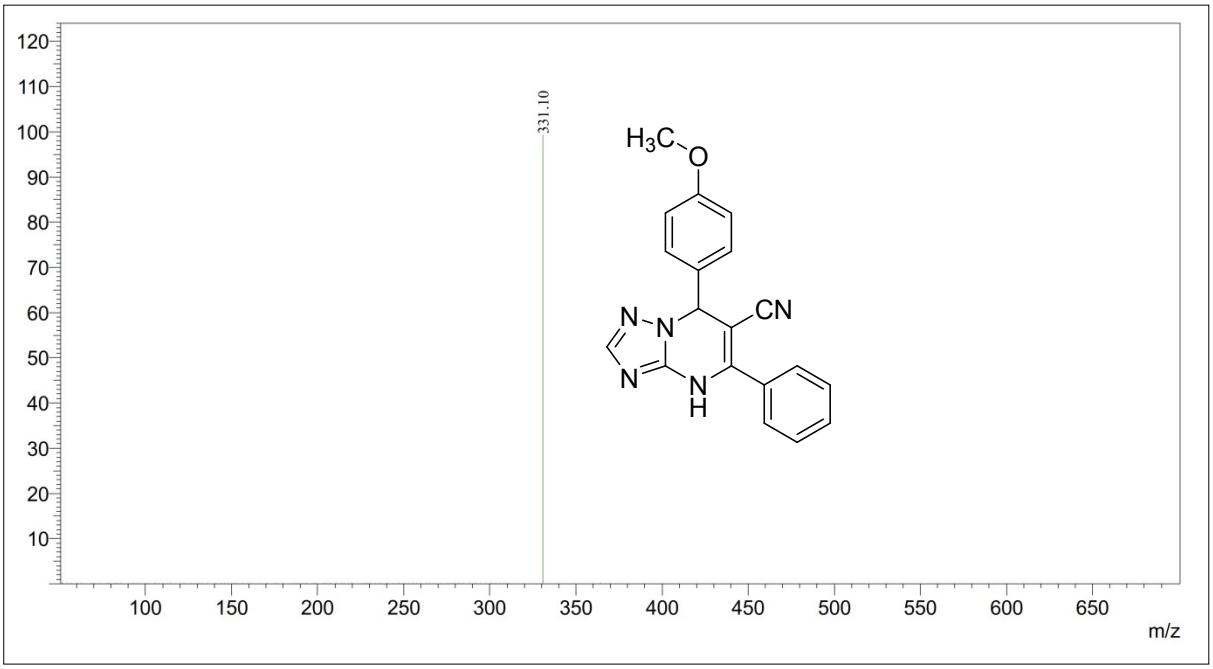
Mass Spectrum of compound **5b**



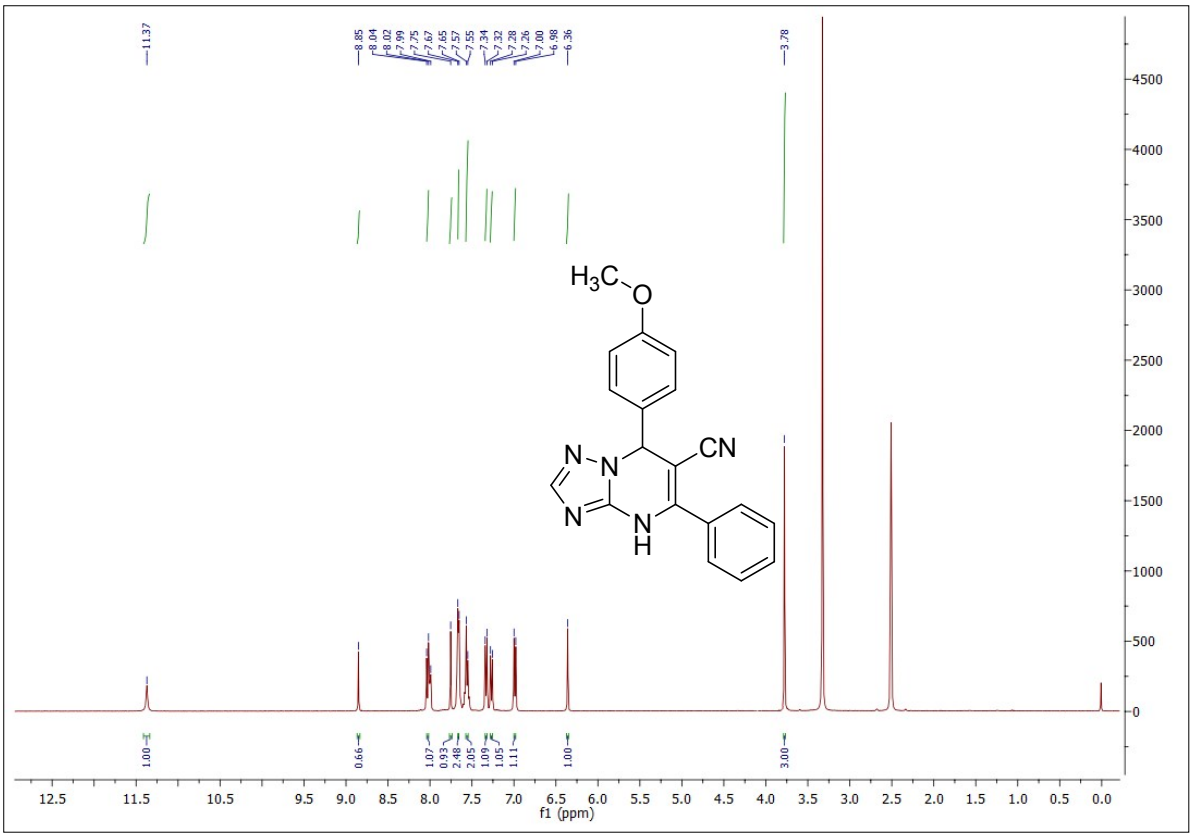
^{1}H NMR Spectrum of compound **5b**



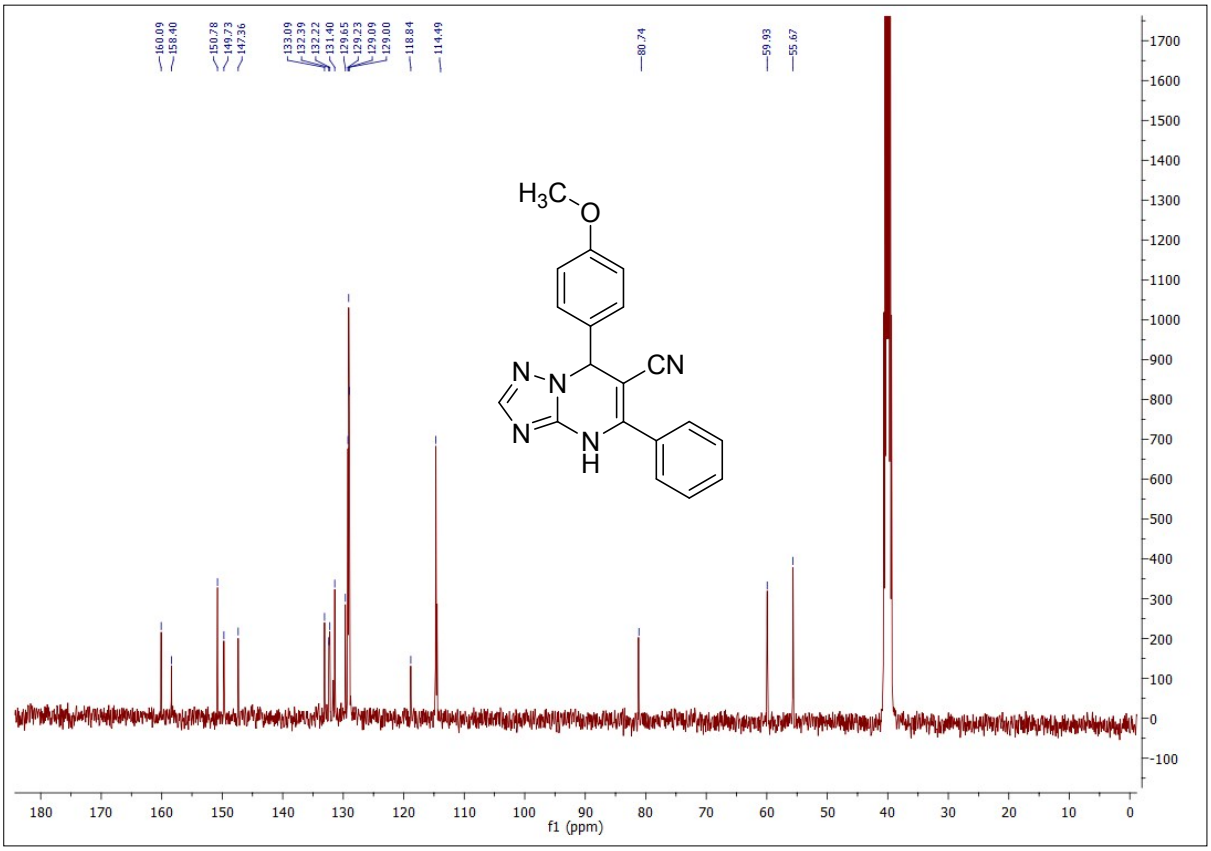
^{13}C NMR Spectrum of compound **4b**



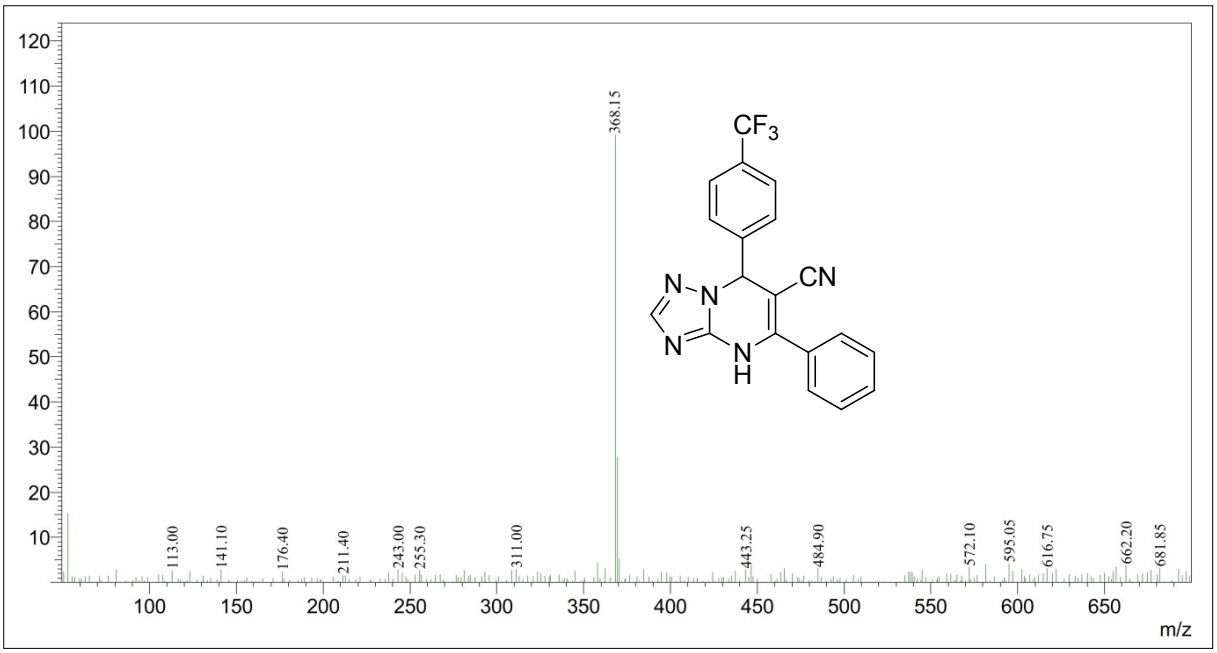
Mass Spectrum of compound **5c**



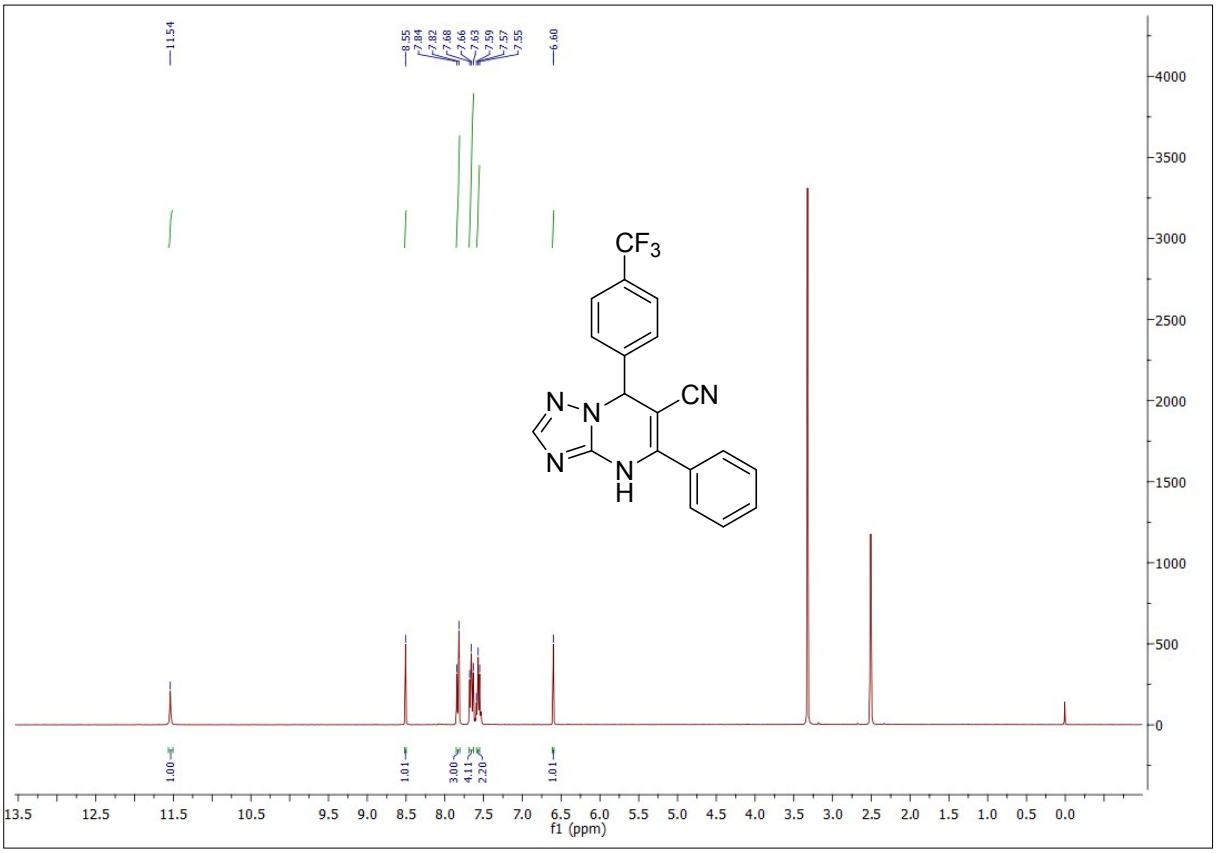
^{1}H NMR Spectrum of compound **5c**



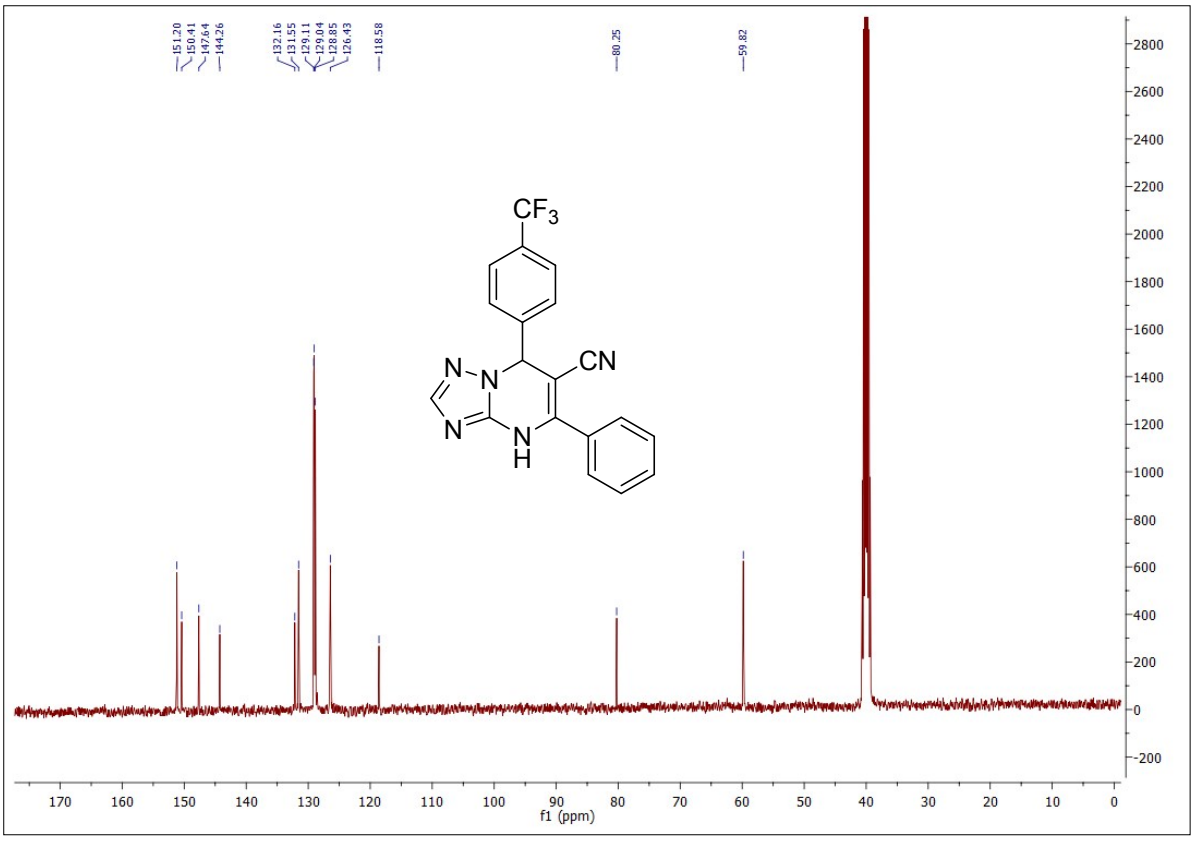
^{13}C NMR Spectrum of compound **4c**



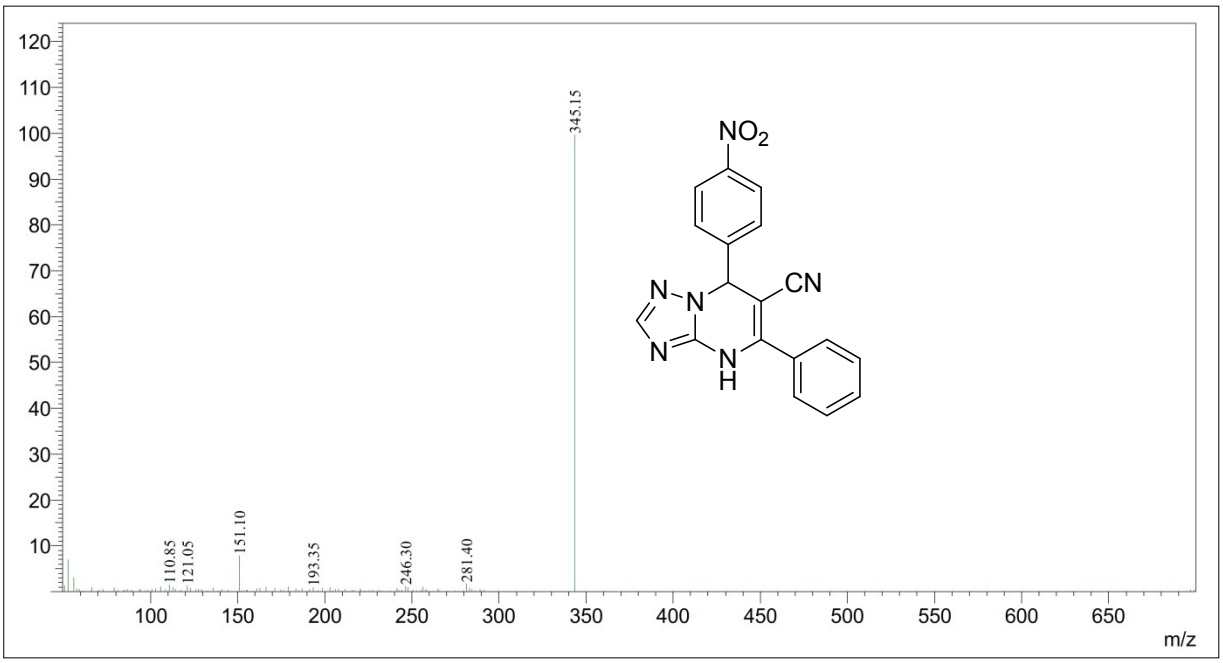
Mass Spectrum of compound **5d**



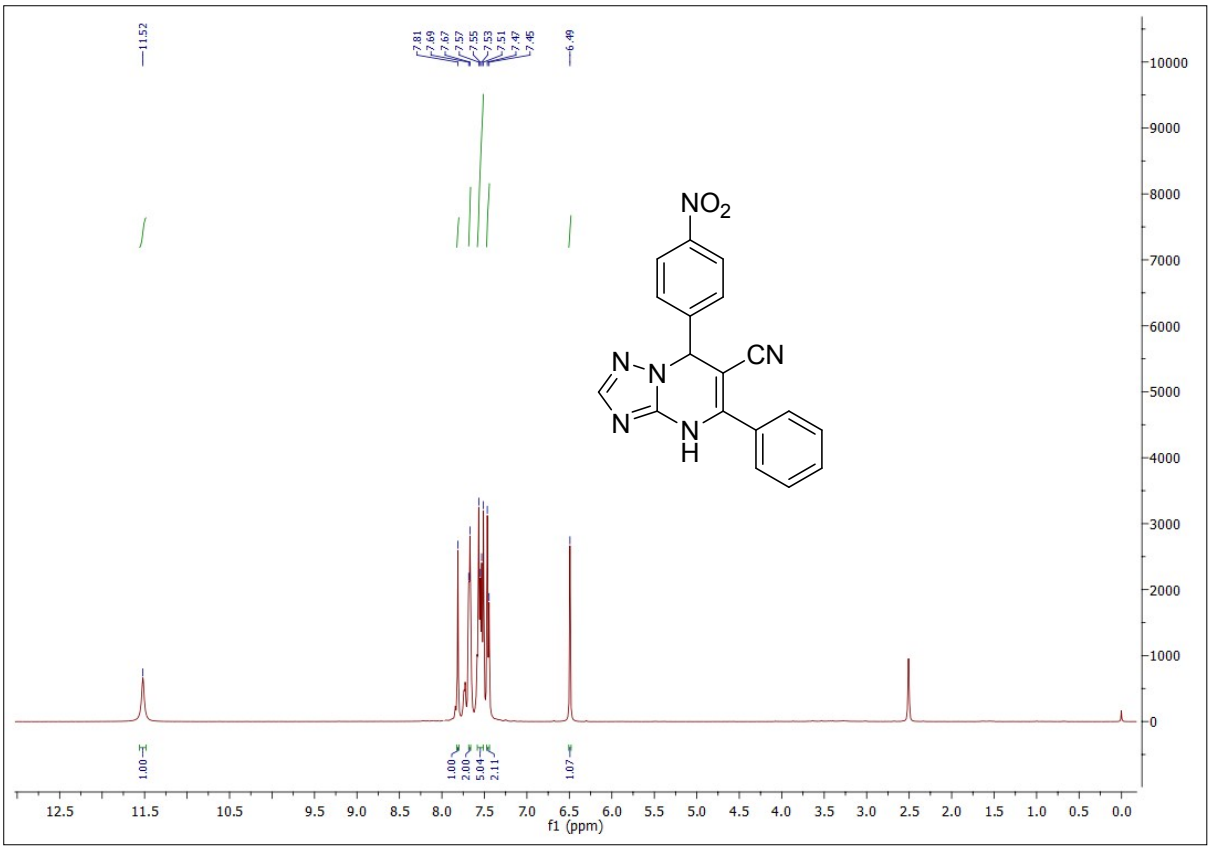
^{1}H NMR Spectrum of compound **5d**



^{13}C NMR Spectrum of compound **4d**



Mass Spectrum of compound **5e**



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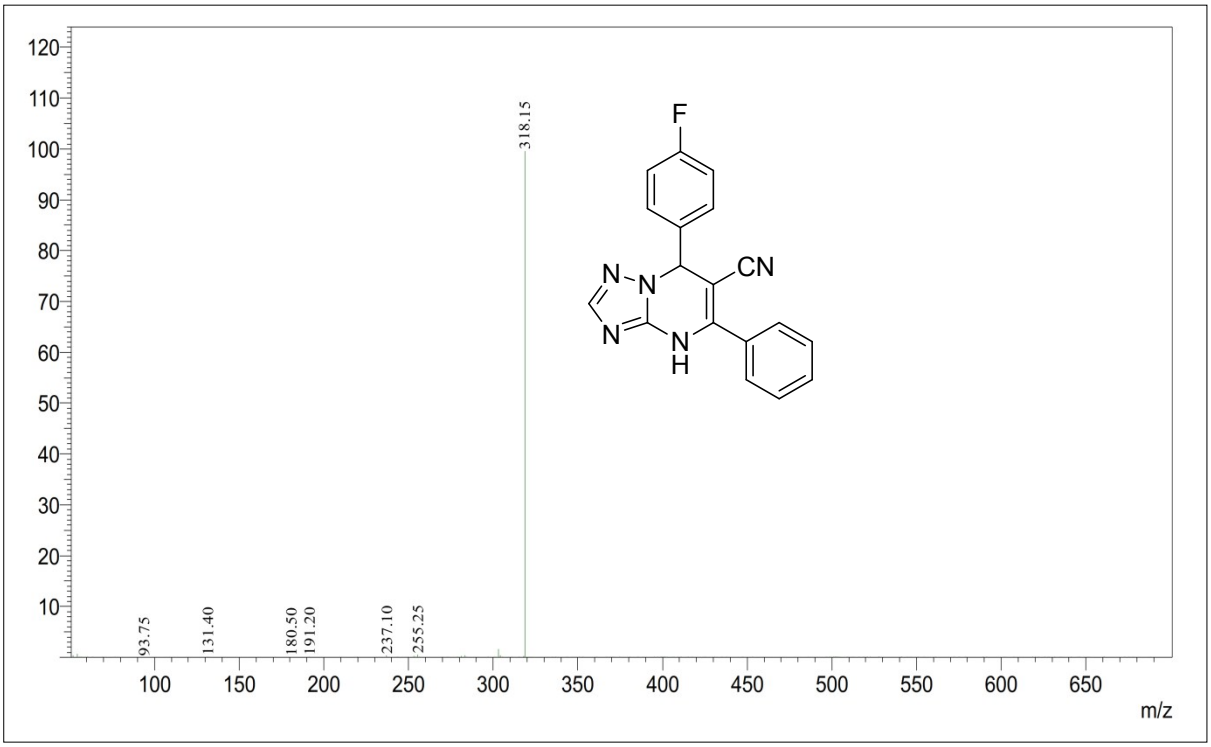
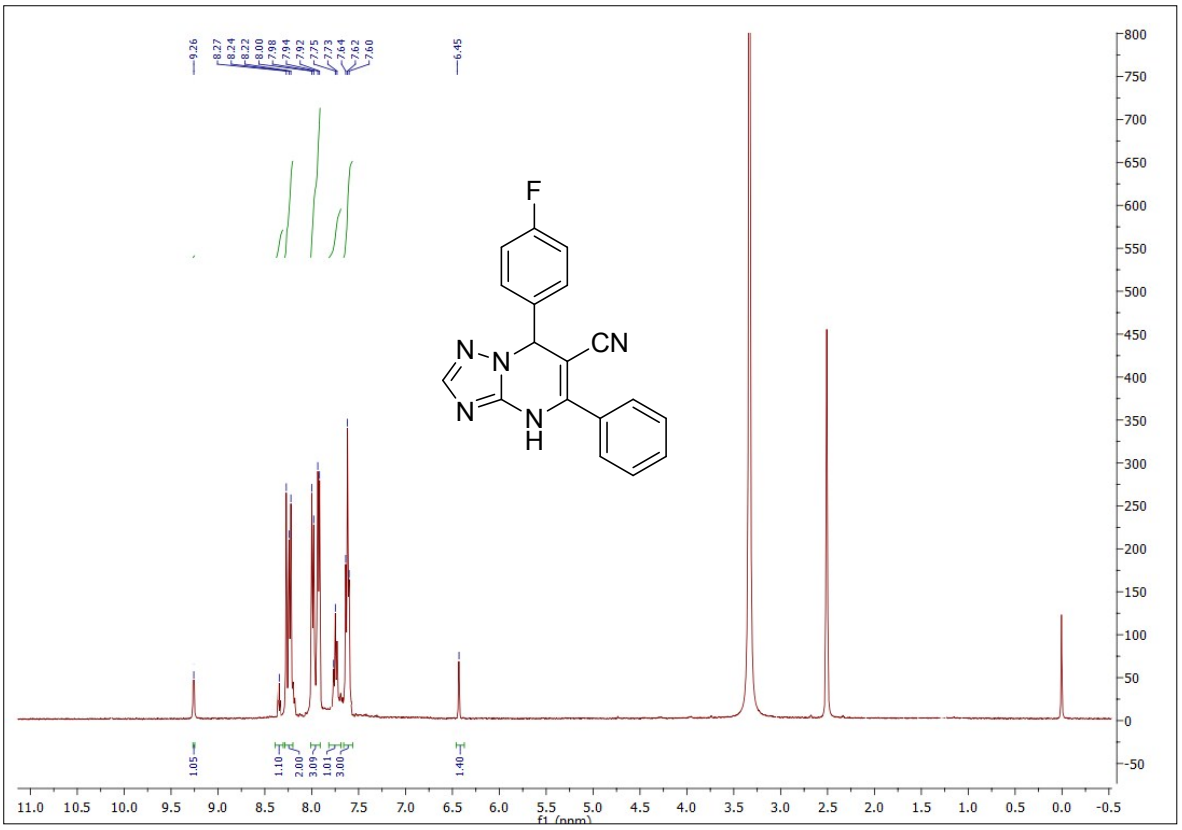


Mass Spectrum of compound **5f**



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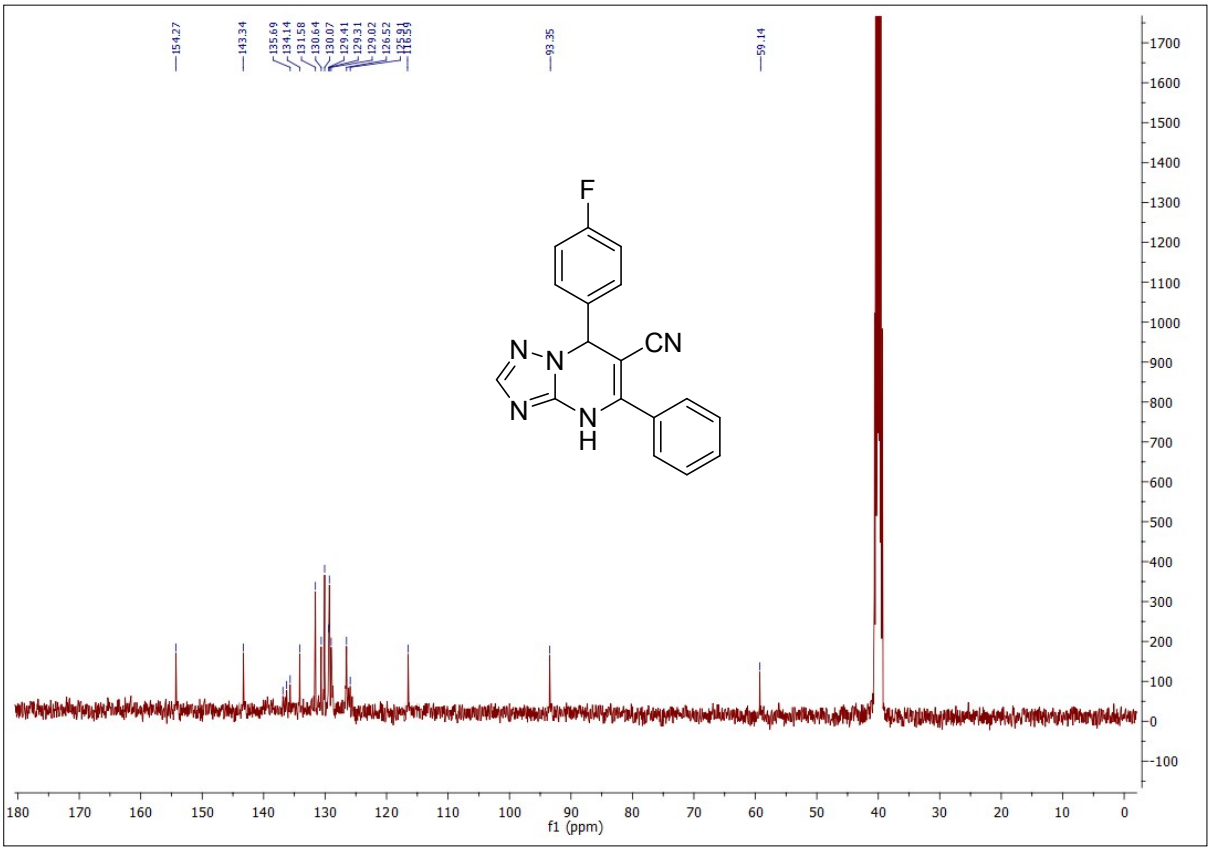

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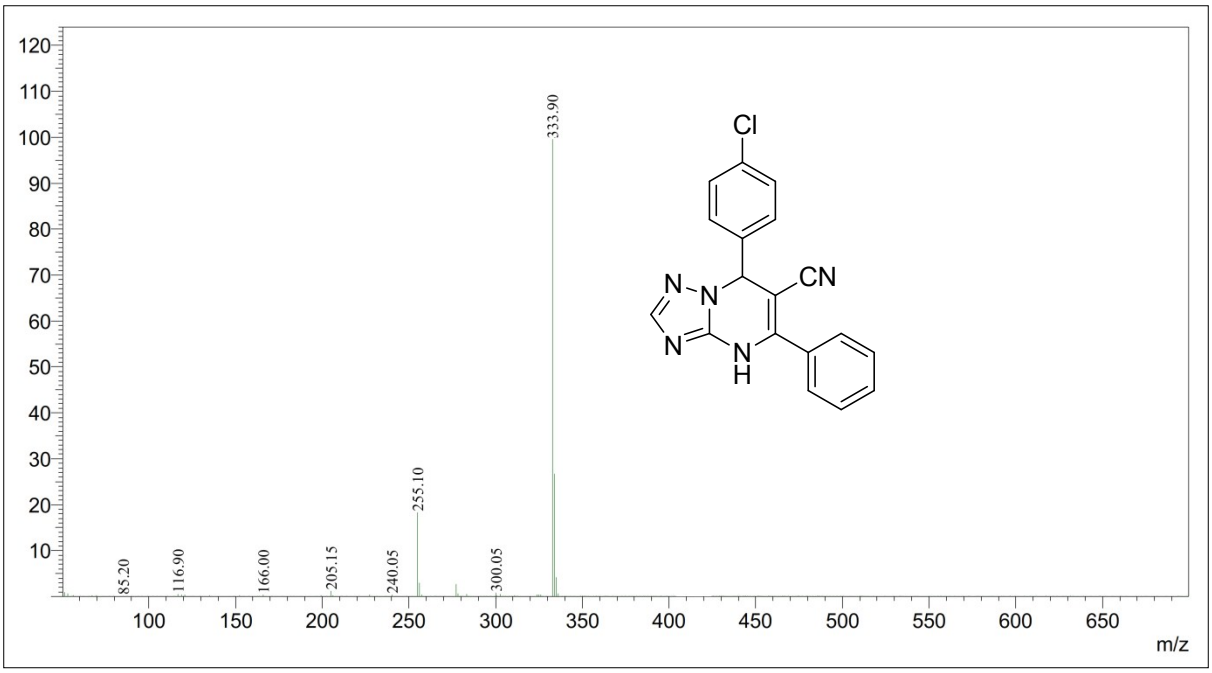
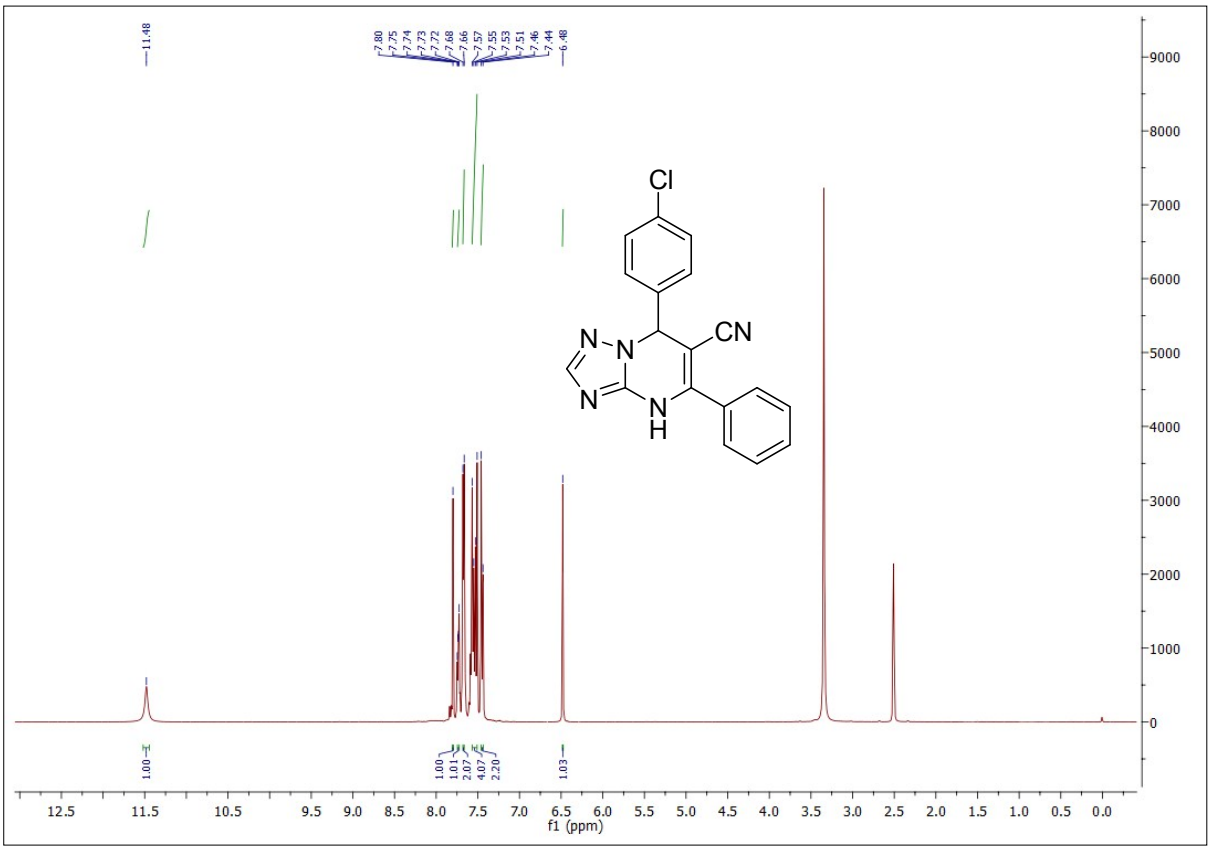
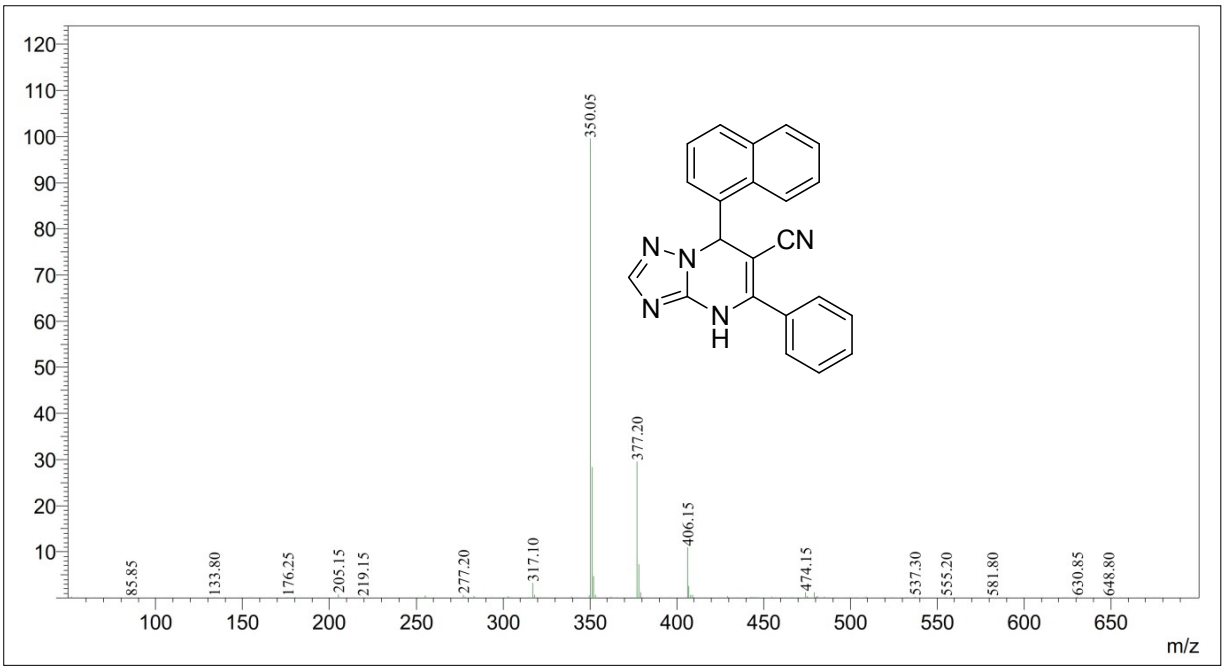


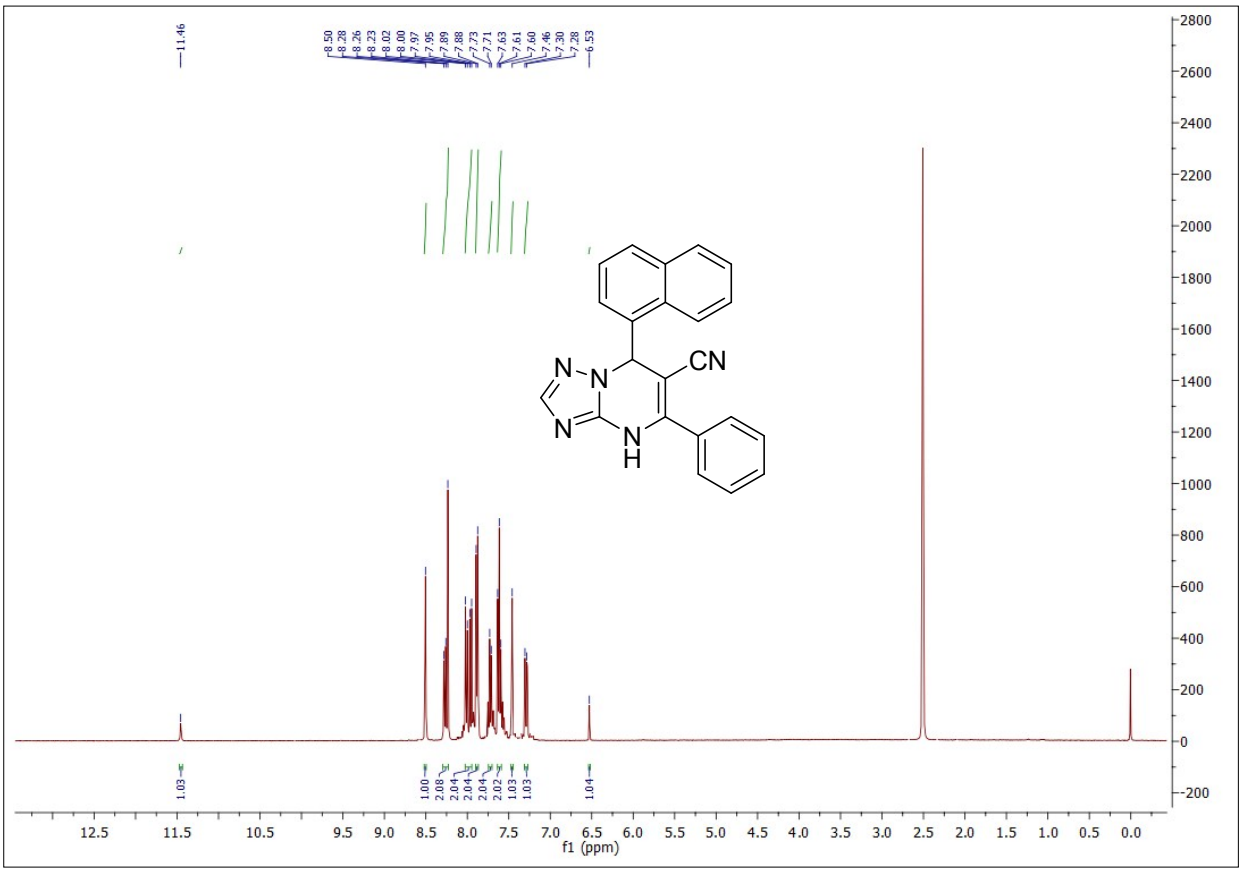
Mass Spectrum of compound **5g**



^{1}H NMR Spectrum of compound **5g**



Mass Spectrum of compound **5h**



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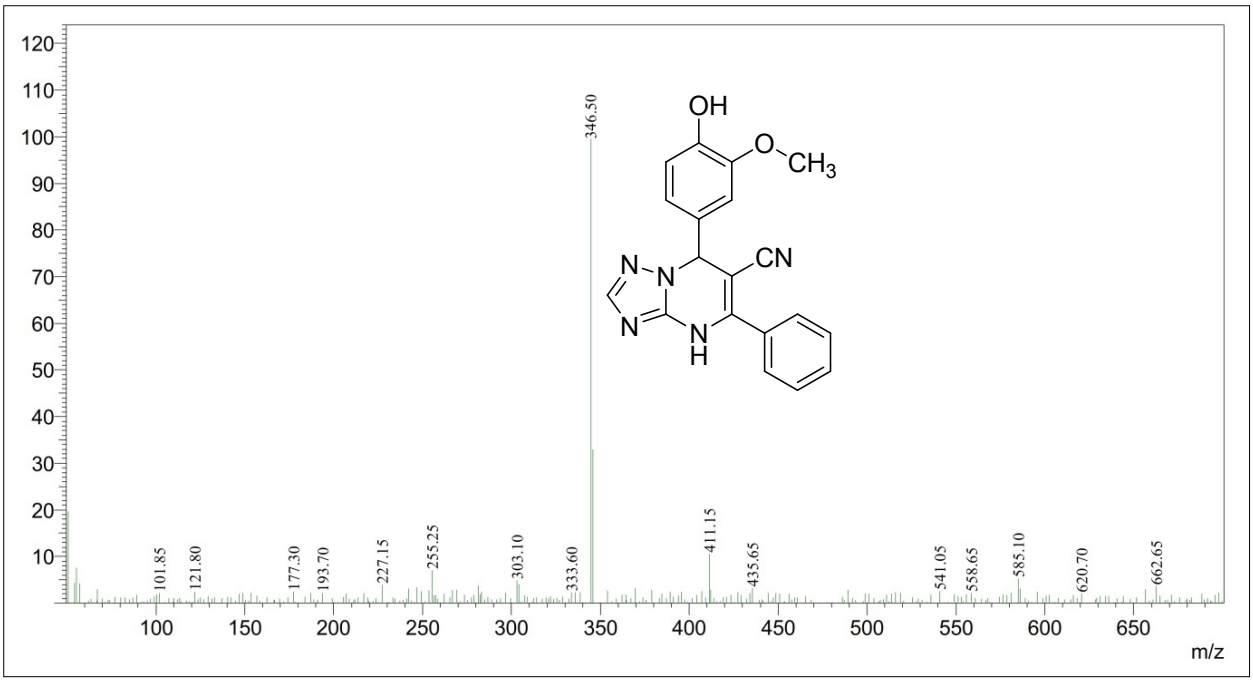
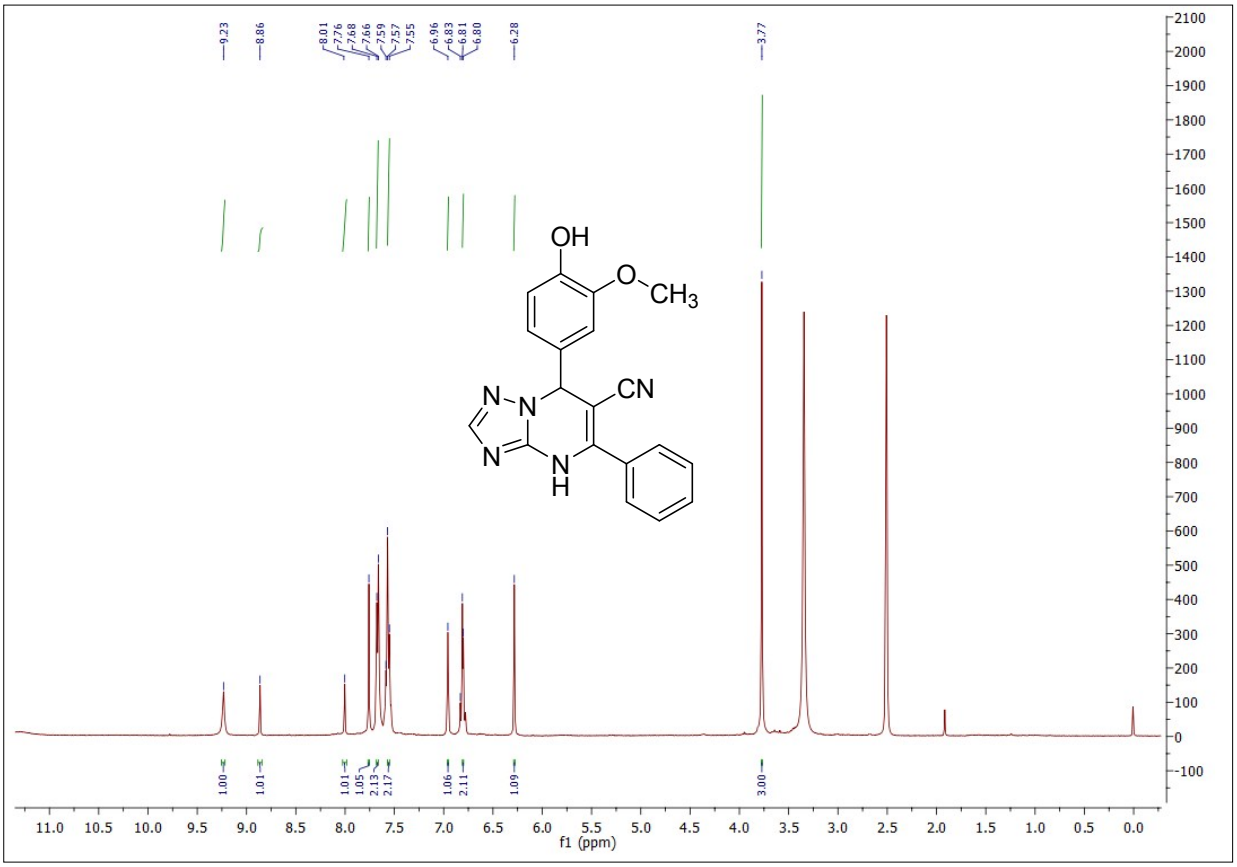
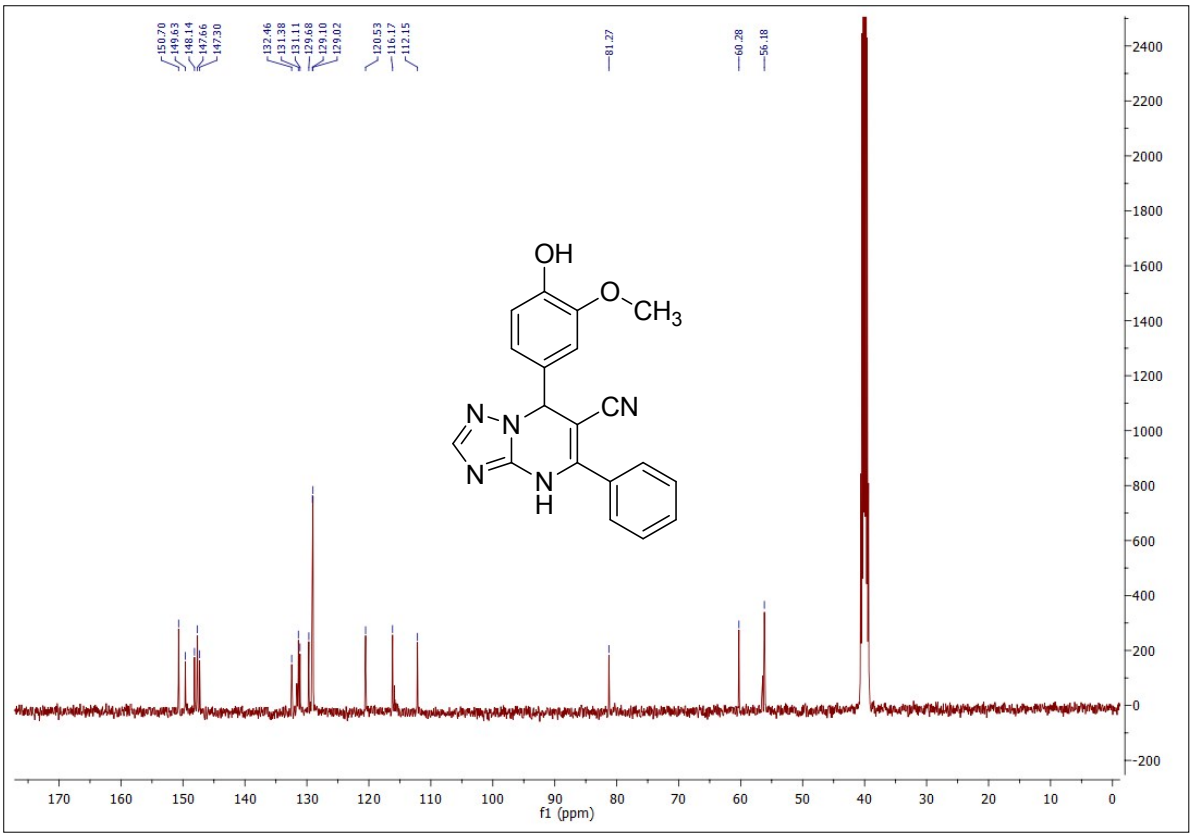


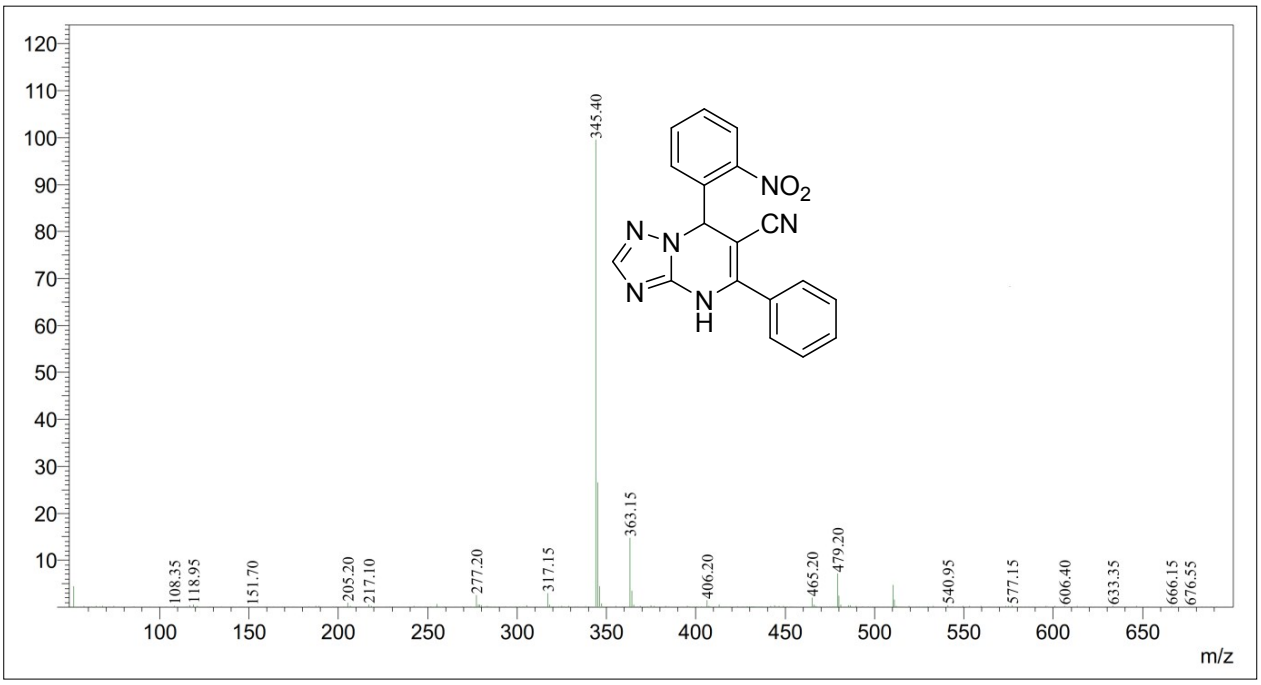
Mass Spectrum of compound **5k**



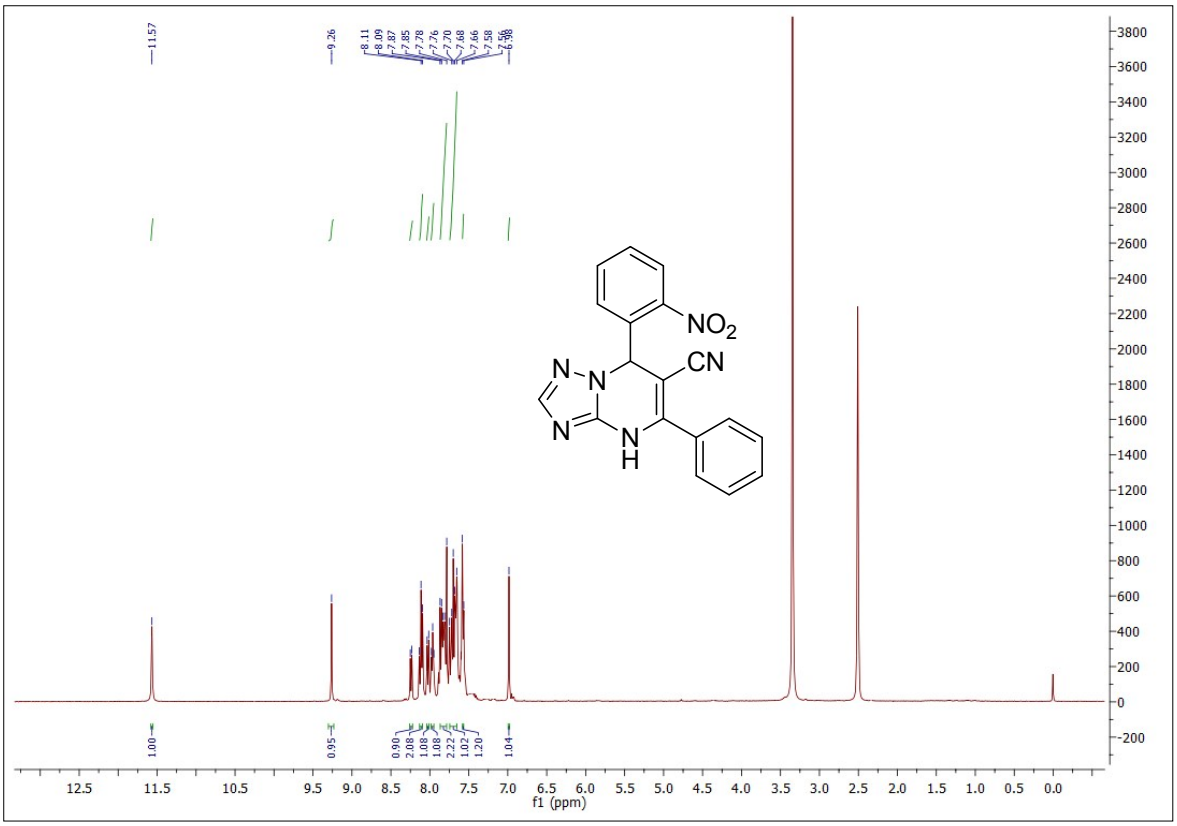
^{1}H NMR Spectrum of compound **5k**



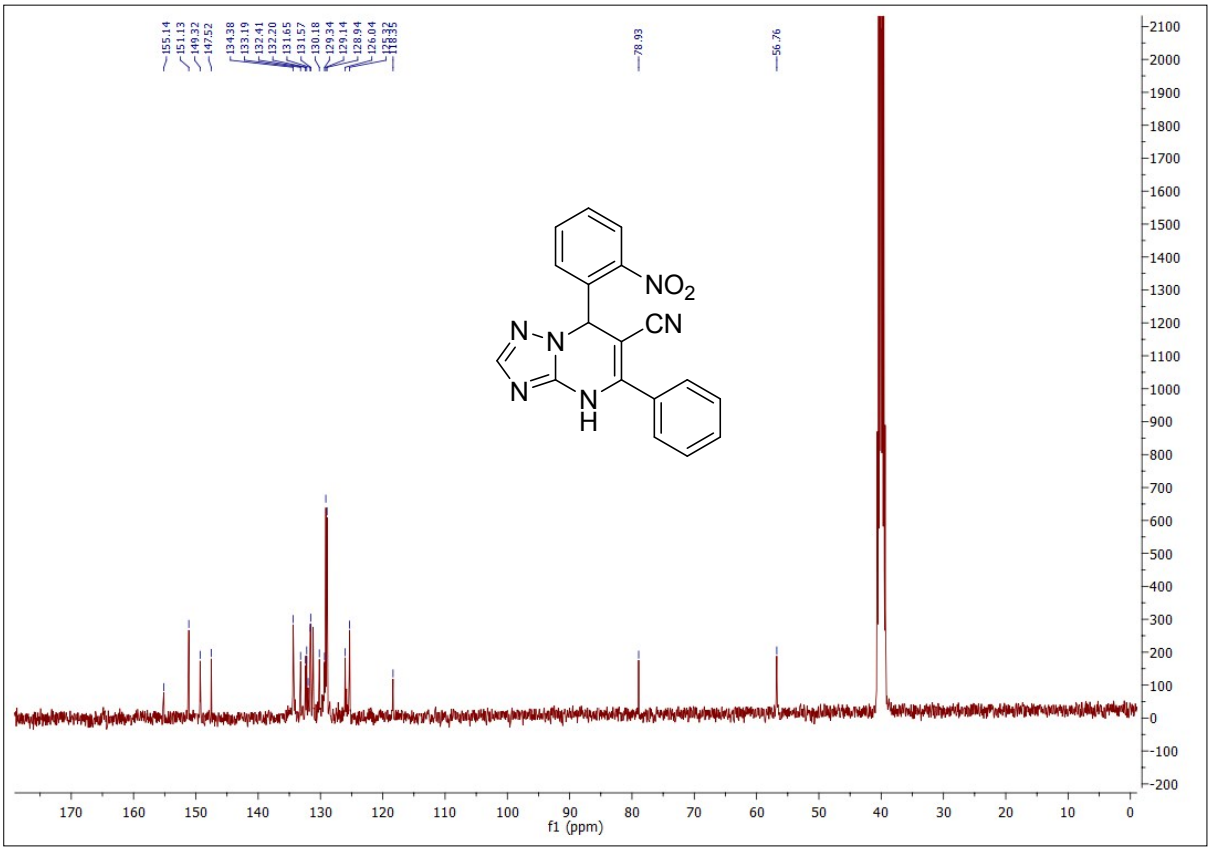
^{13}C NMR Spectrum of compound **4k**



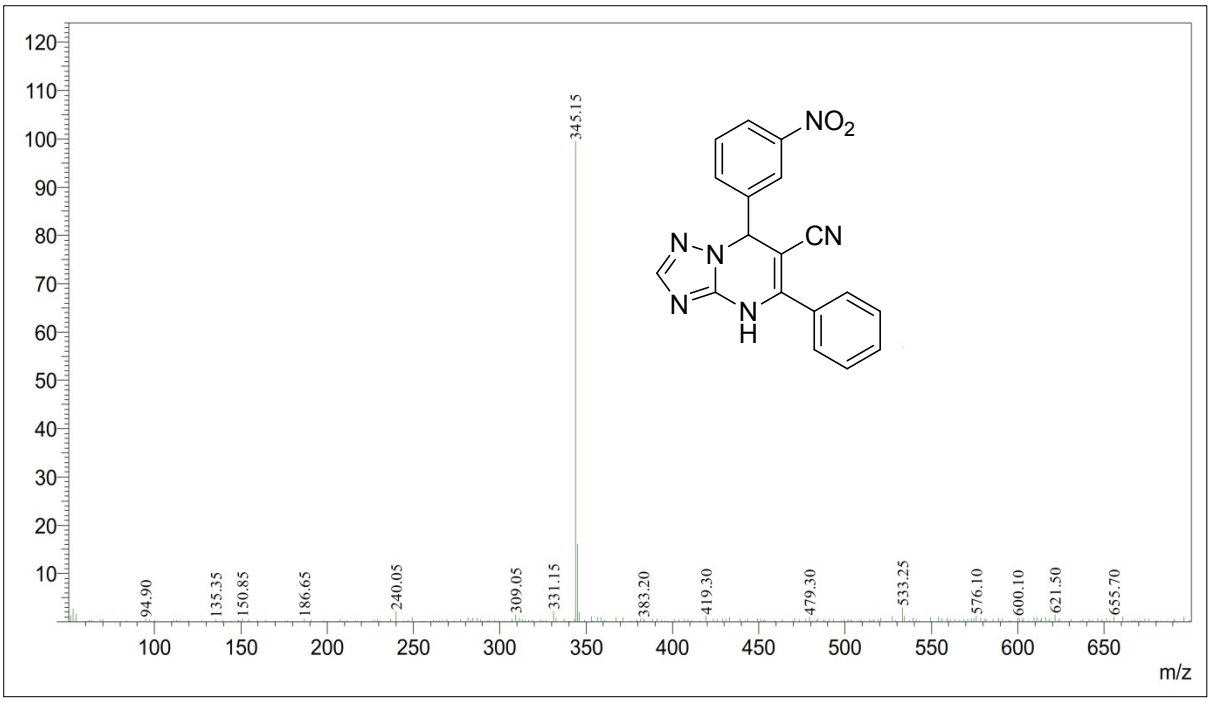
Mass Spectrum of compound **5m**



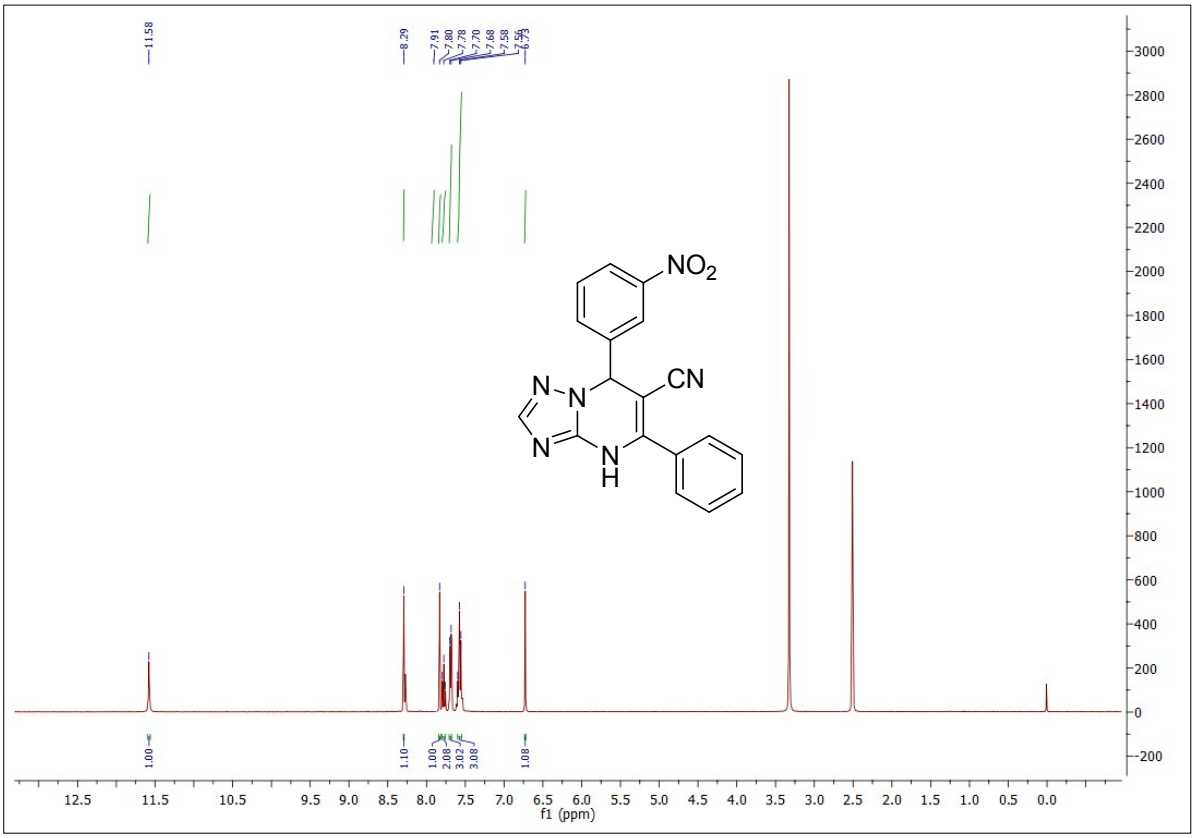
^{1}H NMR Spectrum of compound **5m**



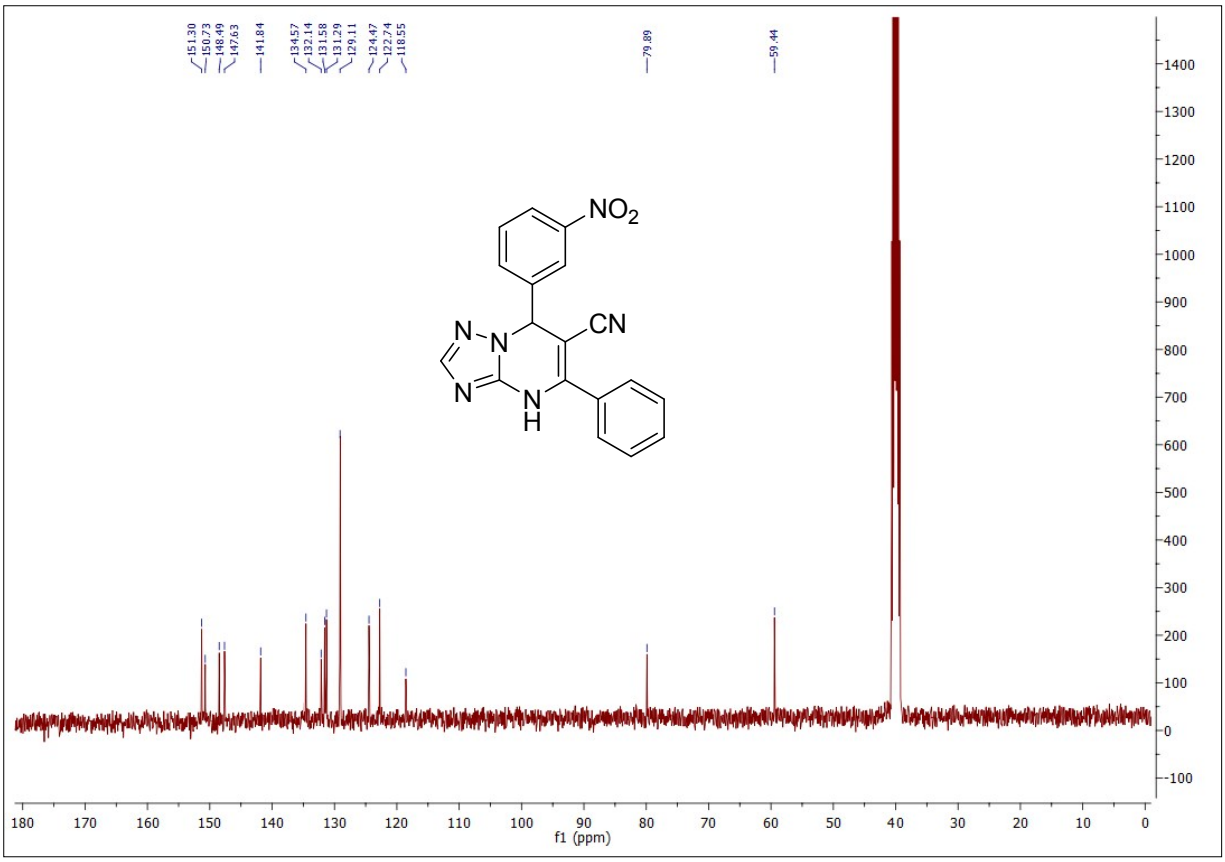
^{13}C NMR Spectrum of compound **4m**



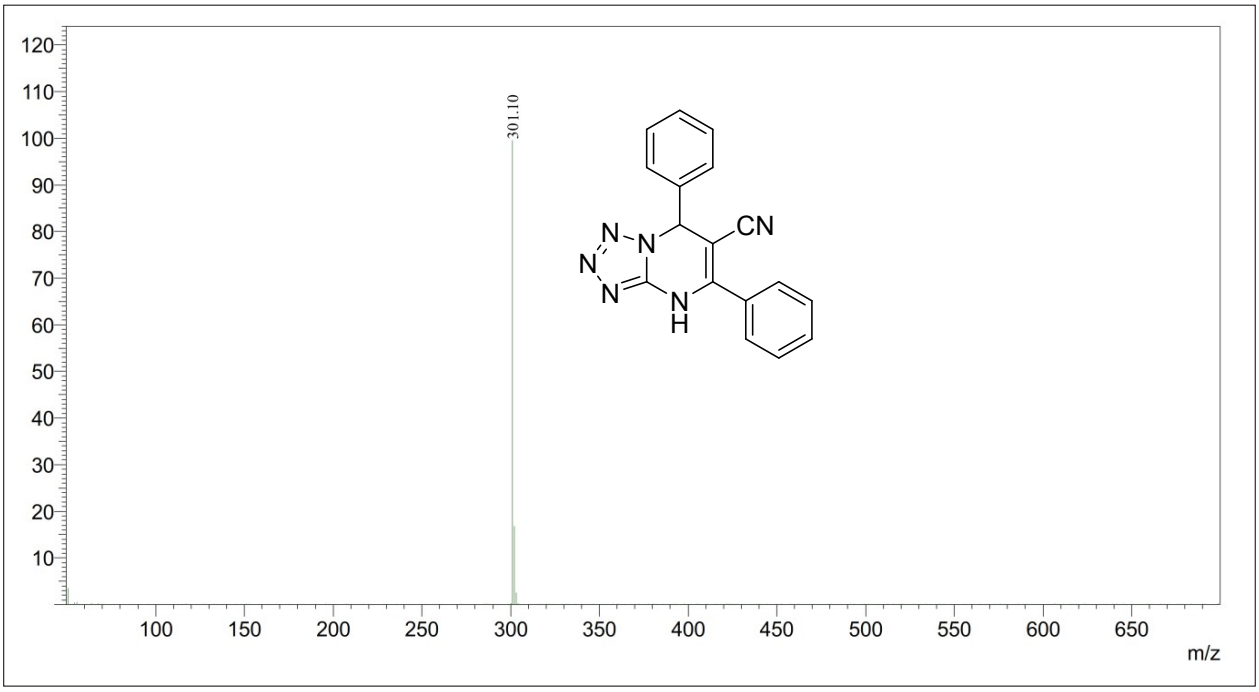
Mass Spectrum of compound **5n**



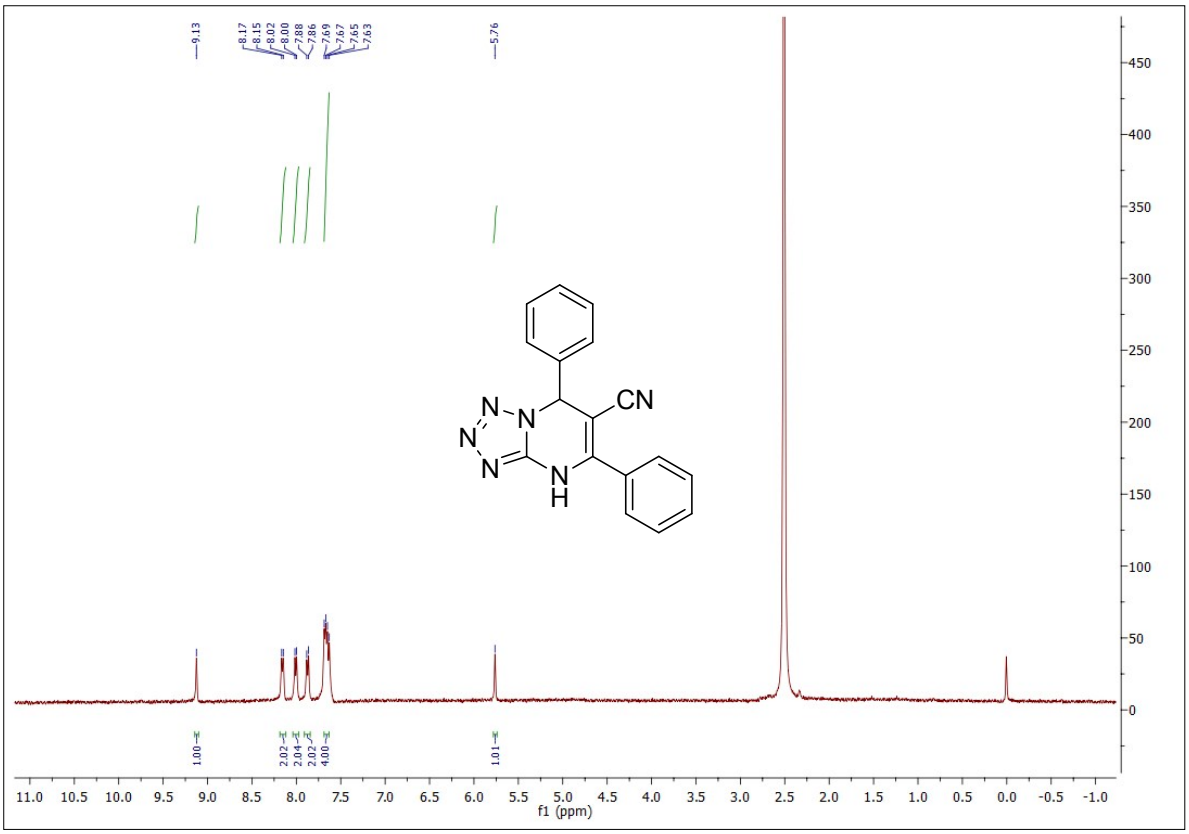
^{1}H NMR Spectrum of compound **5n**



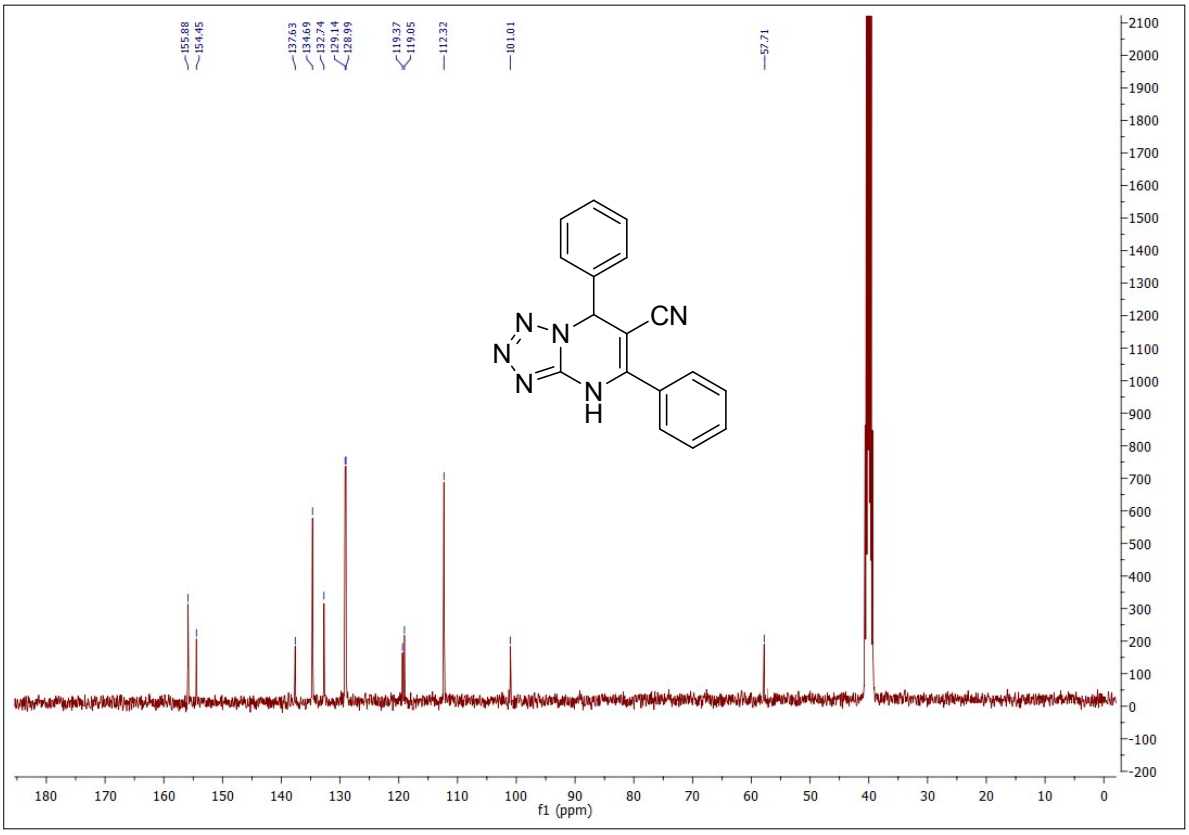
^{13}C NMR Spectrum of compound **4n**



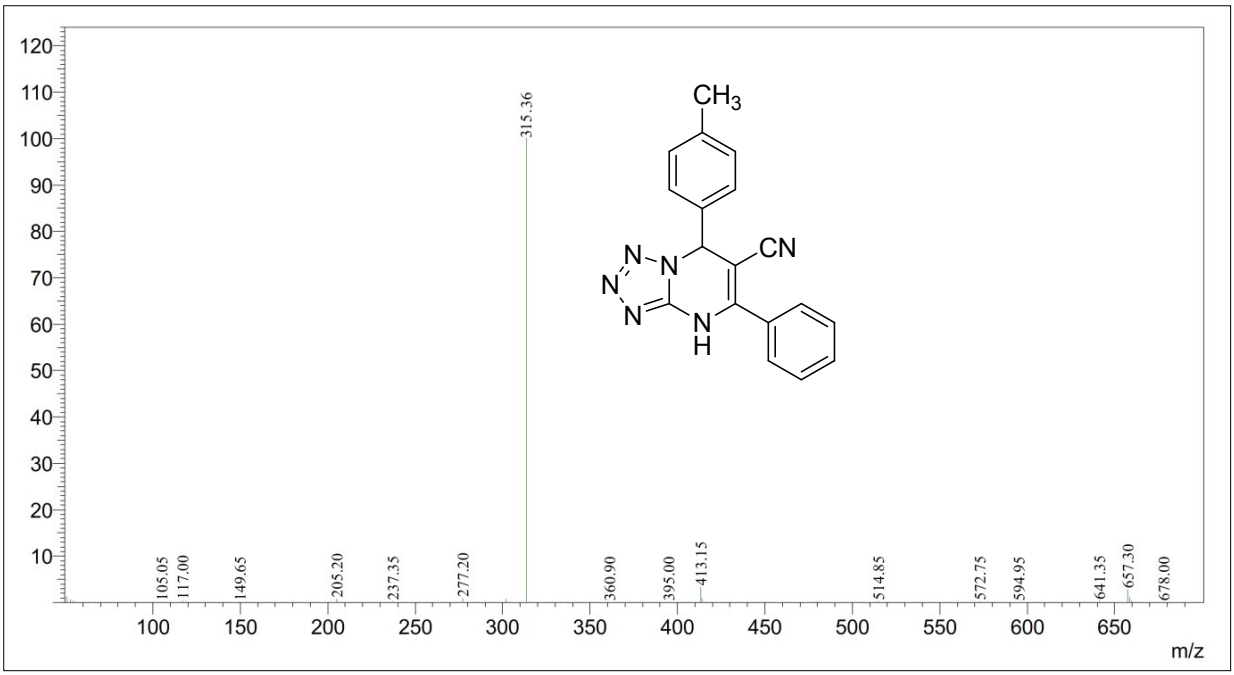
Mass Spectrum of compound **6a**



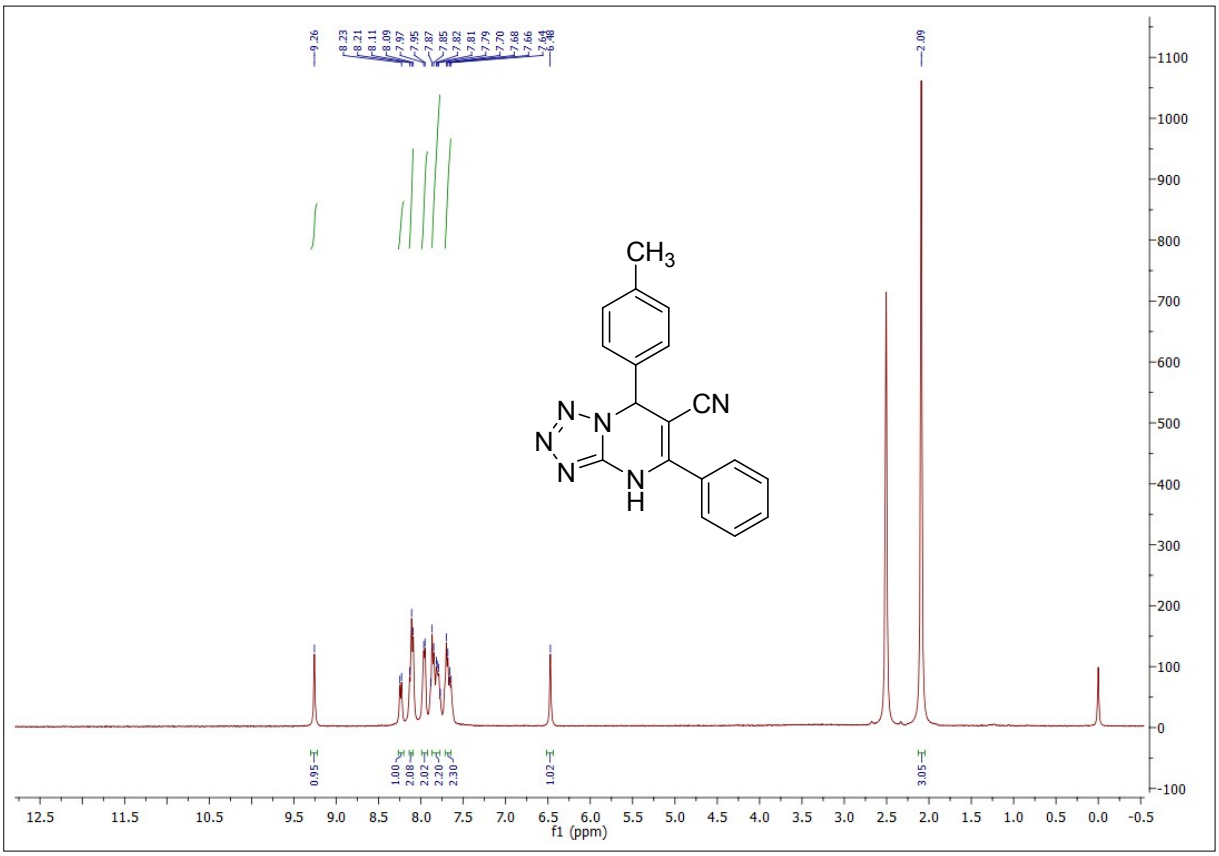
^{1}H NMR Spectrum of compound **6a**



^{13}C NMR Spectrum of compound **6a**



Mass Spectrum of compound **6b**



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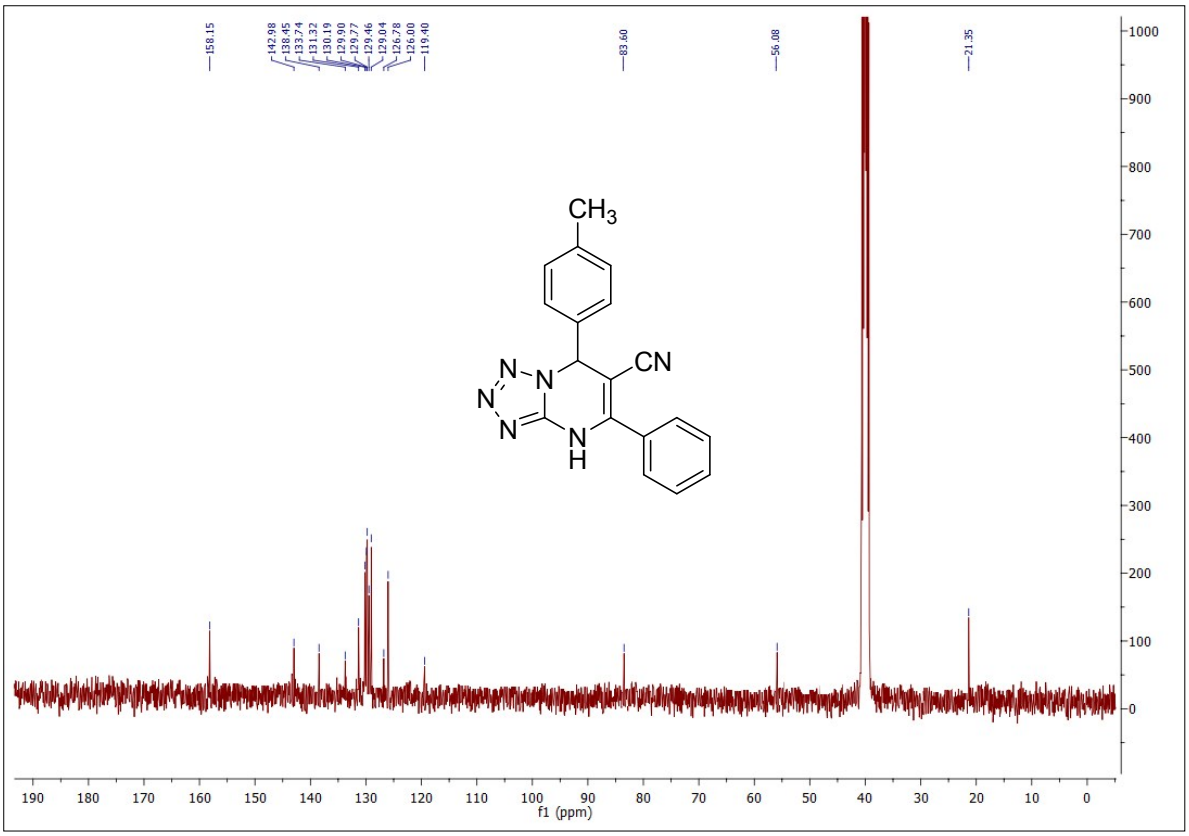

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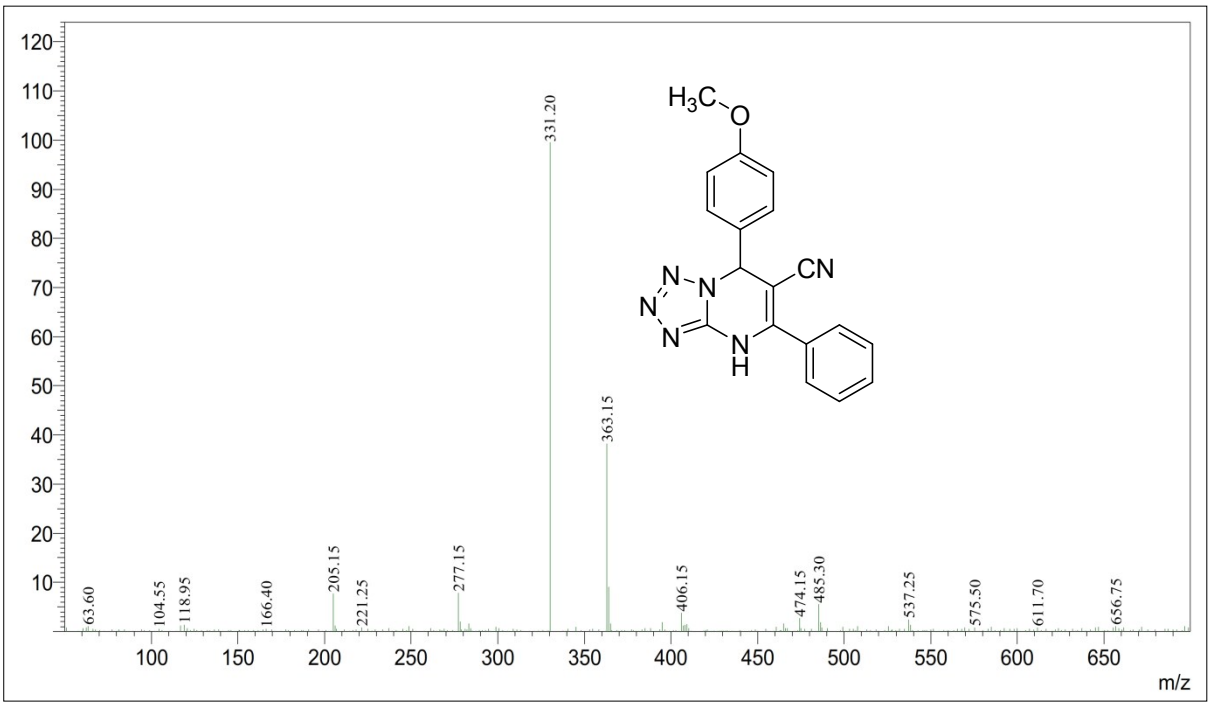
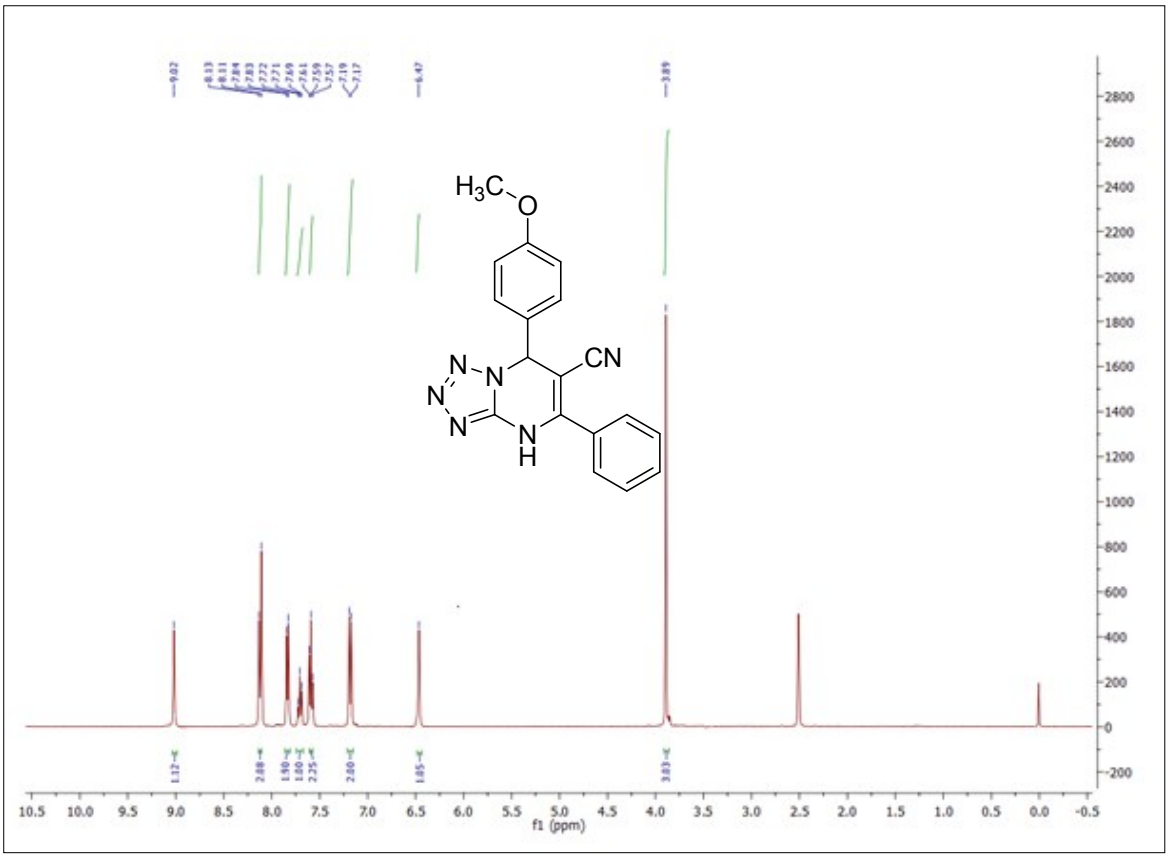
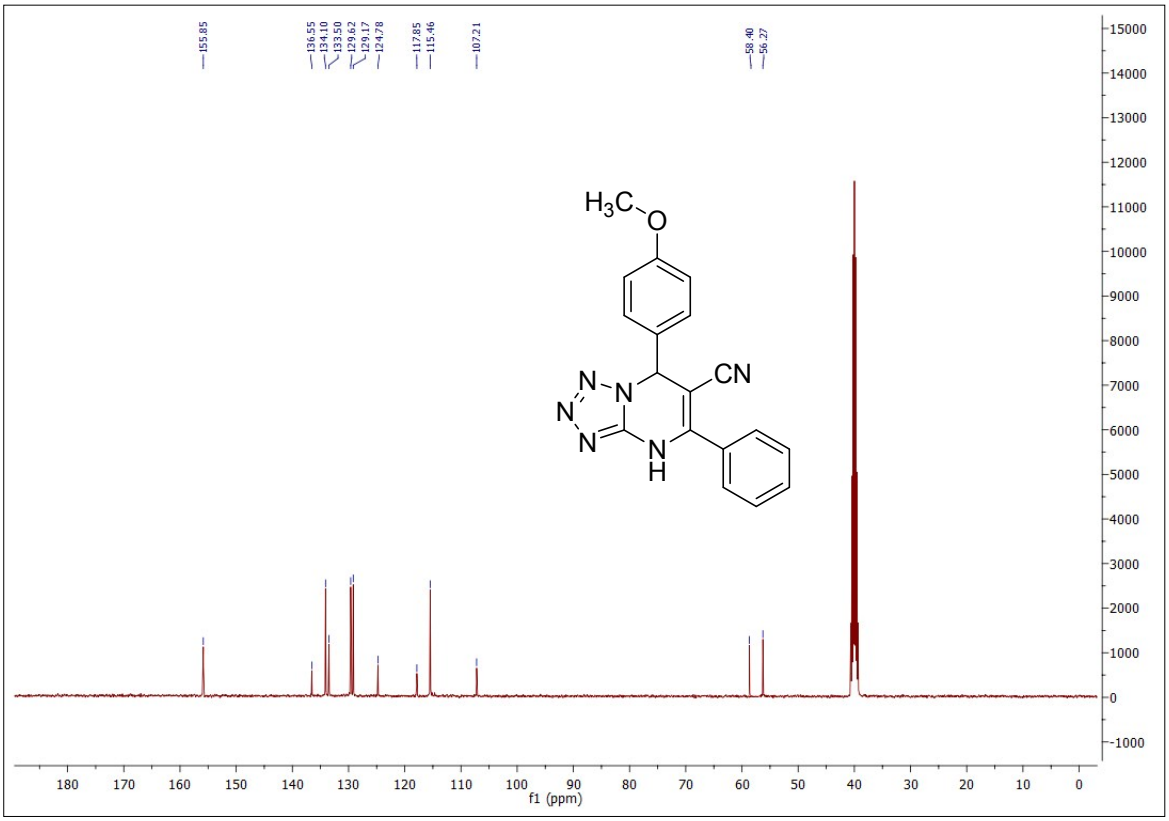


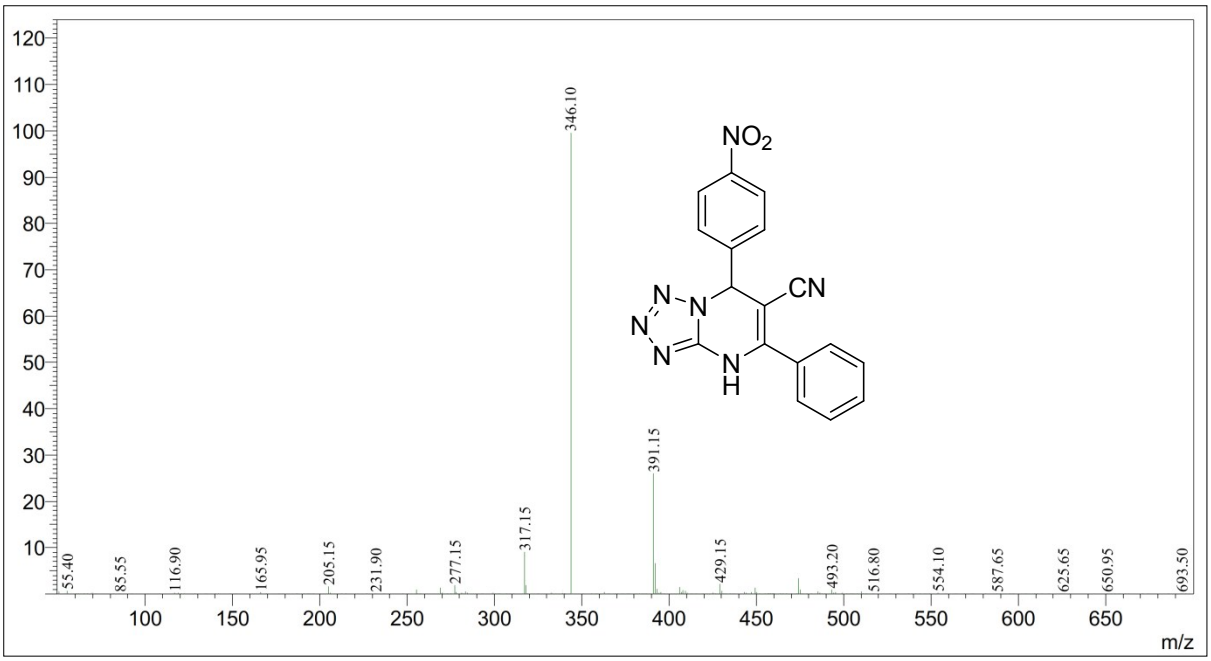
Mass Spectrum of compound **6c**



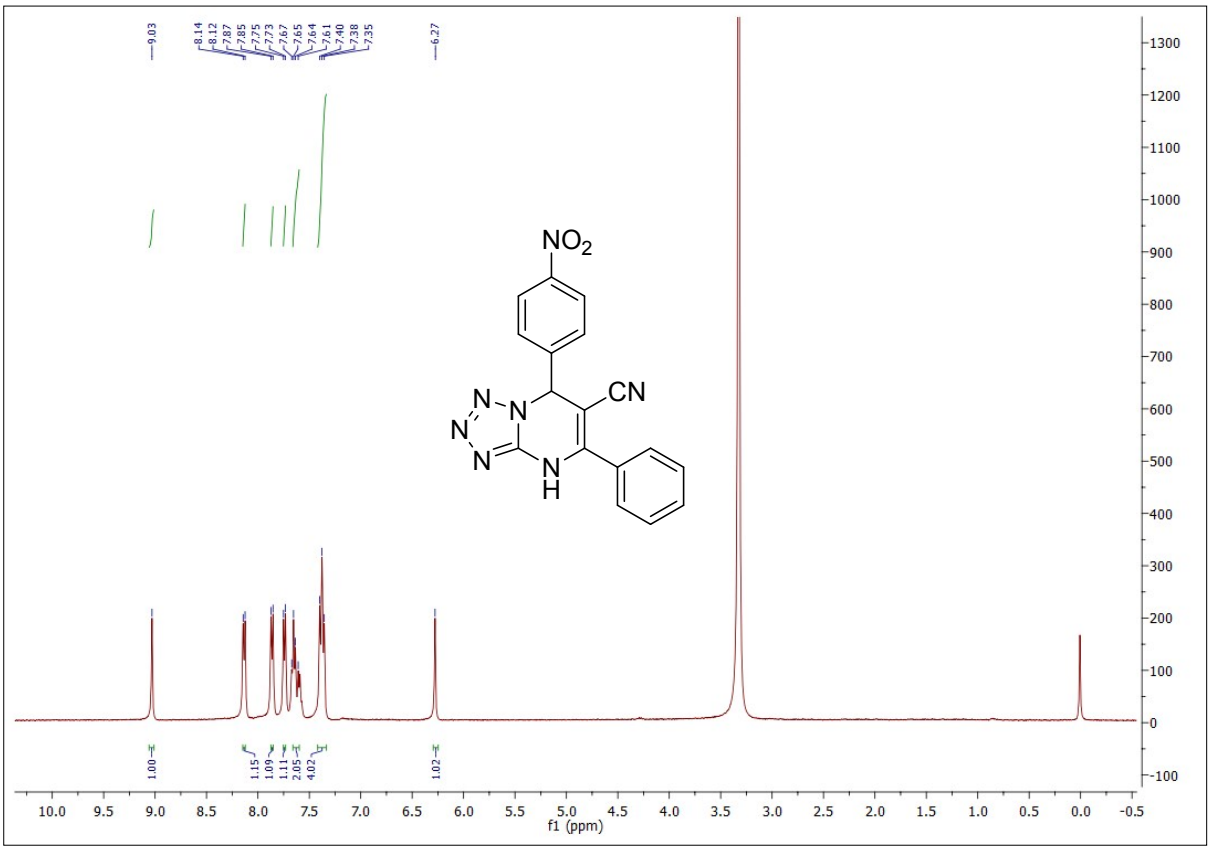
^{1}H NMR Spectrum of compound **6c**



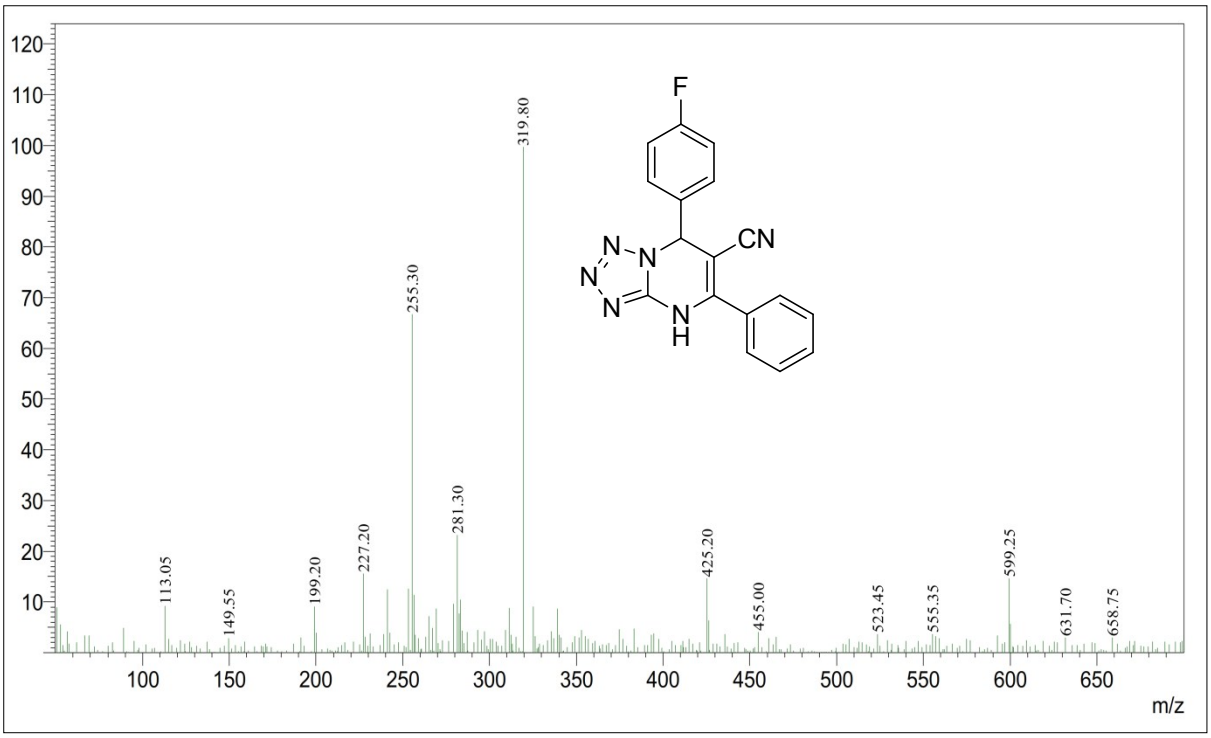
^{13}C NMR Spectrum of compound **6c**



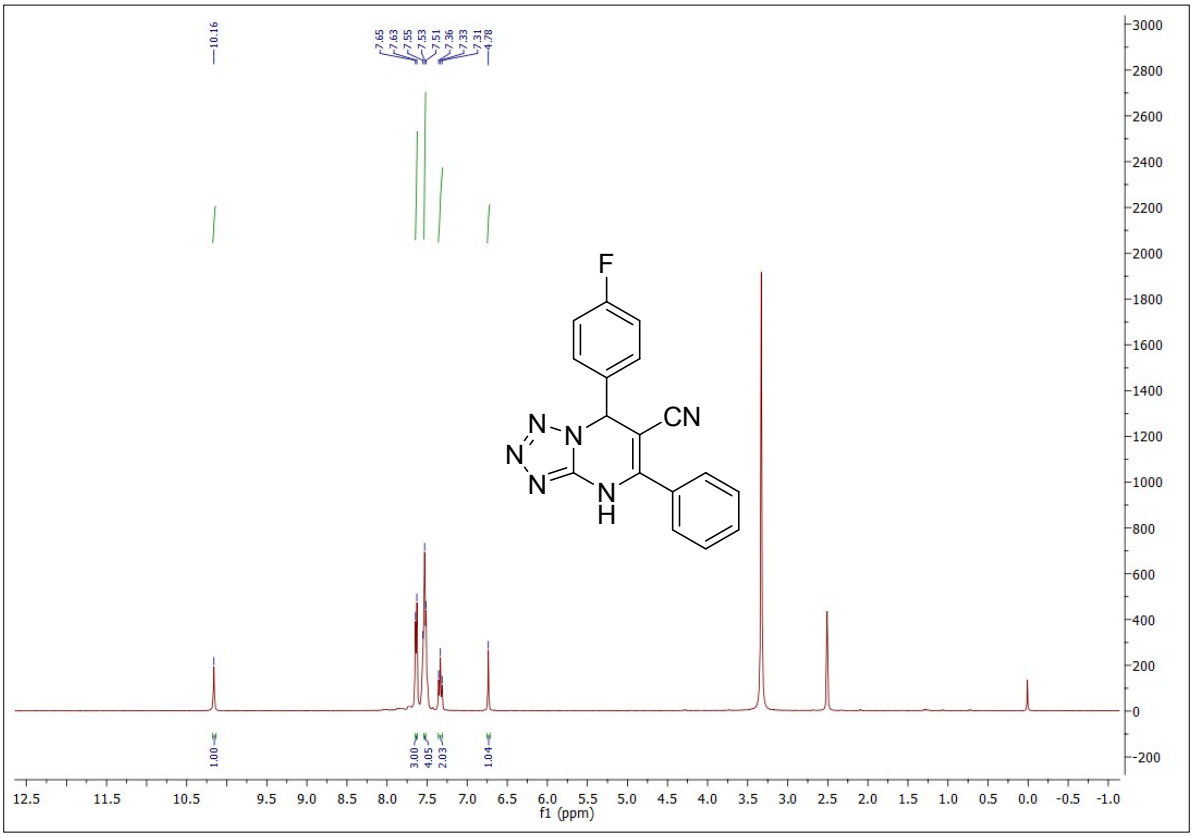
Mass Spectrum of compound **6e**



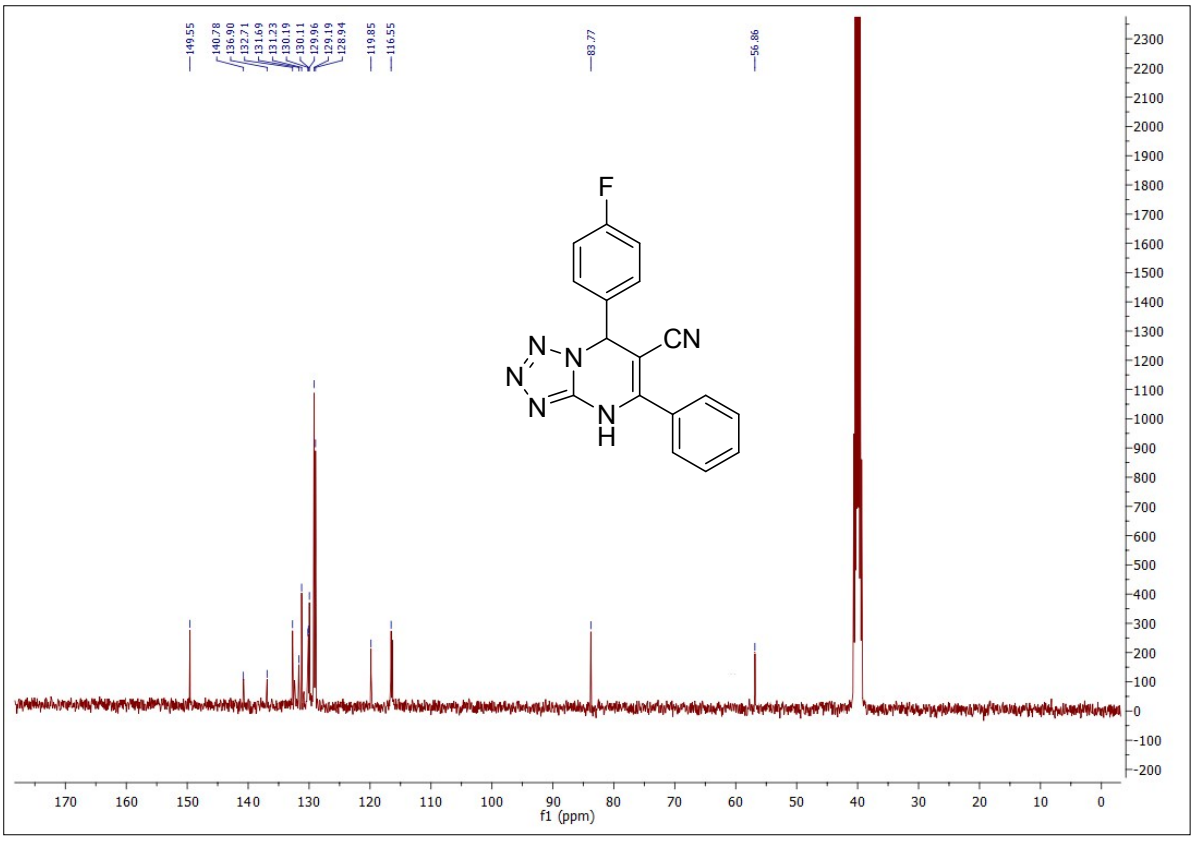
^{1}H NMR Spectrum of compound **6e**



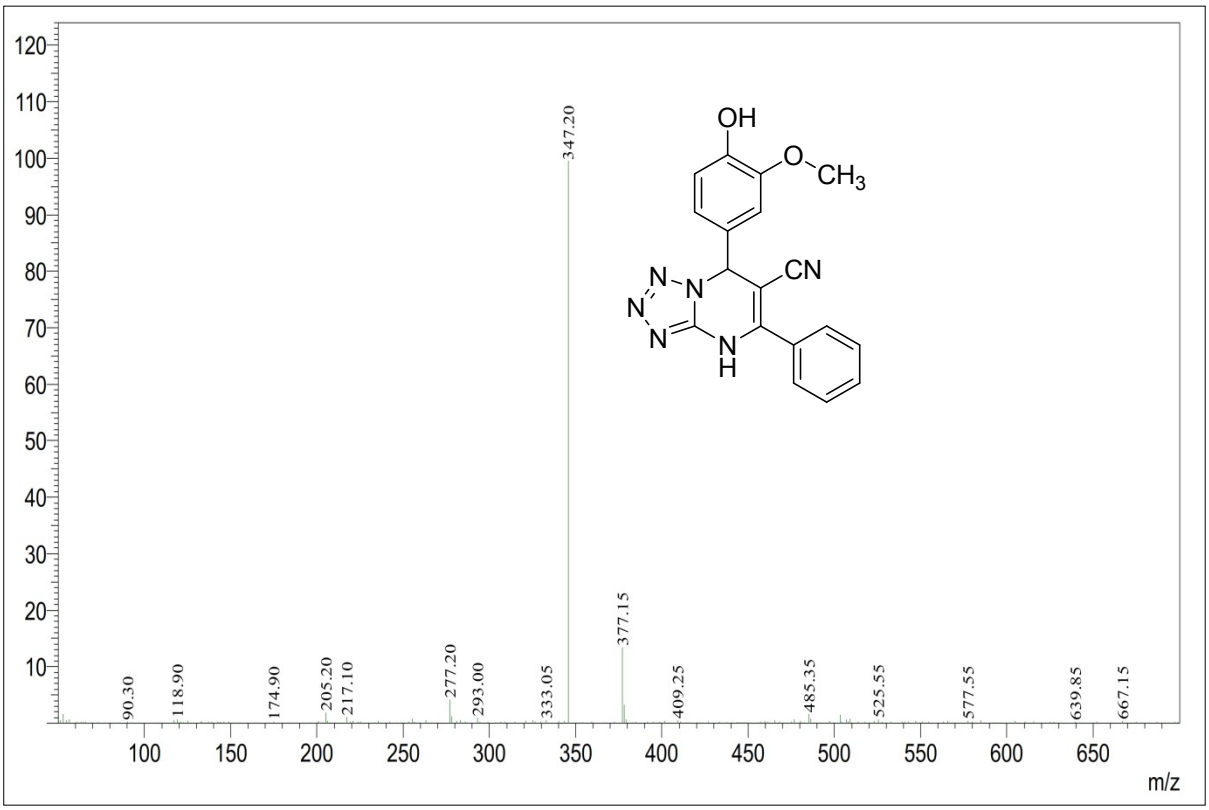
Mass Spectrum of compound **6f**



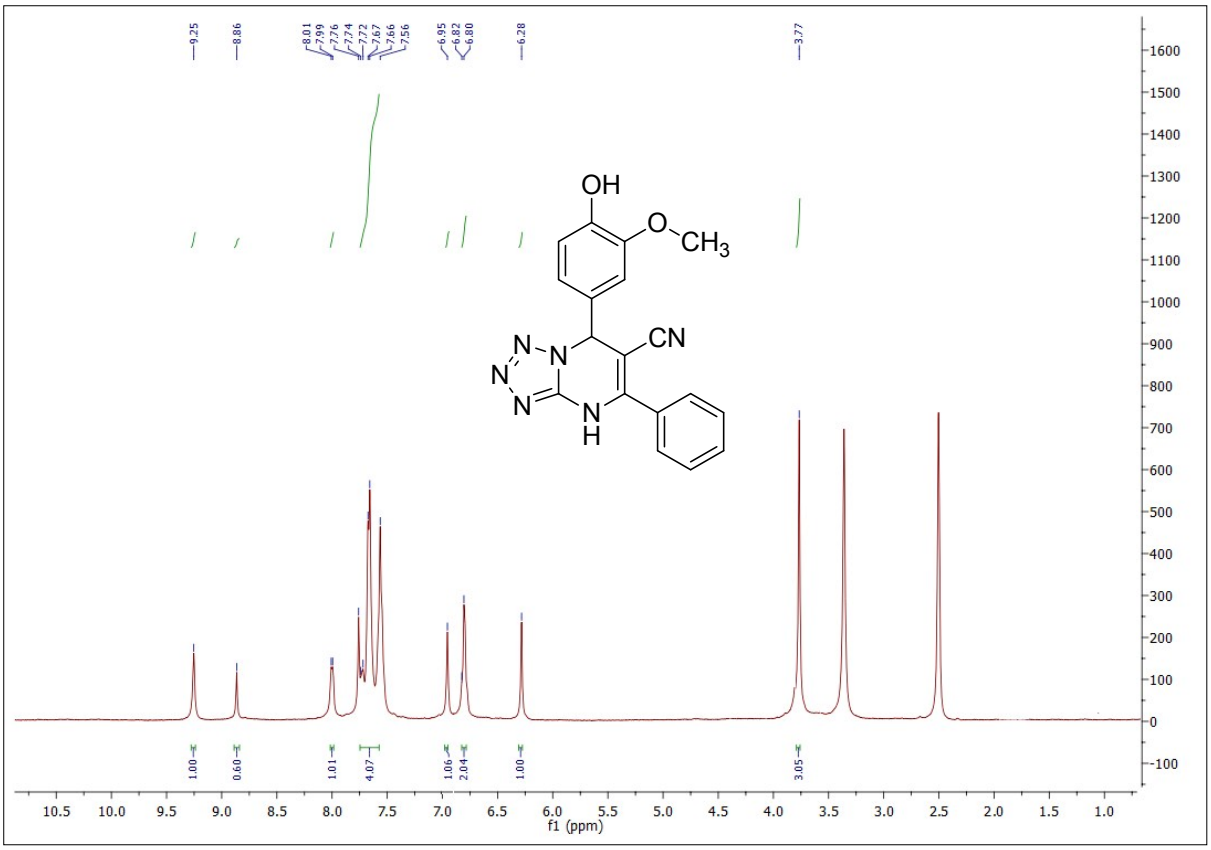
^{1}H NMR Spectrum of compound **6f**



^{13}C NMR Spectrum of compound **6f**



Mass Spectrum of compound **6k**



^{13}C NMR Spectrum of compound **6k**