

Supporting Information

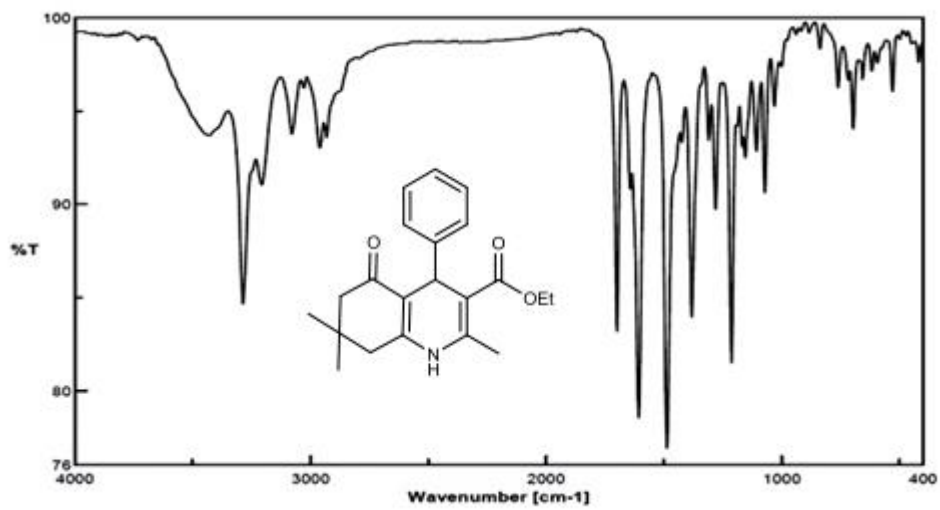
Ionic liquid immobilized on modified magnetic FSM-16: An efficient and magnetically recoverable nanocatalyst

Azar Jahanbakhshi and Mahnaz Farahi*

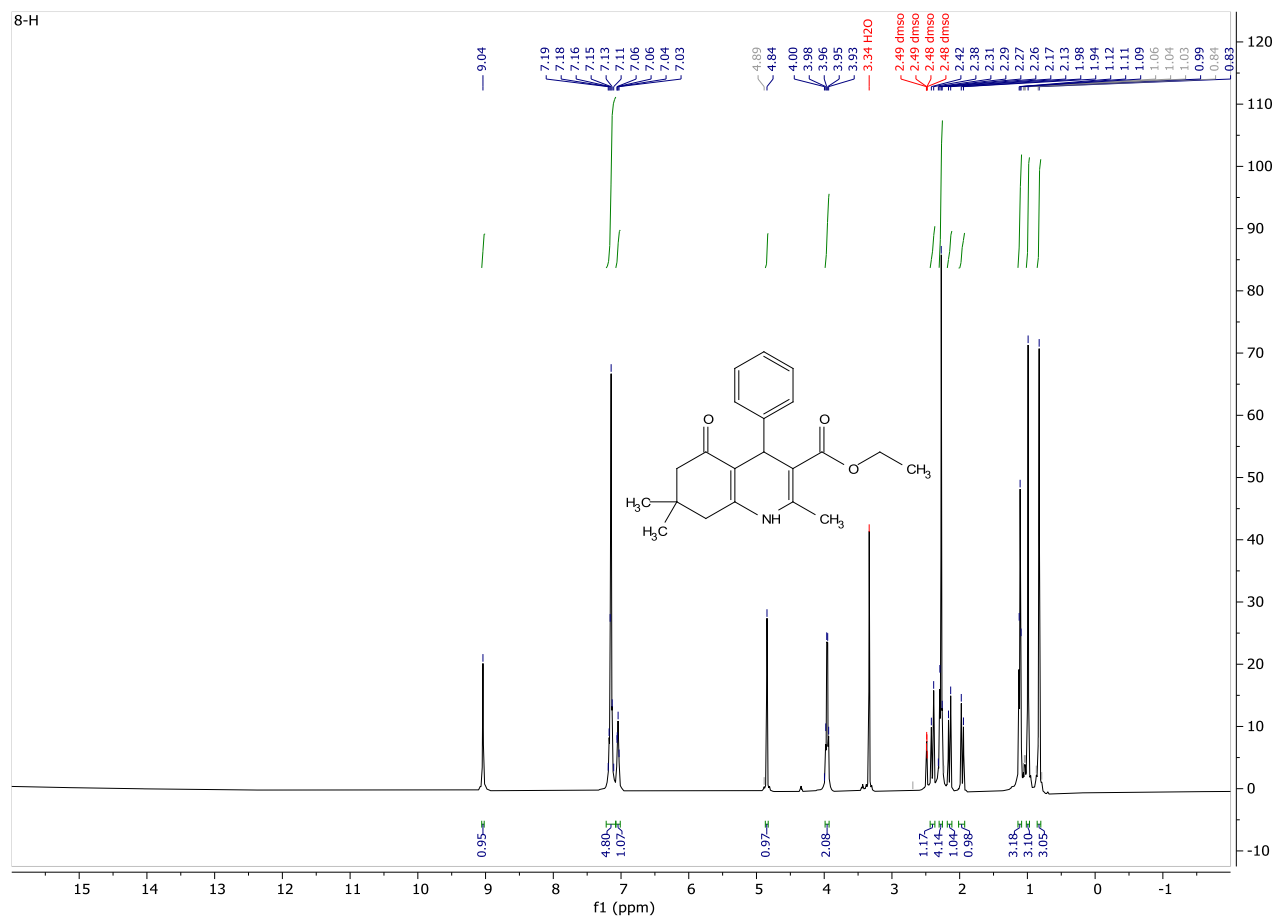
Department of Chemistry, Yasouj University, P. O. Box 353, Yasouj 75918-74831, Iran

*Corresponding author: E-mail: farahimb@yu.ac.ir

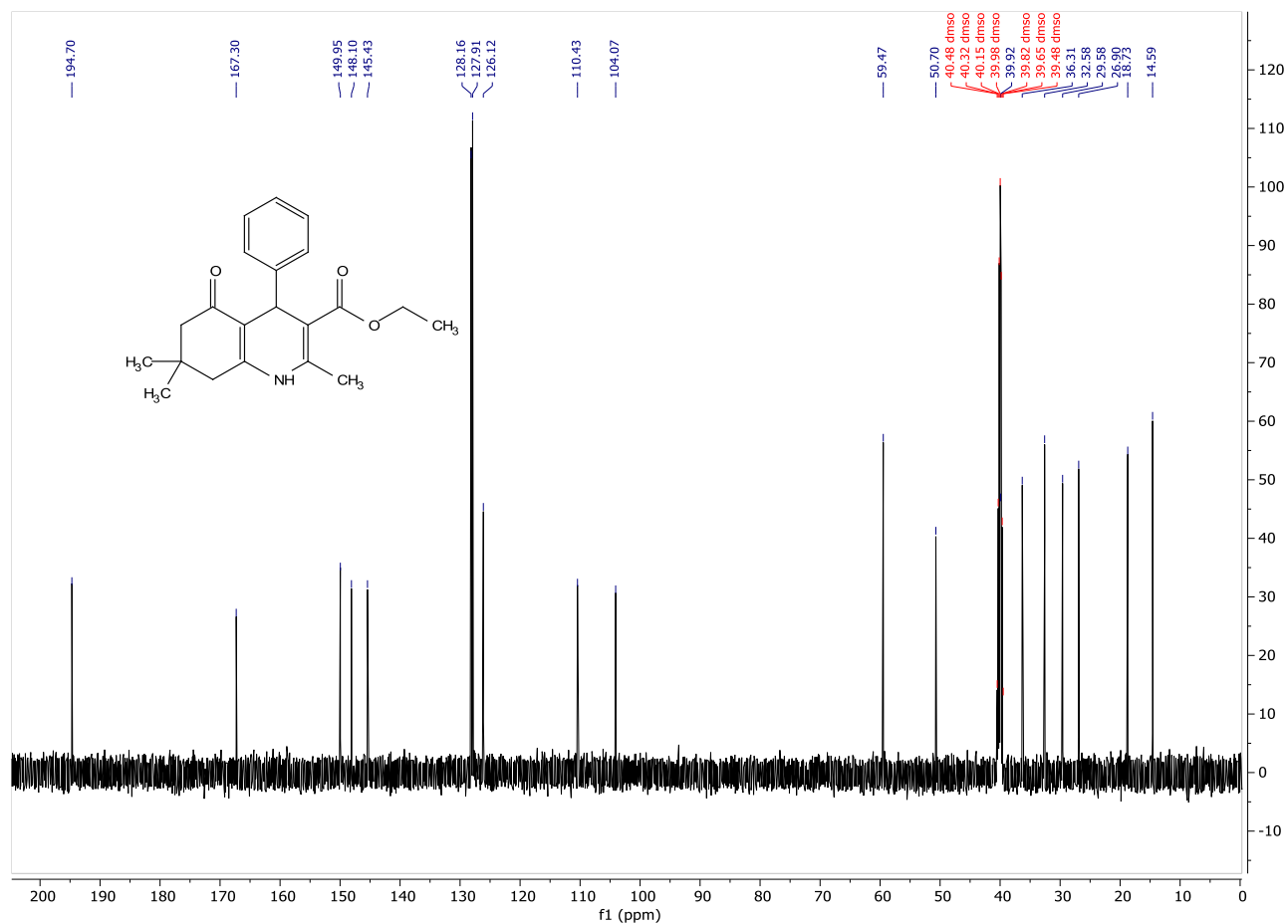
Spectral Data FT-IR	
5a	3288 (N-H, stretching), 3027 (C-H, Ar), 2962 (C-H stretching), 1692 (C=O, ester), 1606(C=O, ketone), 1492(C=C, Ar), 1249 (C-N), 1160 (C-O, ester), 979 cm ⁻¹ .
5b	3274 (N-H, stretching), 3066 (C-H, Ar), 2962 (C-H stretching), 1704 (C=O, ester), 1604 (C=O, ketone), 1496 (C=C, Ar), 1249(C-N), 1172(C-O, ester), 883 cm ⁻¹ .
5c	3274 (N-H, stretching), 3070 (C-H, Ar), 2958 (C-H stretching), 1708 (C=O, ester), 1639 (C=O, ketone), 1492 (C=C, Ar), 1218 (C-N), 1092(C-O, ester), 833 cm ⁻¹ .
5d	3282 (N-H, stretching), 3073(C-H, Ar), 2958 (C-H stretching), 1681(C=O, ester), 1604(C=O, ketone), 1488 (C=C, Ar), 1145 (C-N), 1072 (C-O, ester), 883 cm ⁻¹ .
5e	3291(N-H, stretching), 3074(C-H, Ar), 2968(C-H stretching), 1707(C=O, ester), 1659(C=O, ketone), 1486(C=C, Ar), 1213(C-N), 1041 (C-O, ester), 797 cm ⁻¹ .
5f	3289 (N-H, stretching), 3068(C-H, Ar), 2962(C-H stretching), 1702(C=O, ester), 1650(C=O, ketone), 1494(C=C, Ar), 1220(C-N), 1089 (C-O, ester), 763 cm ⁻¹ .
5g	3237 (N-H, stretching), 3053(C-H, Ar), 2936(C-H stretching), 1702(C=O, ester), 1643(C=O, ketone), 1489(C=C, Ar), 1221(C-N), 1089 (C-O, ester), 783 cm ⁻¹ .
5h	3226 (N-H, stretching), 3077(C-H, Ar), 2976(C-H stretching), 1700(C=O, ester), 1648(C=O, ketone), 1494(C=C, Ar), 1230(C-N), 1075 (C-O, ester) cm ⁻¹ .
5i	3440 (N-H, stretching), 3087(C-H, Ar), 2958(C-H stretching), 1717(C=O, ester), 1634(C=O, ketone), 1498(C=C, Ar), 1243(C-N), 1222(C-O), 1065 (C-O, ester) cm ⁻¹ .



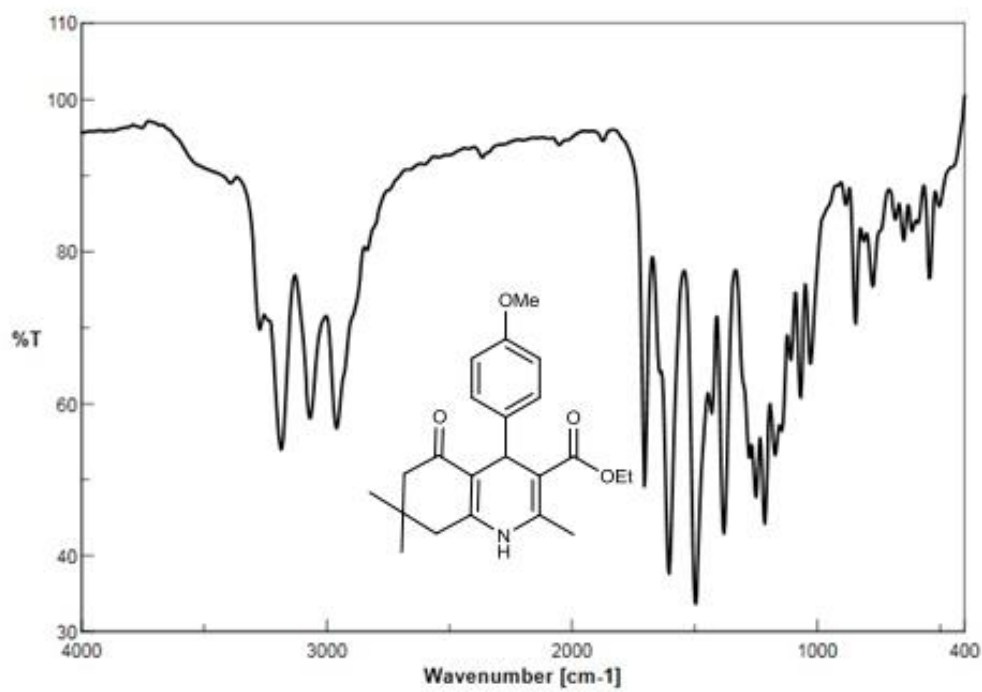
FT-IR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (5a).



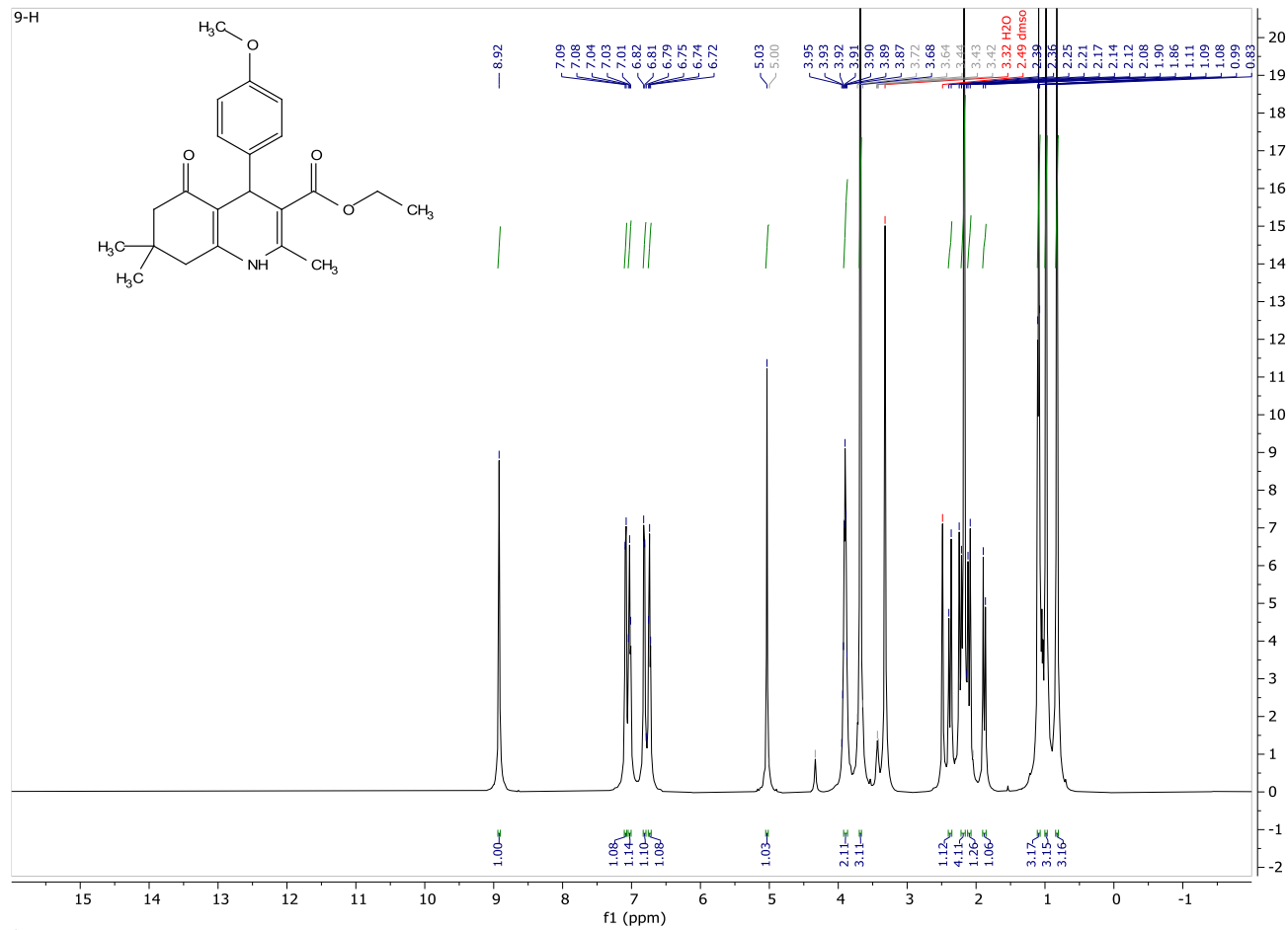
¹H NMR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5a**)



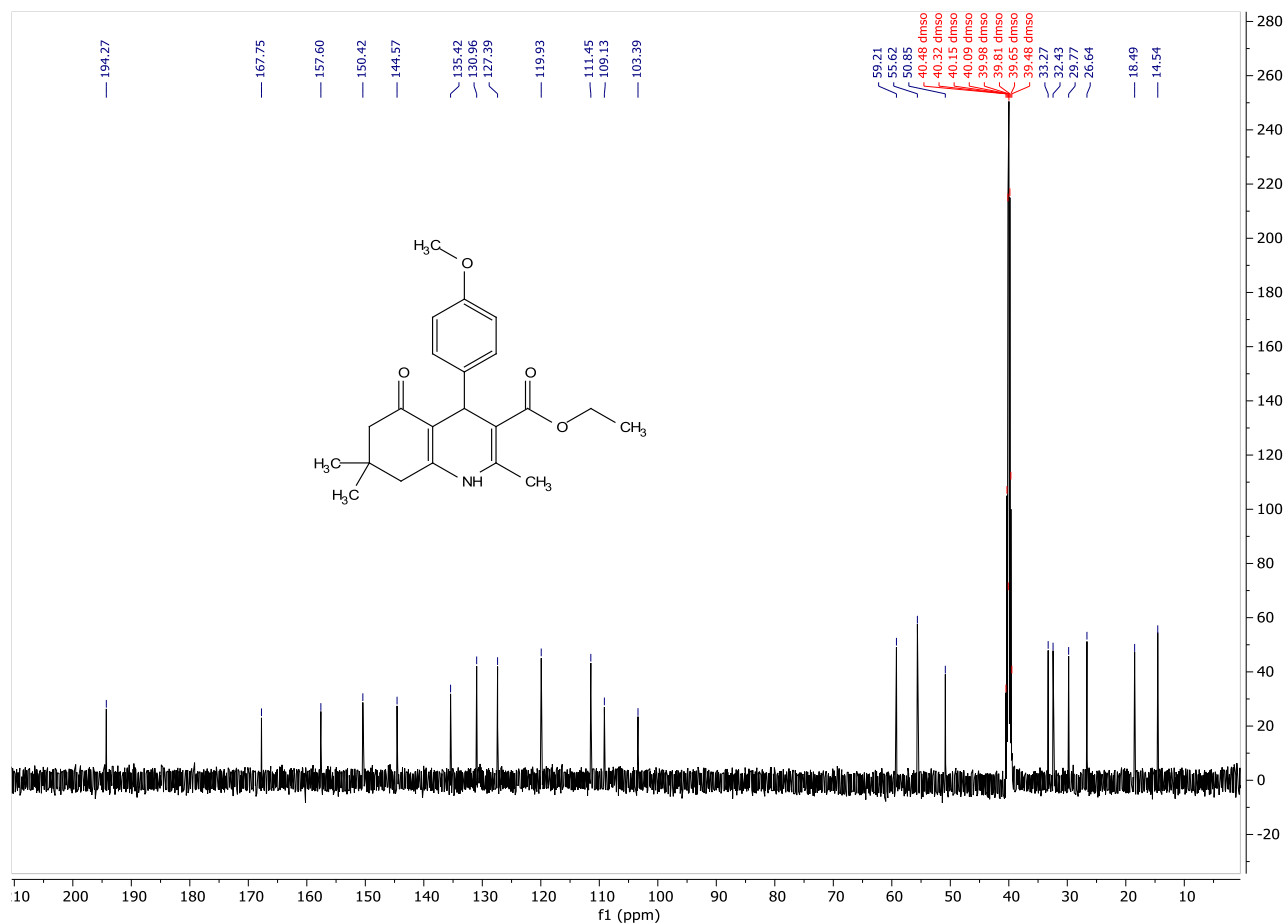
¹³C NMR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-phenyl-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (5a)



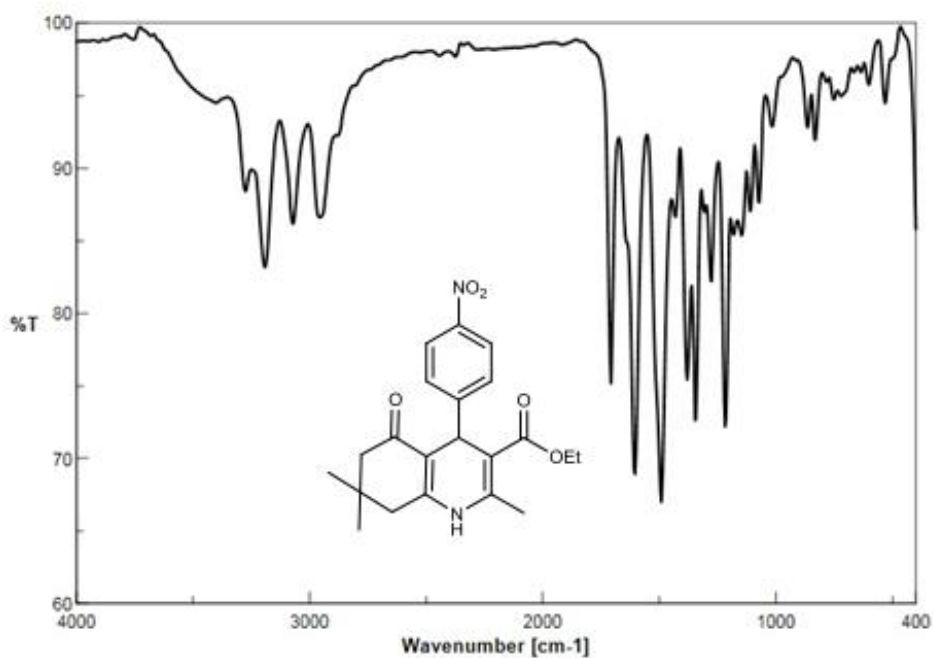
FT-IR spectrum of Ethyl-4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5b**).



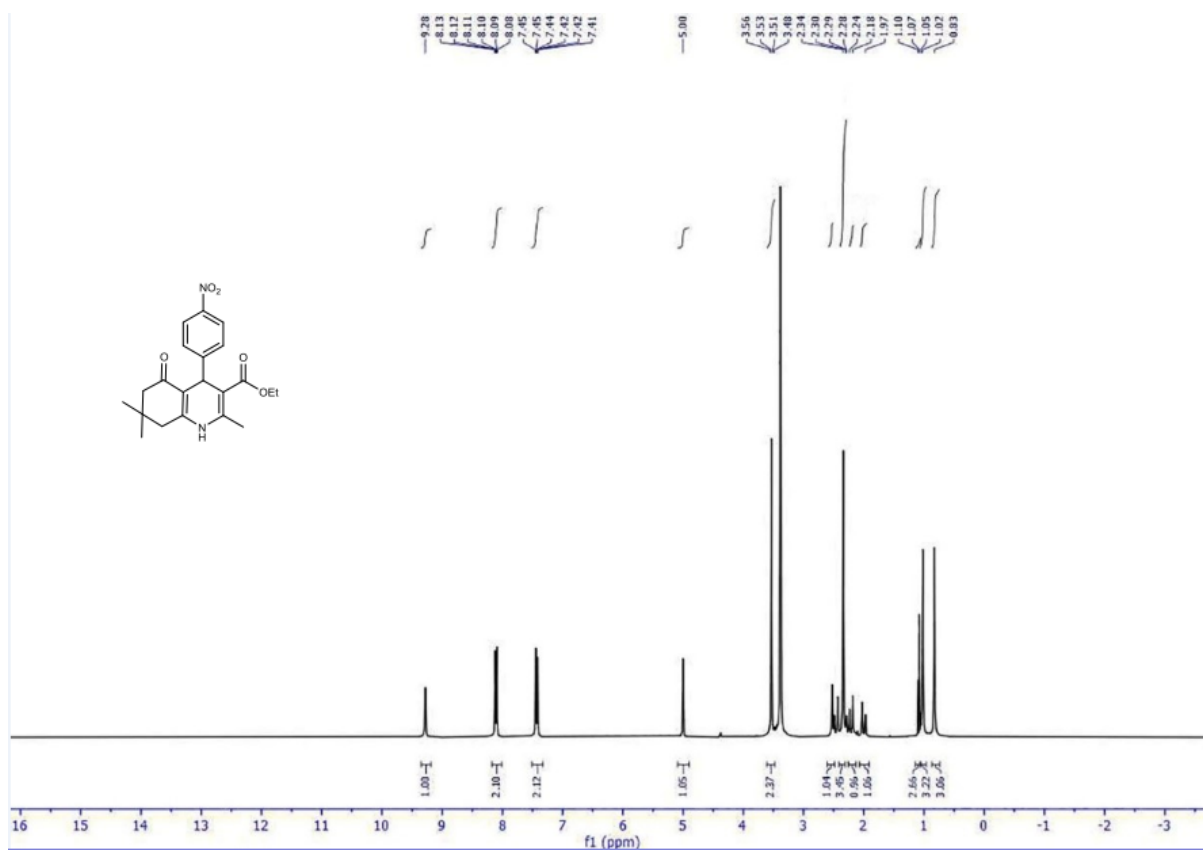
¹H NMR spectrum of Ethyl 4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5b**).



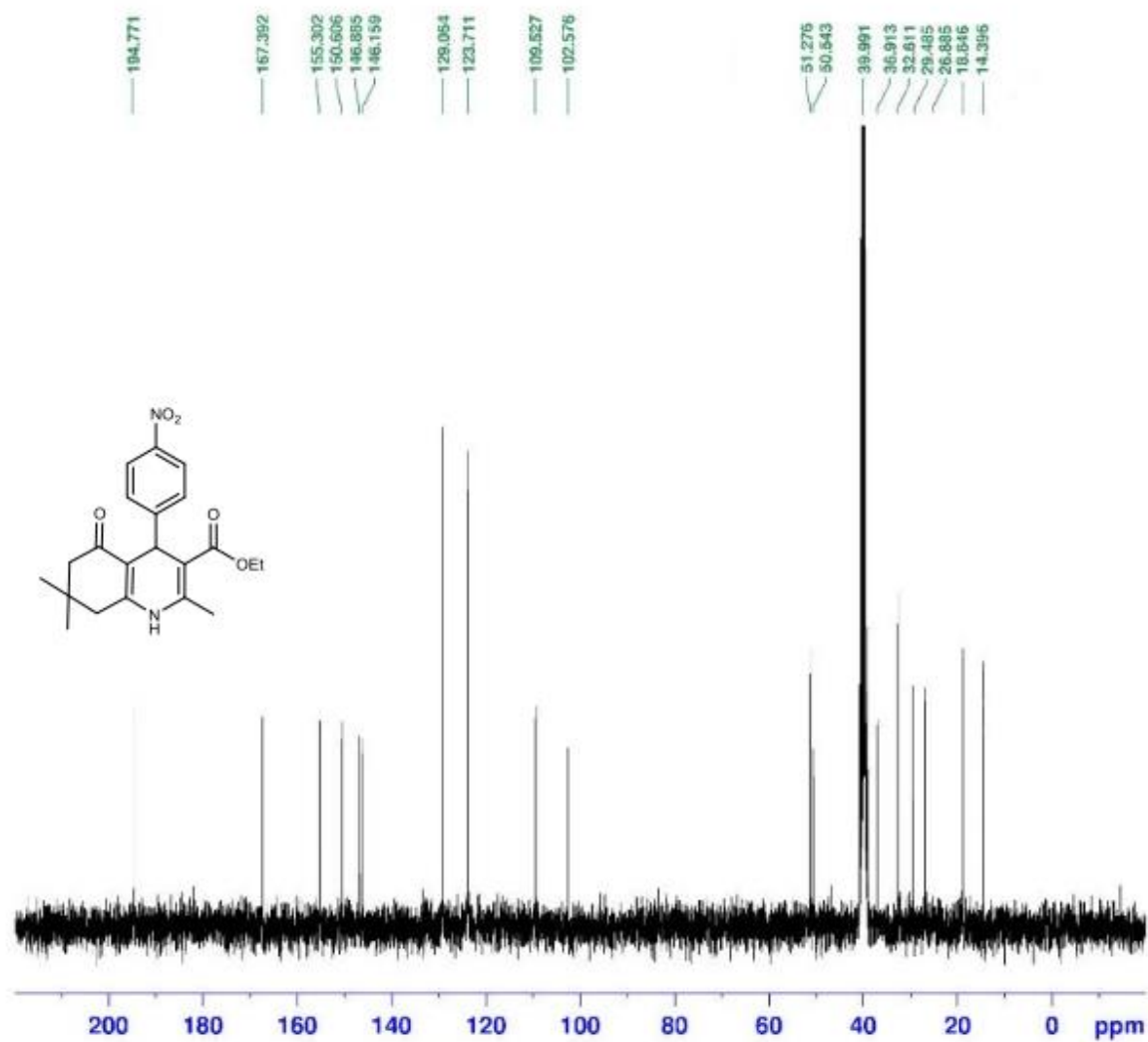
¹³C NMR spectrum of Ethyl-4-(4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5b**).



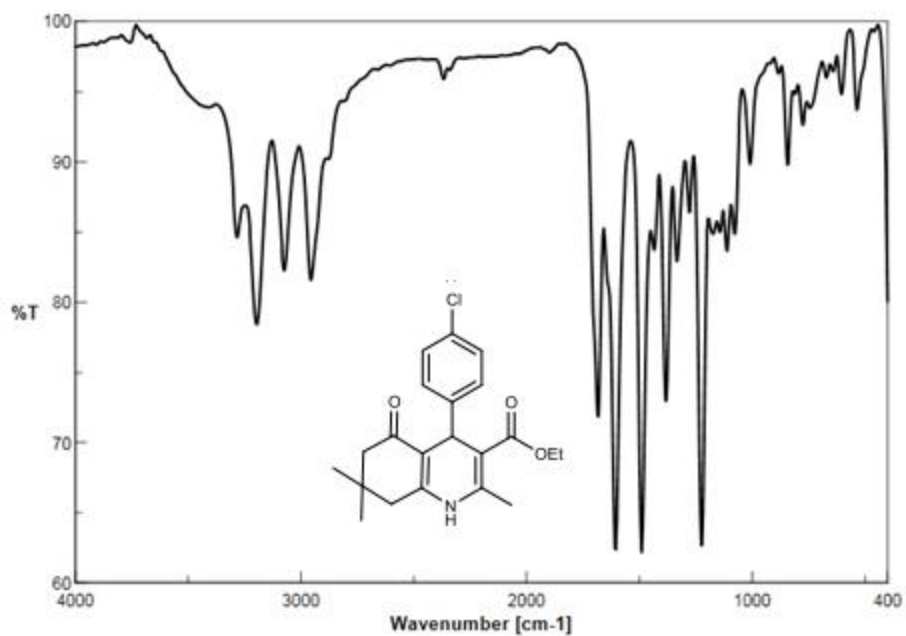
FT-IR spectrum of Ethyl 2,7,7-trimethyl-4-(4-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5c**).



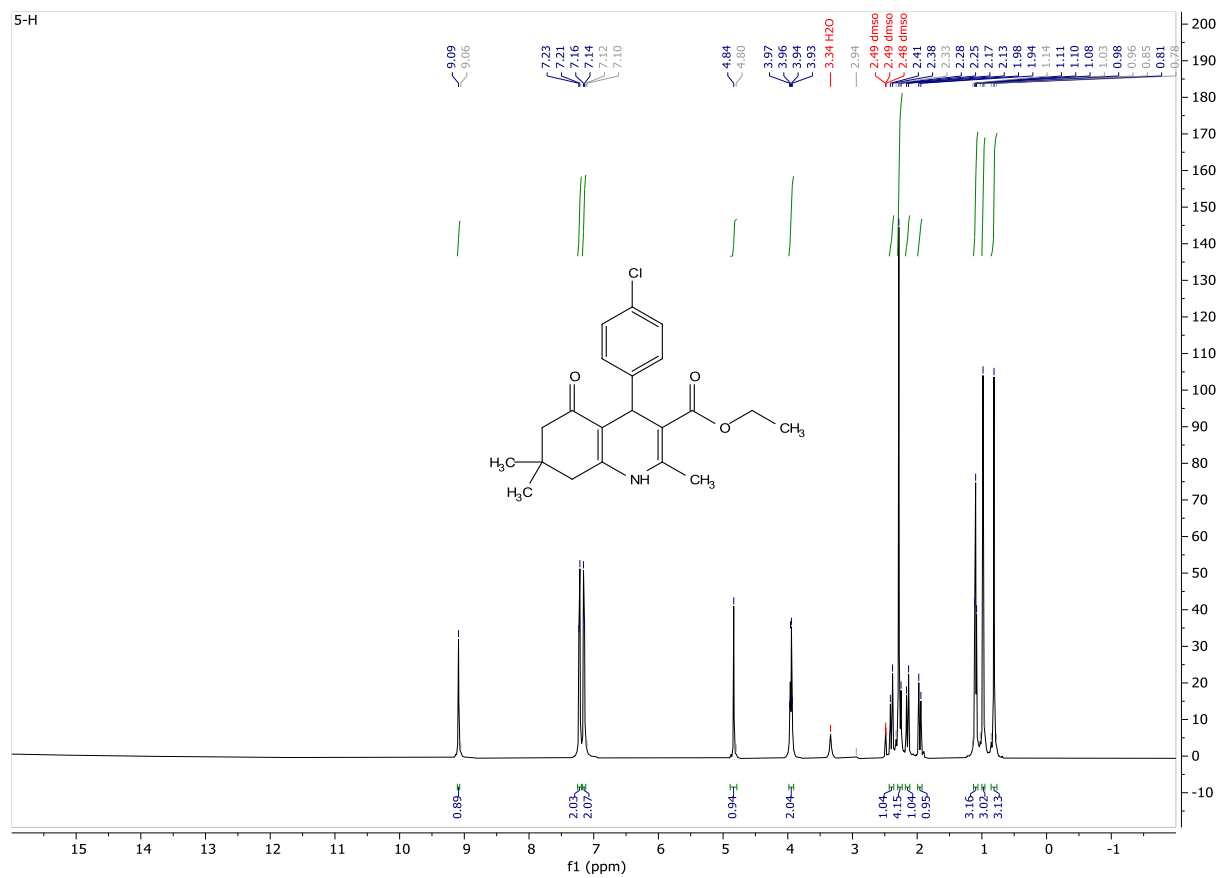
^1H NMR spectrum of Ethyl2,7,7-trimethyl-4-(4-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5c**).



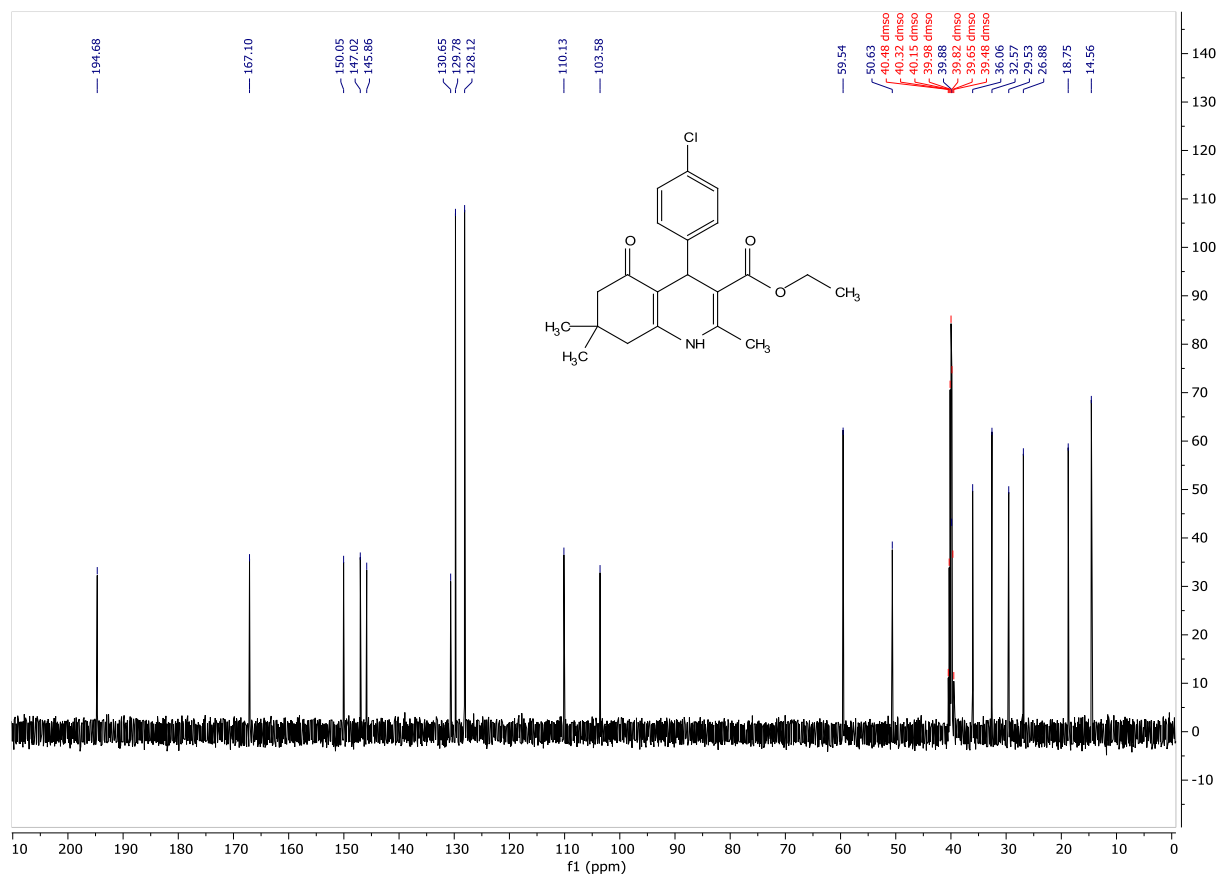
^{13}C NMR spectrum of Ethyl2,7,7-trimethyl-4-(4-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5c**).



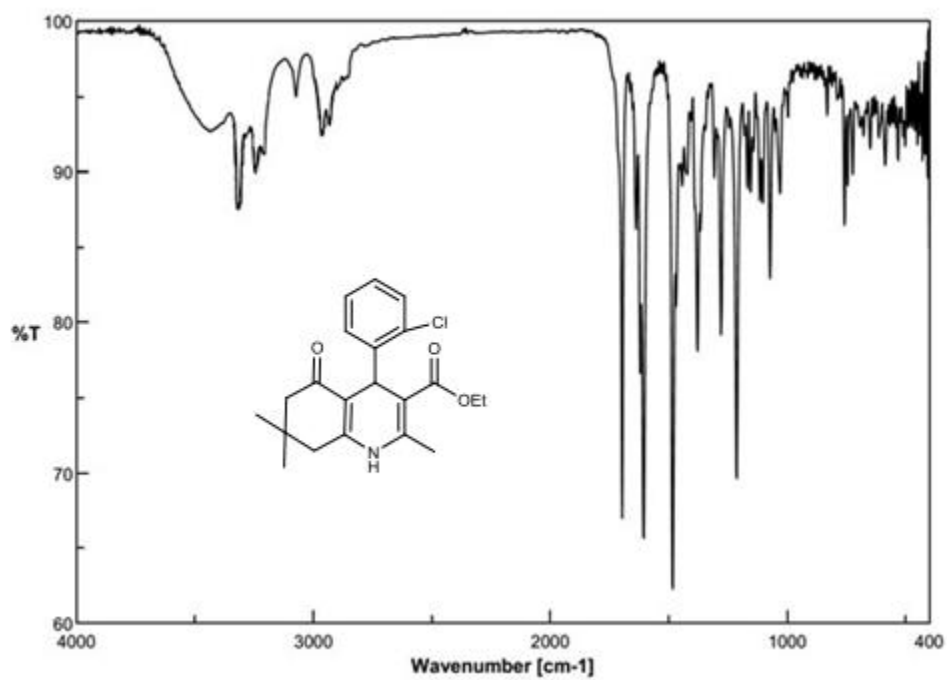
FT-IR spectrum of Eethyl-4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5d**).



¹H NMR spectrum of Eethyl-4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5d**).



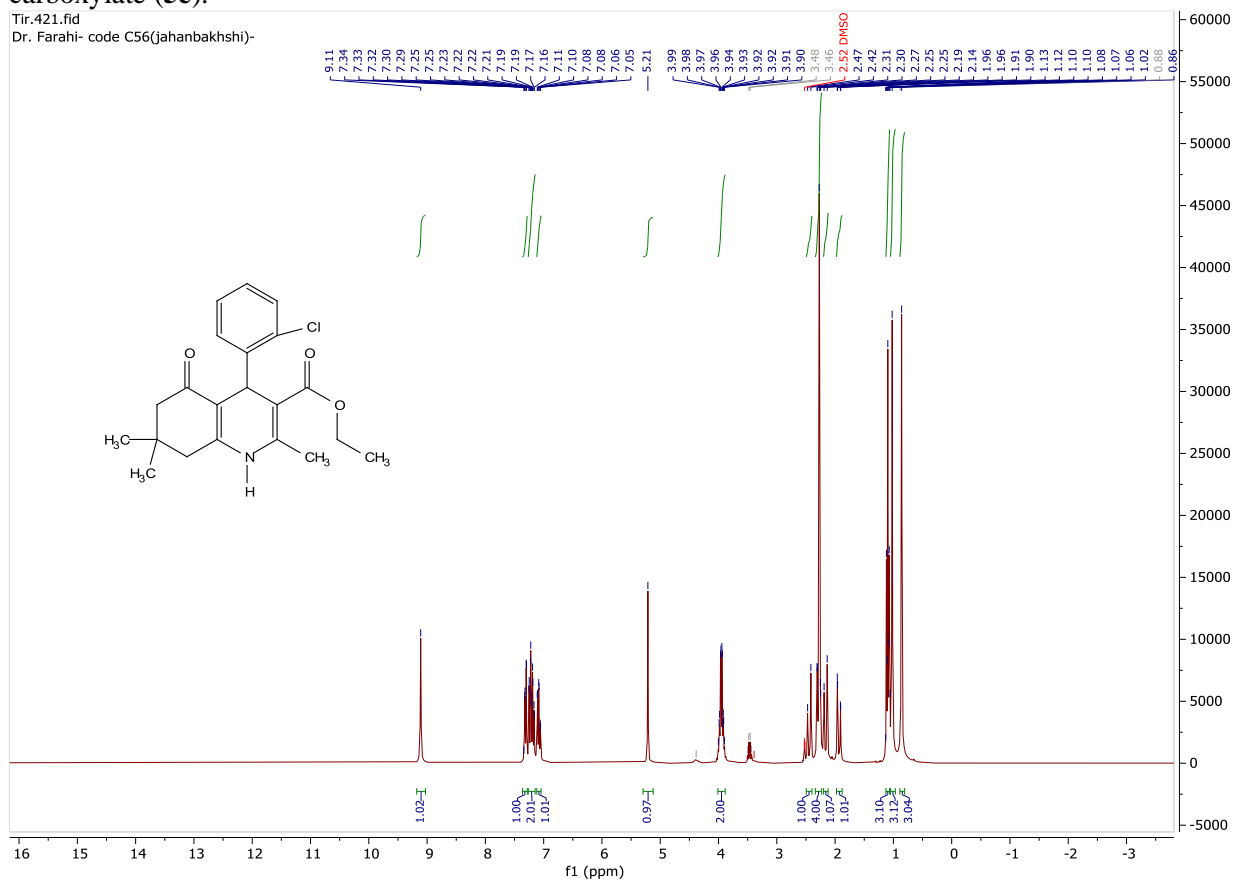
¹³C NMR spectrum of Eethyl-4-(4-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5d**).



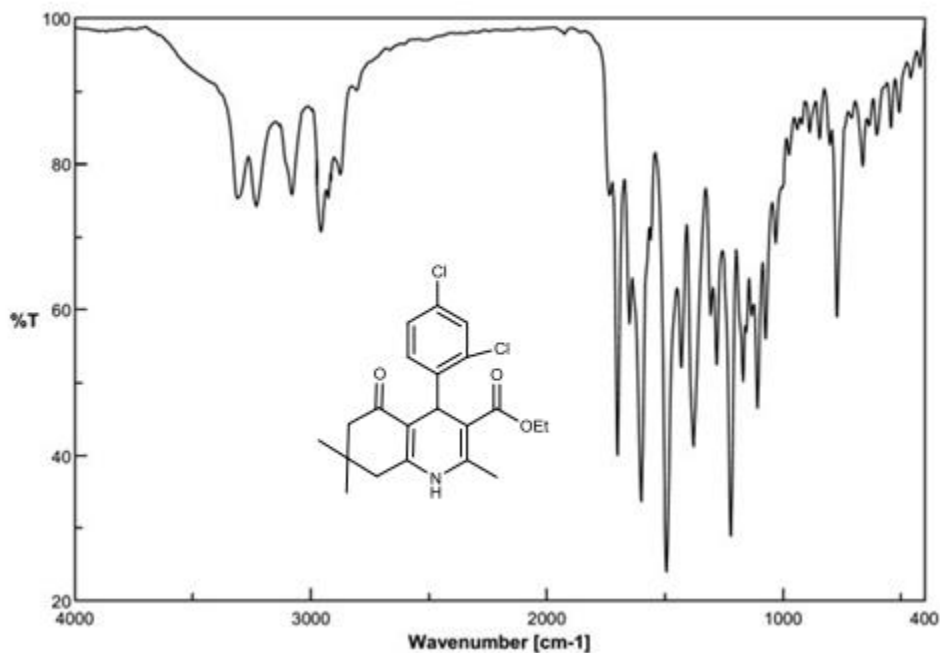
FT-IR spectrum of Eethyl-4-(2-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5e**).

Tir.421.fid

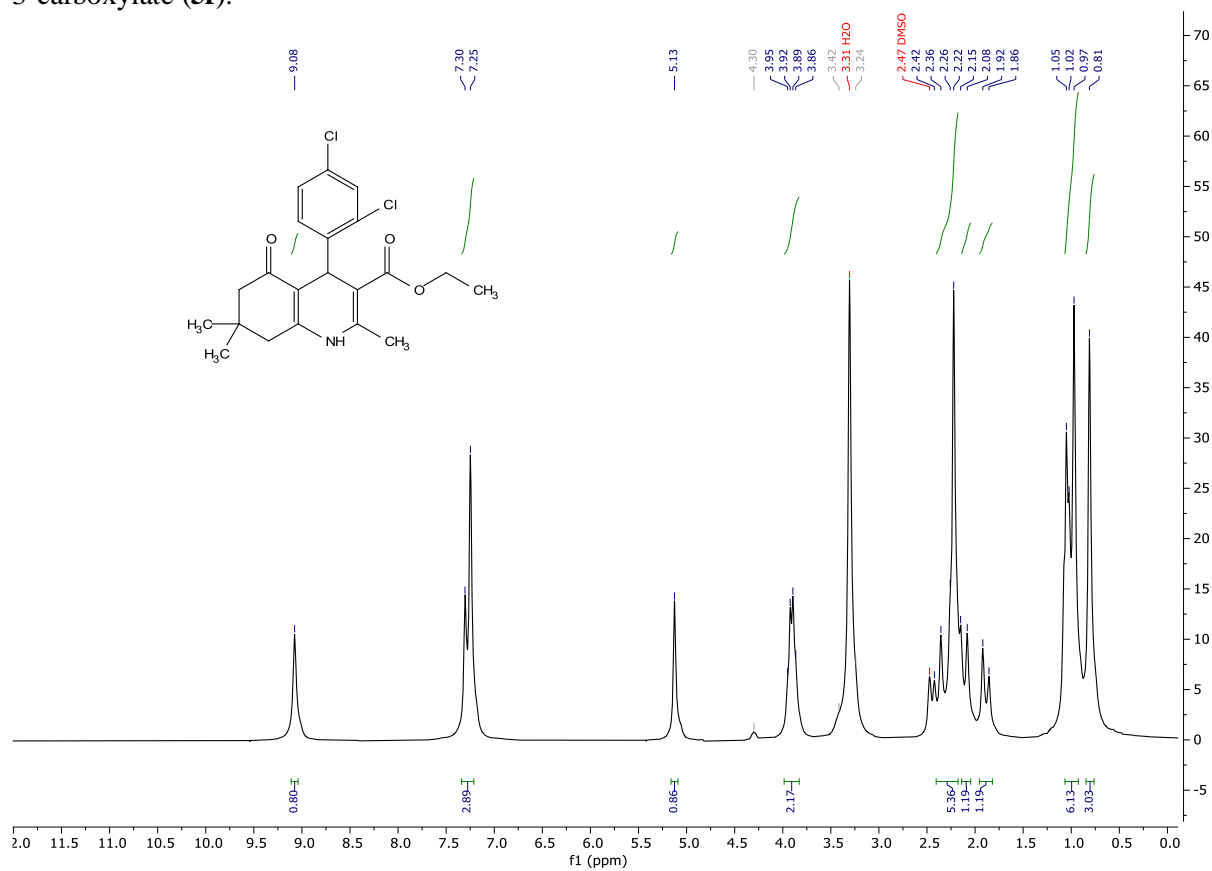
Dr. Farahi- code C56(jahanbakhshi)-



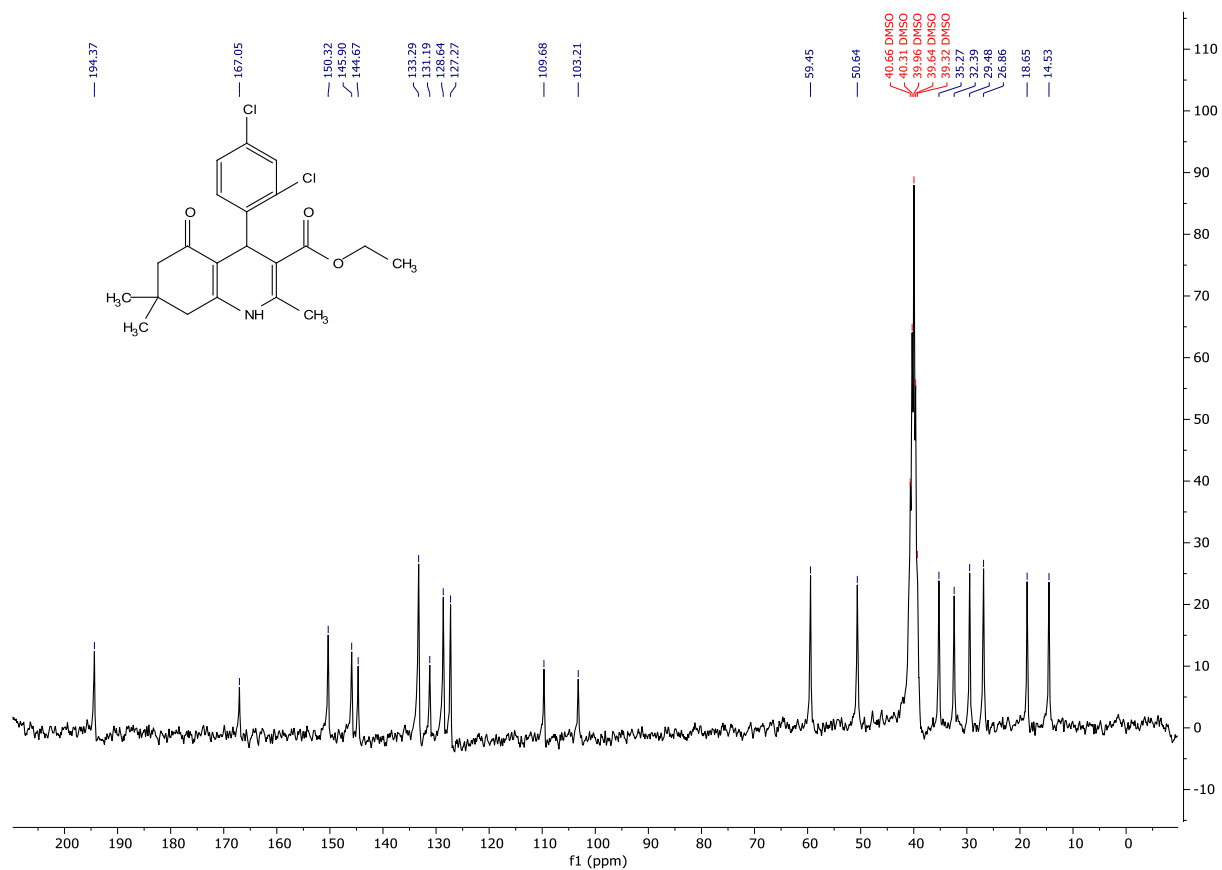
¹H NMR spectrum of Eethyl-4-(2-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5e**).



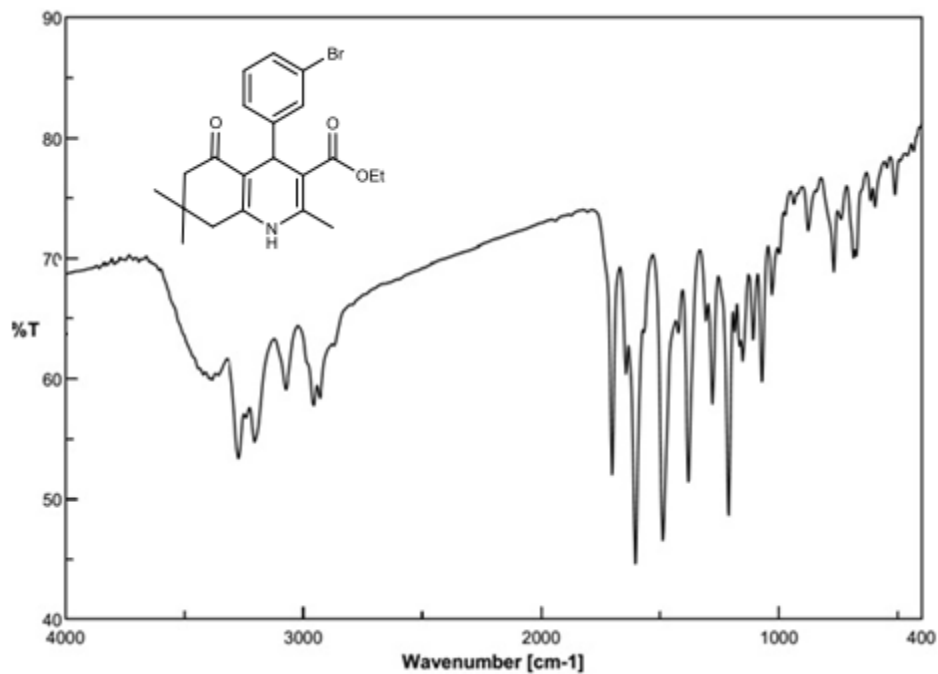
FT-IR spectrum of Ethyl-4-(2,4-dichlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5f**).



¹H NMR spectrum of Ethyl-4-(2,4-dichlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5f**).



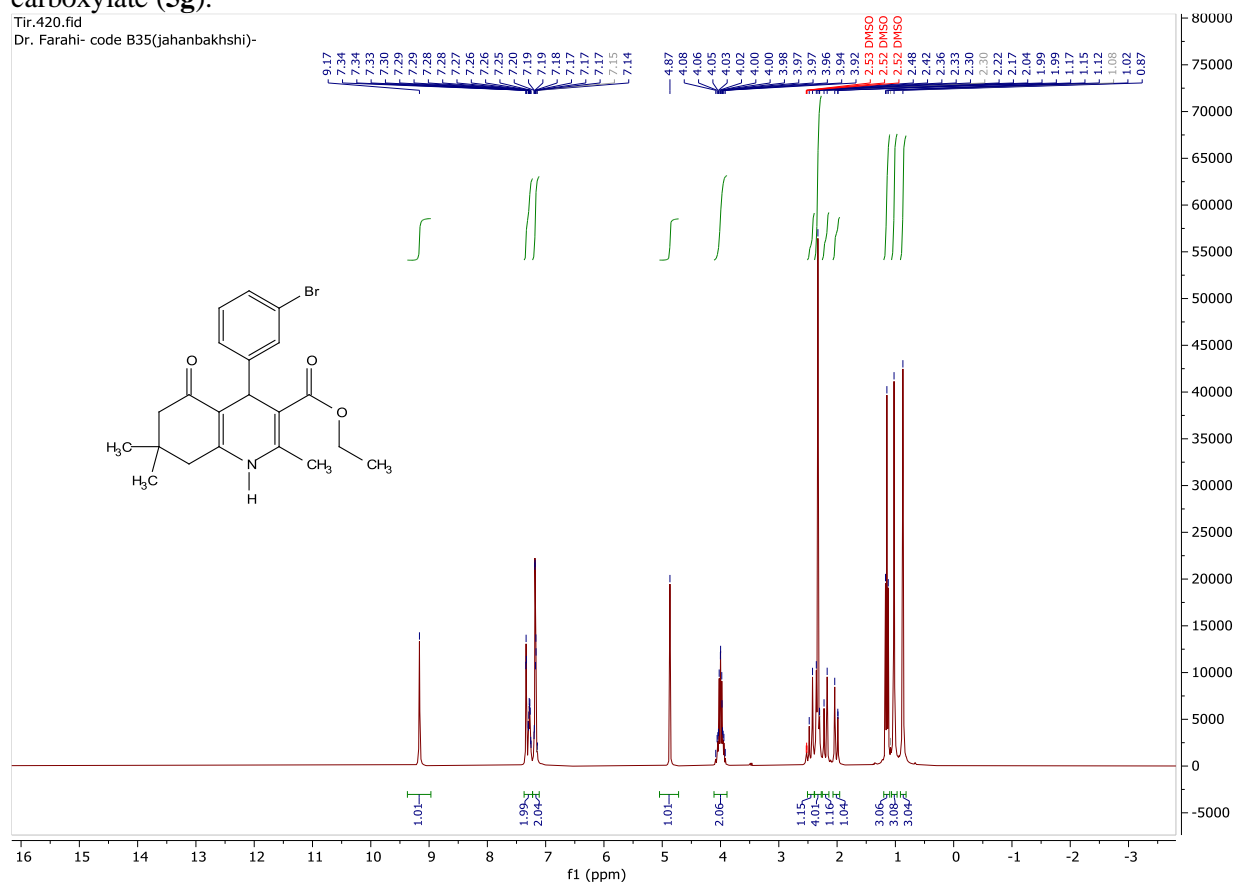
¹³C NMR spectrum of Ethyl-4-(2,4-dichlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5f**).



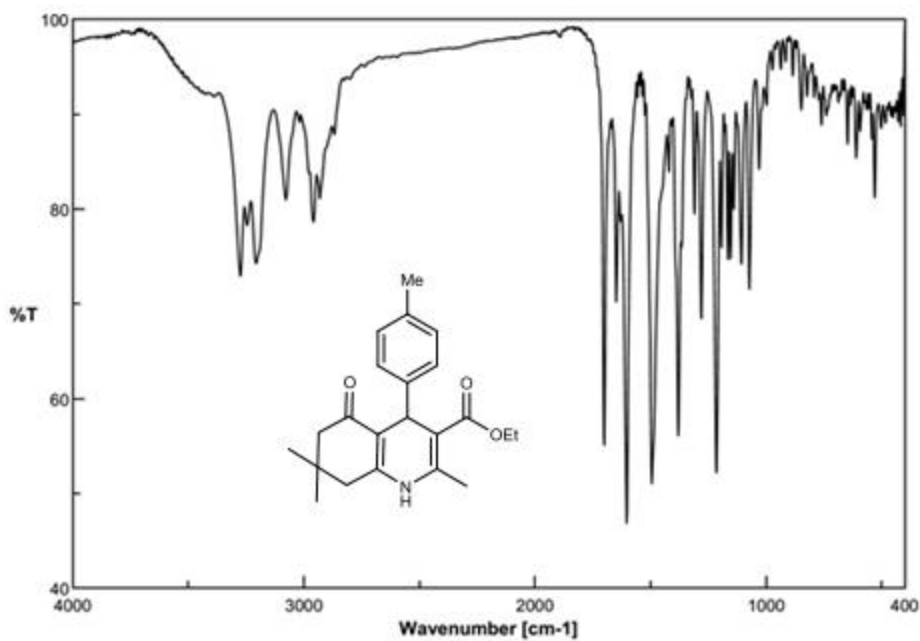
FT-IR spectrum of Ethyl-4-(3-bromophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5g**).

Tir.420.fid

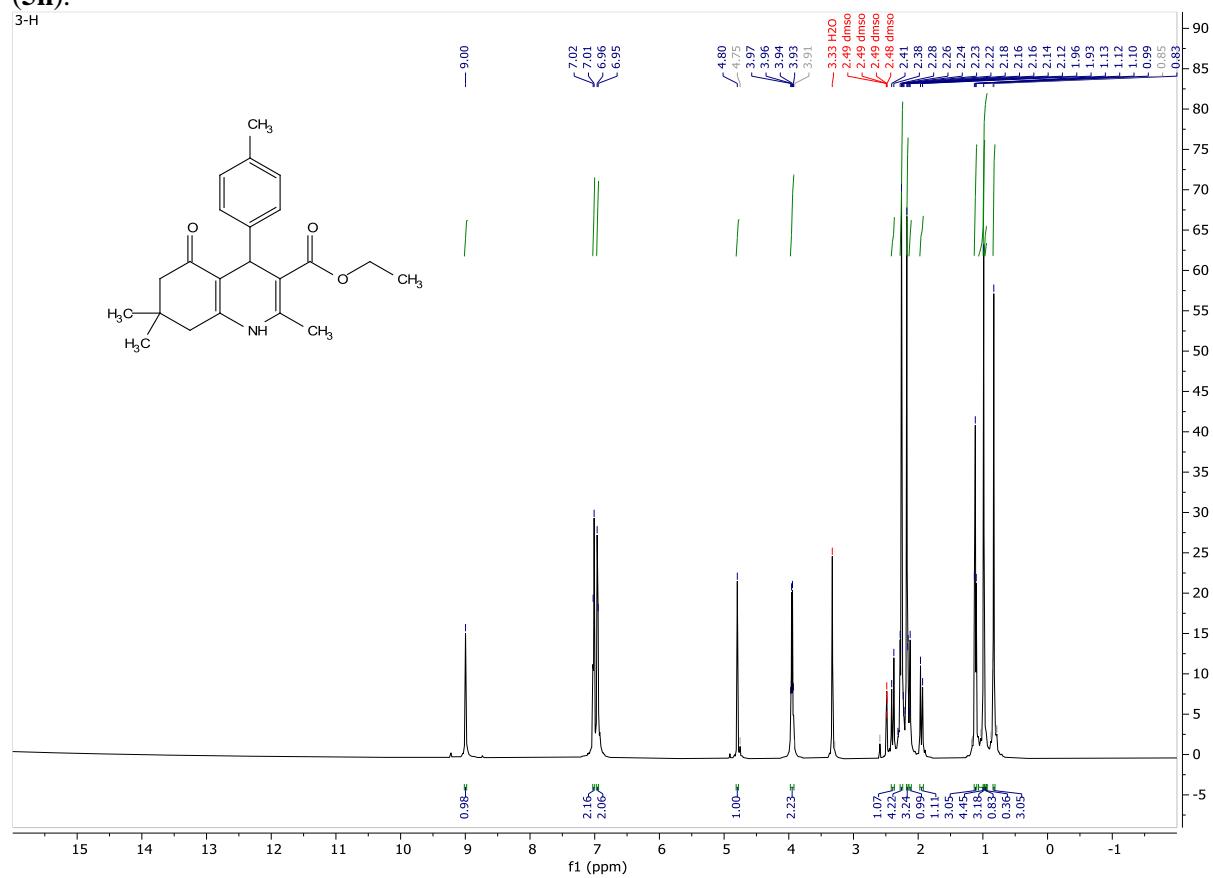
Dr. Farahi- code B35(jahanbakhshi)-



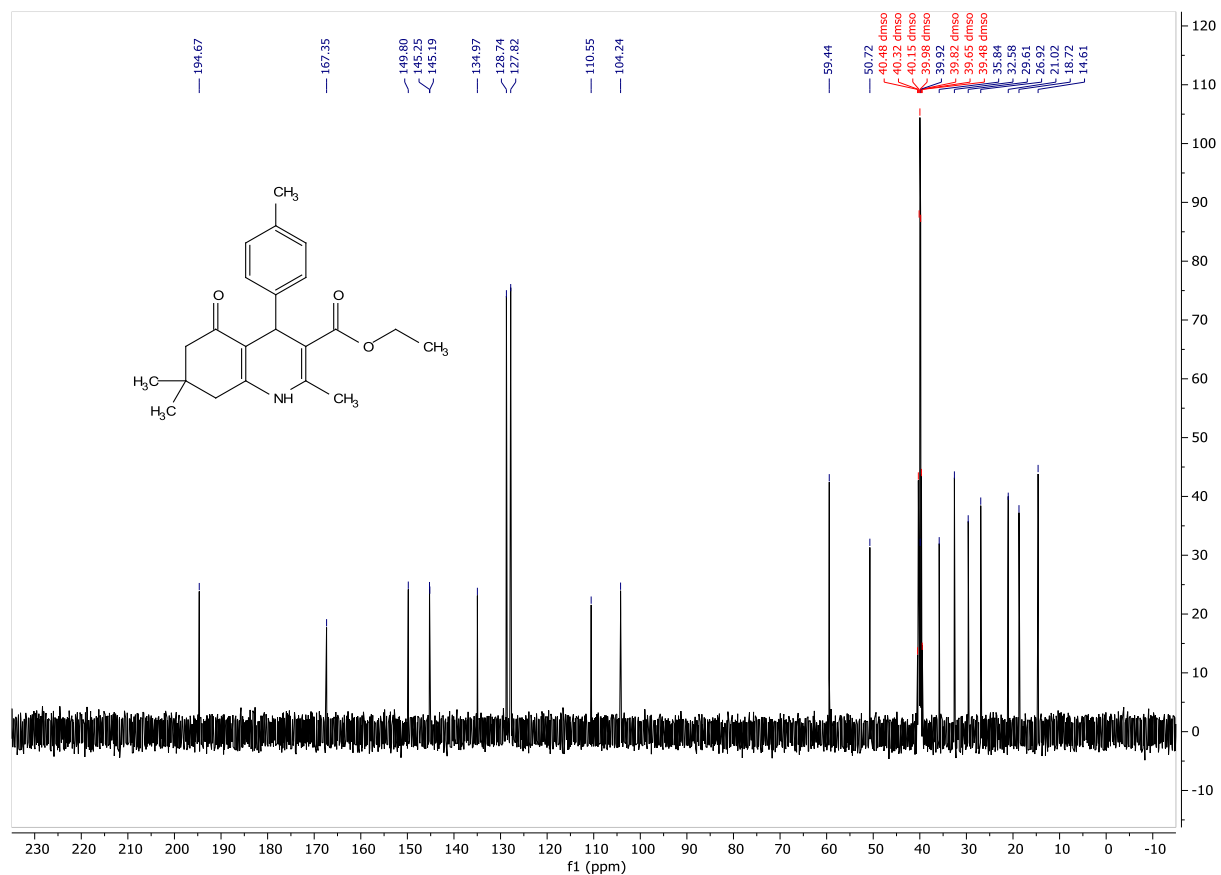
¹H NMR spectrum of Ethyl-4-(3-bromophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydro quinoline-3-carboxylate (**5g**).



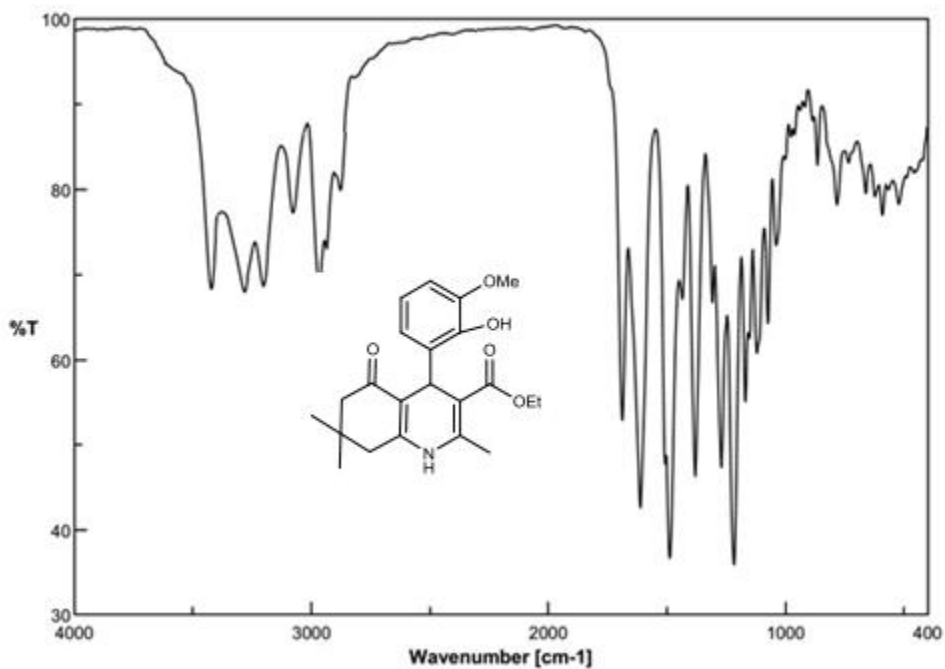
FT-IR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5h**).



¹H NMR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5h**).

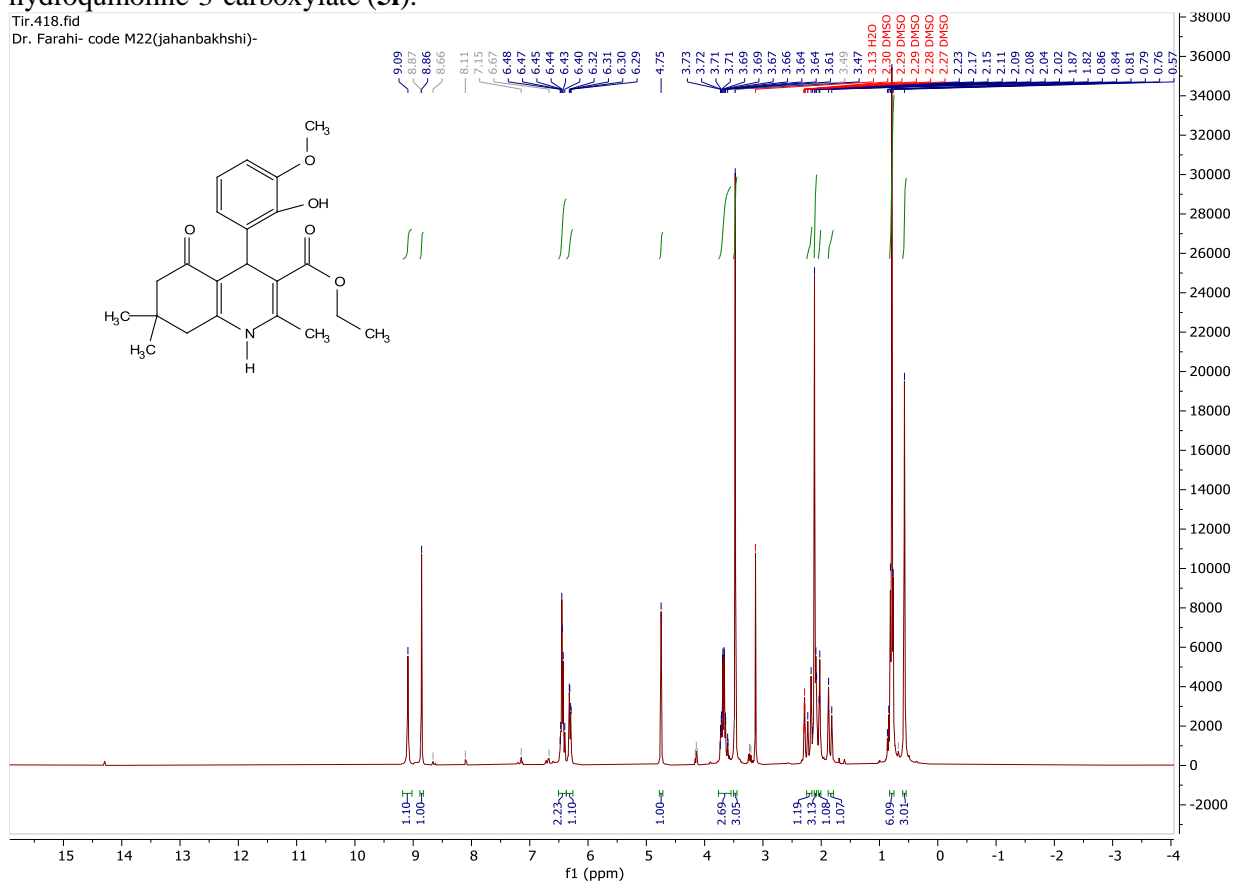


¹³C NMR spectrum of Ethyl-2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5h**).



FT-IR spectrum of Ethyl-4-(2-hydroxy-3-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5i**).

Tir.418.fid
Dr. Farahi- code M22(jahanbakshi)-



¹H NMR spectrum of Ethyl-4-(2-hydroxy-3-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**5i**).