

# Ionic Liquid-assisted Fabrication of Bioactive Heterogeneous Magnetic Nanocatalyst with Antioxidant and Antibacterial Activities for the Synthesis of Polyhydroquinoline Derivatives

Shefa Mirani Nezhad<sup>1</sup>, Ehsan Nazarzadeh Zare<sup>1\*</sup>, Azimeh Davarpanah<sup>1</sup>, Seied Ali Pourmousavi<sup>1</sup>, Milad Ashrafizadeh<sup>2</sup>, Alan Prem Kumar<sup>3,4</sup>

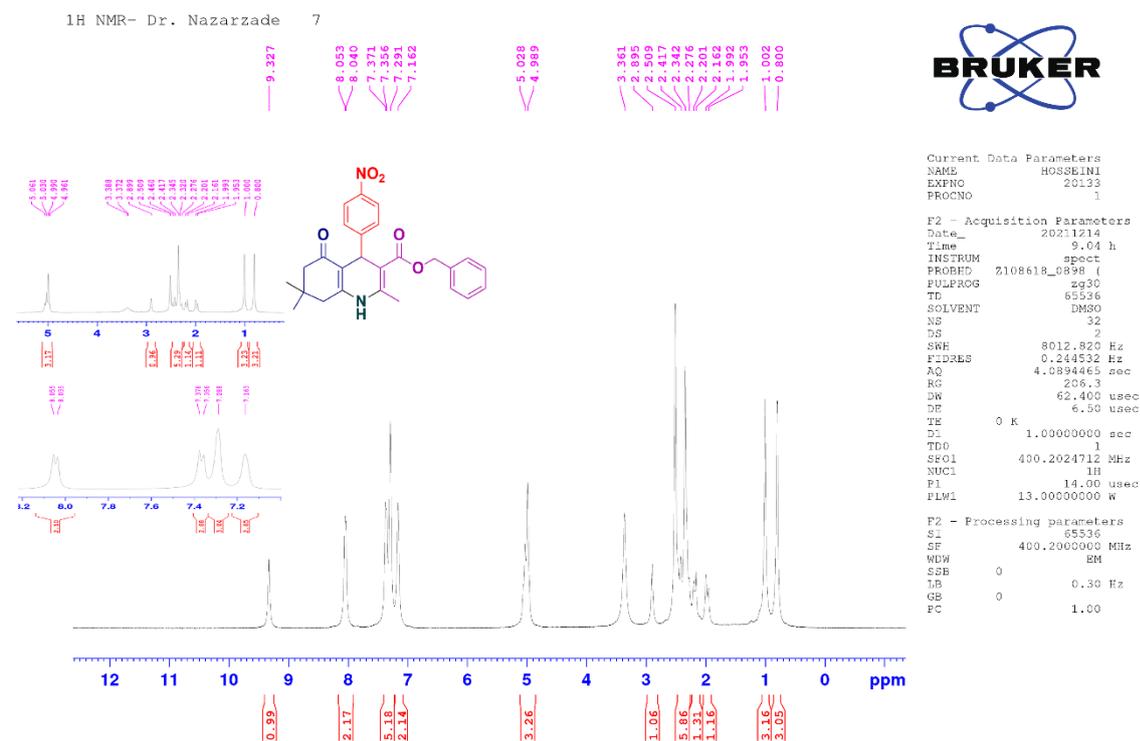
<sup>1</sup> School of Chemistry, Damghan University, Damghan 36716-41167, Iran; shefamirani@yahoo.com (S.M.N.); a.d.13962017@gmail.com (A.D.); pourmousavi@du.ac.ir (S.A.P.)

<sup>2</sup> Faculty of Engineering and Natural Sciences, Sabanci University, Orta Mahalle, Üniversite Caddesi No. 27, Orhanlı, Tuzla 34956, Istanbul, Turkey; dvm.milad1994@gmail.com

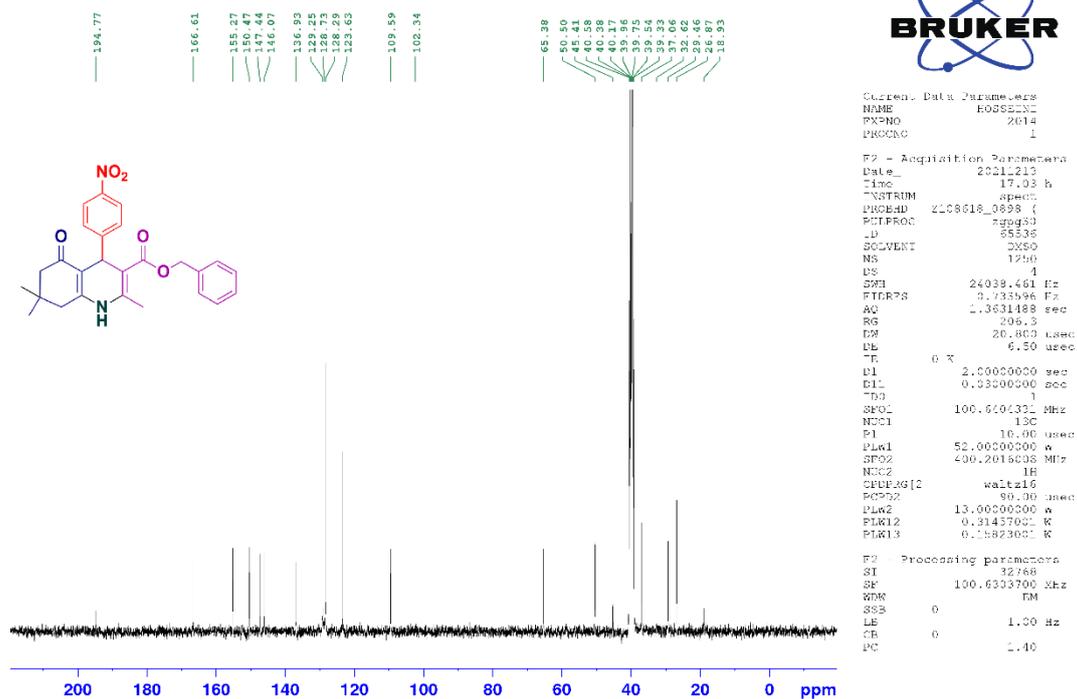
<sup>3</sup> Cancer Science Institute of Singapore and Department of Pharmacology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore 117599, Singapore; apkumar@nus.edu.sg

<sup>4</sup> NUS Centre for Cancer Research (N2CR), Yong Loo Lin School of Medicine, National University of Singapore, Singapore 117599, Singapore

\* Correspondence: ehsan.nazarzadehzare@gmail.com or e.nazarzadeh@du.ac.ir

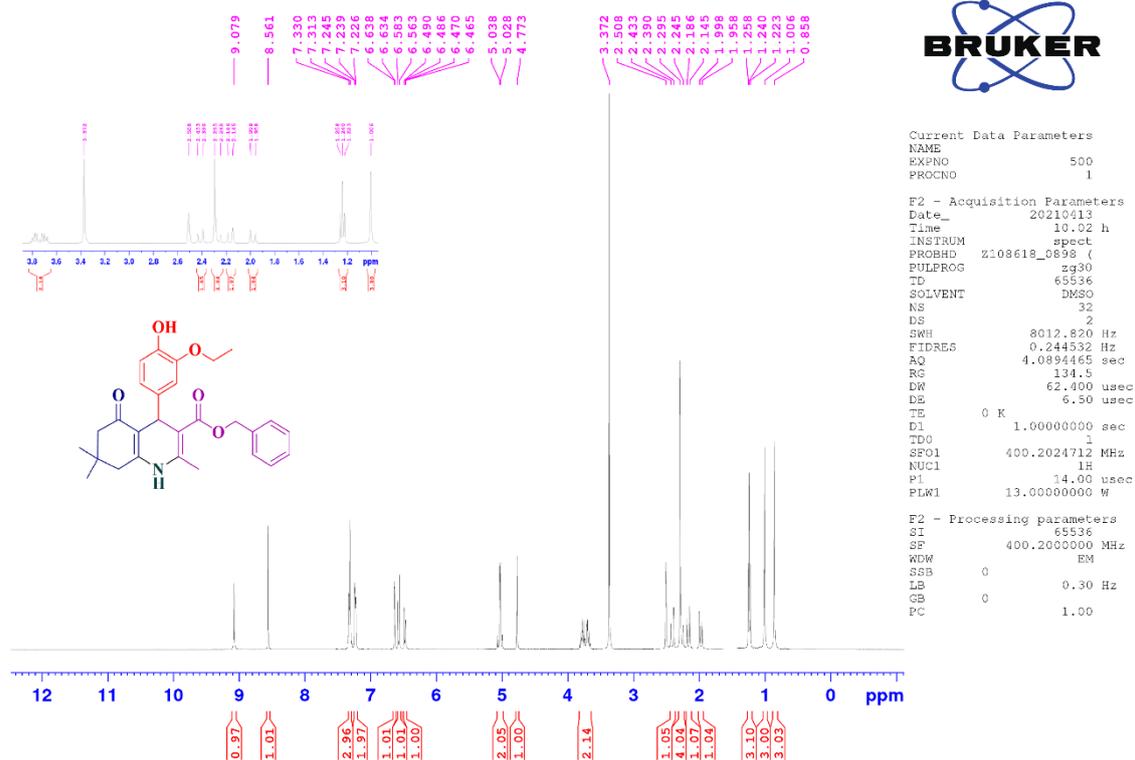


**Figure S1.** <sup>1</sup>H-NMR spectra of benzyl 2,7,7-trimethyl-4-(4-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 2)



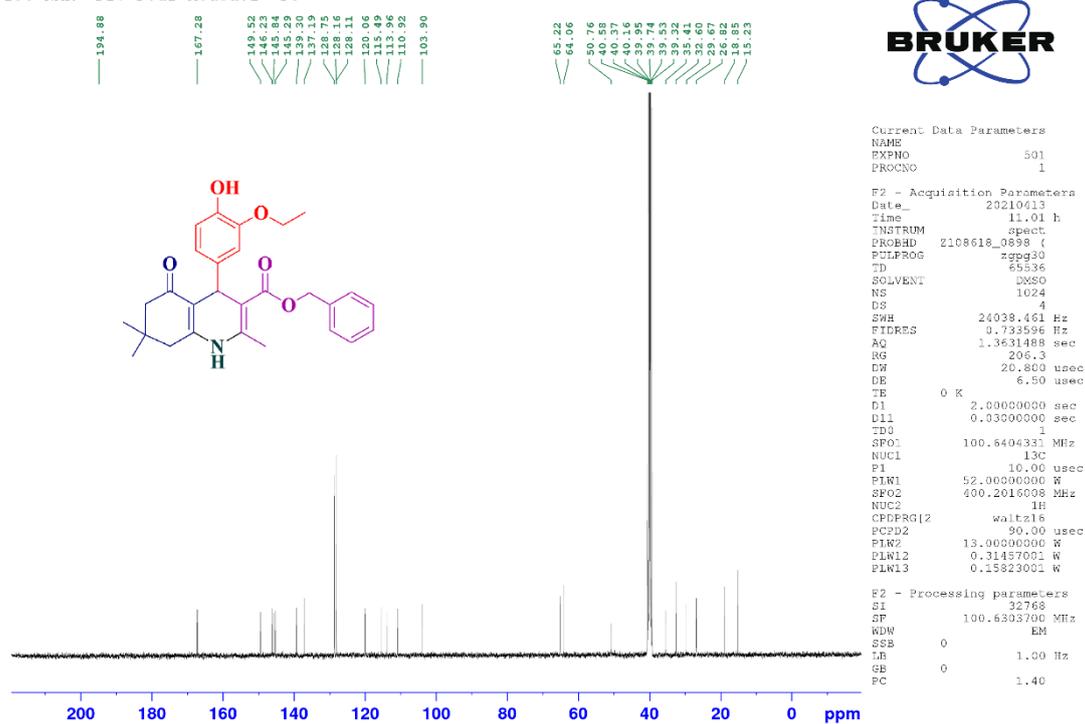
**Figure S2.** <sup>13</sup>C-NMR spectra of benzyl 2,7,7-trimethyl-4-(4-nitrophenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 2)

<sup>1</sup>H NMR- Dr. Pour Mousavi P5



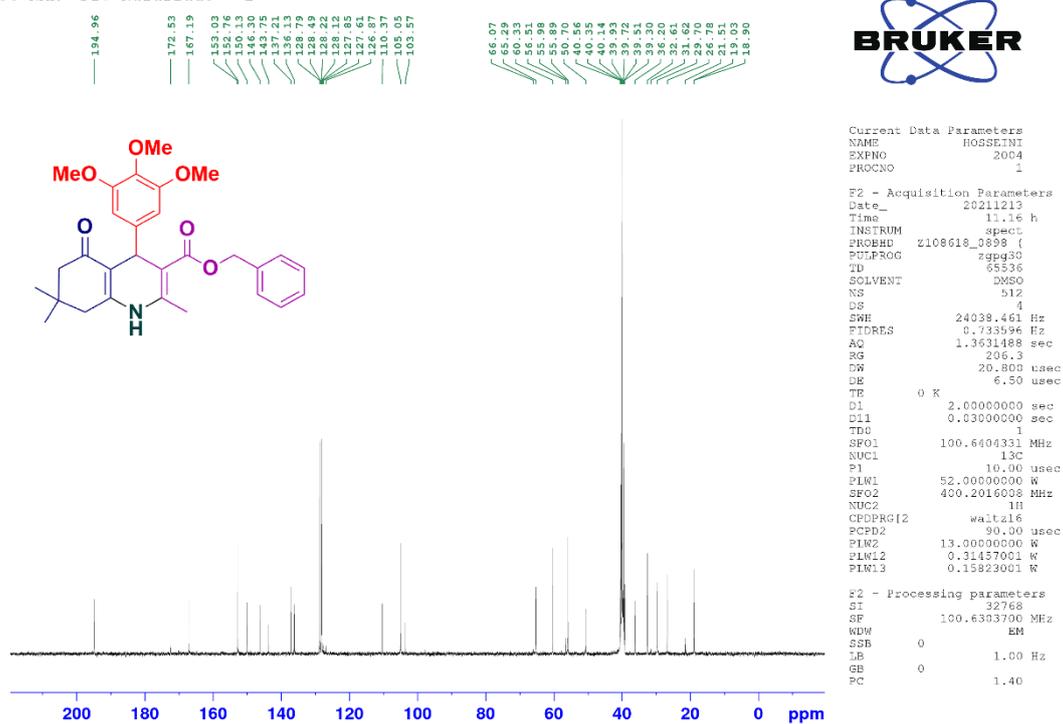
**Figure S3.** <sup>1</sup>H-NMR spectra of Benzyl4-(3-ethoxy-4-hydroxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquino line -3-carboxylate (**Table 5, Entry3**)

13C NMR- Dr. Pour Mousavi P5

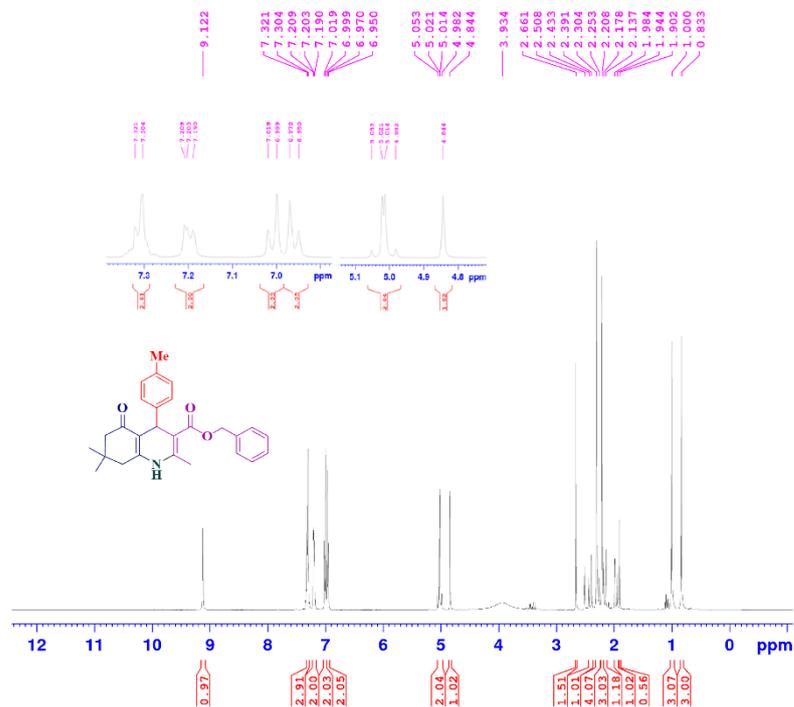


**Figure S4.** <sup>13</sup>C-NMR spectra of Benzyl4-(3-ethoxy-4-hydroxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquino line -3-carboxylate (Table 5, Entry3)





**Figure S6.** <sup>13</sup>C-NMR spectra of benzyl 2,7,7-trimethyl-5-oxo-4-(3,4,5-trimethoxyphenyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 5)

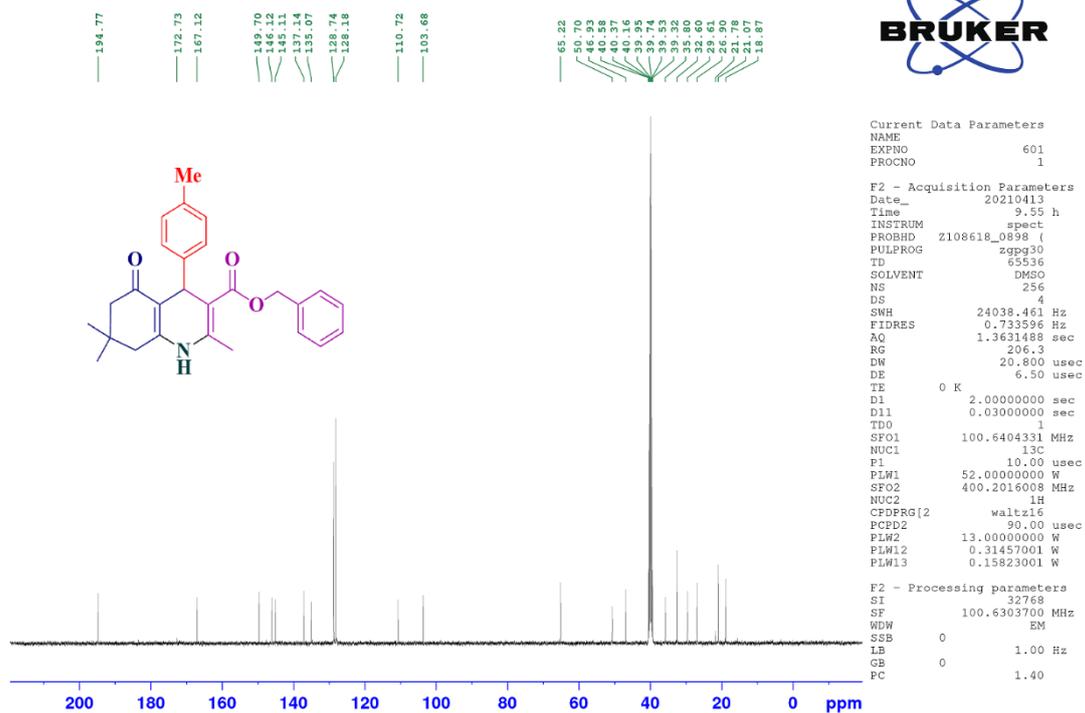


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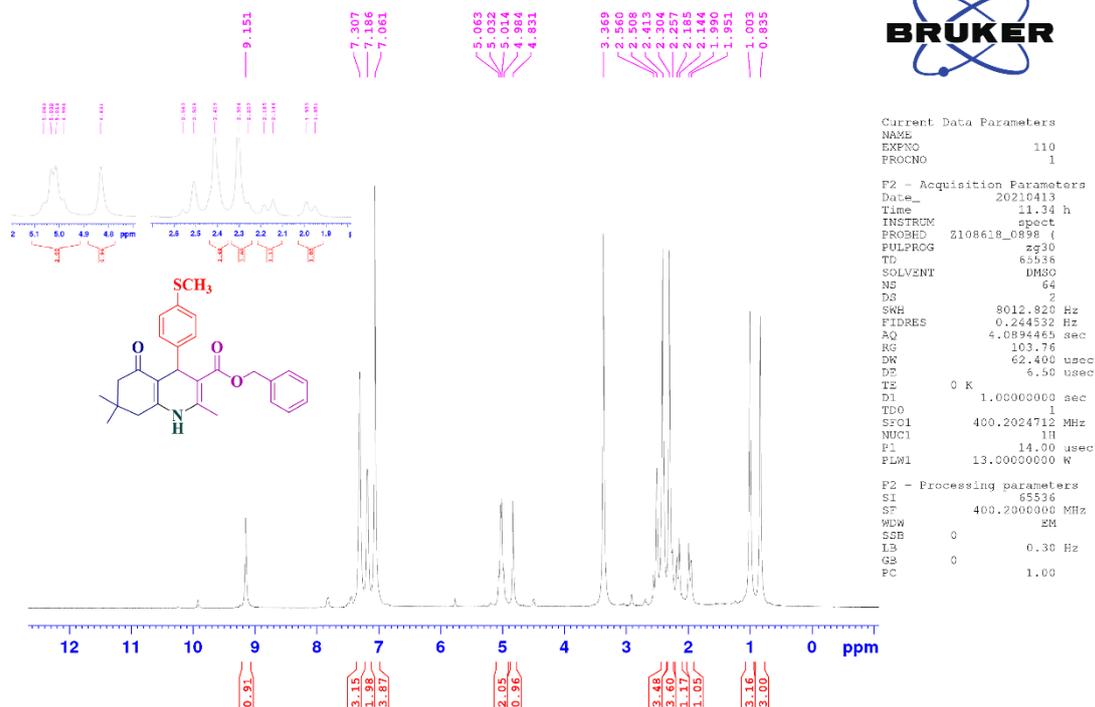
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**Figure S7.** <sup>1</sup>H-NMR spectra of Benzyl 2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 9).

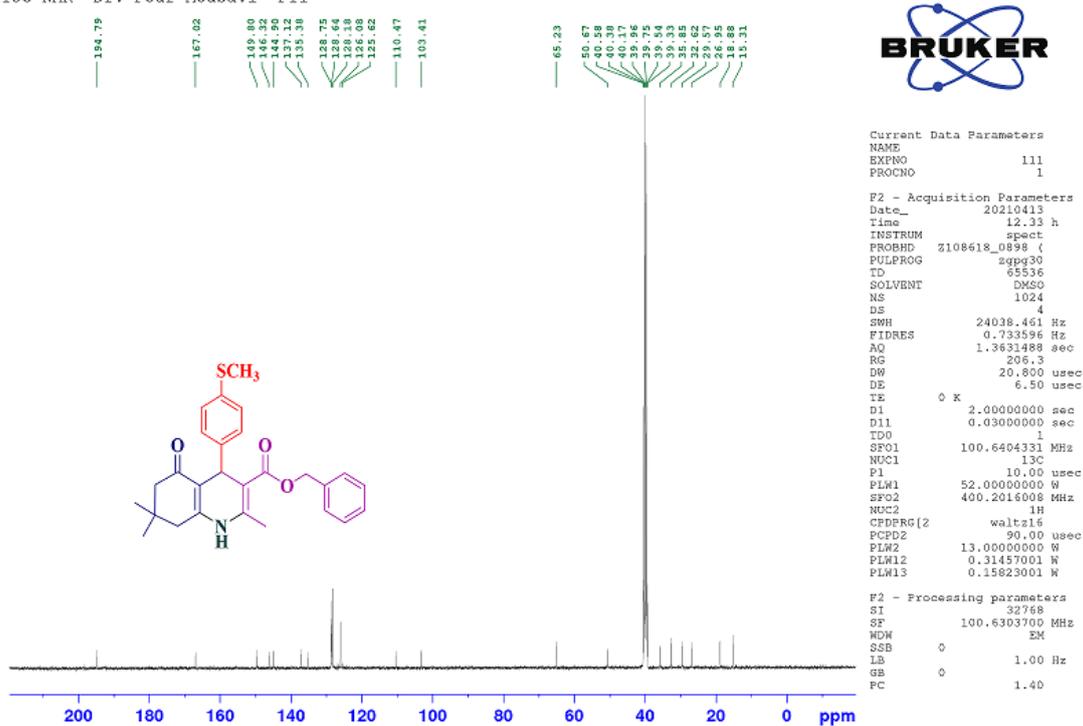


**Figure S8.** <sup>13</sup>C-NMR spectra of Benzyl 2,7,7-trimethyl-5-oxo-4-(p-tolyl)-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 9).



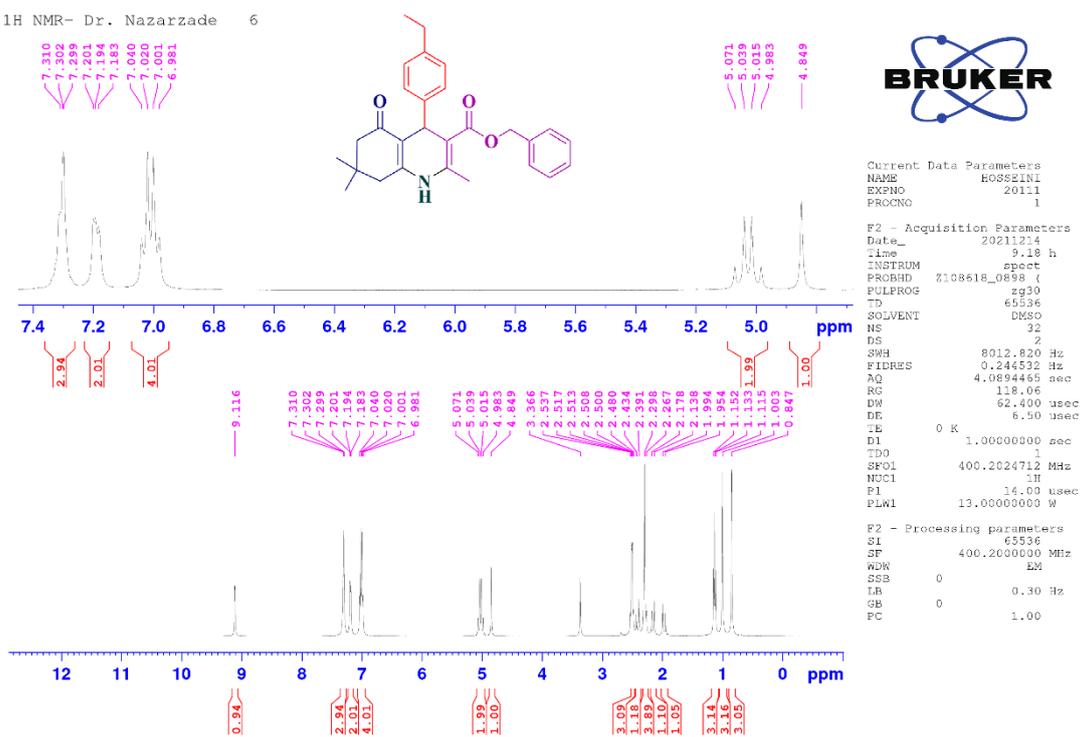
**Figure S9.** <sup>1</sup>H-NMR spectra of Benzyl 2,7,7-trimethyl-4-(4-(methylthio)phenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**Table 5, Entry10**)

<sup>13</sup>C NMR- Dr. Pour Mousavi P11



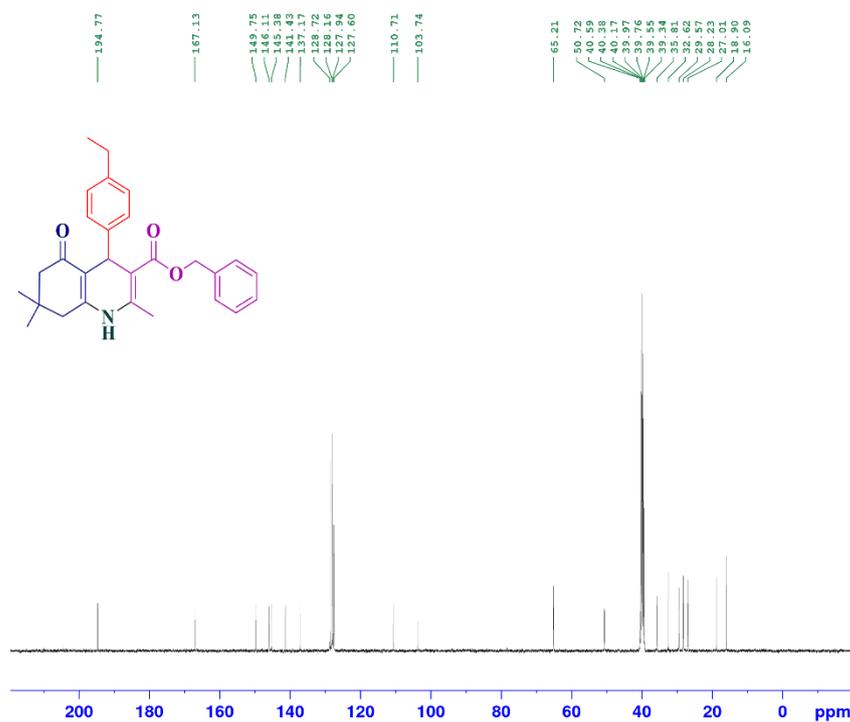
**Figure S10.** <sup>13</sup>C-NMR spectra of Benzyl 2,7,7-trimethyl-4-(4-(methylthio)phenyl)-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry10)

<sup>1</sup>H NMR- Dr. Nazarzade 6



**Figure S11.** <sup>1</sup>H-NMR spectra of benzyl 4-(4-ethylphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 13)

13C NMR- Dr. Nazarzade 6



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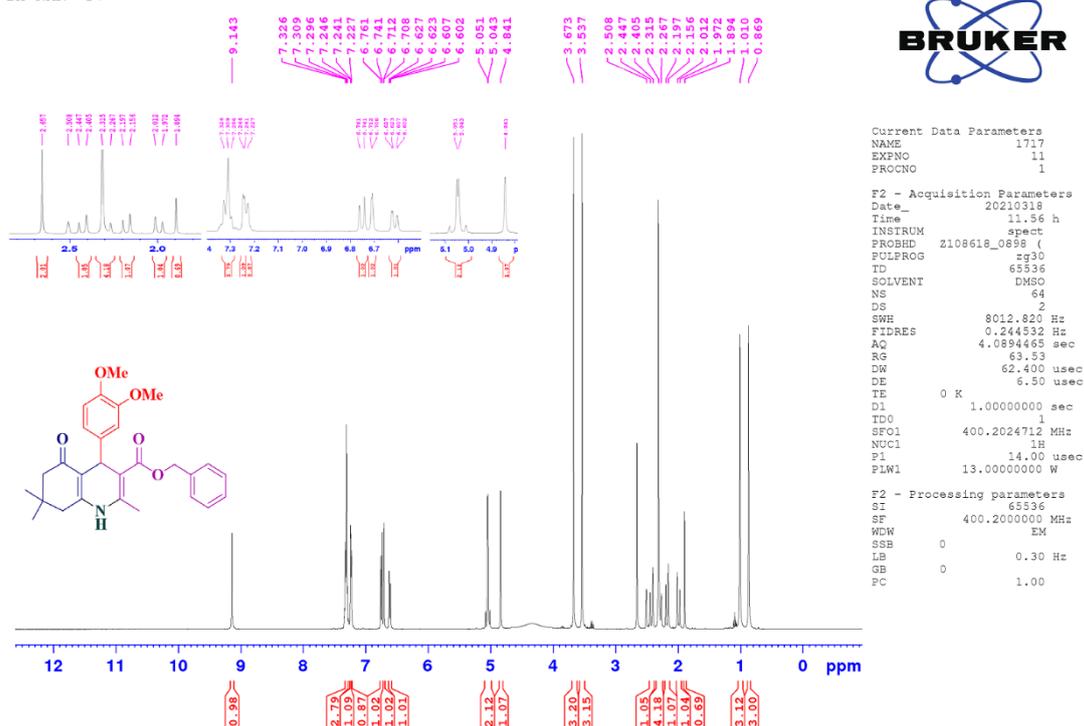
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**Figure S12.** <sup>13</sup>C-NMR spectra of benzyl 4-(4-ethylphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 13)

1H NMR- P7



**Figure S13.** <sup>1</sup>H-NMR spectra of Benzyl 4-(3,4-dimethoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (**Table 5, Entry 15**)

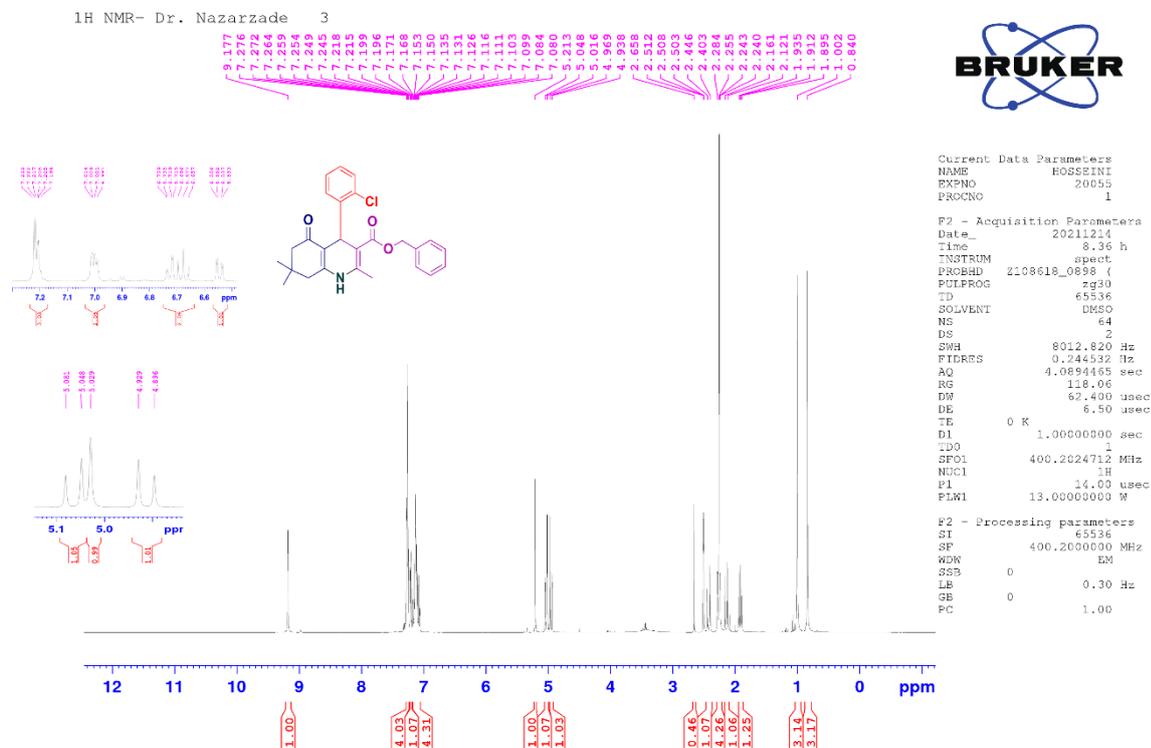
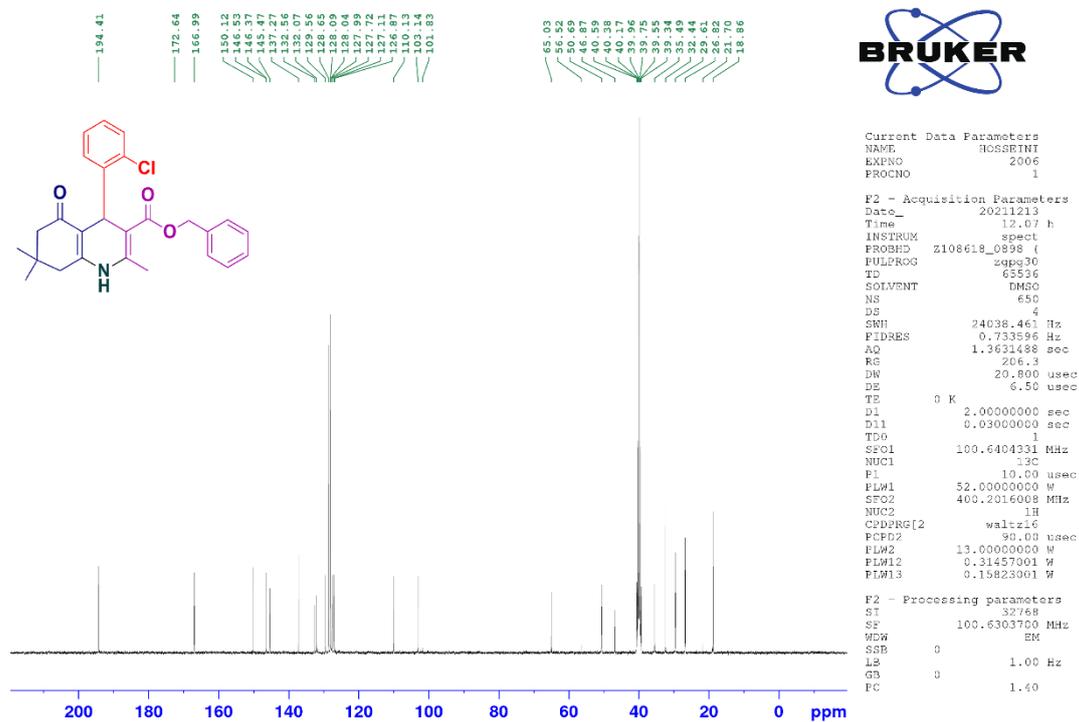
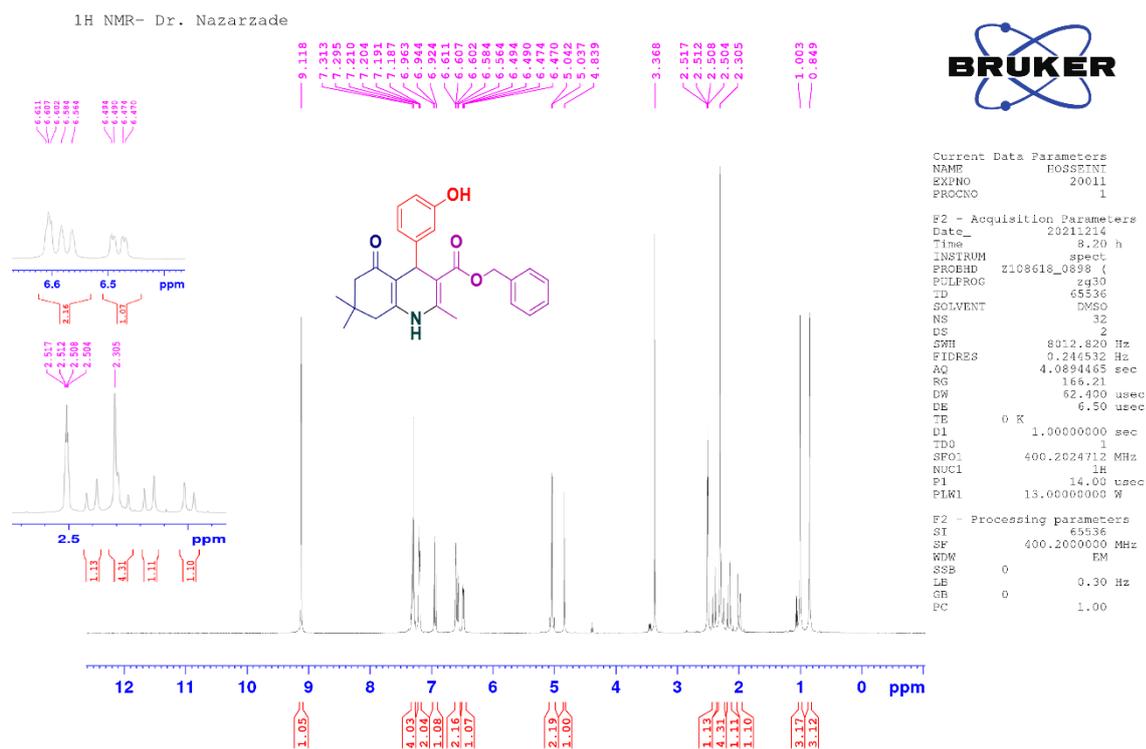


Figure S14. <sup>1</sup>H-NMR spectra of benzyl 4-(2-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 18)



**Figure S15.** <sup>13</sup>C-NMR spectra of benzyl 4-(2-chlorophenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 18)



**Figure S16.** <sup>1</sup>H-NMR spectra of benzyl 4-(3-hydroxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 19)

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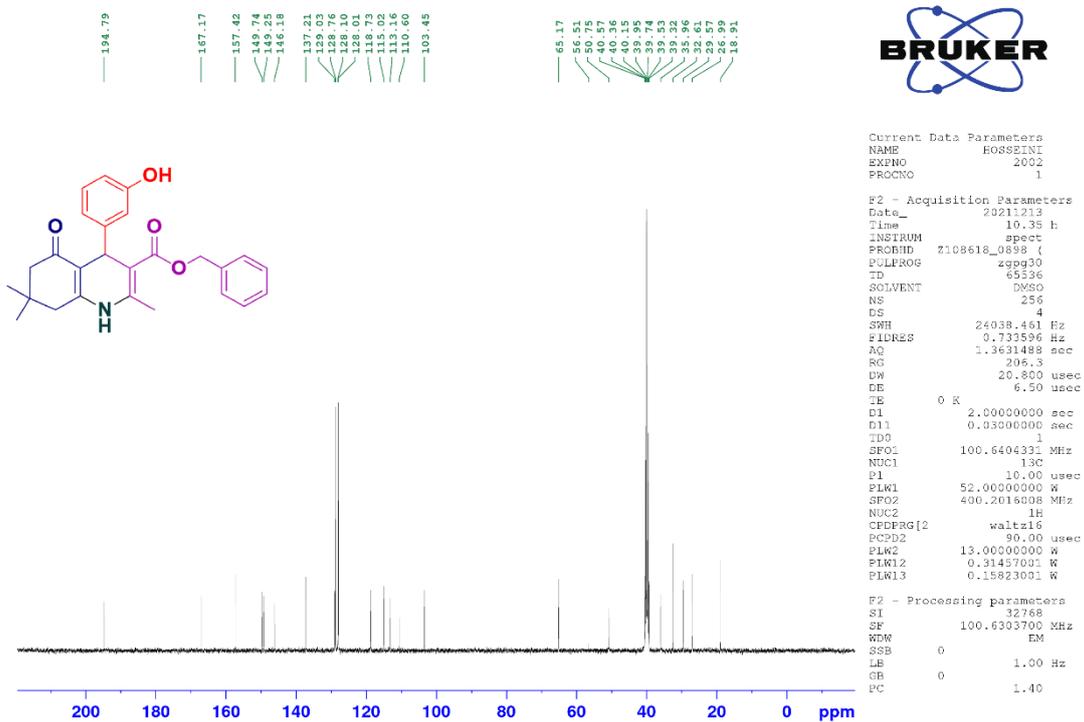
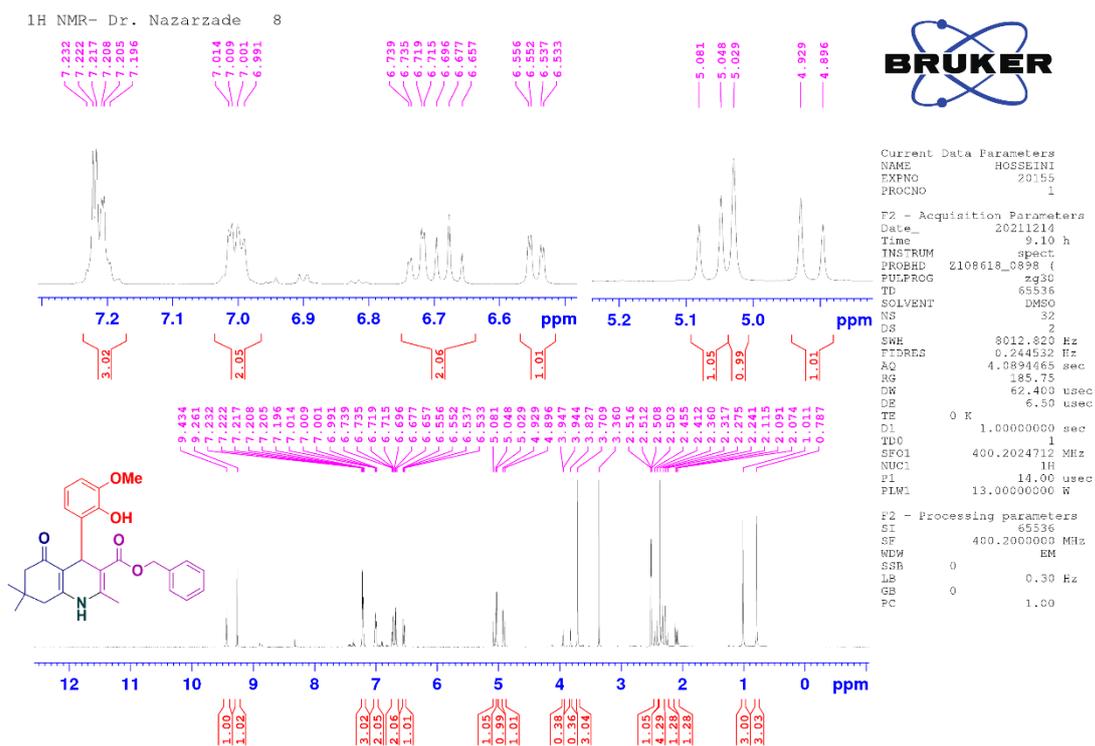
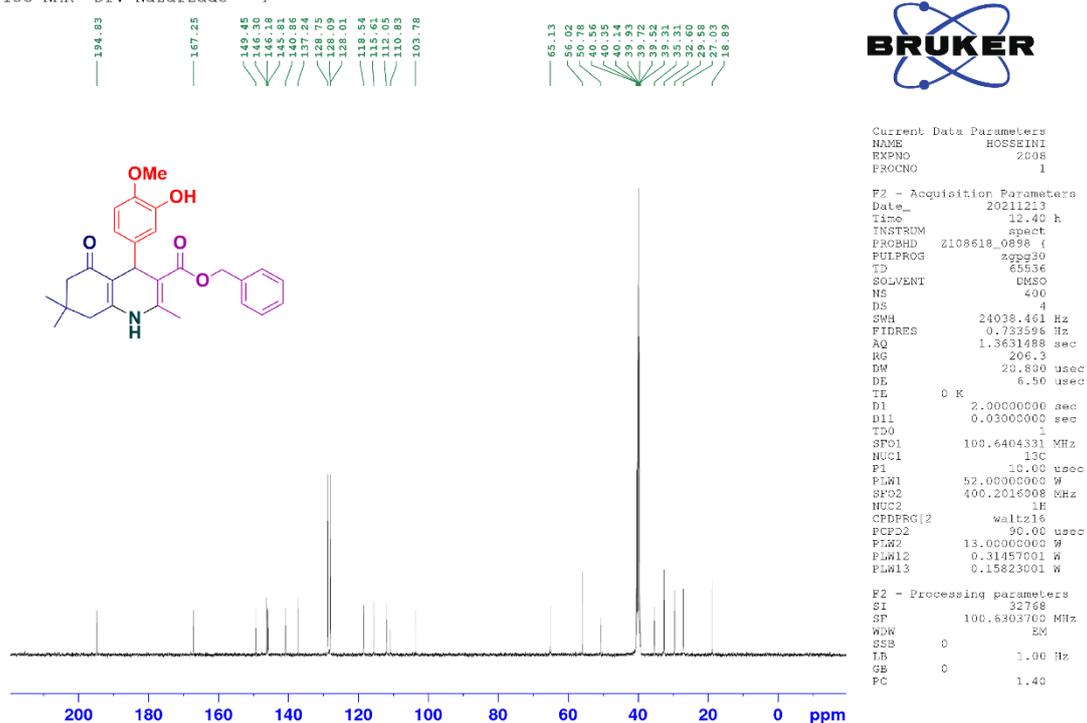


Figure S17. <sup>13</sup>C-NMR spectra of benzyl 4-(3-hydroxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 19)

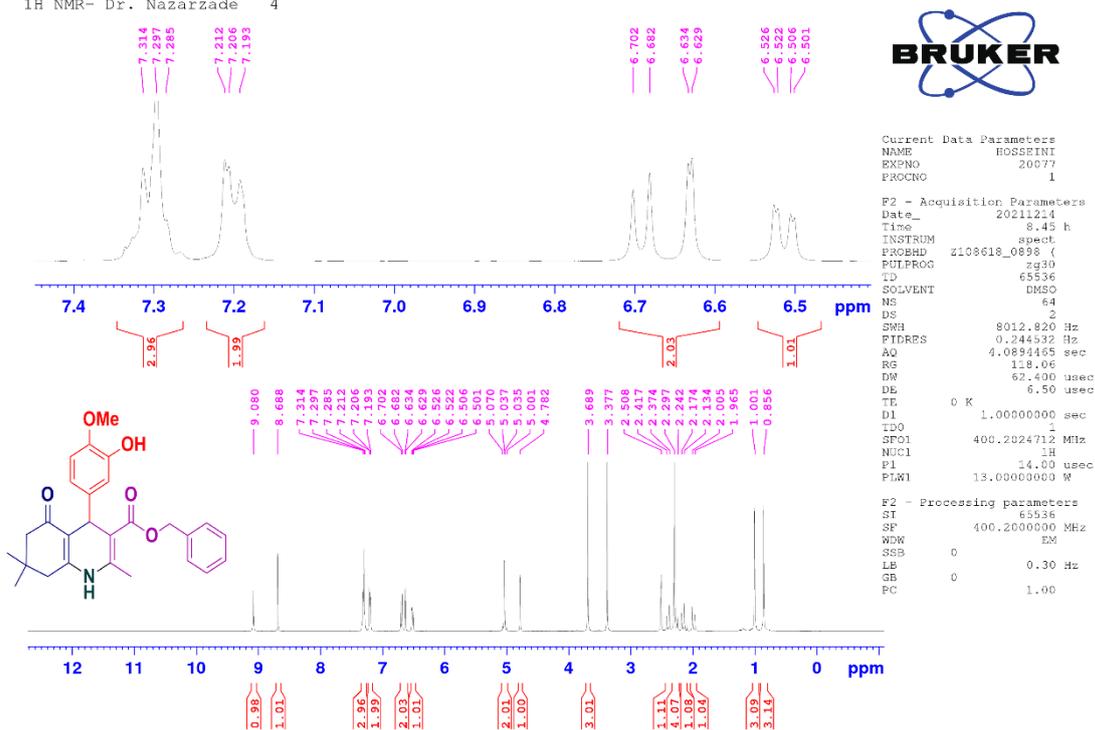


**Figure S18.** <sup>1</sup>H-NMR spectra of benzyl 4-(2-hydroxy-3-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 20)

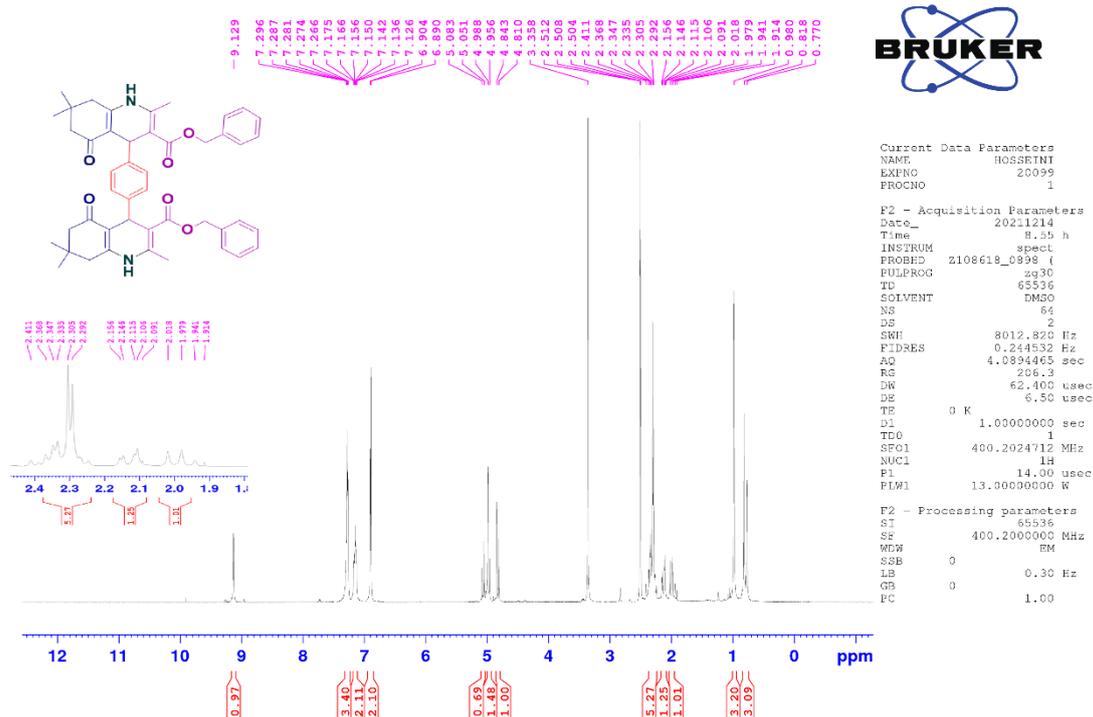
13C NMR- Dr. Nazarzade 4



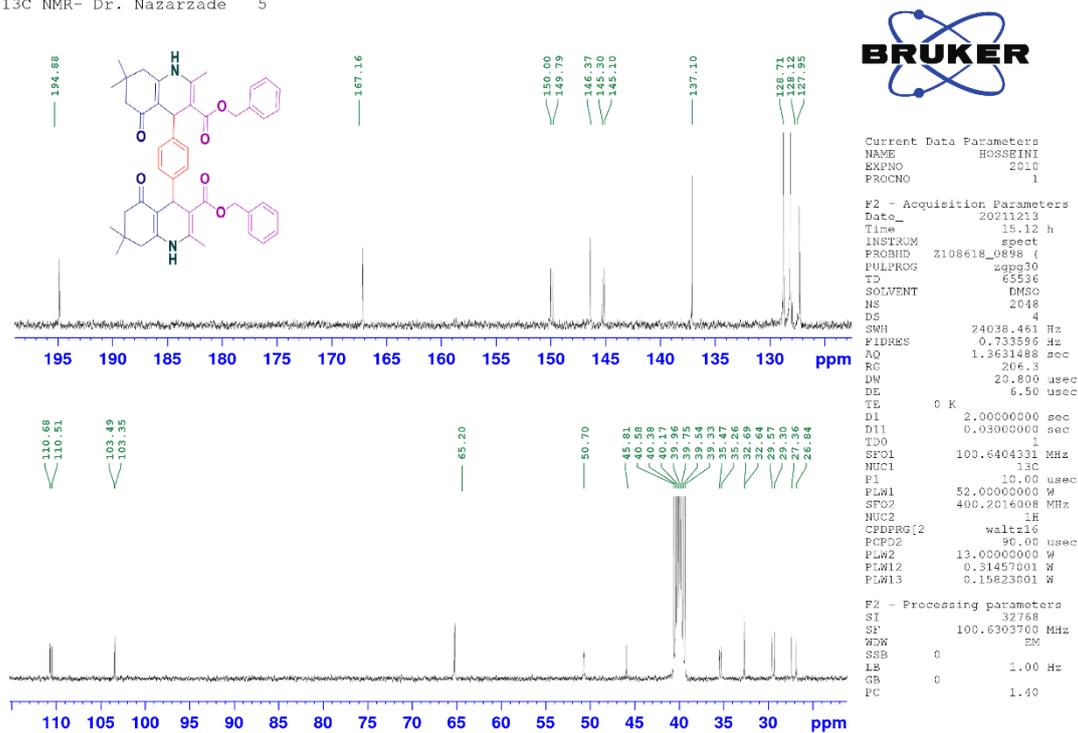
**Figure S19.** <sup>13</sup>C-NMR spectra of benzyl 4-(3-hydroxy-4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 20)



**Figure S20.** <sup>1</sup>H-NMR spectra of benzyl 4-(3-hydroxy-4-methoxyphenyl)-2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate (Table 5, Entry 22)

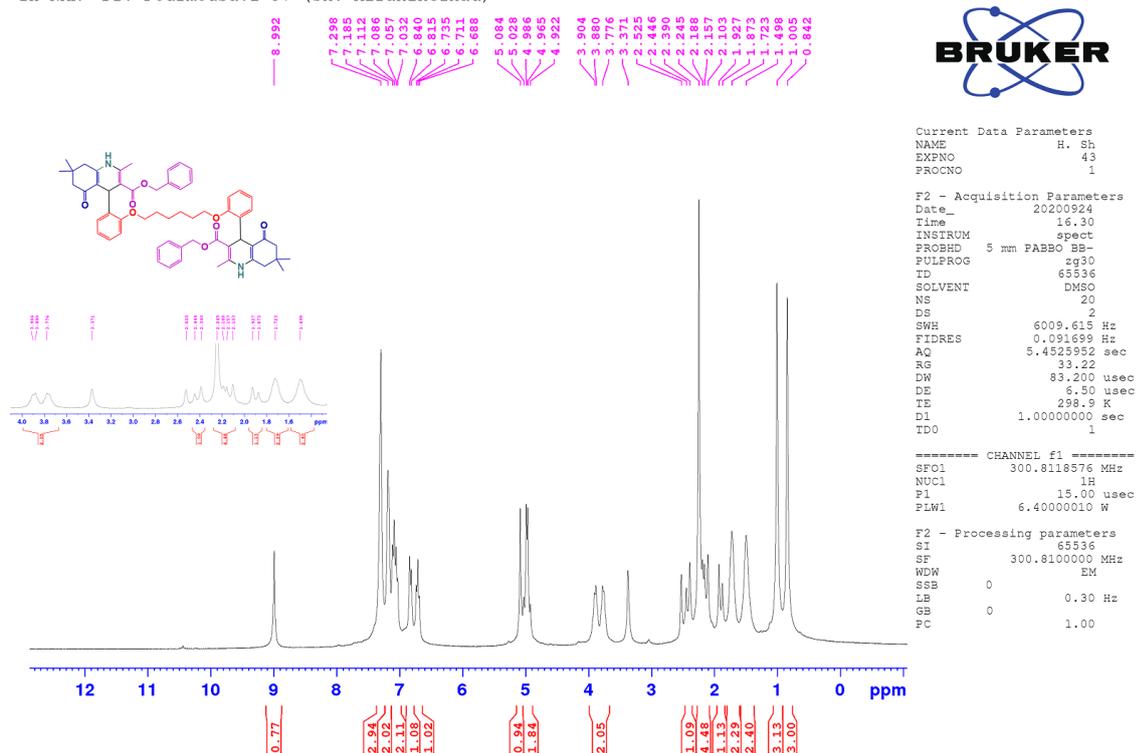


**Figure S21.** <sup>1</sup>H-NMR spectra of dibenzyl 4,4'-(1,4-phenylene)bis(2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate) (Table 5, Entry23)

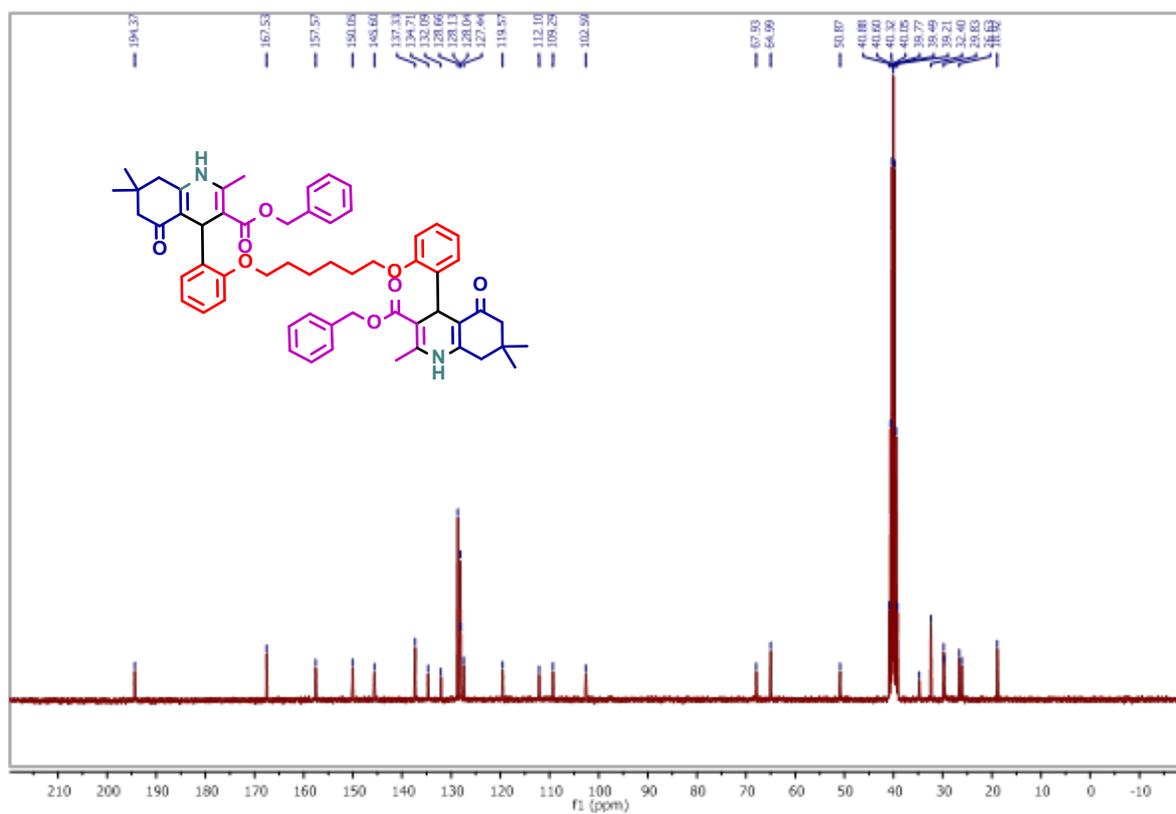


**Figure S22.** <sup>13</sup>C-NMR spectra of dibenzyl 4,4'-(1,4-phenylene)bis(2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate) (Table 5, Entry 23)

<sup>1</sup>H-NMR- Dr. Pourmousavi 37 (Sh. Miraninezhad)



**Figure S23.** <sup>1</sup>H-NMR spectra of Dibenzyloxybis(2,1-phenylene)bis(2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate) (Table 5, Entry 24)



**Figure S24.** <sup>13</sup>C-NMR Spectra of dibenzyl 4,4'-((hexane-1,6-diylbis(oxy))bis(2,1-phenylene))bis(2,7,7-trimethyl-5-oxo-1,4,5,6,7,8-hexahydroquinoline-3-carboxylate) (Table 3, Entry 24)