Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Novel magnetic FSM-16 supported ionic liquid/Pd complex as a high performance and recyclable catalyst for the synthesis of pyrano[3,2-*c*]chromenes

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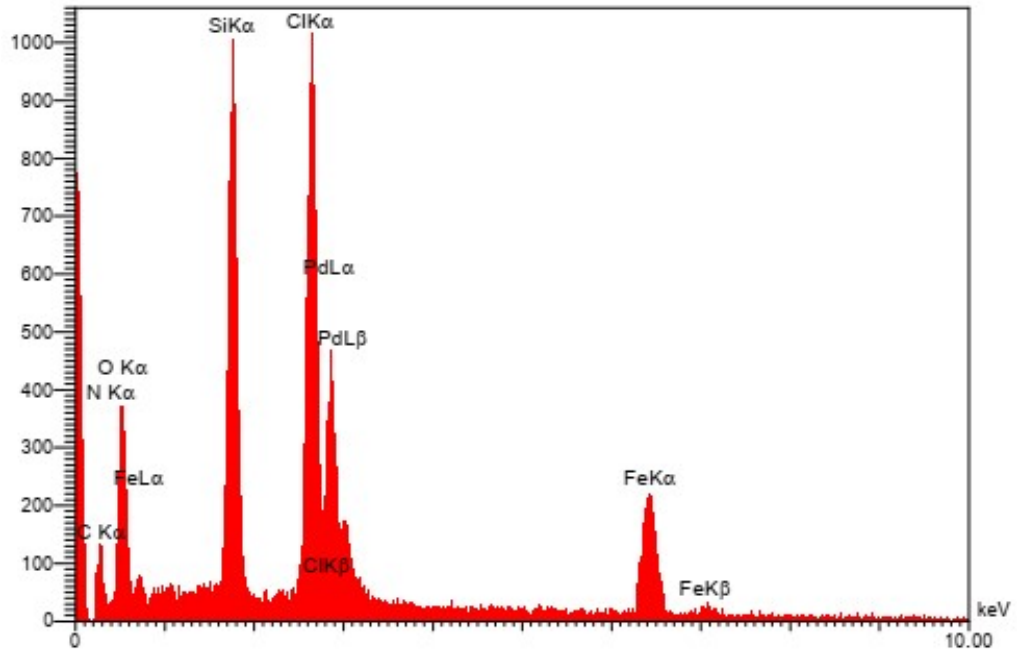


Fig. S1. The EDX analysis of the Fe_3O_4@FSM-16/IL-Pd nanocatalyst.

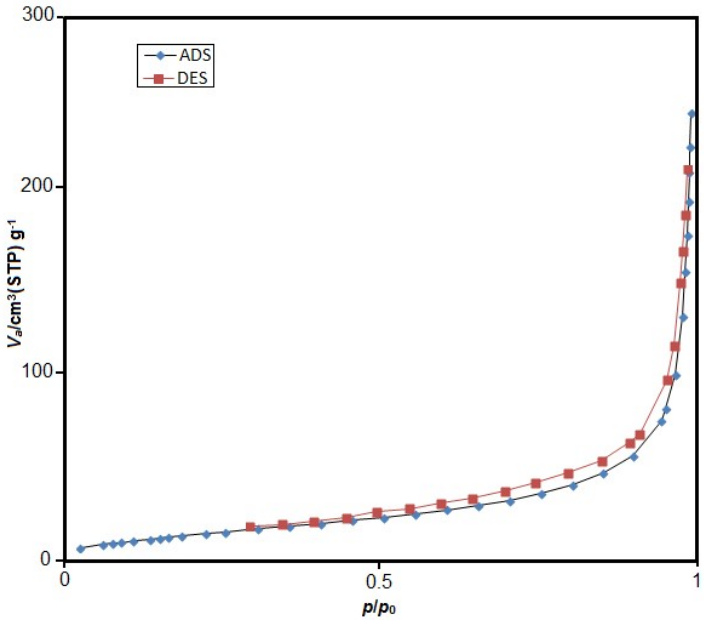


Fig. S2. N_2 adsorption-desorption isotherm of the Fe_3O_4@FSM-16/IL-Pd.

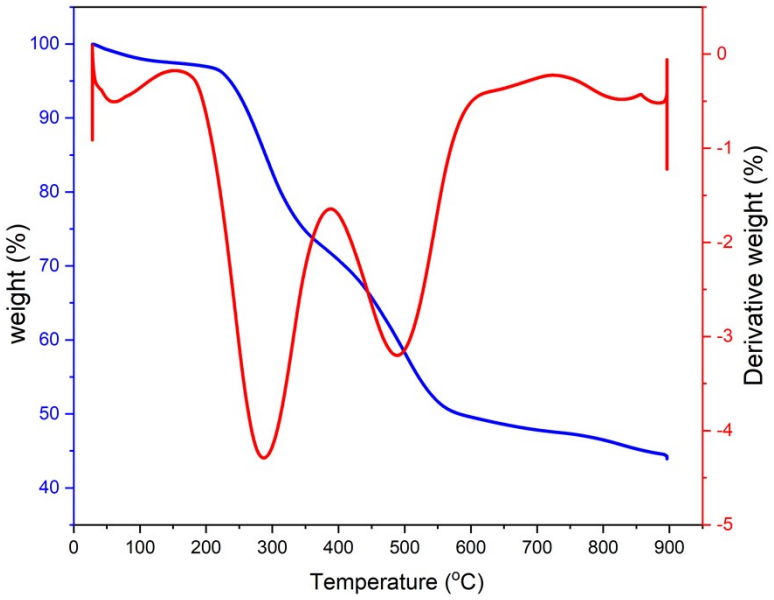
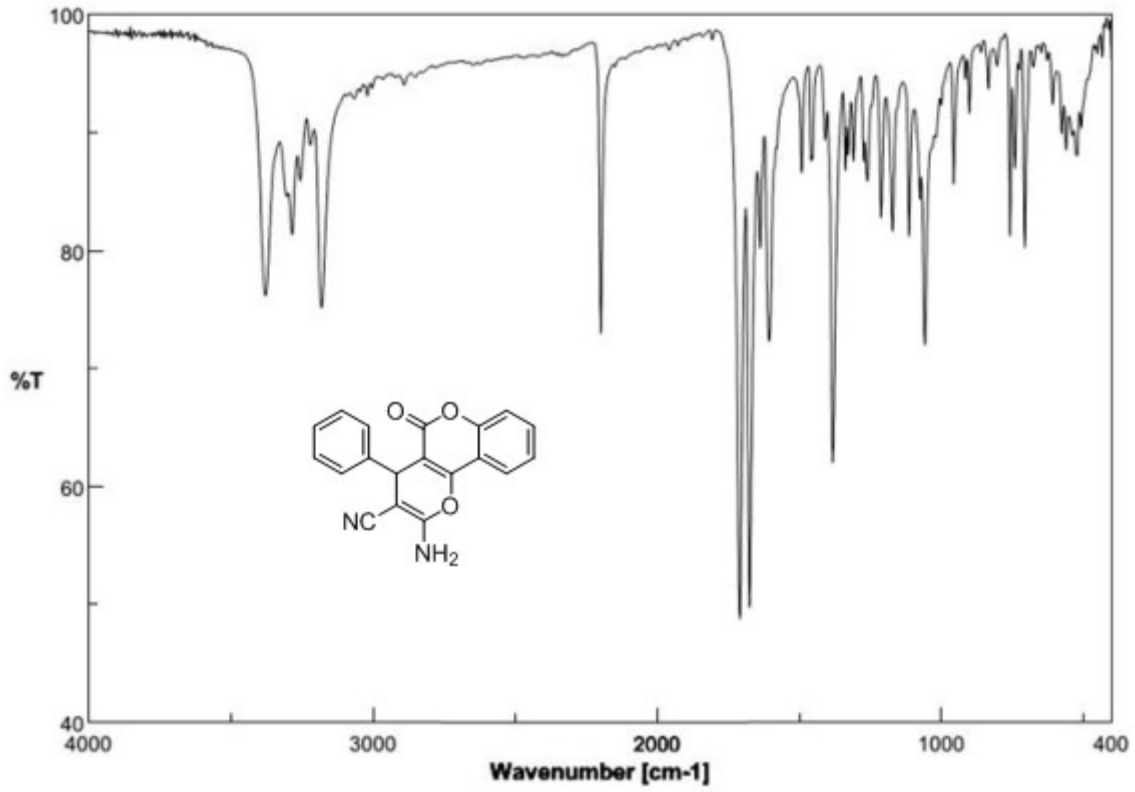
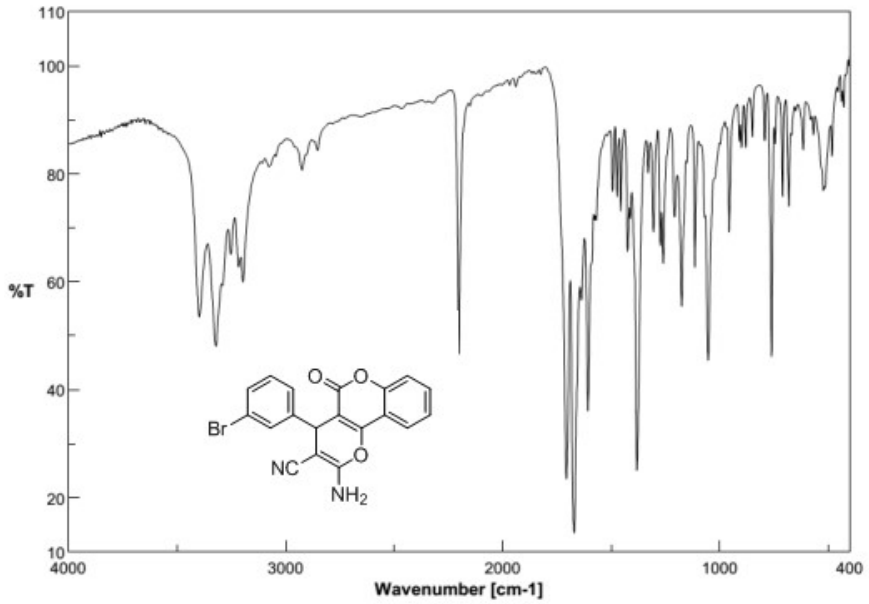


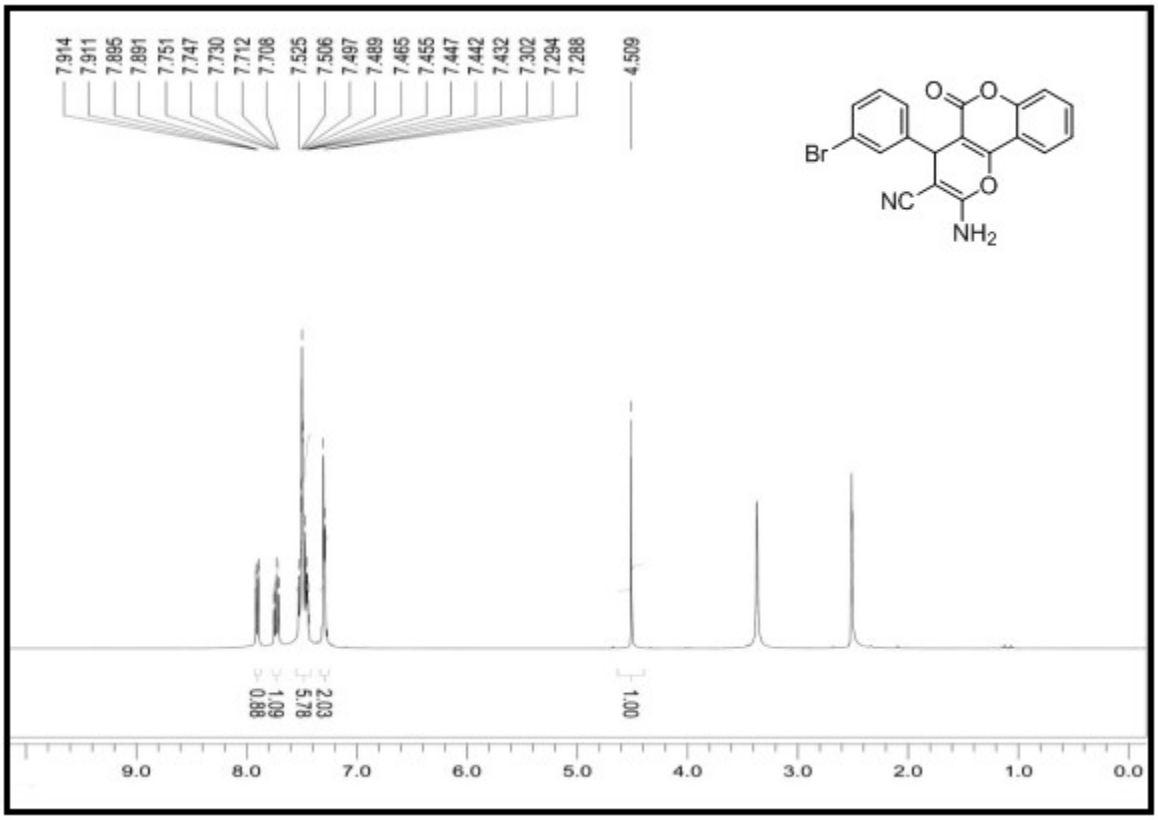
Fig. S3. TGA of the Fe_3O_4@FSM-16/IL-Pd.



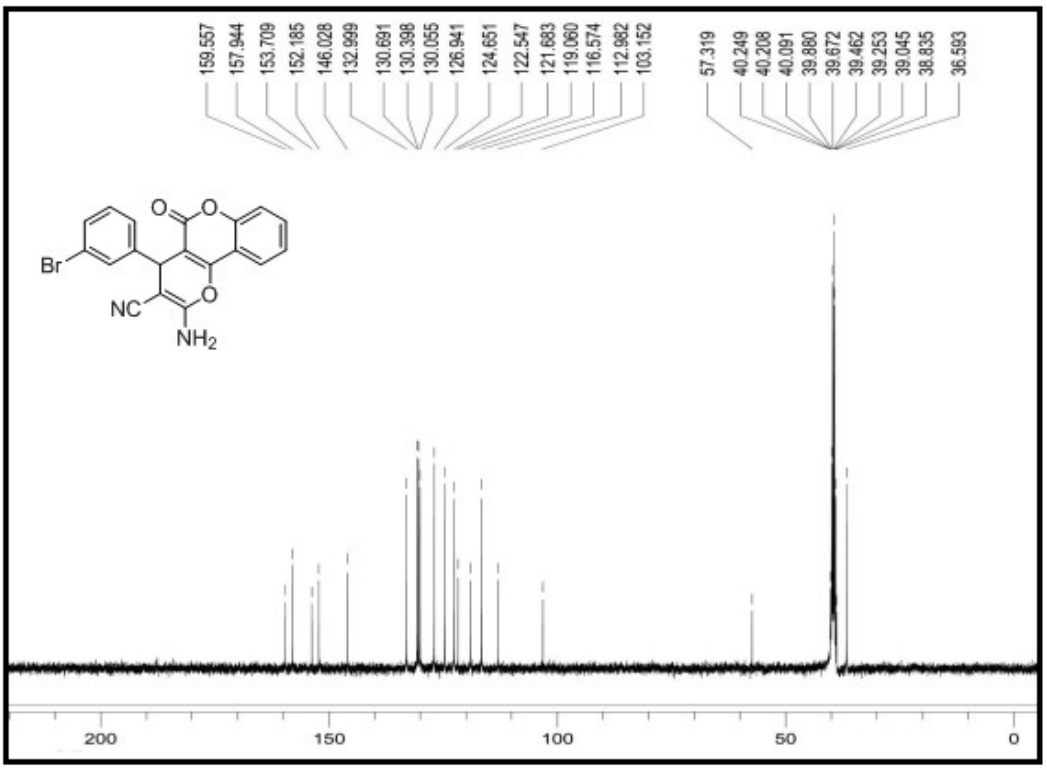
FT-IR spectrum of 2-amino-5-oxo-4-phenyl-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5a**).



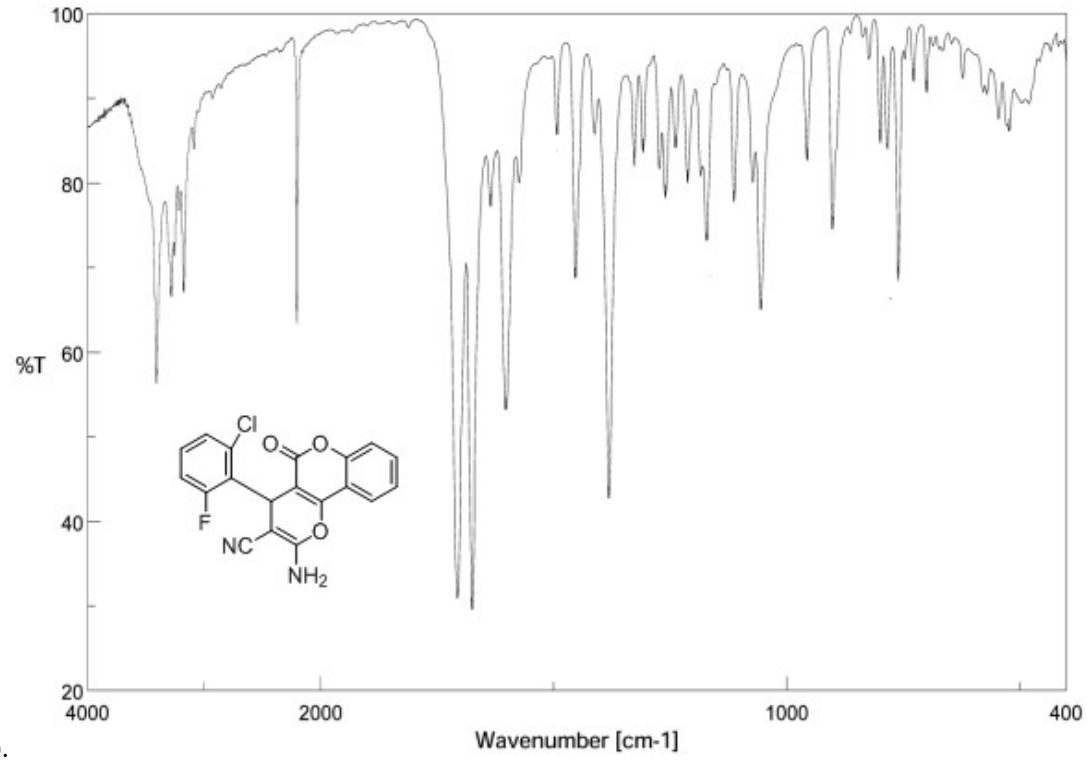
FT-IR spectrum of 2-amino-4-(3-bromophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5b**).



^{1}H NMR spectrum of 2-amino-4-(3-bromophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5b**).

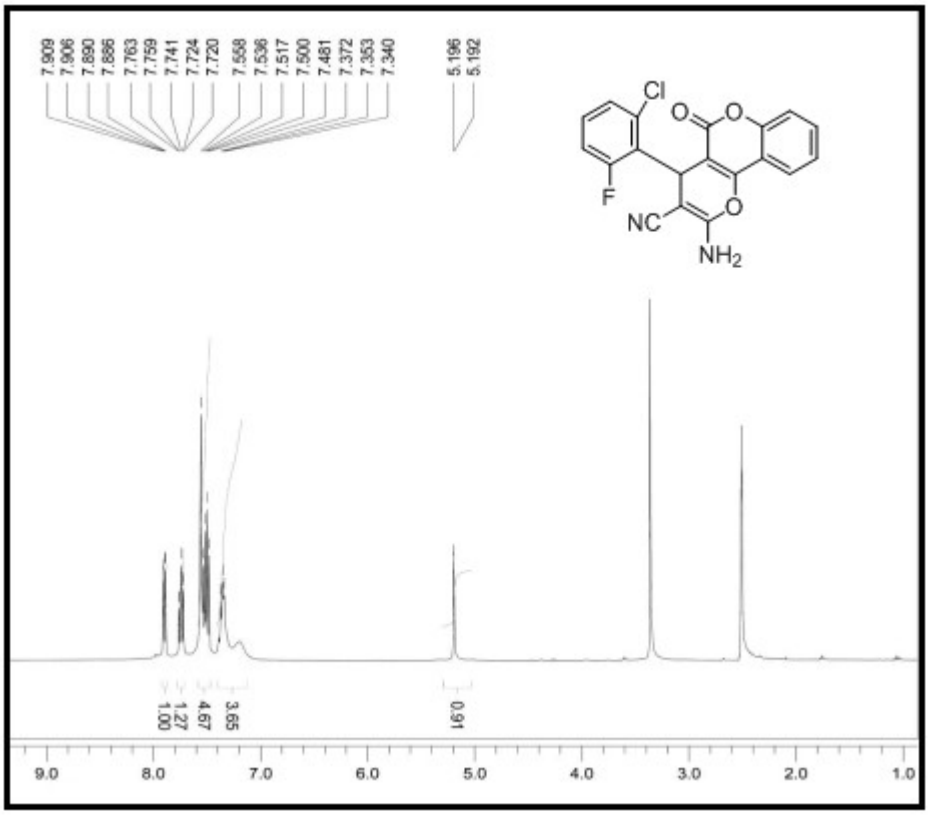


^{13}C NMR spectrum of 2-amino-4-(3-bromophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile

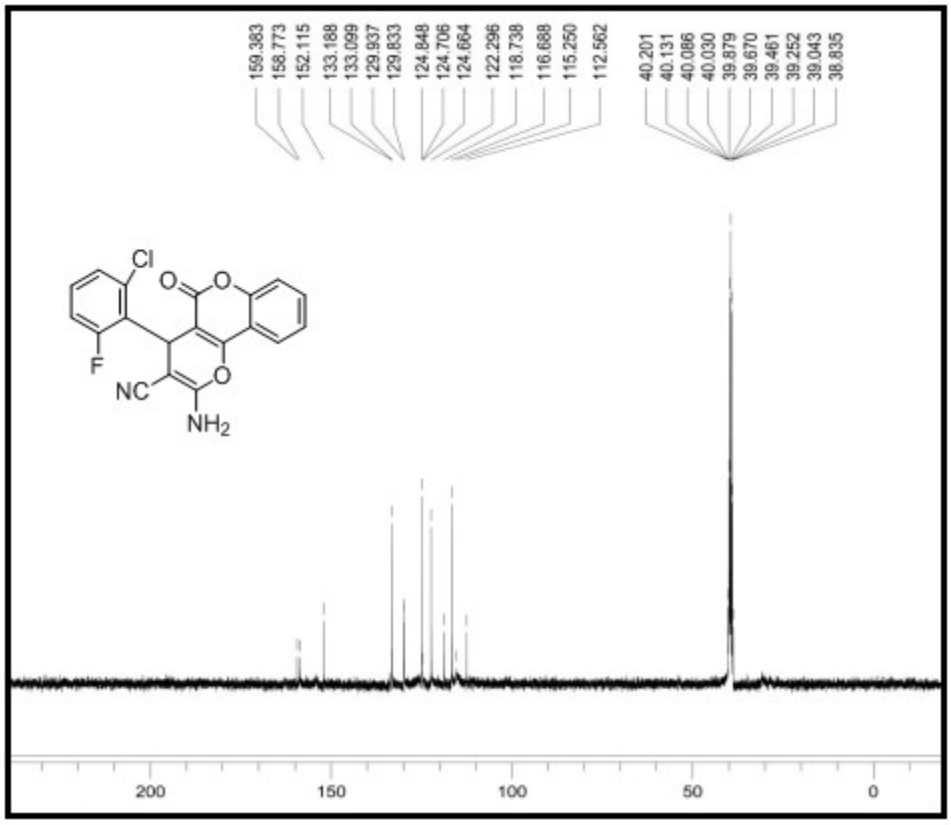


(**5b**).

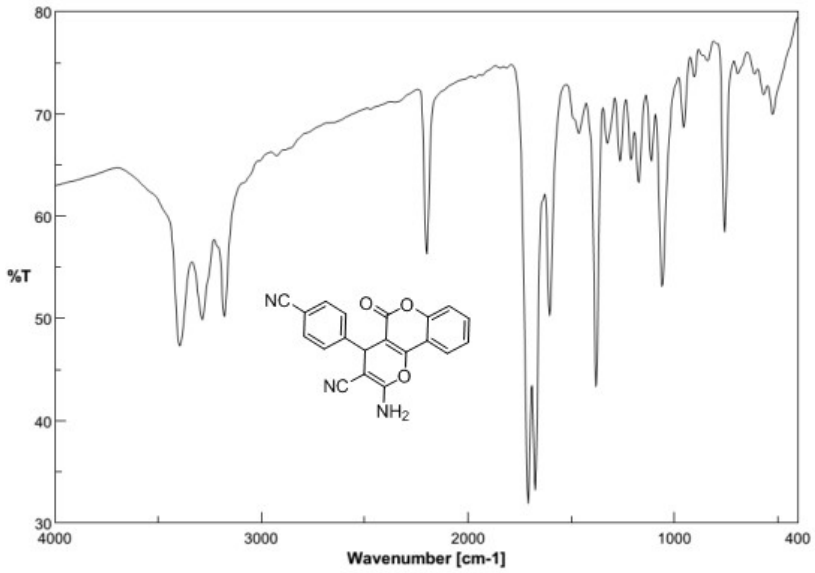
FT-IR spectrum of 2-amino-4-(2-chloro-6-fluorophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5c**).



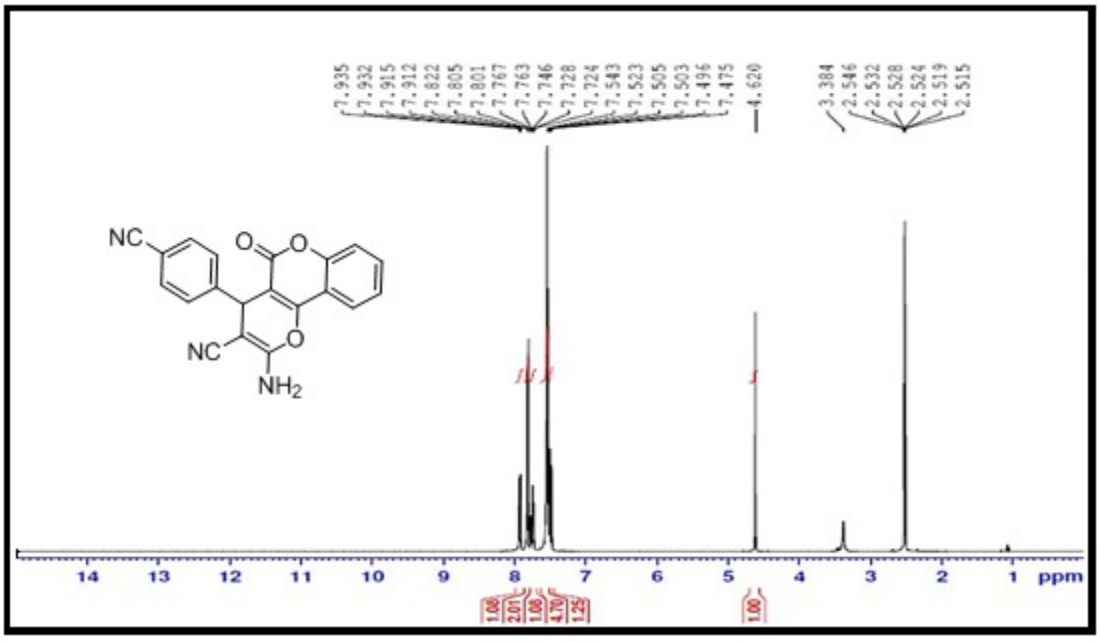
^{1}H NMR spectrum of 2-amino-4-(2-chloro-6-fluorophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5c**).



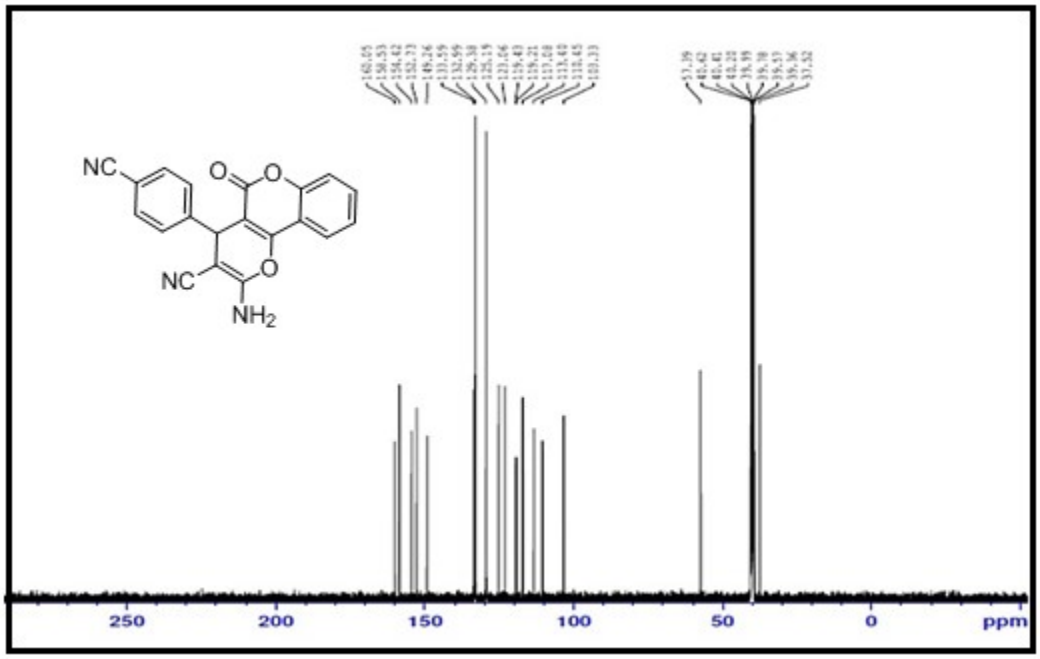
^{13}C NMR spectrum of 2-amino-4-(2-chloro-6-fluorophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5c**).



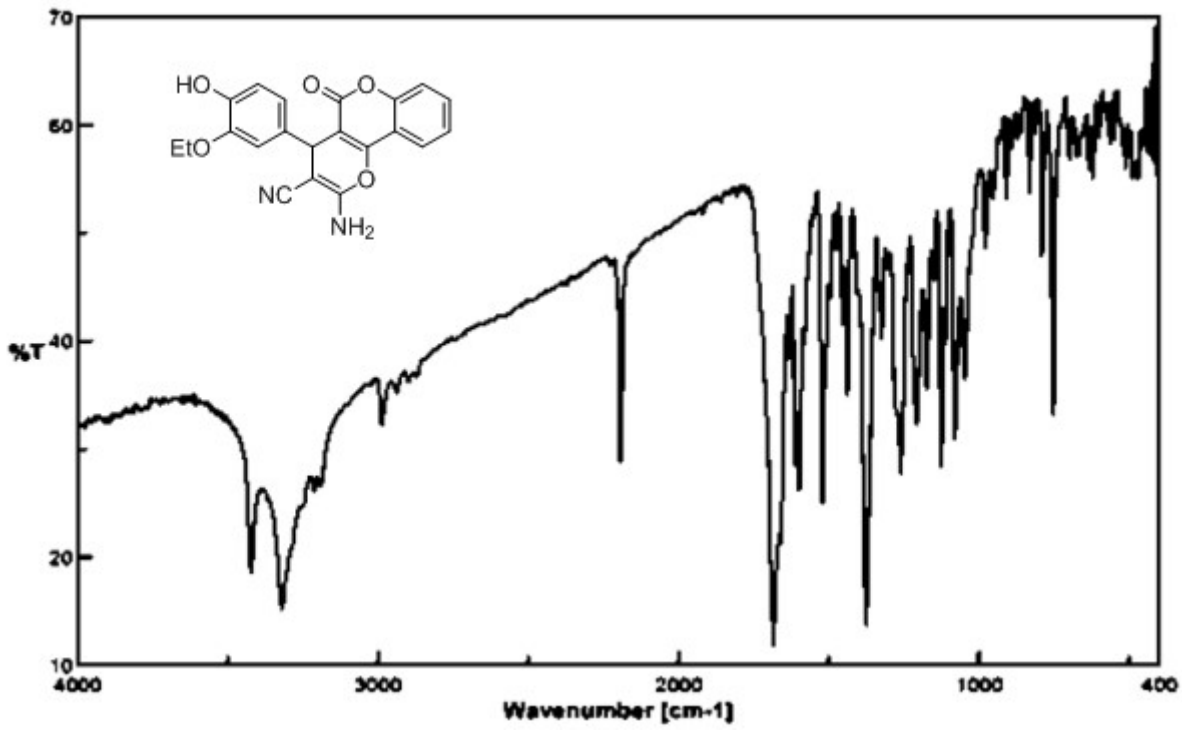
FT-IR spectrum of 2-amino-4-(4-cyanophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5d**).



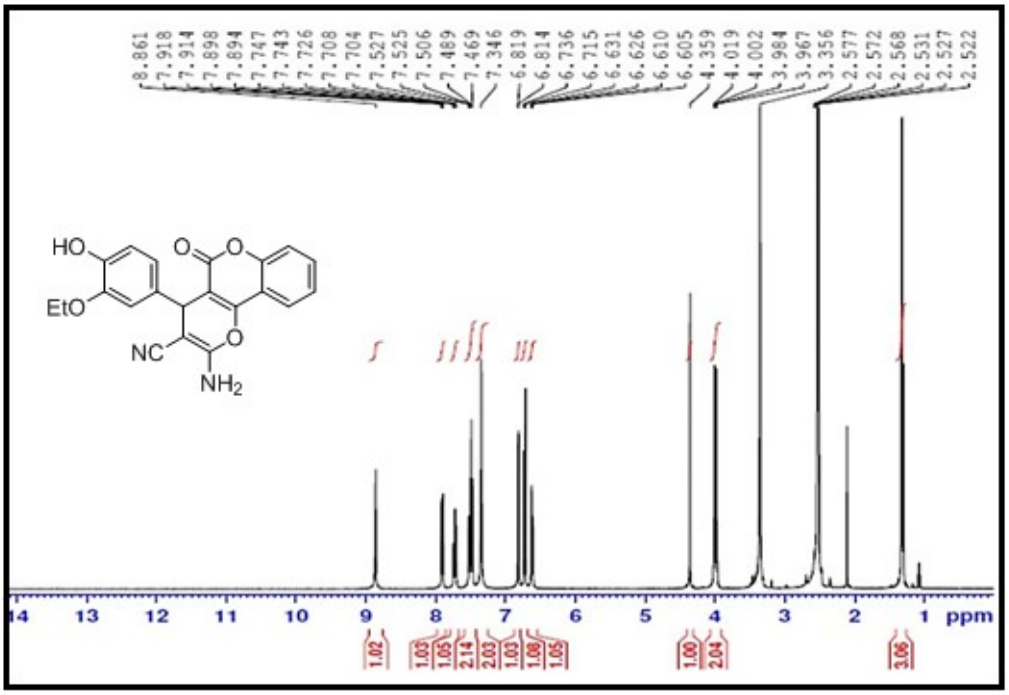
^{1}H NMR spectrum of 2-amino-4-(4-cyanophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5d**).



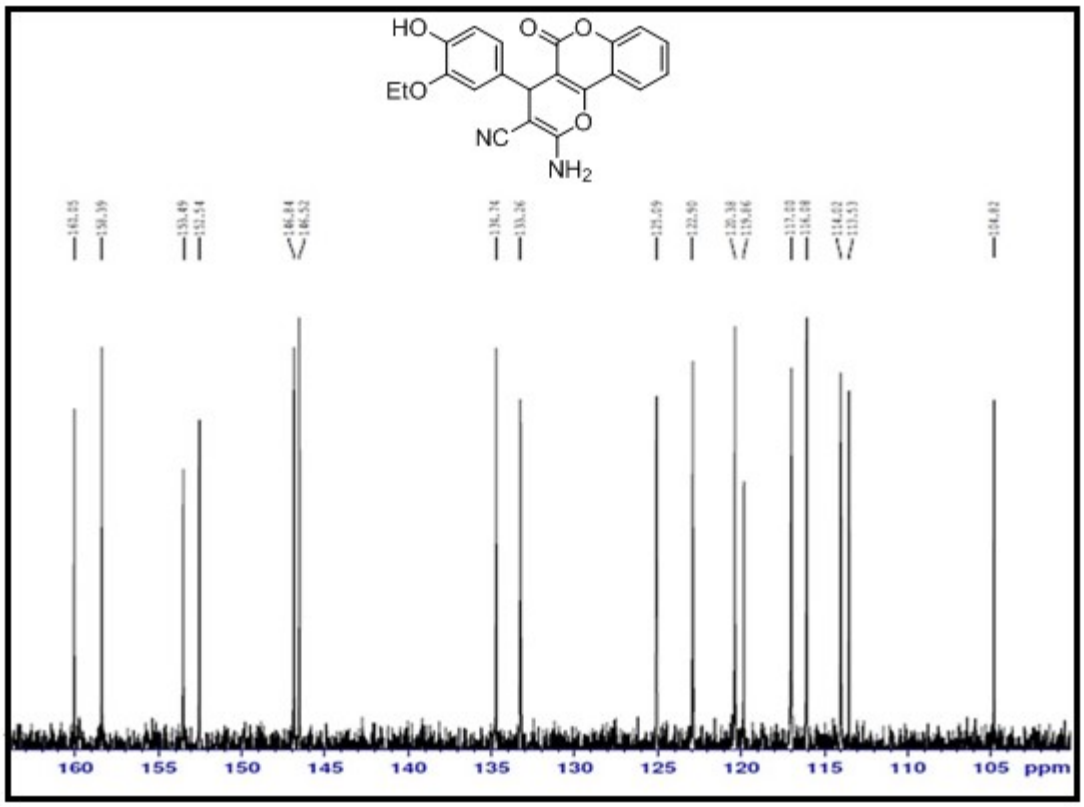
^{13}C NMR spectrum of 2-amino-4-(4-cyanophenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5d**).



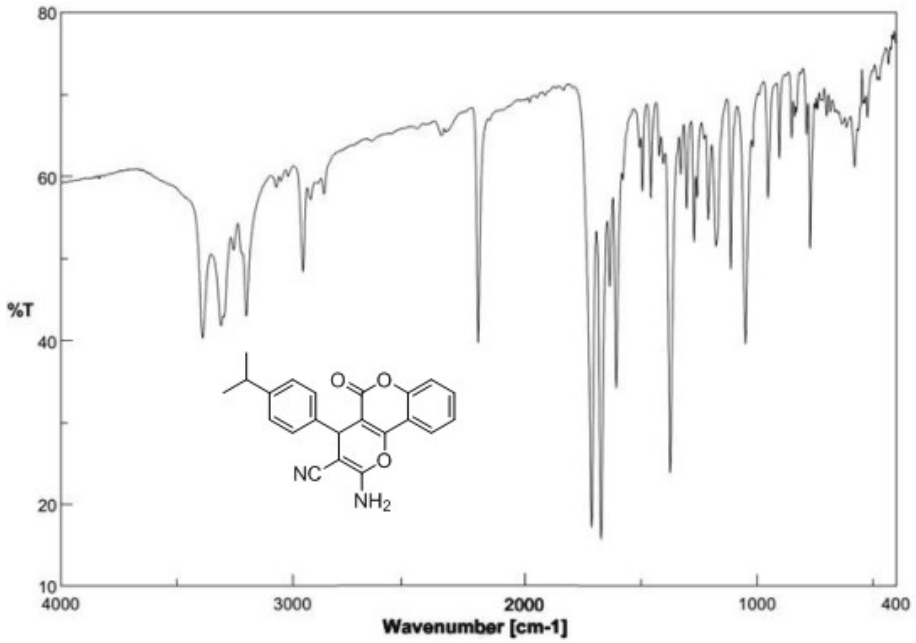
FT-IR spectrum of 2-amino-4-(3-ethoxy-4-hydroxyphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5e**).



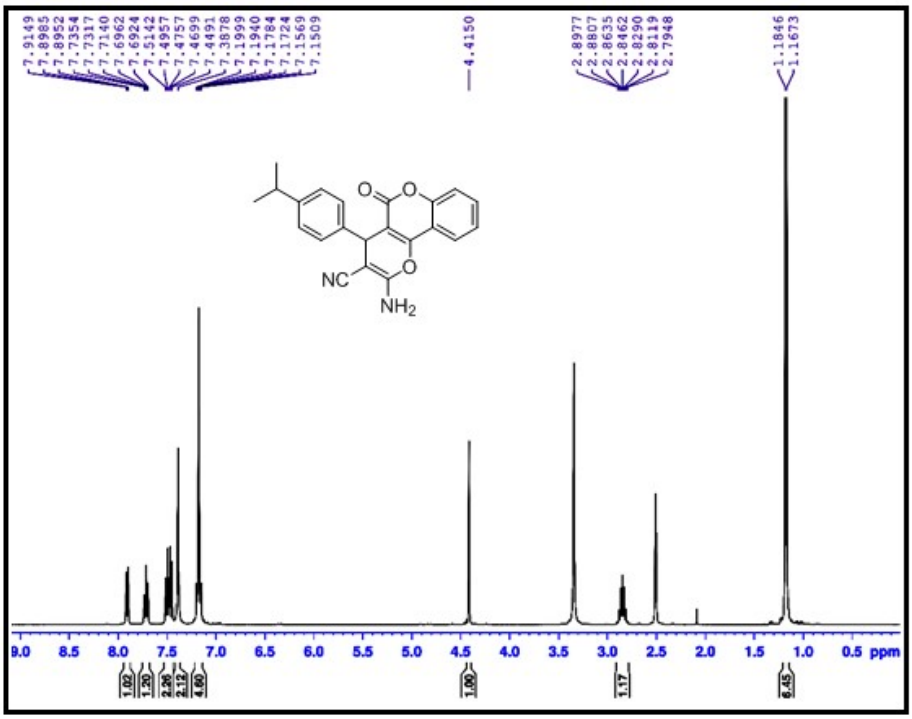
^{1}H NMR spectrum of 2-amino-4-(3-ethoxy-4-hydroxyphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5e**).



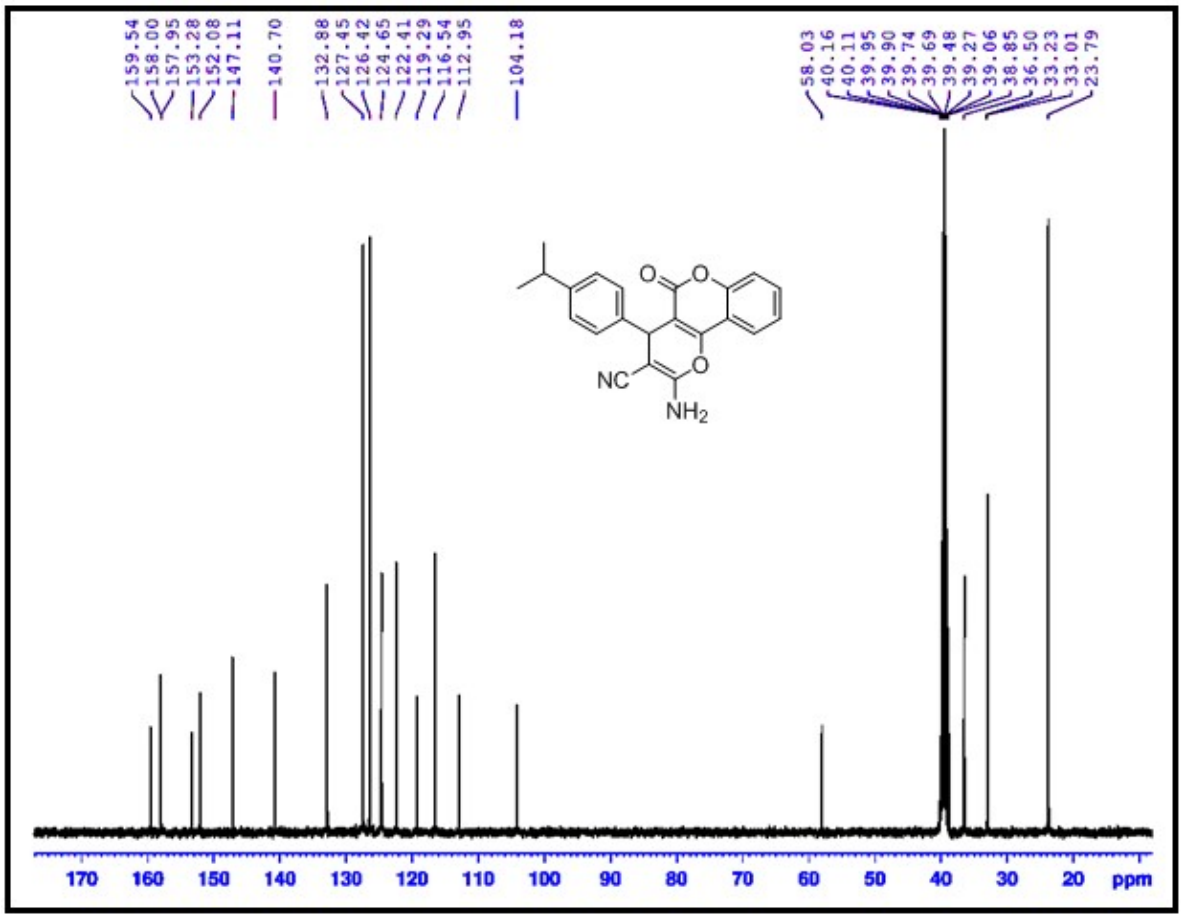
^{13}C NMR spectrum of 2-amino-4-(3-ethoxy-4-hydroxyphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5e**).



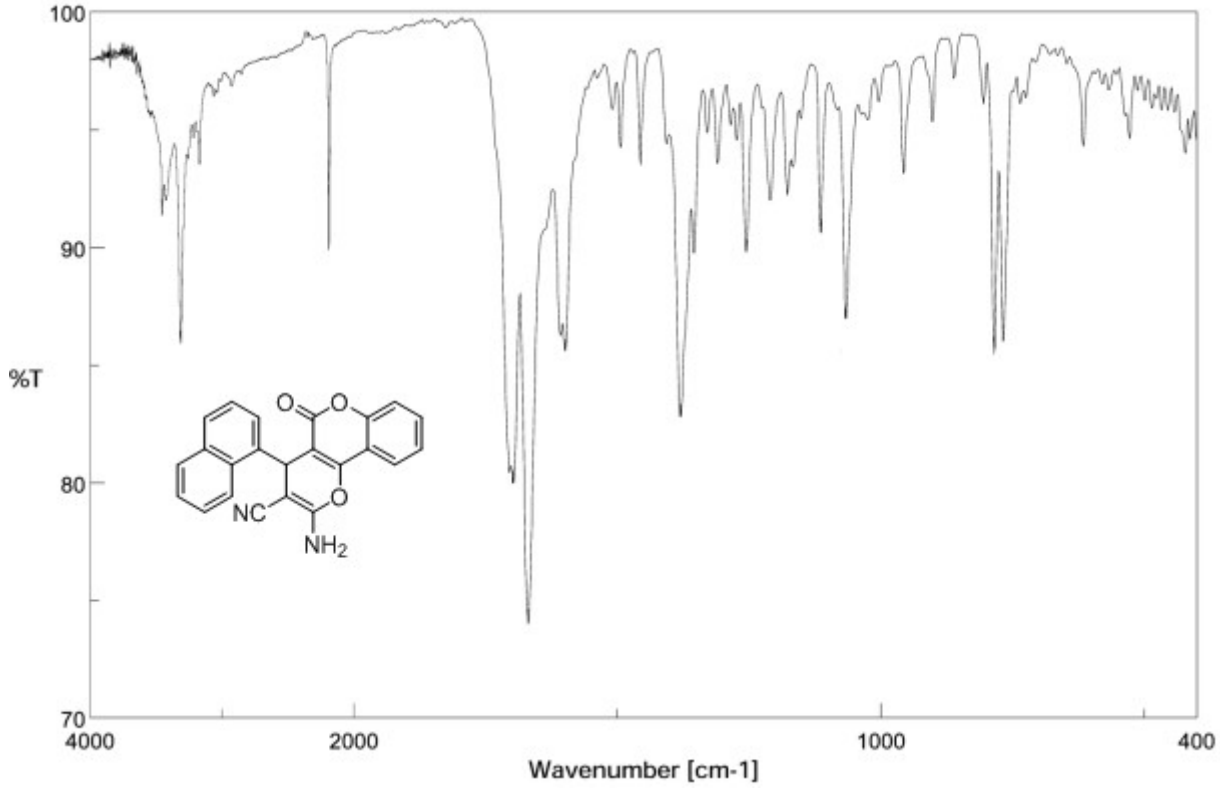
FT-IR spectrum of 2-amino-4-(4-isopropylphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5f**).



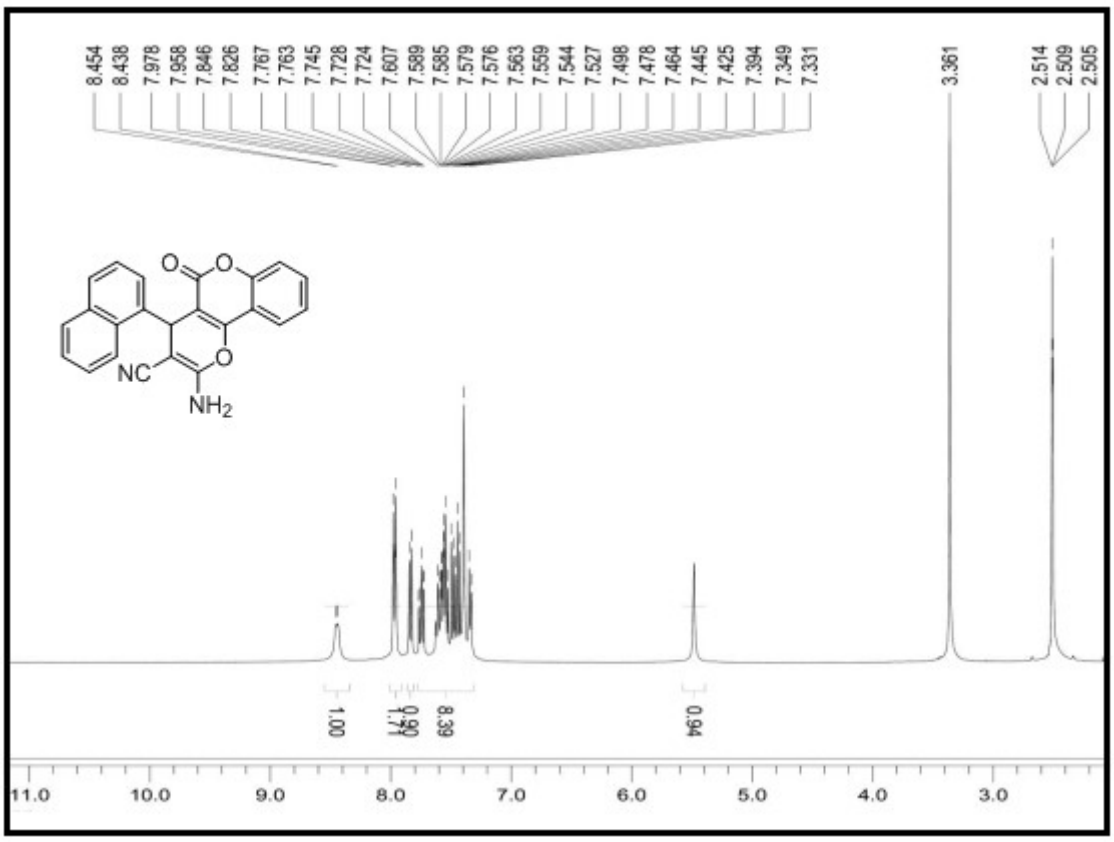
[1] H NMR spectrum of 2-amino-4-(4-isopropylphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5f**)



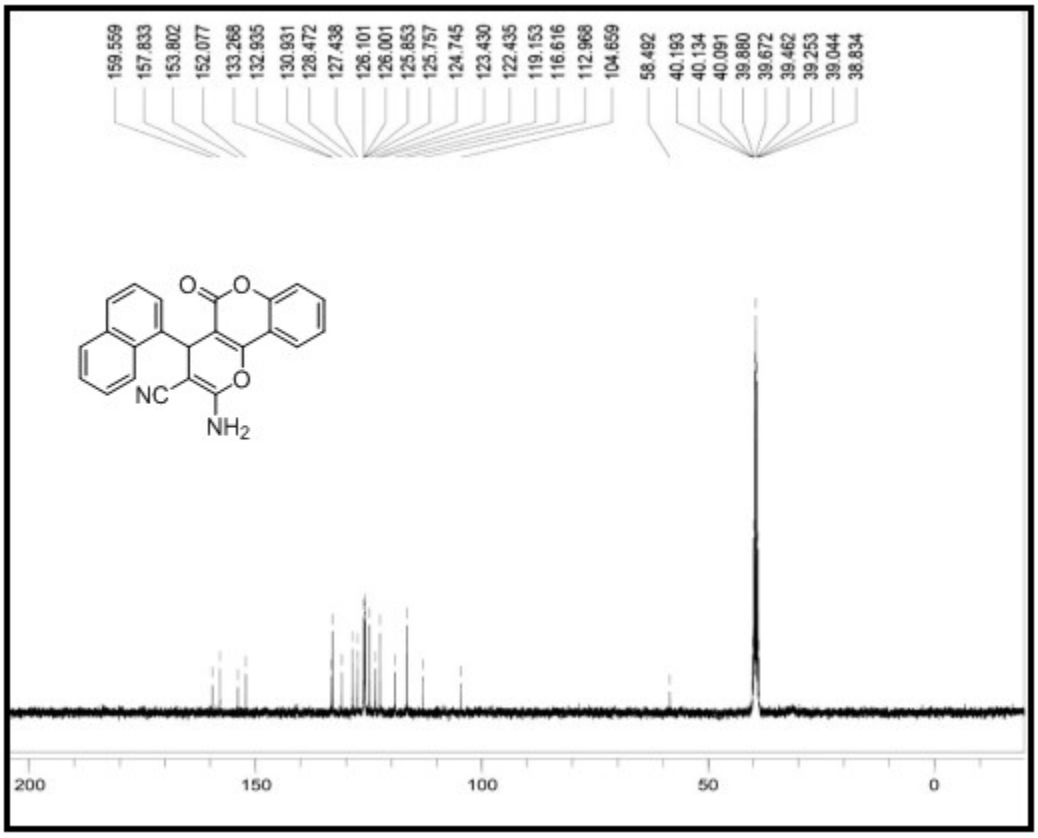
^{13}C NMR spectrum of 2-amino-4-(4-isopropylphenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5f**)



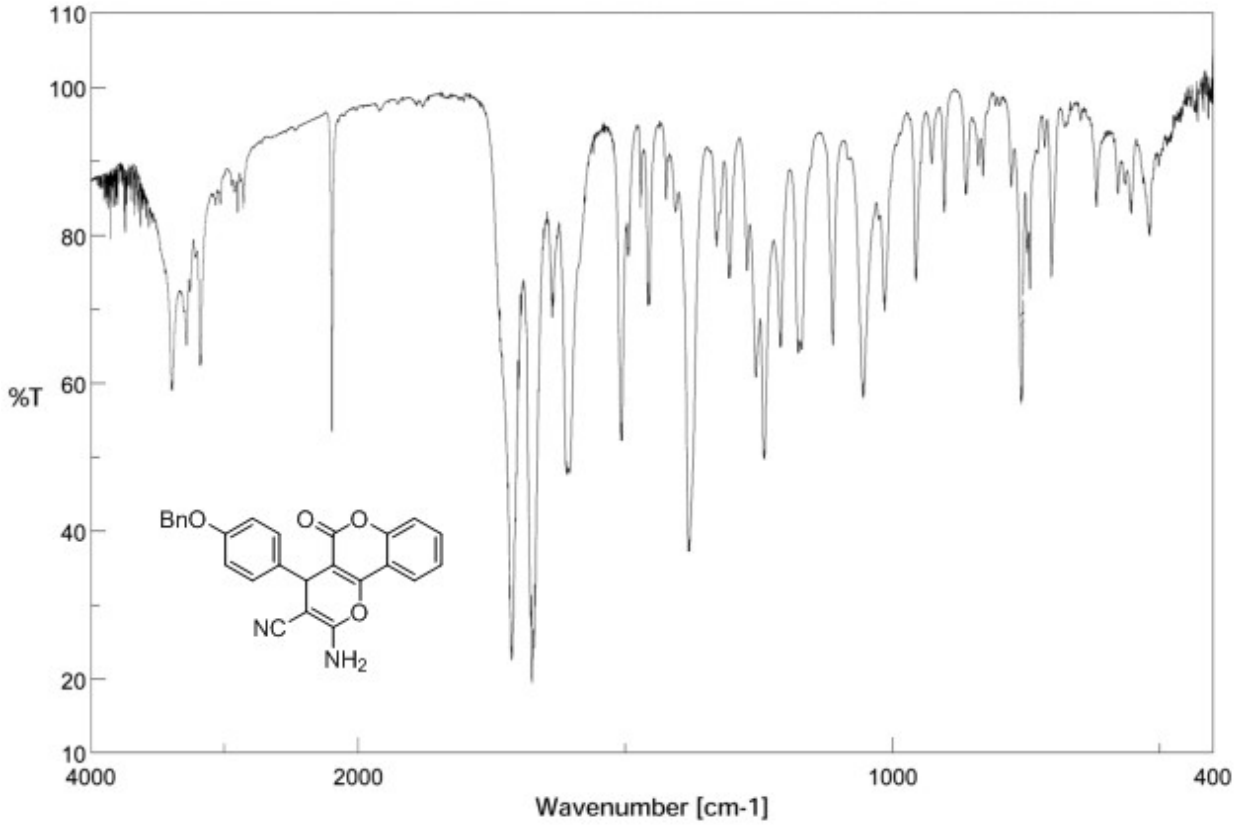
FT-IR spectrum of 2-amino-4-(naphthalen-1-yl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5g**).



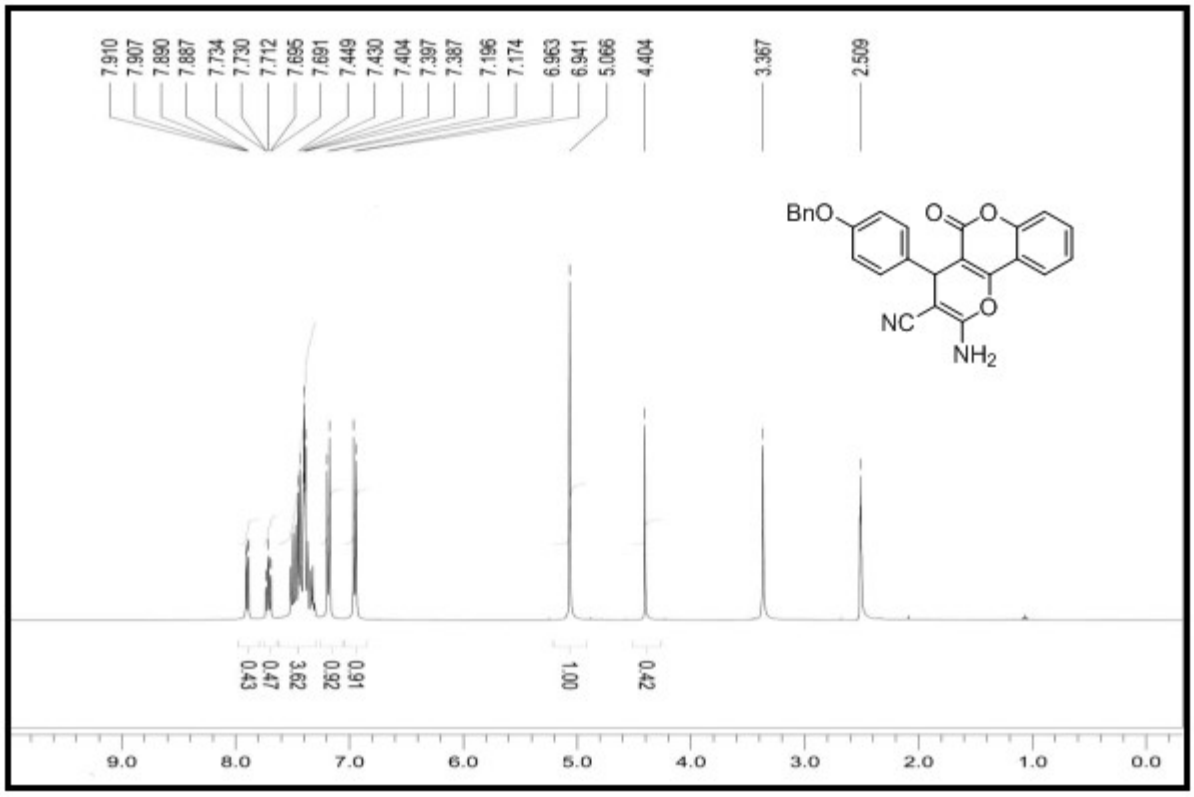
^{1}H NMR spectrum of 2-amino-4-(naphthalen-1-yl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5g**).



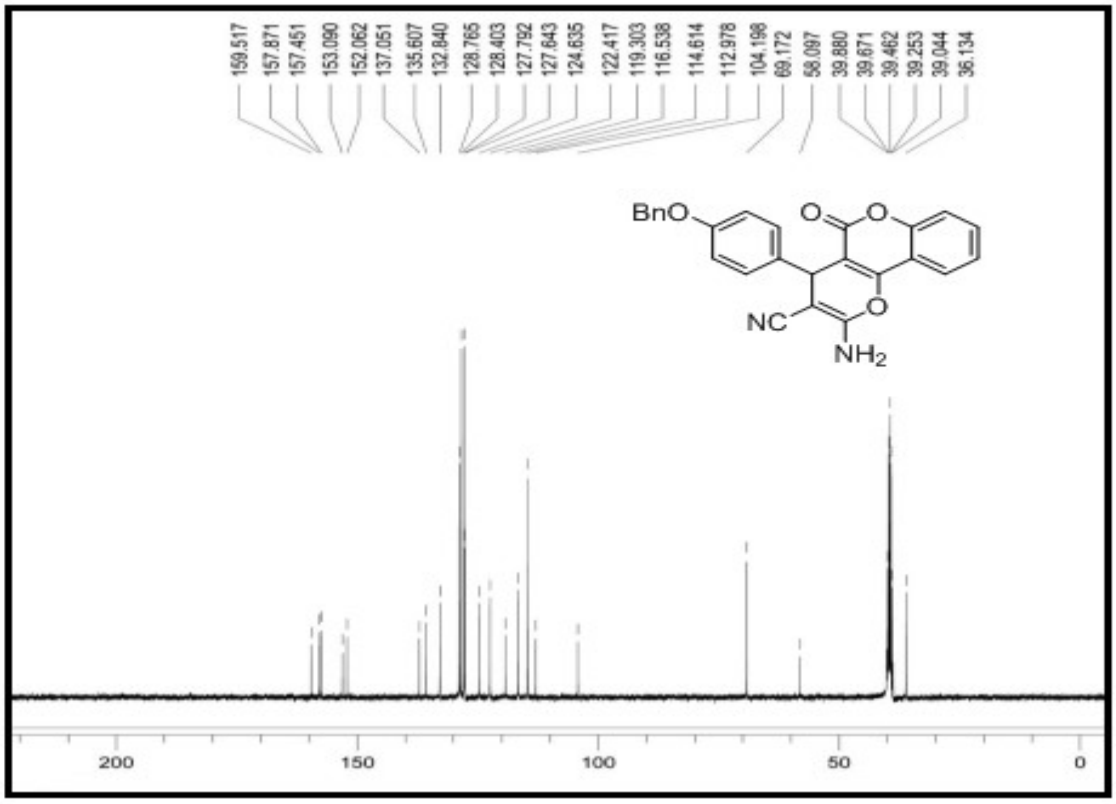
^{13}C NMR spectrum of 2-amino-4-(naphthalen-1-yl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5g**).



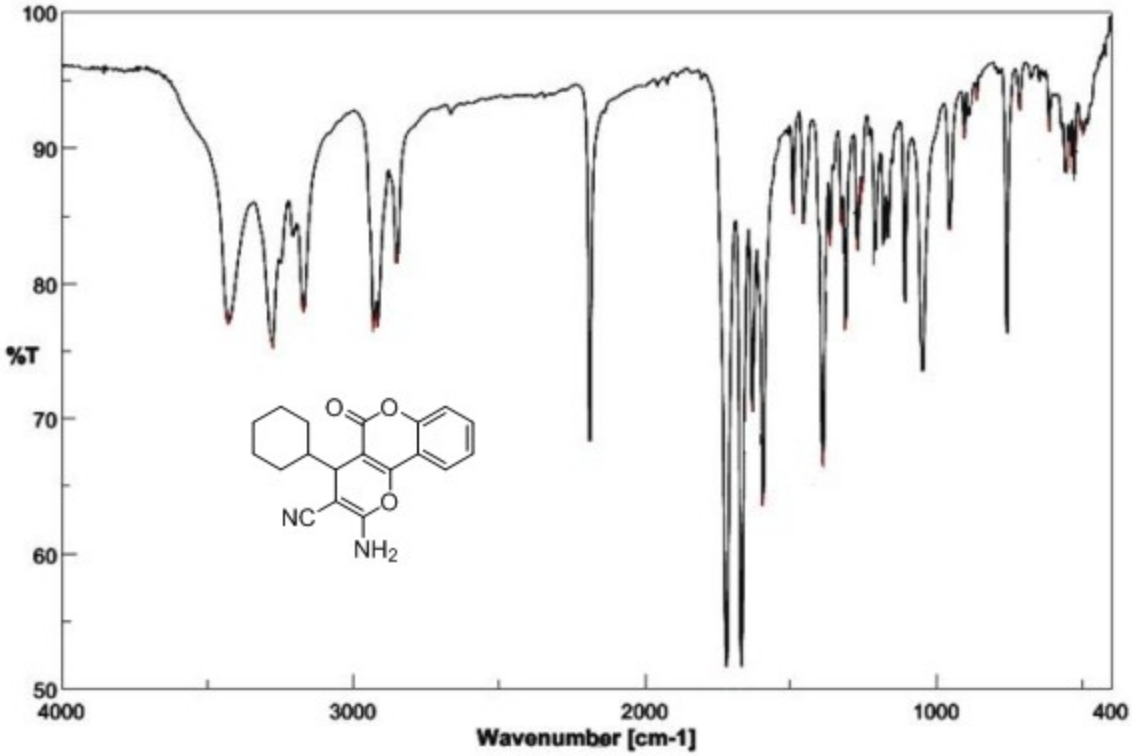
FT-IR spectrum of 2-amino-4-(4-(benzyloxy)phenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5h**).



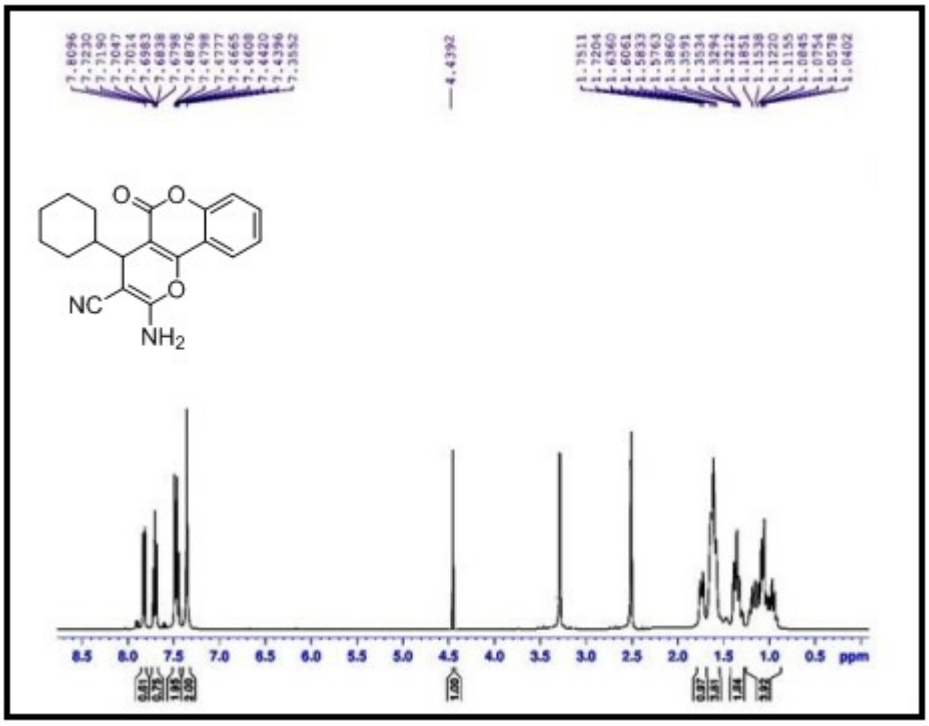
^{1}H NMR spectrum of 2-amino-4-(4-(benzyloxy)phenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5h**).



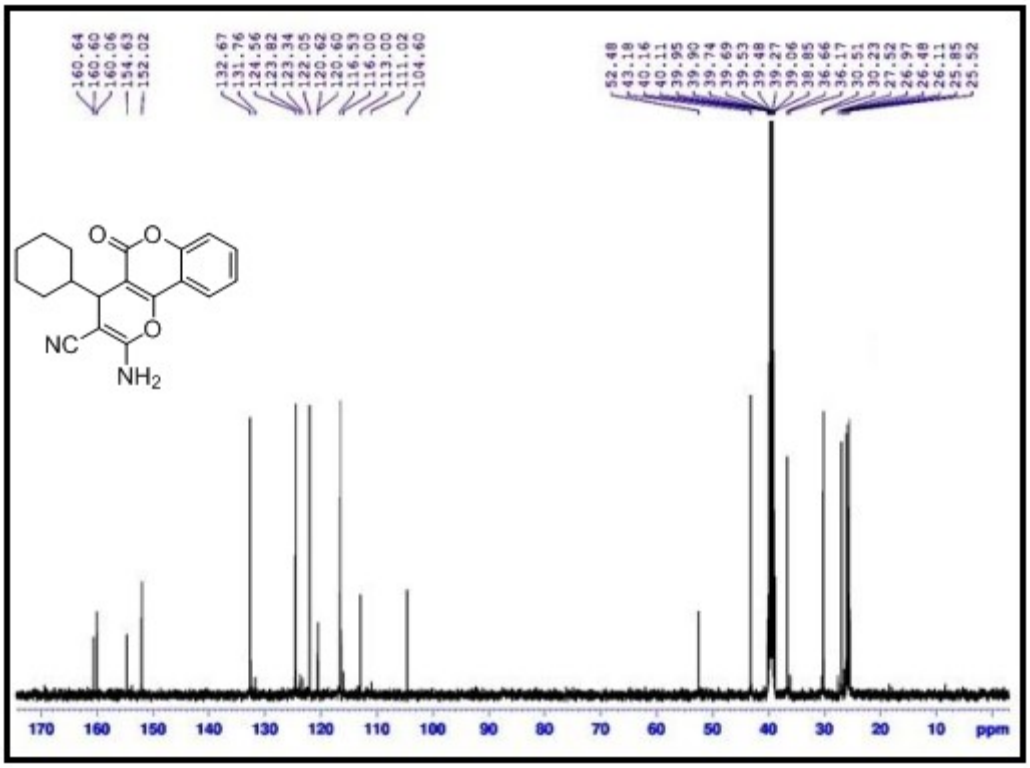
^{13}C NMR spectrum of 2-amino-4-(4-(benzyloxy)phenyl)-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5h**).



FT-IR spectrum of 2-amino-4-cyclohexyl-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile (**5i).**



^{1}H NMR spectrum of 2-amino-4-cyclohexyl-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile **(5i).**



^{13}C NMR spectrum of 2-amino-4-cyclohexyl-5-oxo-4*H*,5*H*-pyrano[3,2-*c*]chromene-3-carbonitrile **(5i).**