

Synthesis and Biological Evaluation of *N*-Naphthoyl-Phenylglyoxamide-Based Small Molecular Antimicrobial Peptide Mimics as Novel Antimicrobial Agents and Biofilm Inhibitors

Shashidhar Nizalapur^a, Kitty Ho^a, Önder Kimyon^b, Eugene Yee^{a,e}, Thomas Berry^c, Mike Manefield^b, Cranfield C^c, Mark Willcox^d, David StC Black^a and Naresh Kumar^{a*}

^a*School of Chemistry, UNSW Australia, Sydney, NSW 2052, Australia.*

^b*Centre for Marine Bio-Innovation, School of Biotechnology and Biomolecular Sciences.*

^c*Molecular Biosciences Team, School of Life Sciences, University of Technology Sydney.*

^d*School of Optometry and Vision Science, UNSW Australia, Sydney, NSW 2052, Australia.*

^e*Children's Cancer Institute Australia, Lowy Cancer Research Centre, University of New South Wales, Sydney, Australia.*

UNSW Australia, Sydney, NSW 2052, Australia.

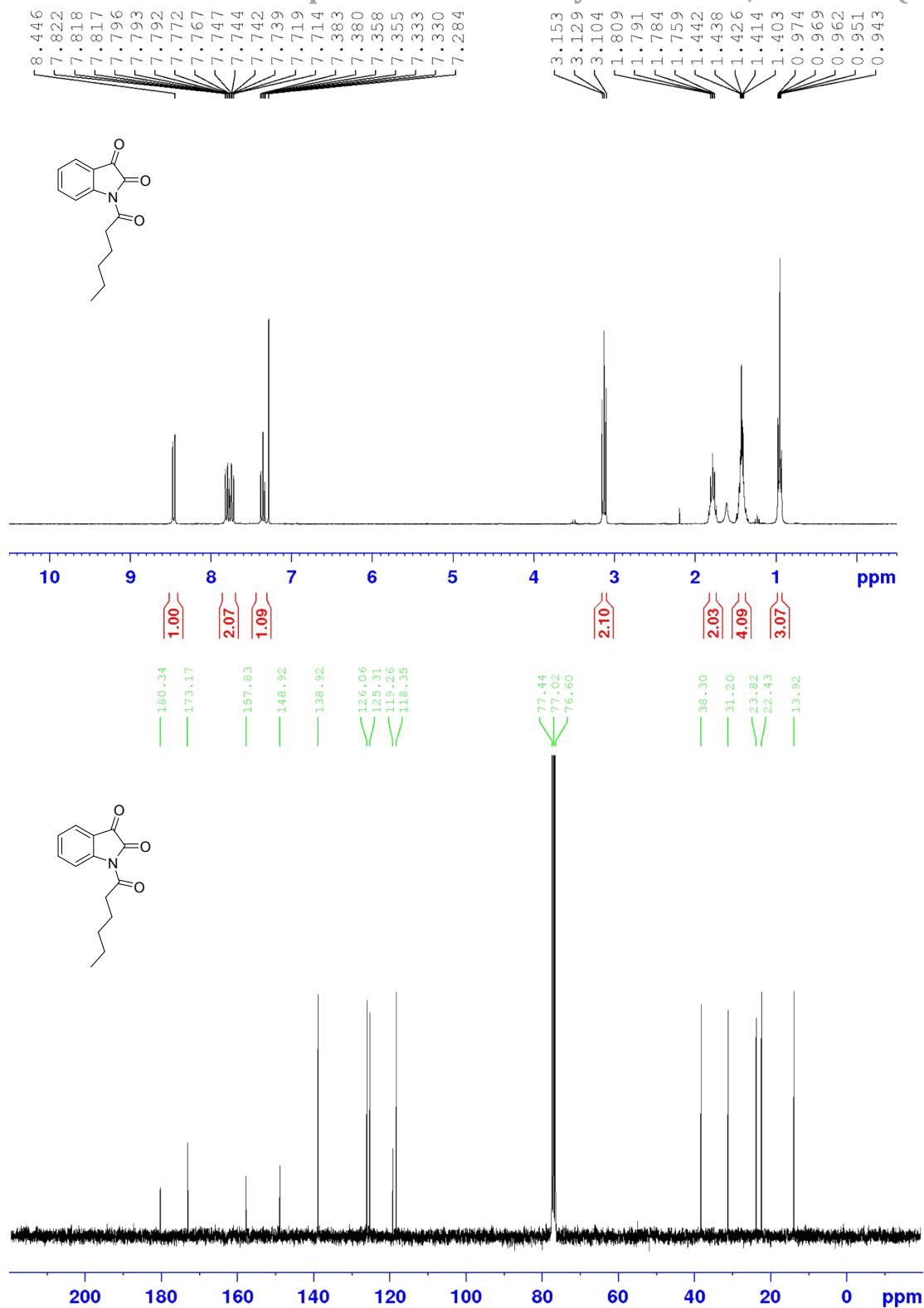
**E-mail:* n.kumar@unsw.edu.au* Tel: +61 29385 4698; Fax:+61 29385 6141.

Contents

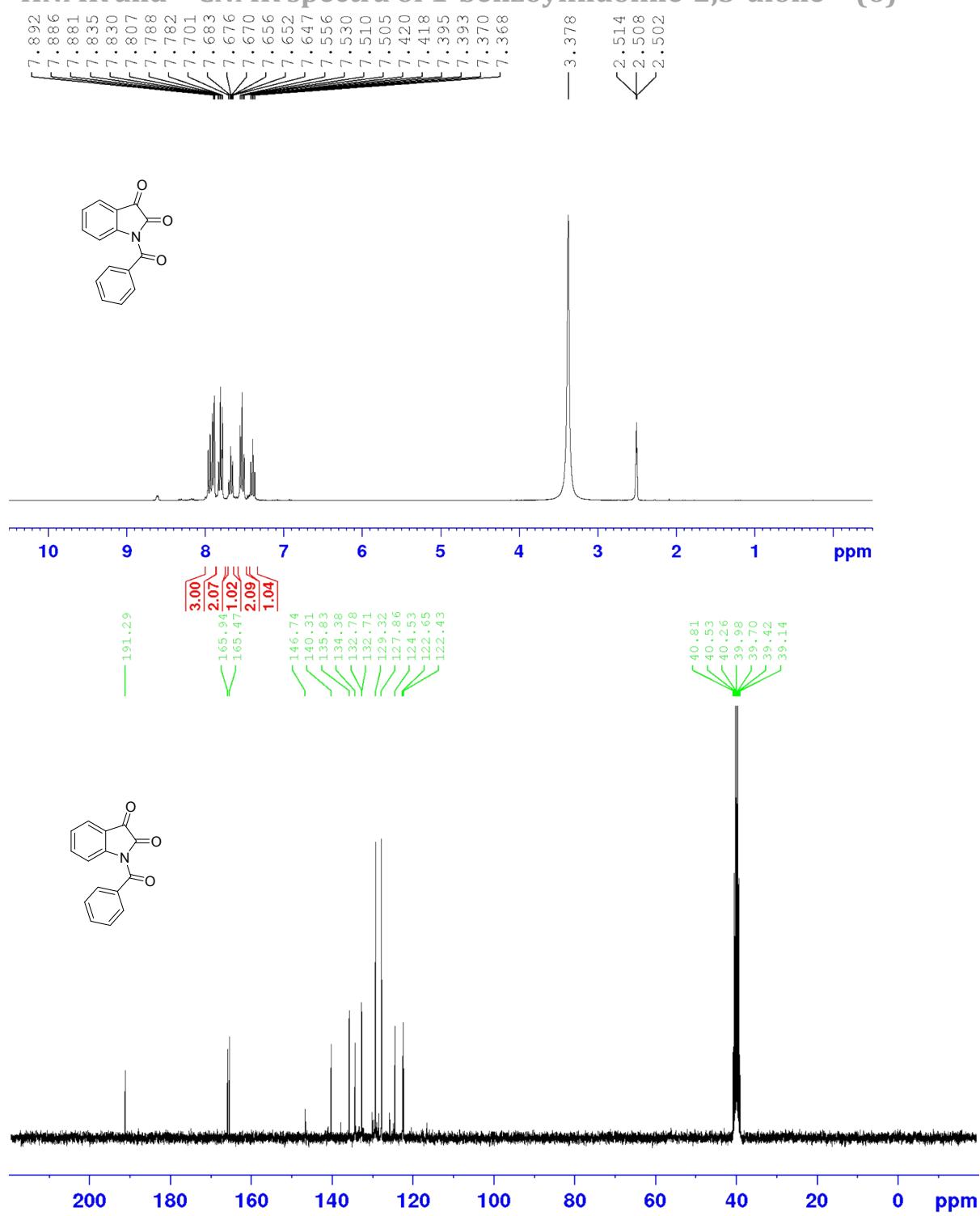
¹ HNMR and ¹³ CNMR spectra of 1-hexanoylindoline-2,3-dione ³³ (5)	7
¹ HNMR and ¹³ CNMR spectra of 1-benzoylindoline-2,3-dione ³⁷ (6)	8
¹ HNMR and ¹³ CNMR spectra of 1-(2-naphthoyl)indoline-2,3-dione (11)	9
¹ HNMR and ¹³ CNMR spectra of 1-(2-naphthoyl)-5-bromoindoline-2,3-dione (12)	10
¹ HNMR and ¹³ CNMR spectra of 1-(2-naphthoyl)-5-chloroindoline-2,3-dione (13).....	11
¹ HNMR and ¹³ CNMR spectra of 1-(2-naphthoyl)-5-fluoroindoline-2,3-dione (14).....	12
¹ HNMR and ¹³ CNMR spectra of 1-(2-naphthoyl)-5-methylindoline-2,3-dione (15).....	13
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)hexanamide (16a)	14
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)hexanamide (17a)	15
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)benzamide (18a)	16
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)benzamide (19a)	17
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (20a)	18
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (21a)	19
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(4-bromo-2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (22a)	20
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(4-chloro-2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (23a)	21
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)-4-fluorophenyl)-2-naphthamide (24a).....	22
¹ HNMR and ¹³ CNMR spectra of <i>N</i> -(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)-4-methylphenyl)-2-naphthamide (25a)	23
¹ HNMR and ¹³ CNMR spectra of 2-(2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (16b).....	24
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (17b)	25
¹ HNMR and ¹³ CNMR spectra of 2-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (18b).....	26

¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium chloride (19b)	27
¹ HNMR and ¹³ CNMR spectra of 2-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (20b)	28
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (21b)	29
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-bromophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (22b)	30
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-chlorophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (23b)	31
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-fluorophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (24b)	32
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-methylphenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (25b)	33
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (18c)	37
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (19c)	38
¹ HNMR and ¹³ CNMR spectra of 2-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N,N-trimethylethan-1-aminium iodide (20c)	39
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (21c)	40
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-bromophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (22c)	41
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-chlorophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (23c)	43
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-fluorophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (24c)	44
¹ HNMR and ¹³ CNMR spectra of 3-(2-(2-naphthamido)-5-methylphenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (25c)	45

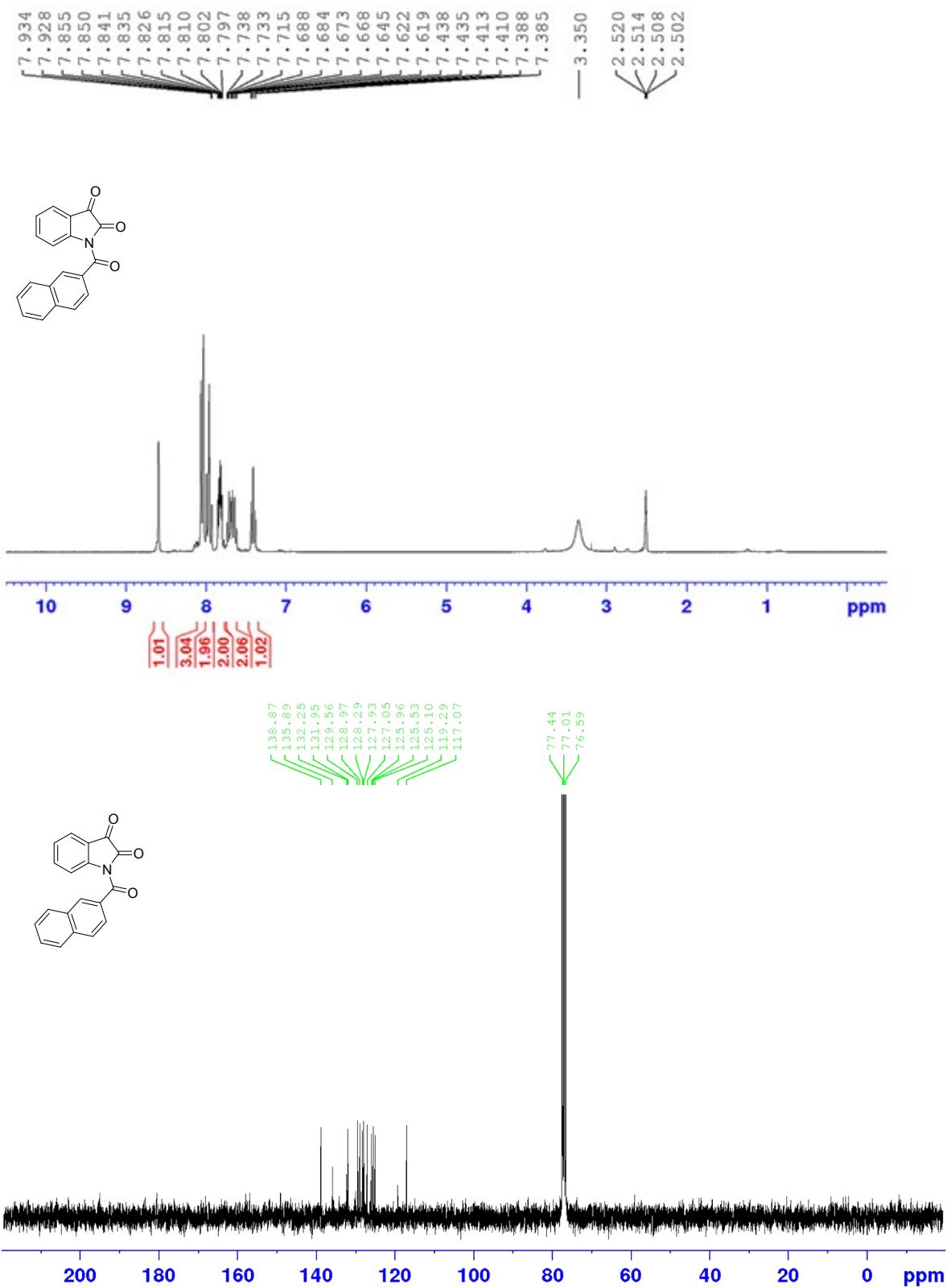
¹H NMR and ¹³C NMR spectra of 1-hexanoylindoline-2,3-dione³³ (5)



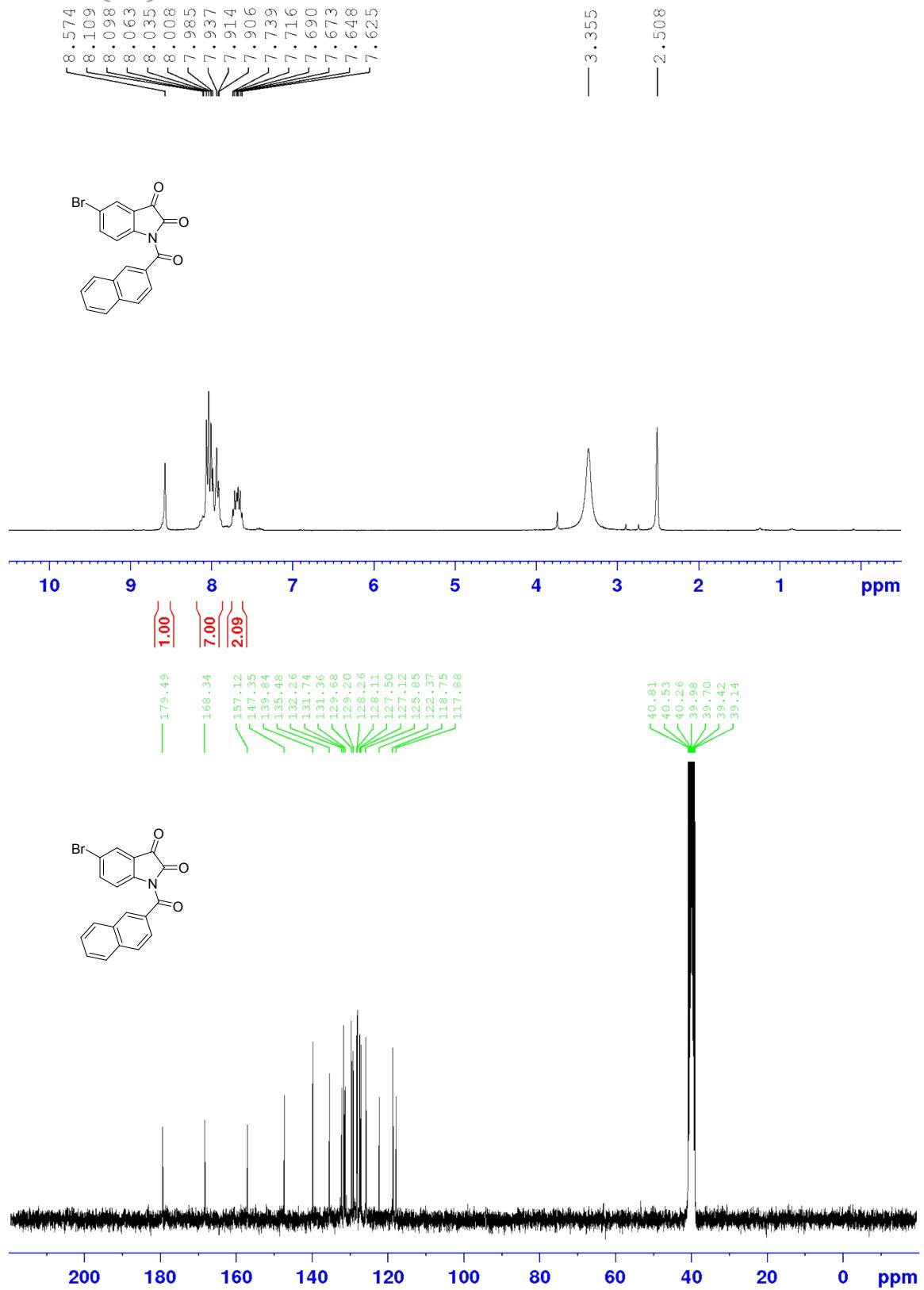
^1H NMR and ^{13}C NMR spectra of 1-benzoylindoline-2,3-dione³⁷ (6)



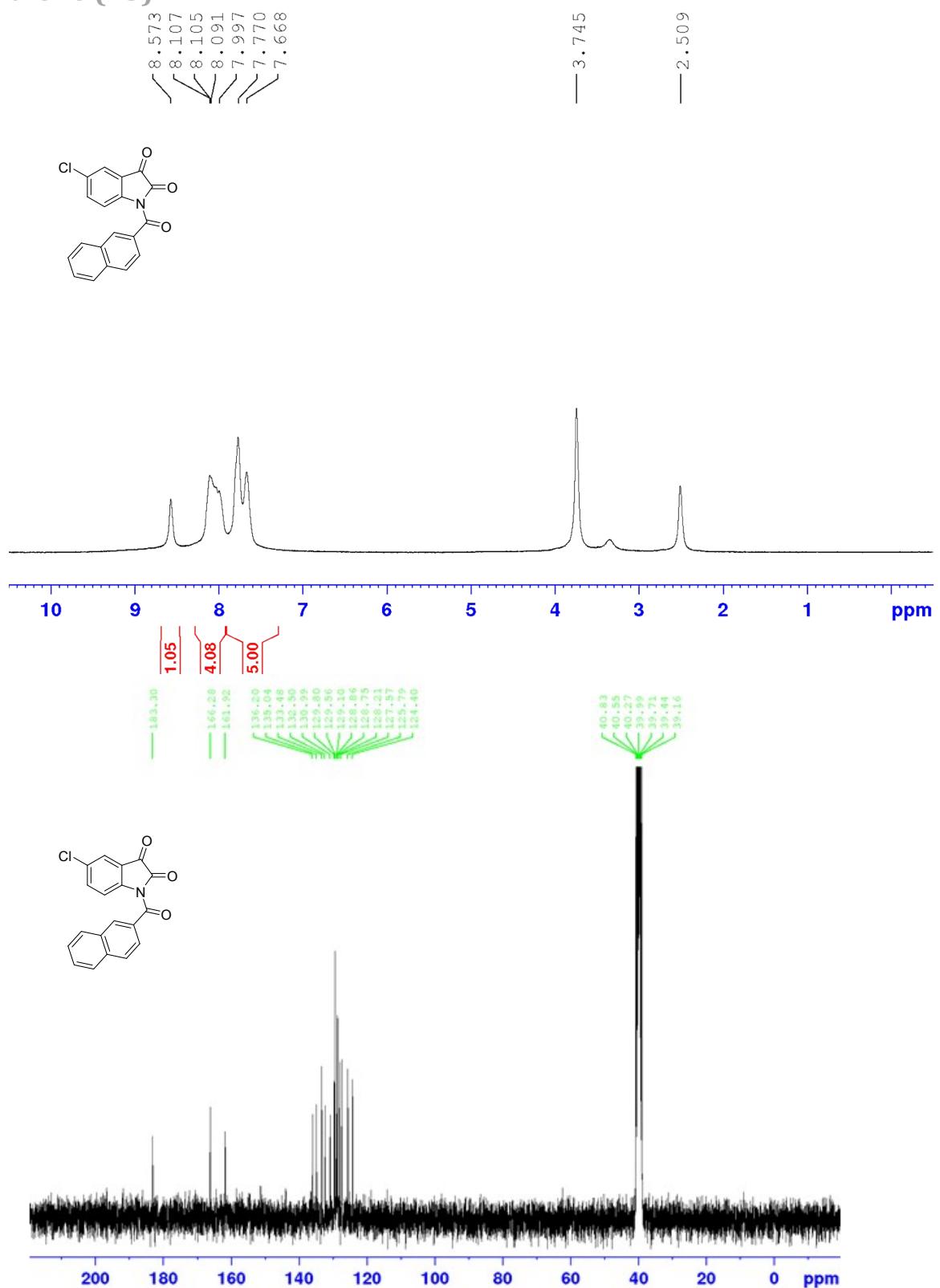
¹H NMR and ¹³C NMR spectra of 1-(2-naphthoyl)indoline-2,3-dione (11)



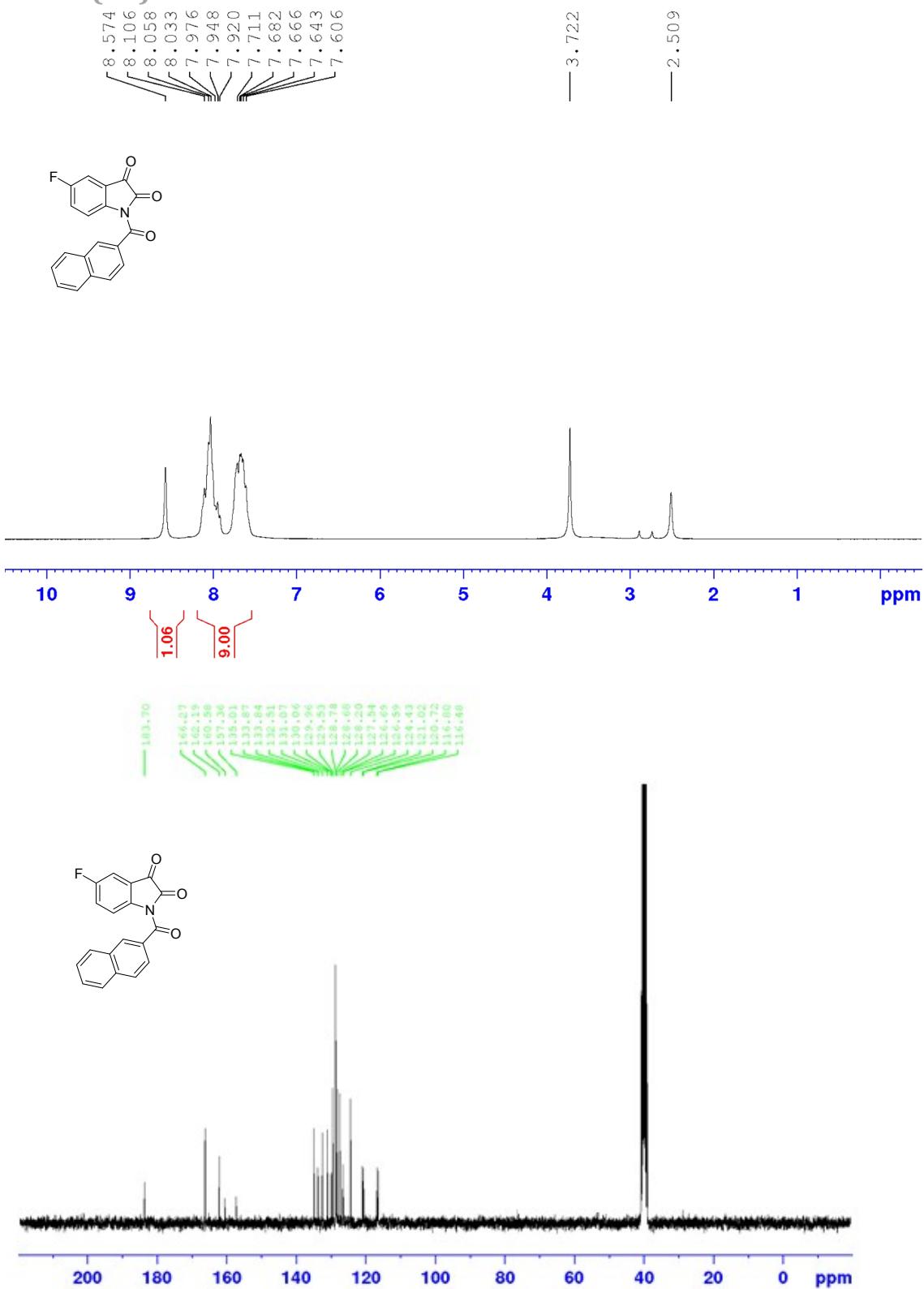
¹H NMR and ¹³C NMR spectra of 1-(2-naphthoyl)-5-bromoindoline-2,3-dione (12)



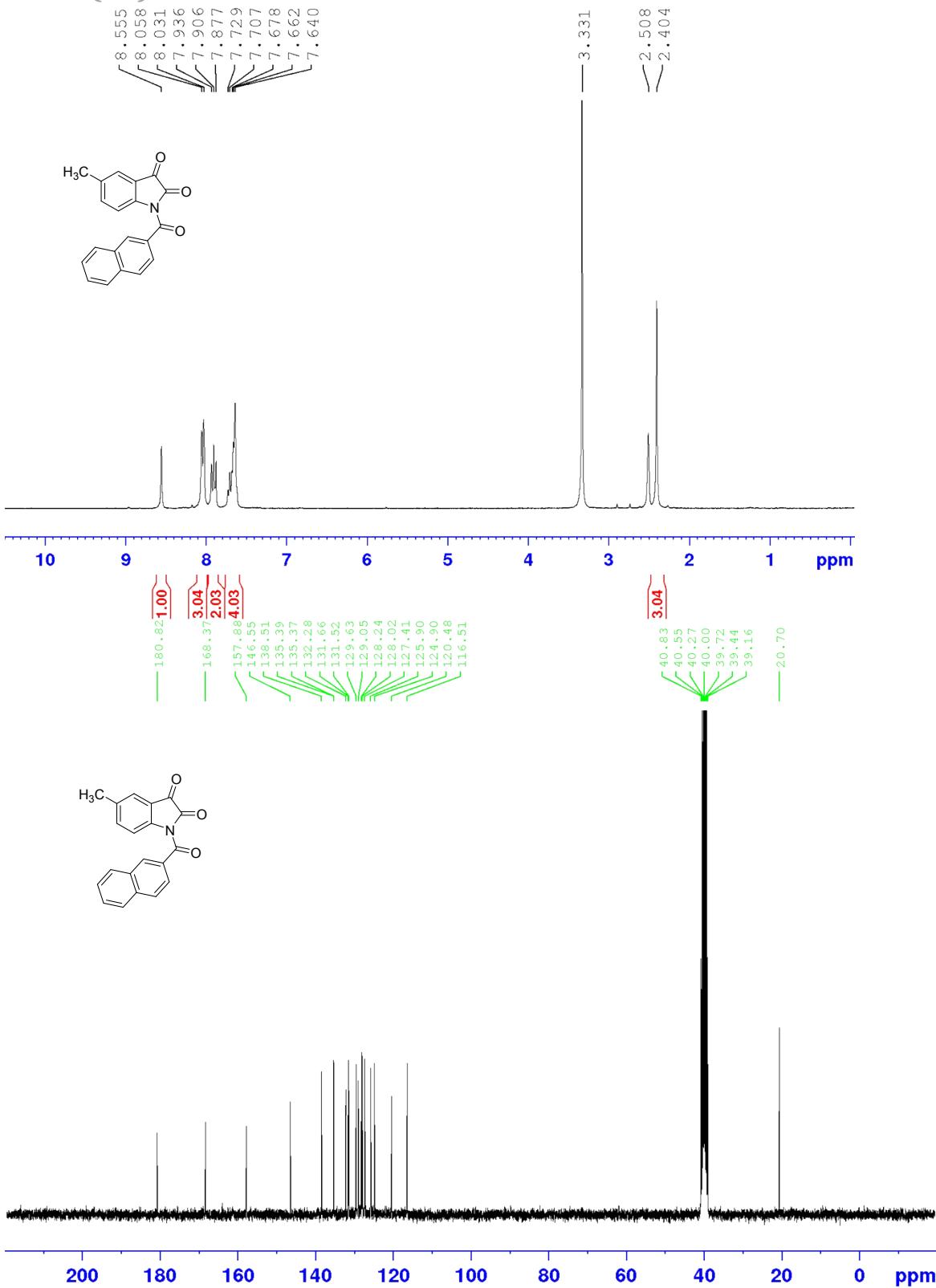
¹HNMR and ¹³CNMR spectra of 1-(2-naphthoyl)-5-chloroindoline-2,3-dione (13)



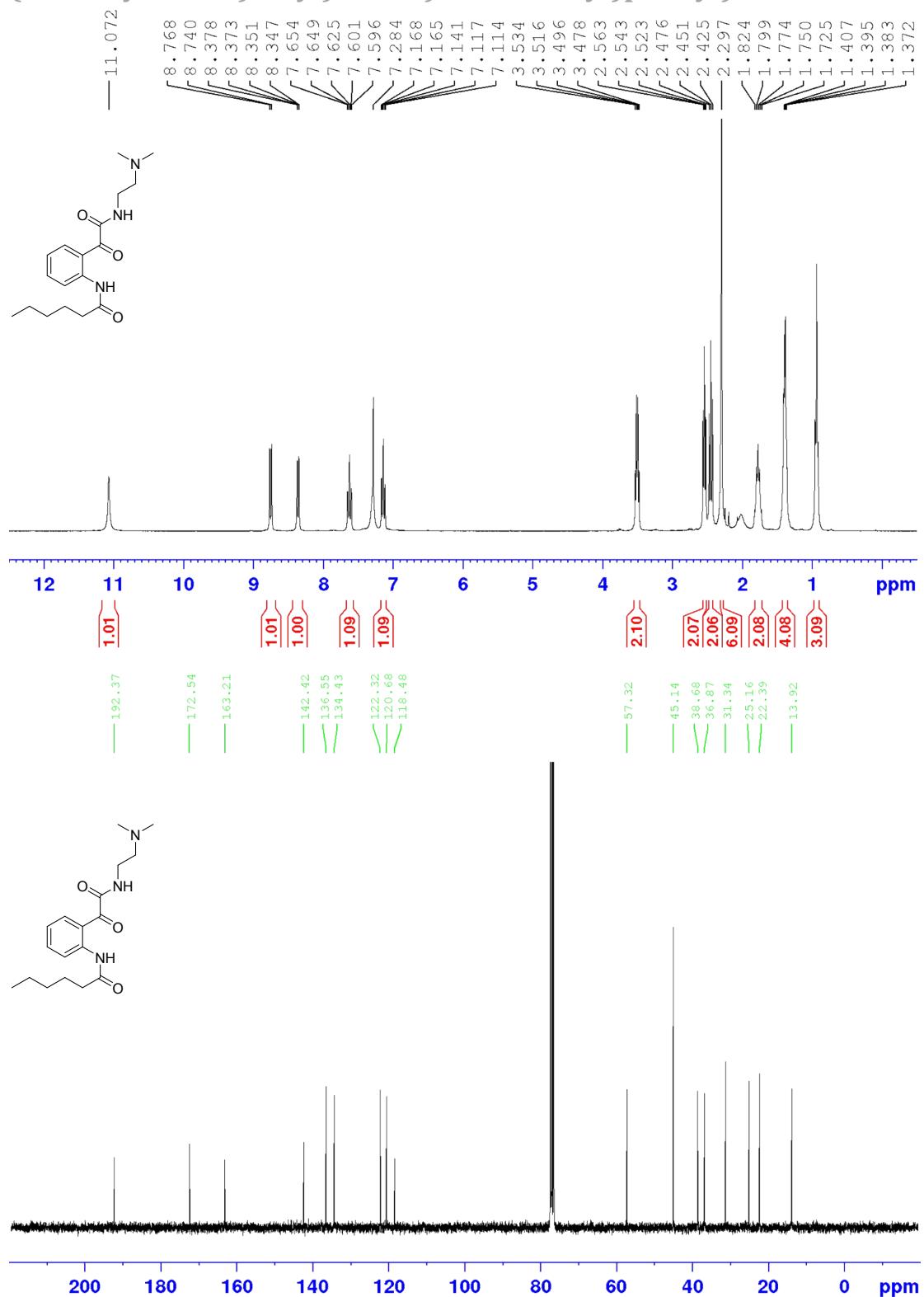
^1H NMR and ^{13}C NMR spectra of 1-(2-naphthoyl)-5-fluoroindoline-2,3-dione (14)



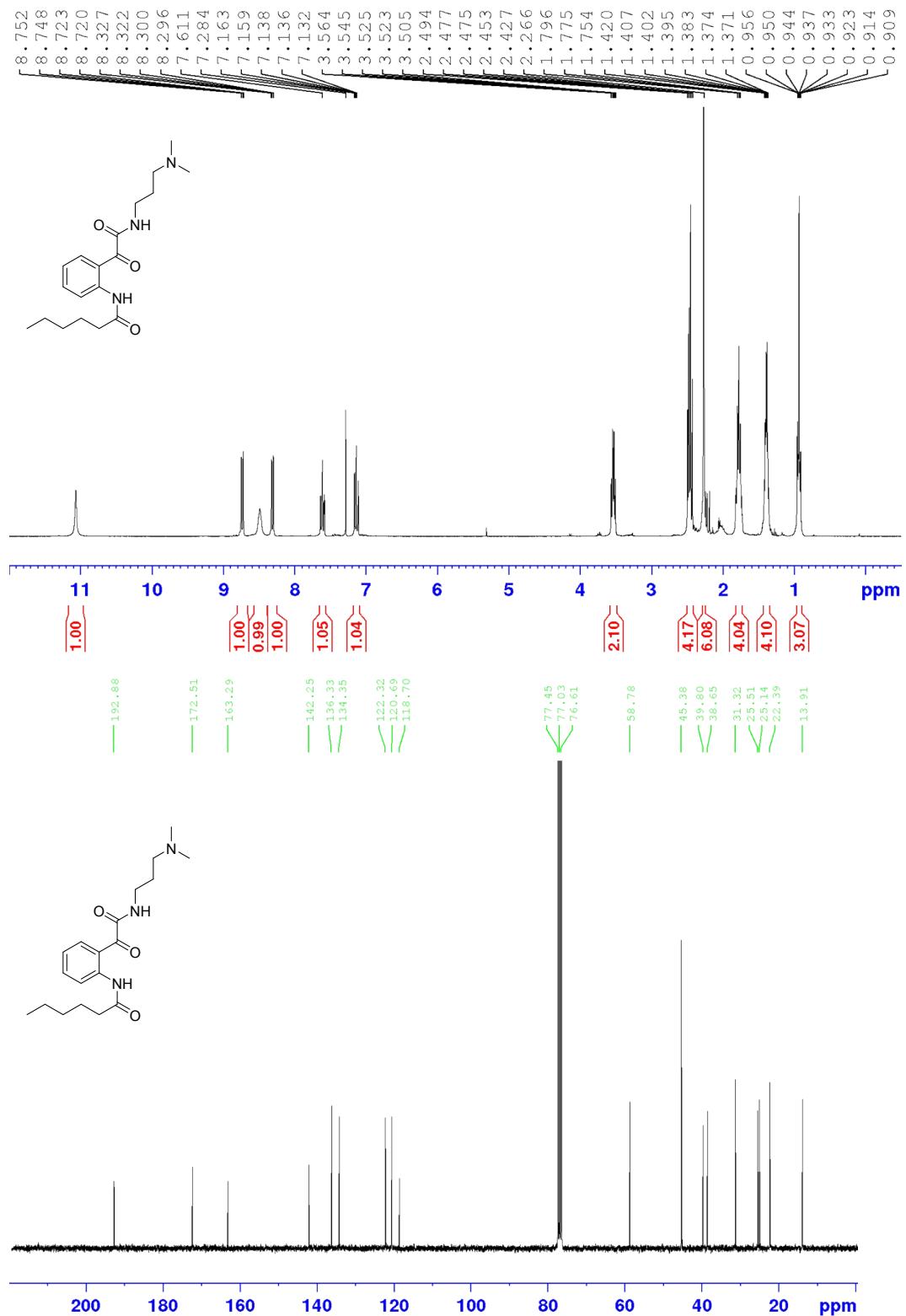
¹H NMR and ¹³C NMR spectra of 1-(2-naphthoyl)-5-methylindoline-2,3-dione (15)



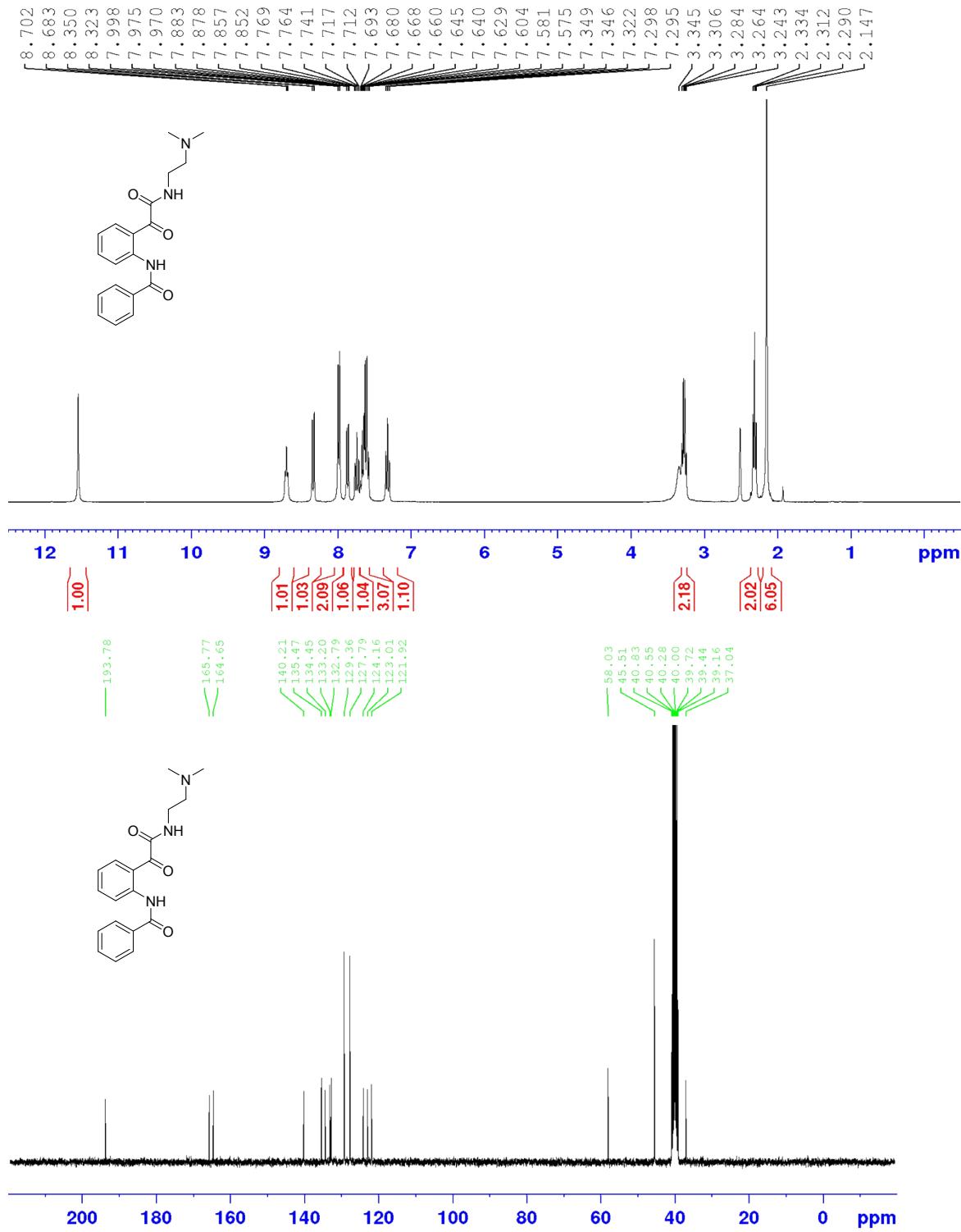
¹H NMR and ¹³C NMR spectra of *N*-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)hexanamide (16a)



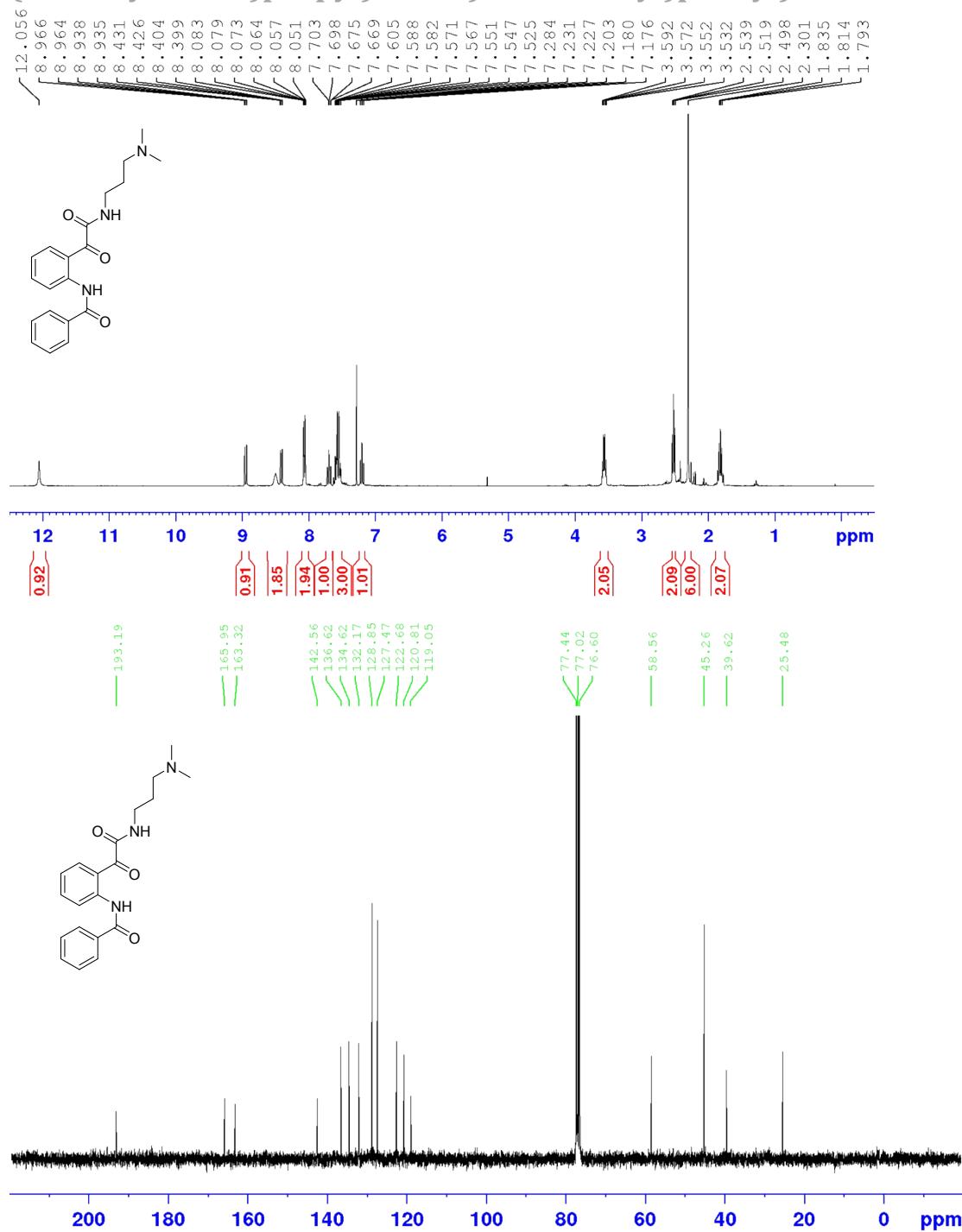
¹H NMR and ¹³C NMR spectra of *N*-(2-((2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)hexanamide (17a)



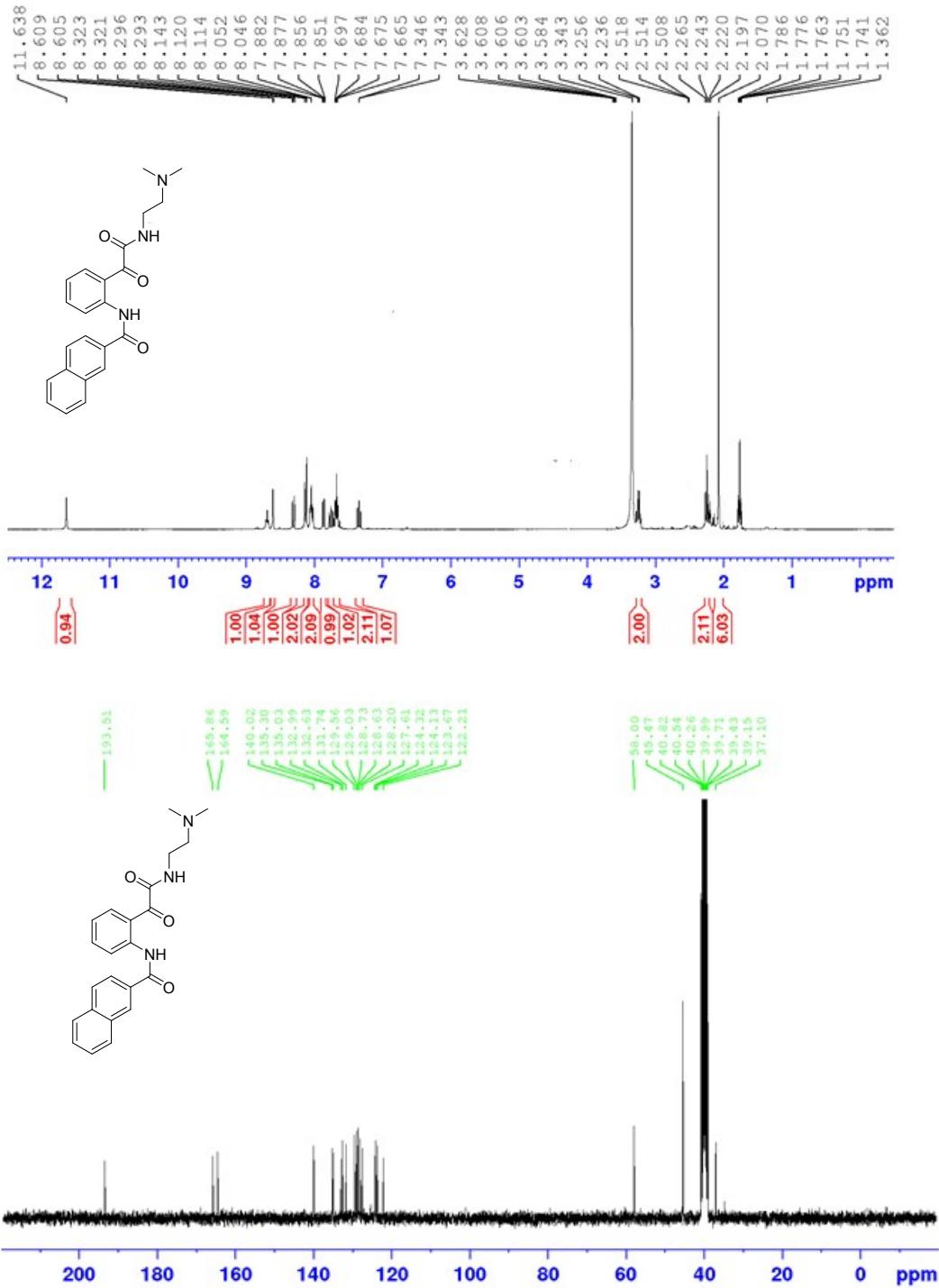
¹HNMR and ¹³CNMR spectra of *N*-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)benzamide (18a)



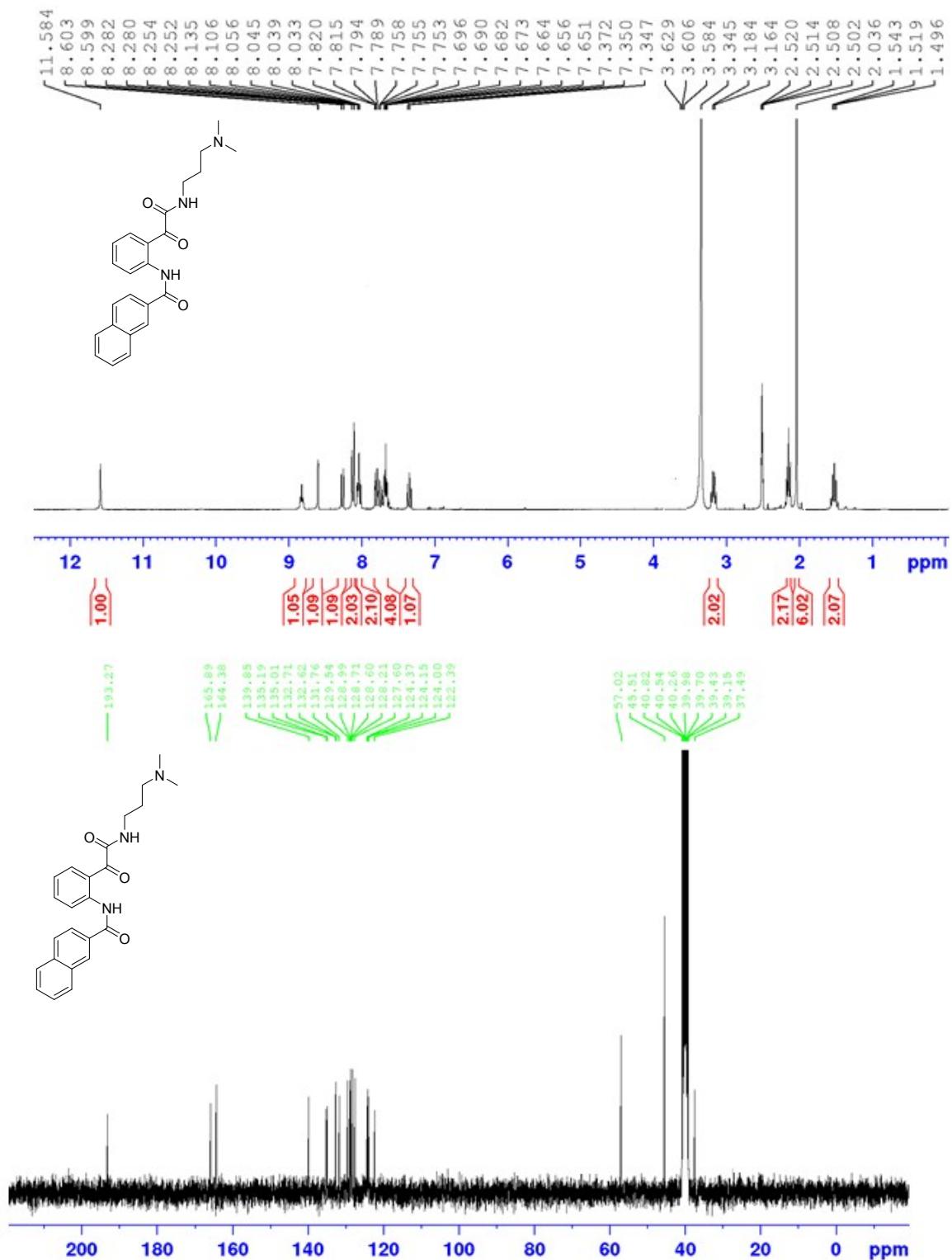
¹H NMR and ¹³C NMR spectra of *N*-(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)benzamide (19a)



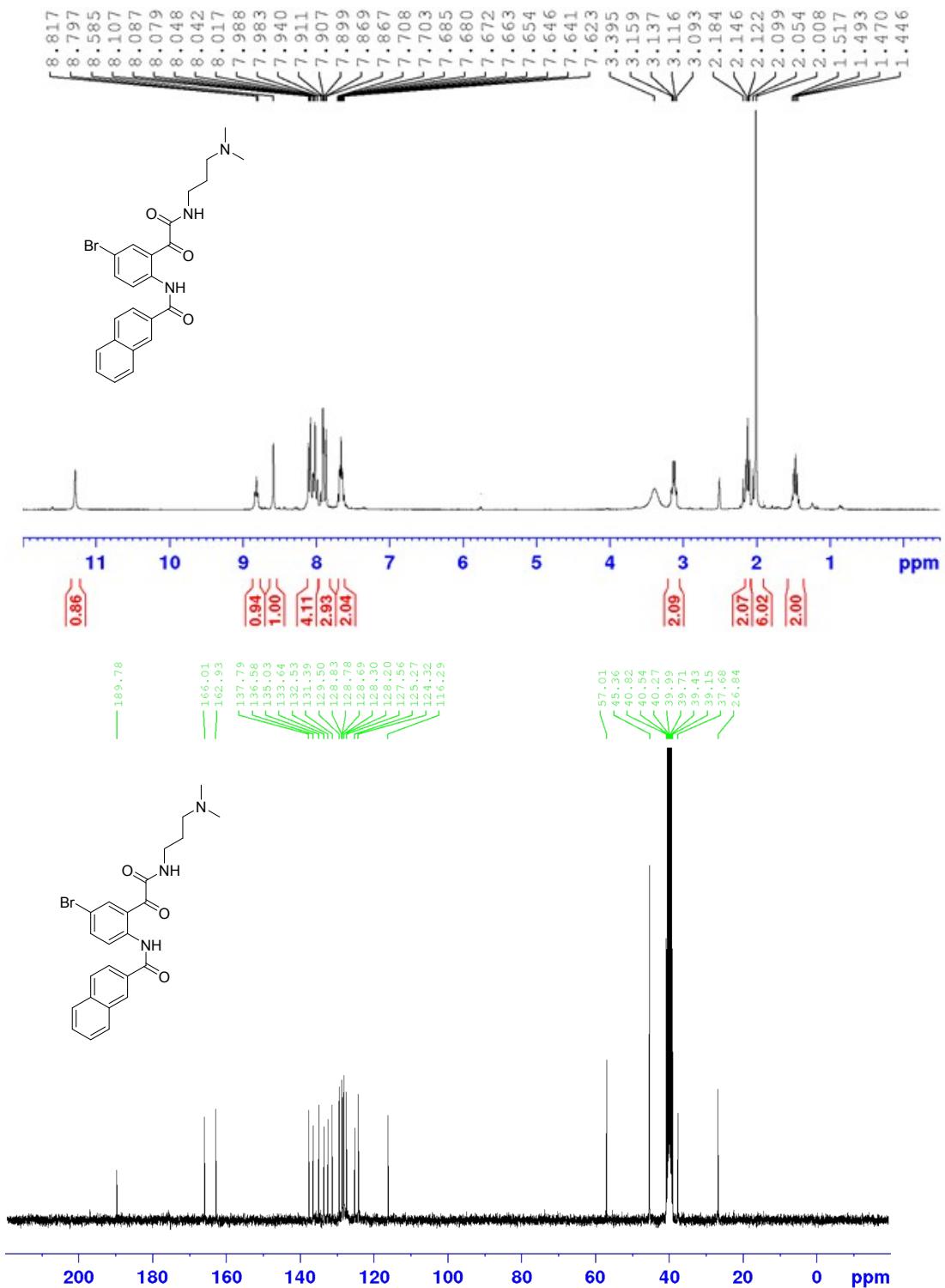
¹HNMR and ¹³CNMR spectra of N-(2-(2-((2-(dimethylamino)ethyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (20a)



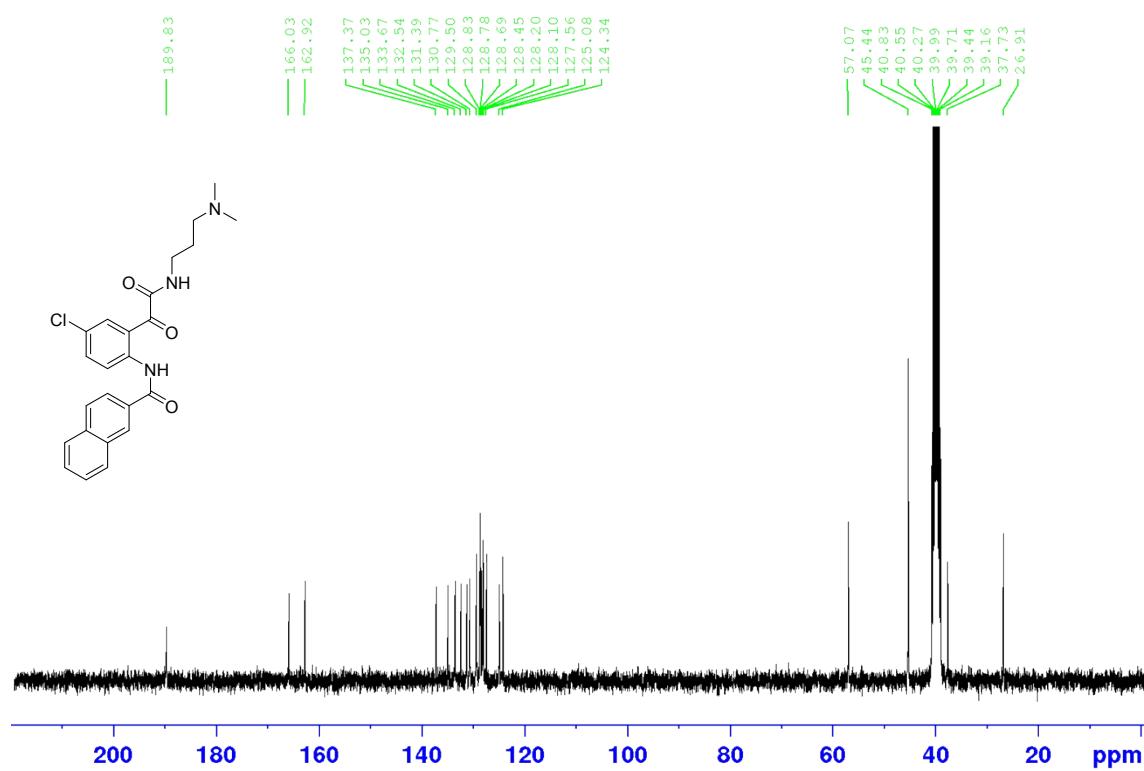
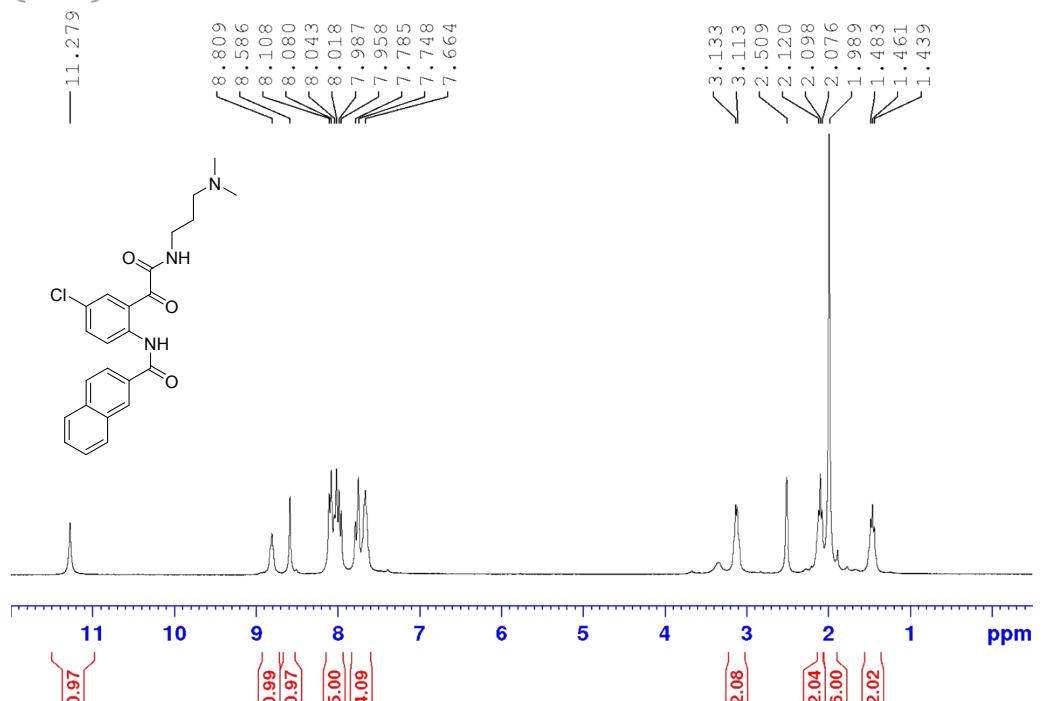
¹H NMR and ¹³C NMR spectra of *N*-(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (21a)



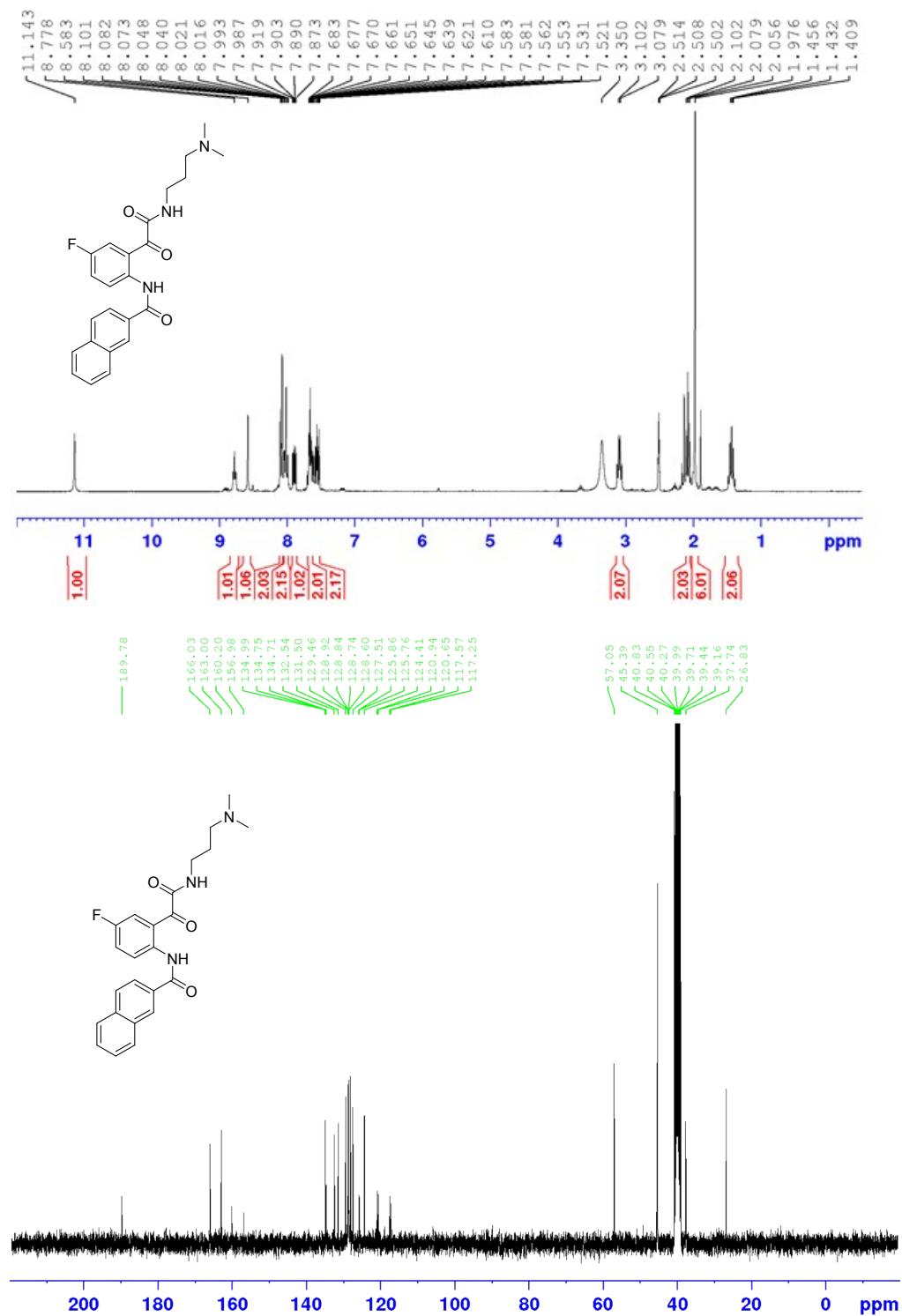
¹H NMR and ¹³C NMR spectra of *N*-(4-bromo-2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (22a)



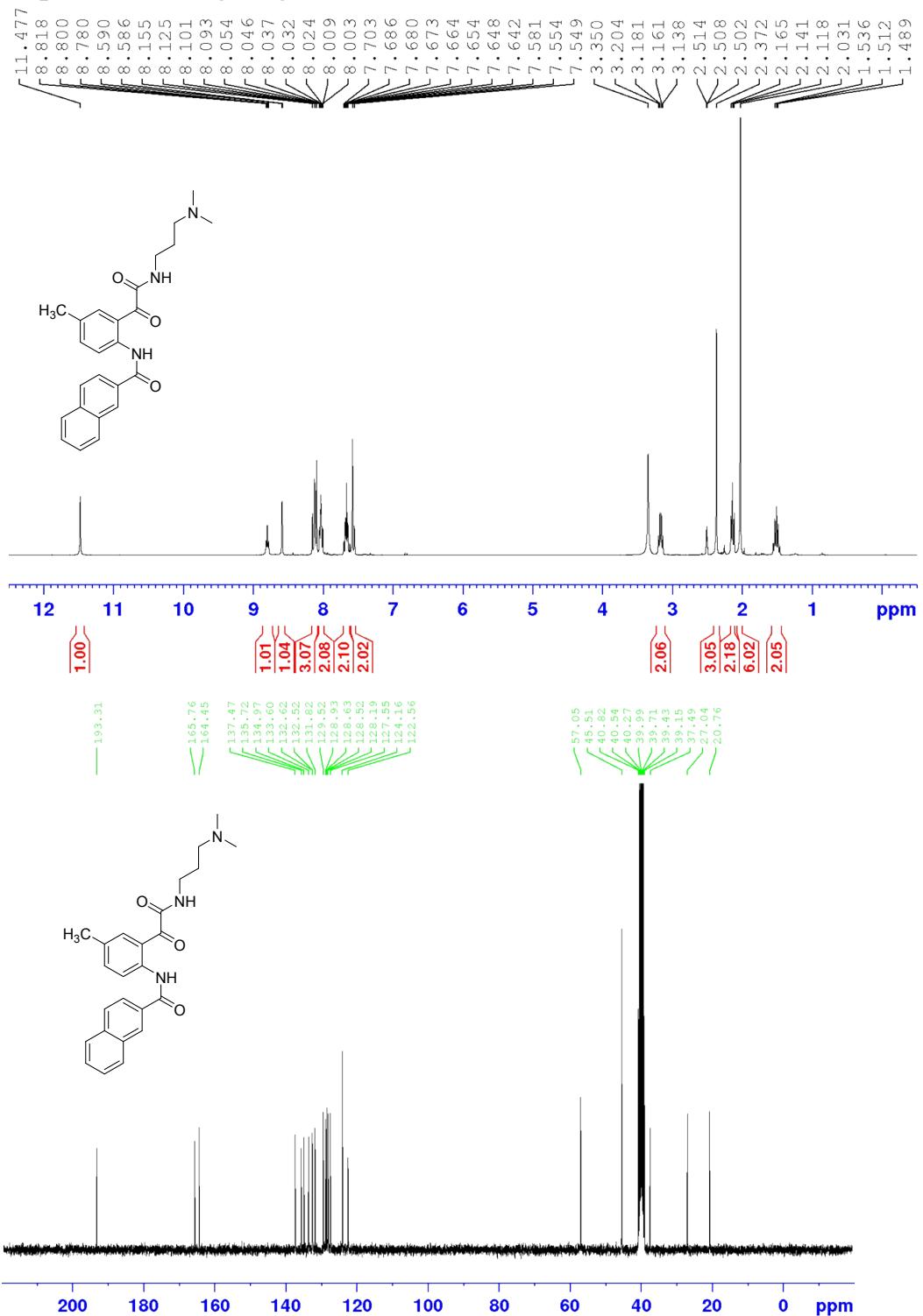
¹H NMR and ¹³C NMR spectra of *N*-(4-chloro-2-((2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)phenyl)-2-naphthamide (23a)



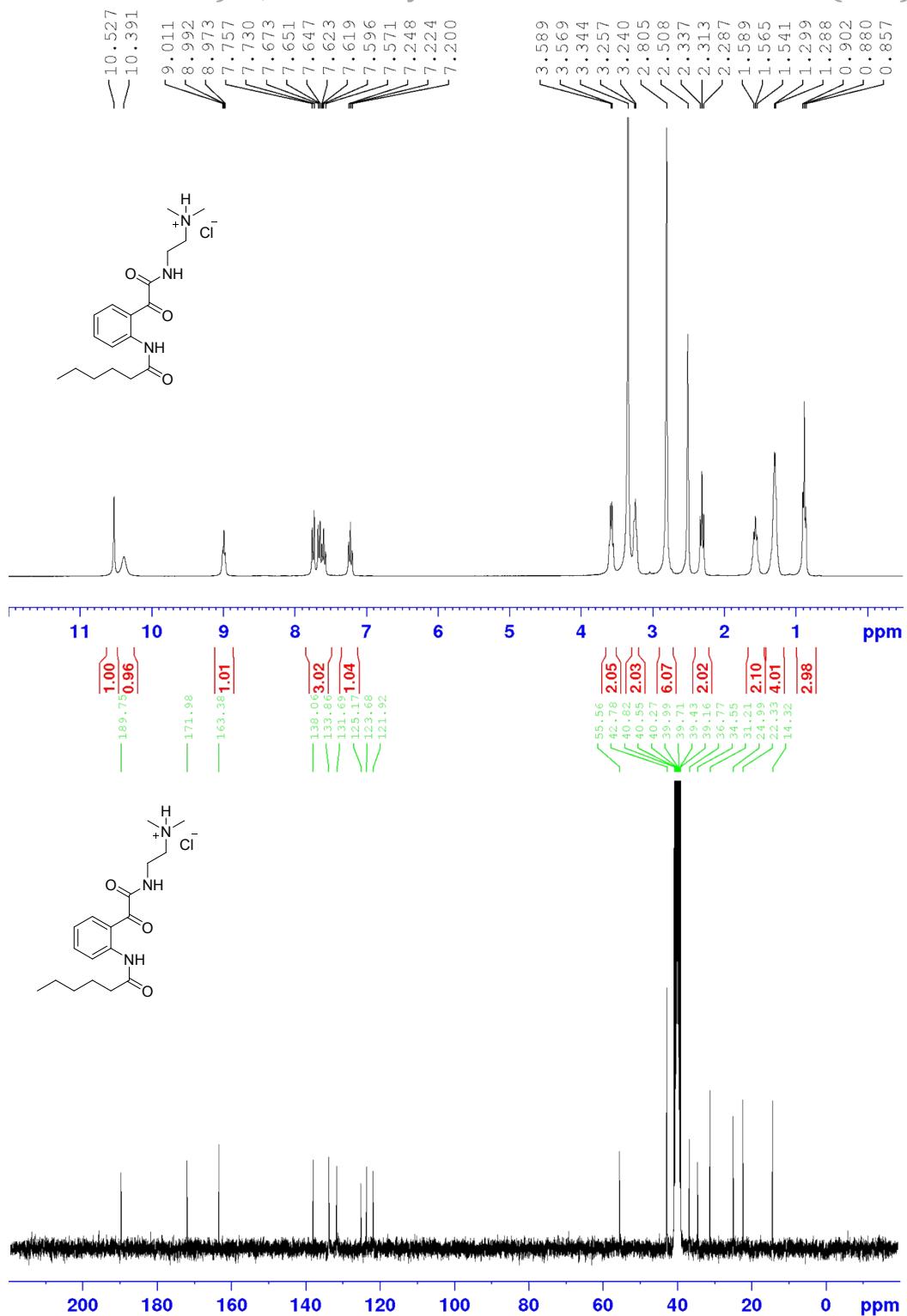
¹H NMR and ¹³C NMR spectra of *N*-(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)-4-fluorophenyl)-2-naphthamide (24a)



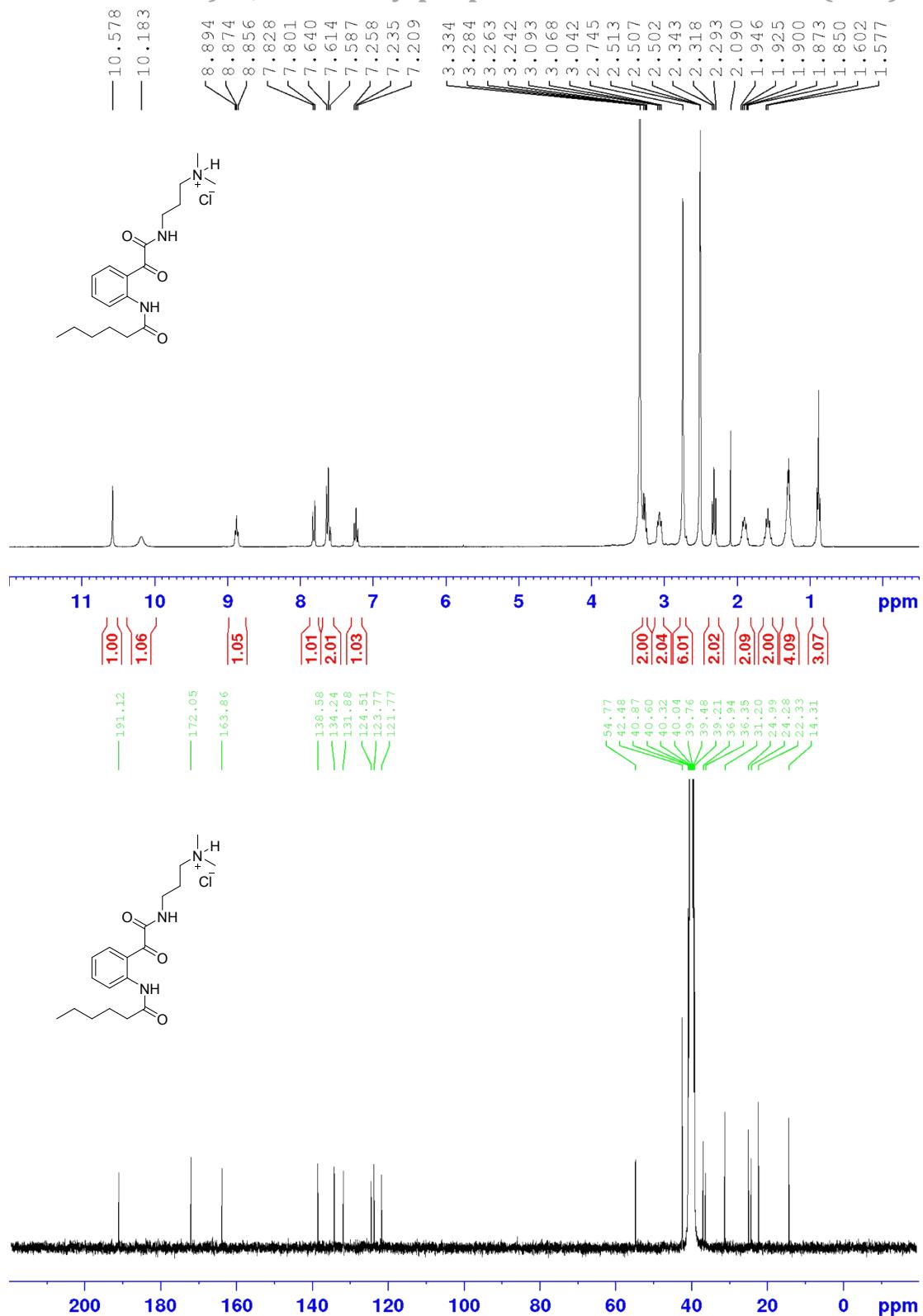
¹H NMR and ¹³C NMR spectra of *N*-(2-(2-((3-(dimethylamino)propyl)amino)-2-oxoacetyl)-4-methylphenyl)-2-naphthamide (25a)



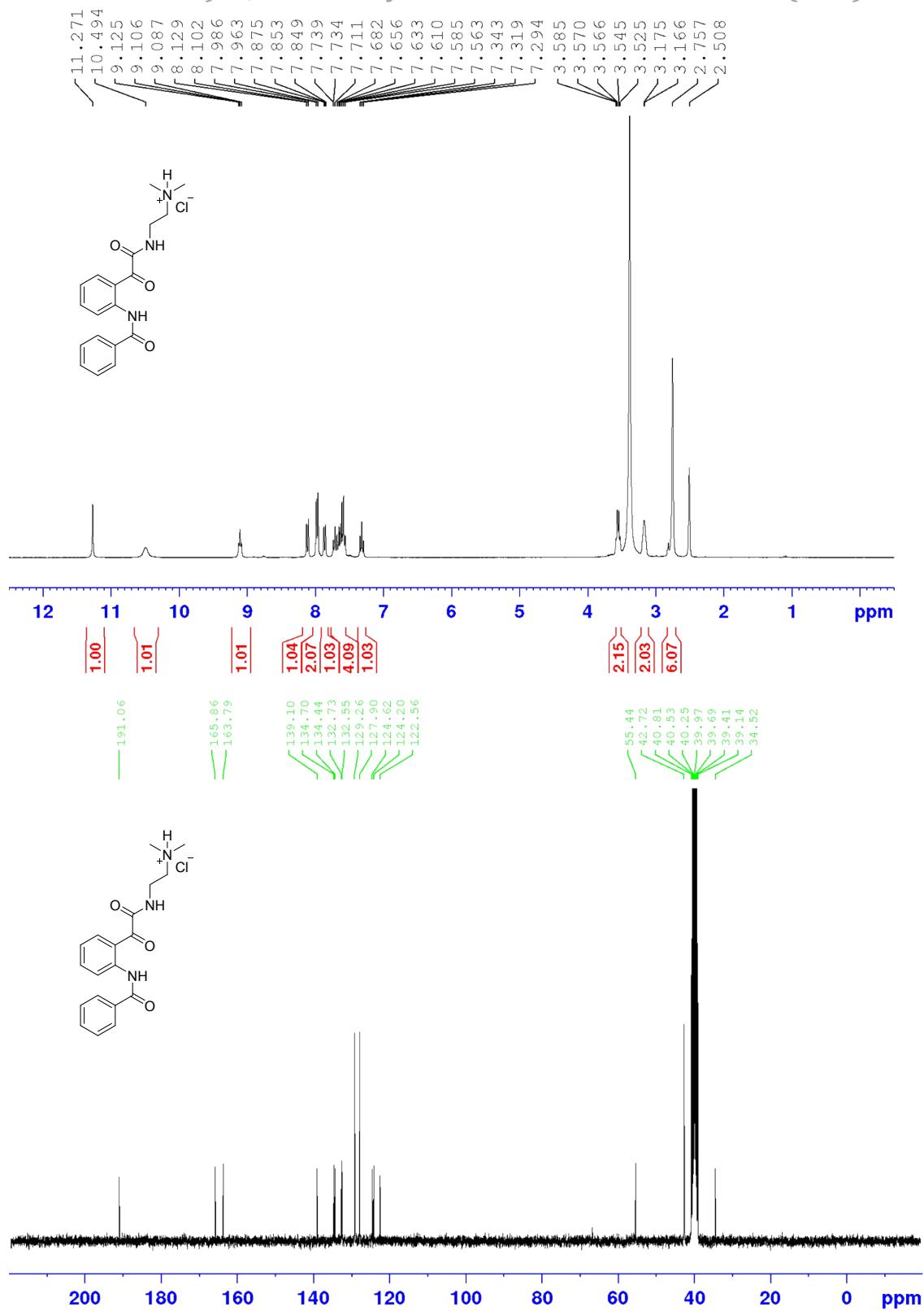
¹HNMR and ¹³CNMR spectra of 2-(2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (16b)



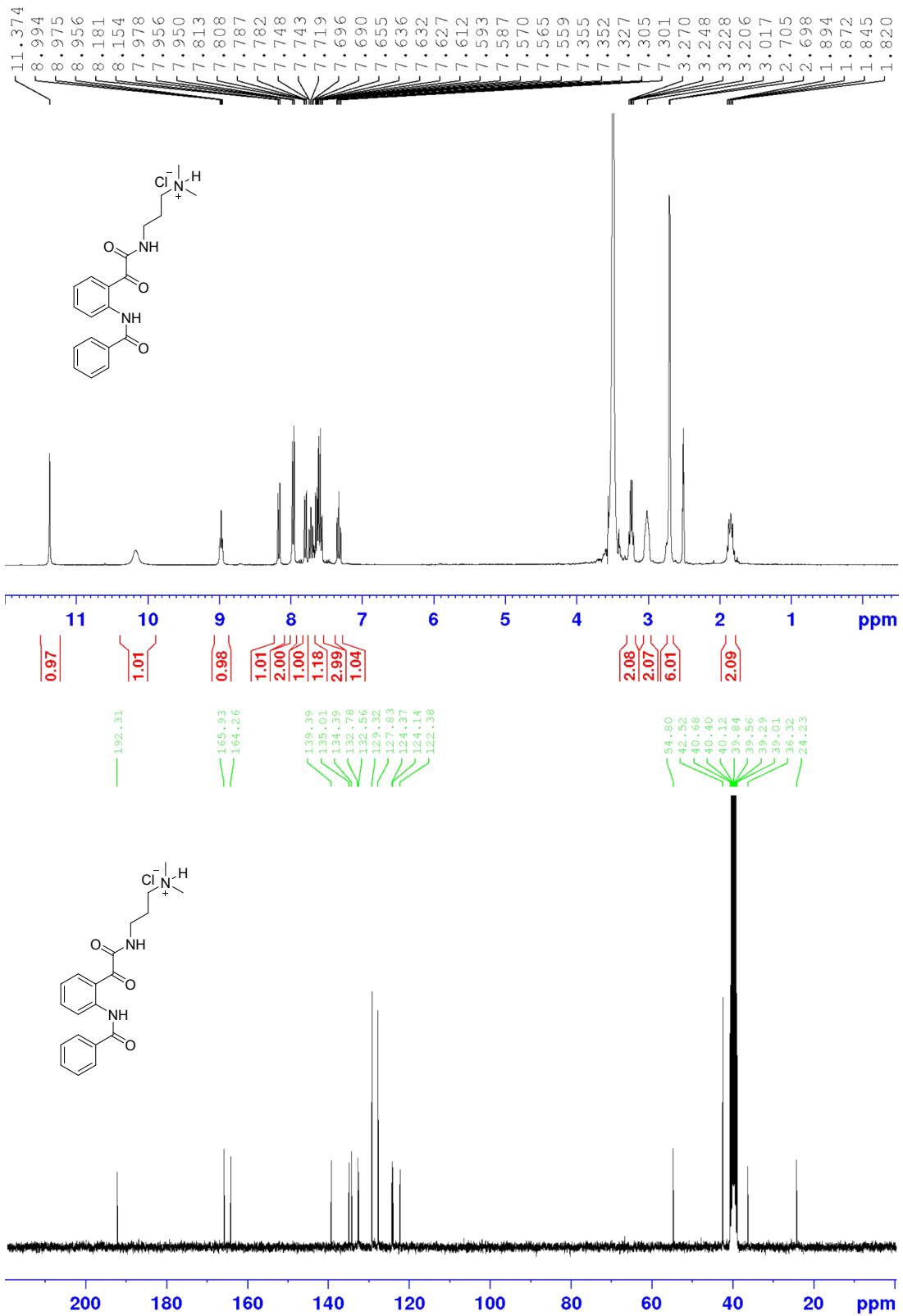
¹H NMR and ¹³C NMR spectra of 3-(2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (17b)



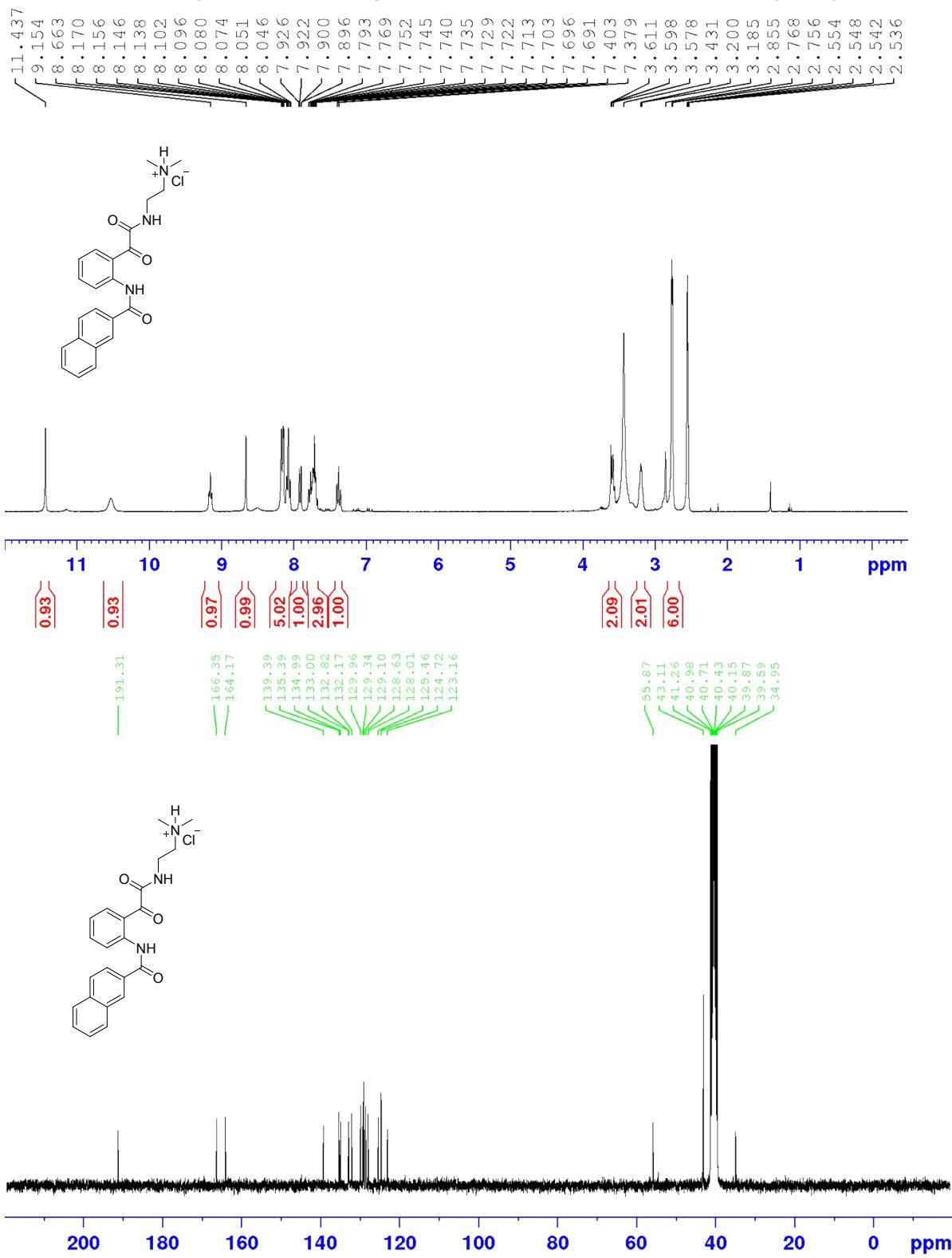
¹H NMR and ¹³C NMR spectra of 2-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (18b)



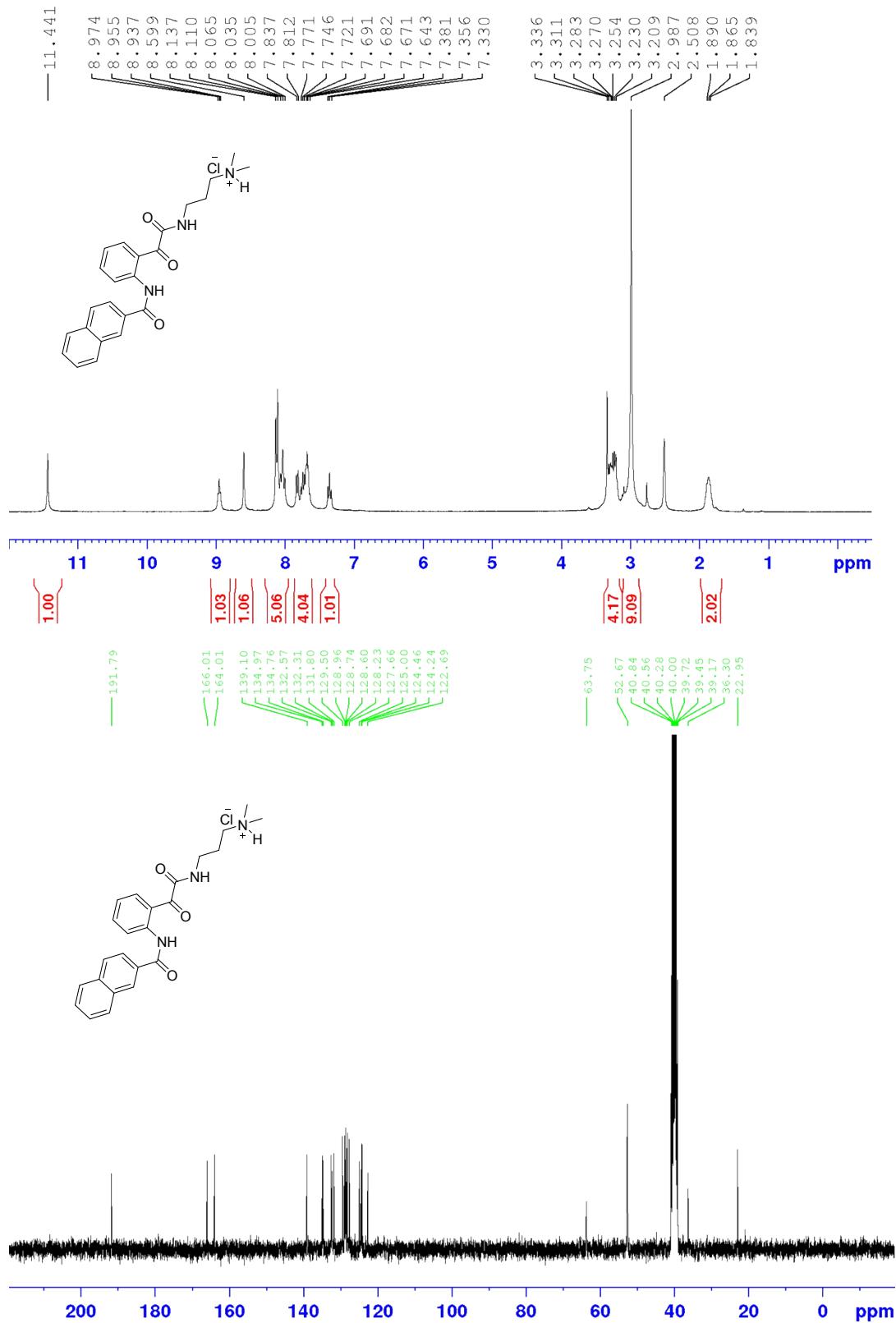
¹HNMR and ¹³CNMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium chloride (19b)



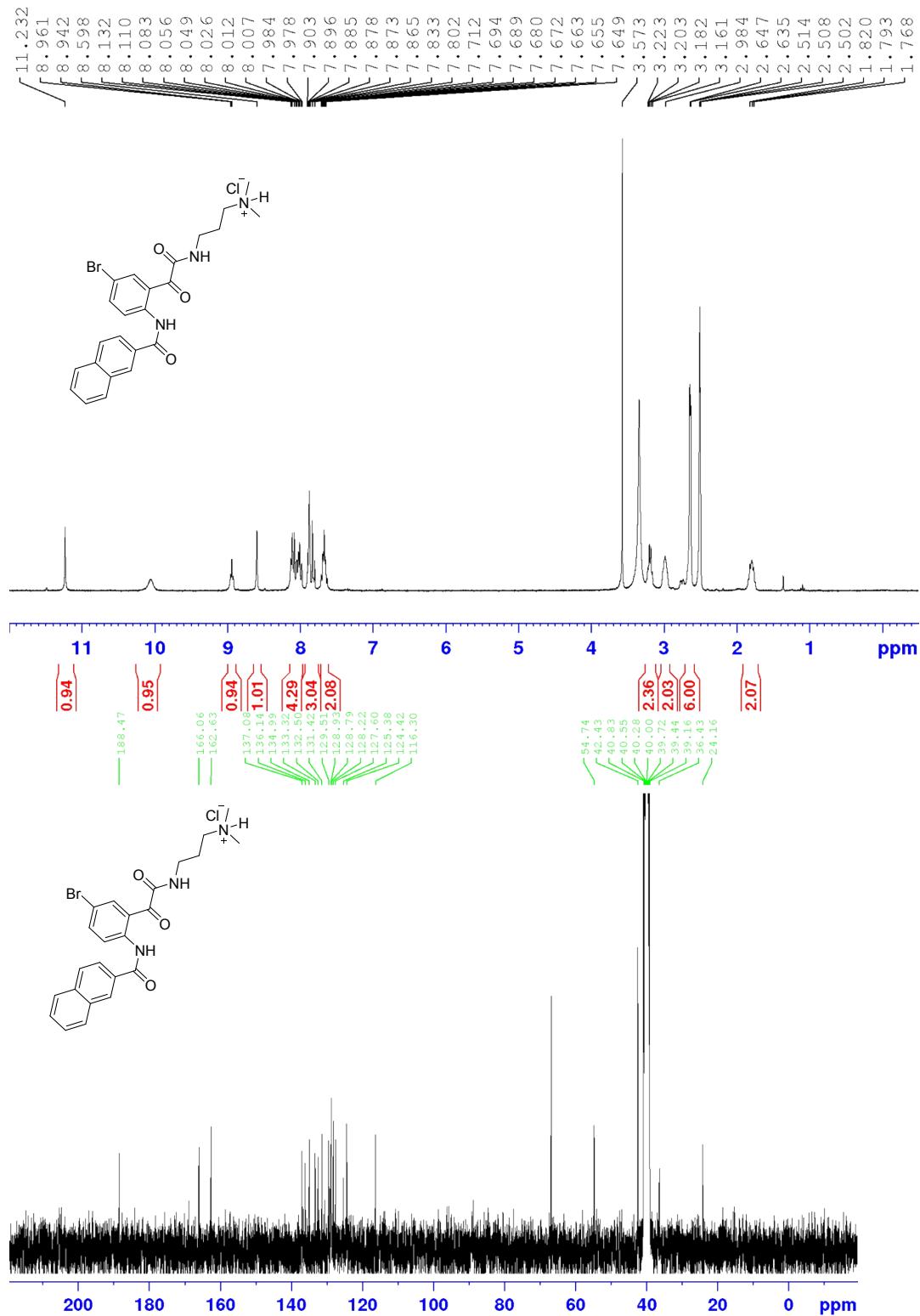
¹HNMR and ¹³CNMR spectra of 2-(2-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N-dimethylethan-1-aminium chloride (20b)



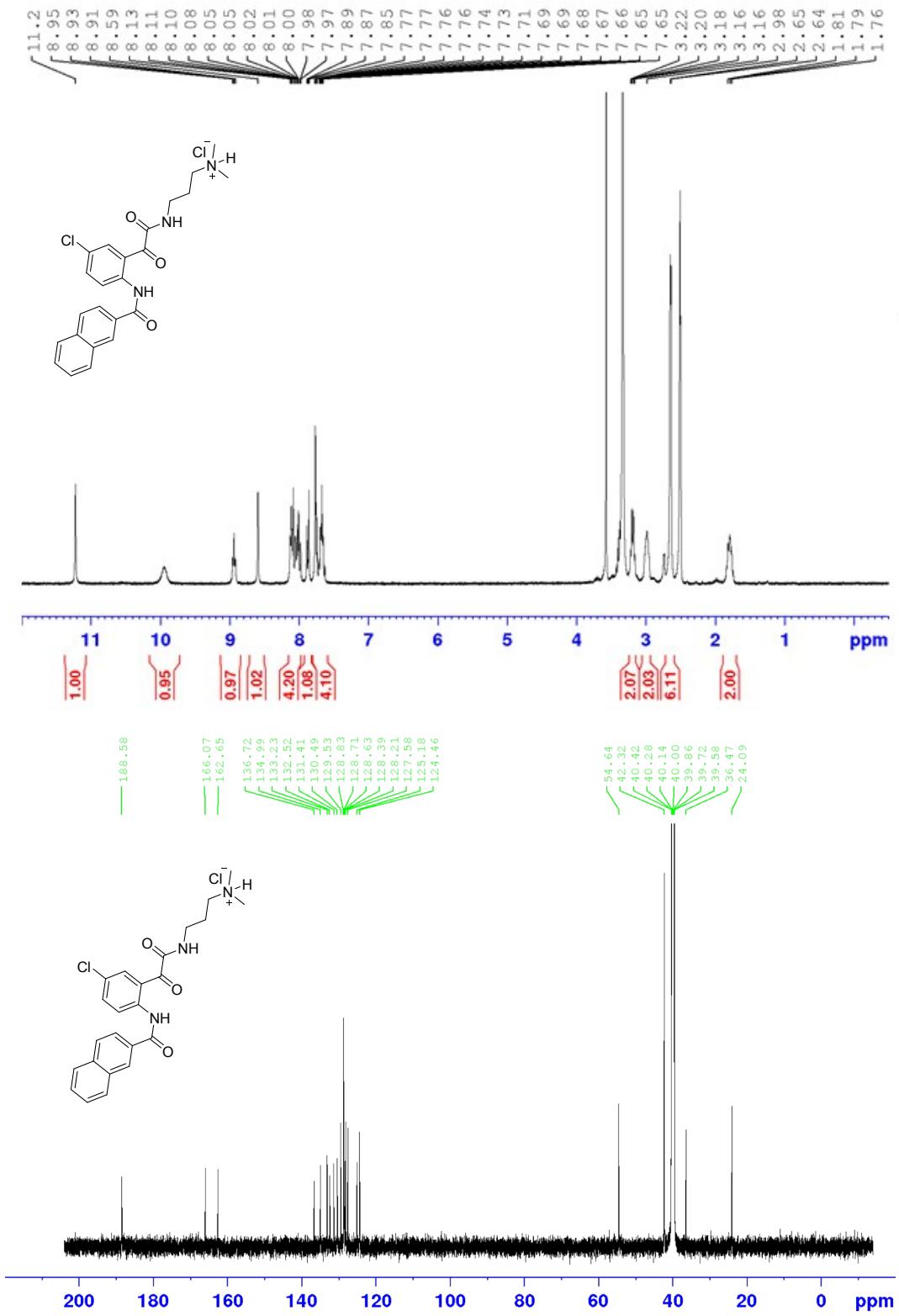
¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (21b)



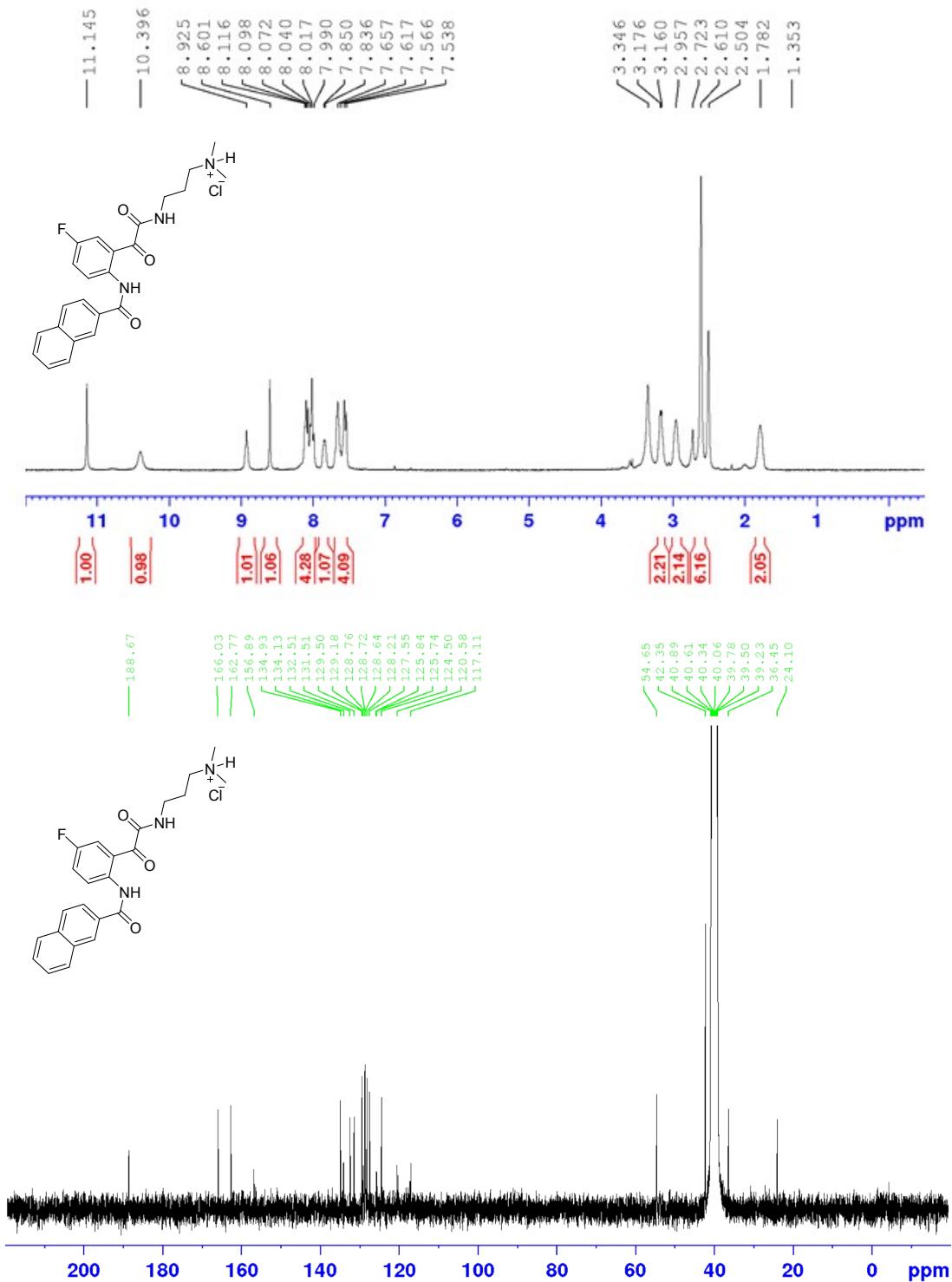
¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)-5-bromophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (22b)



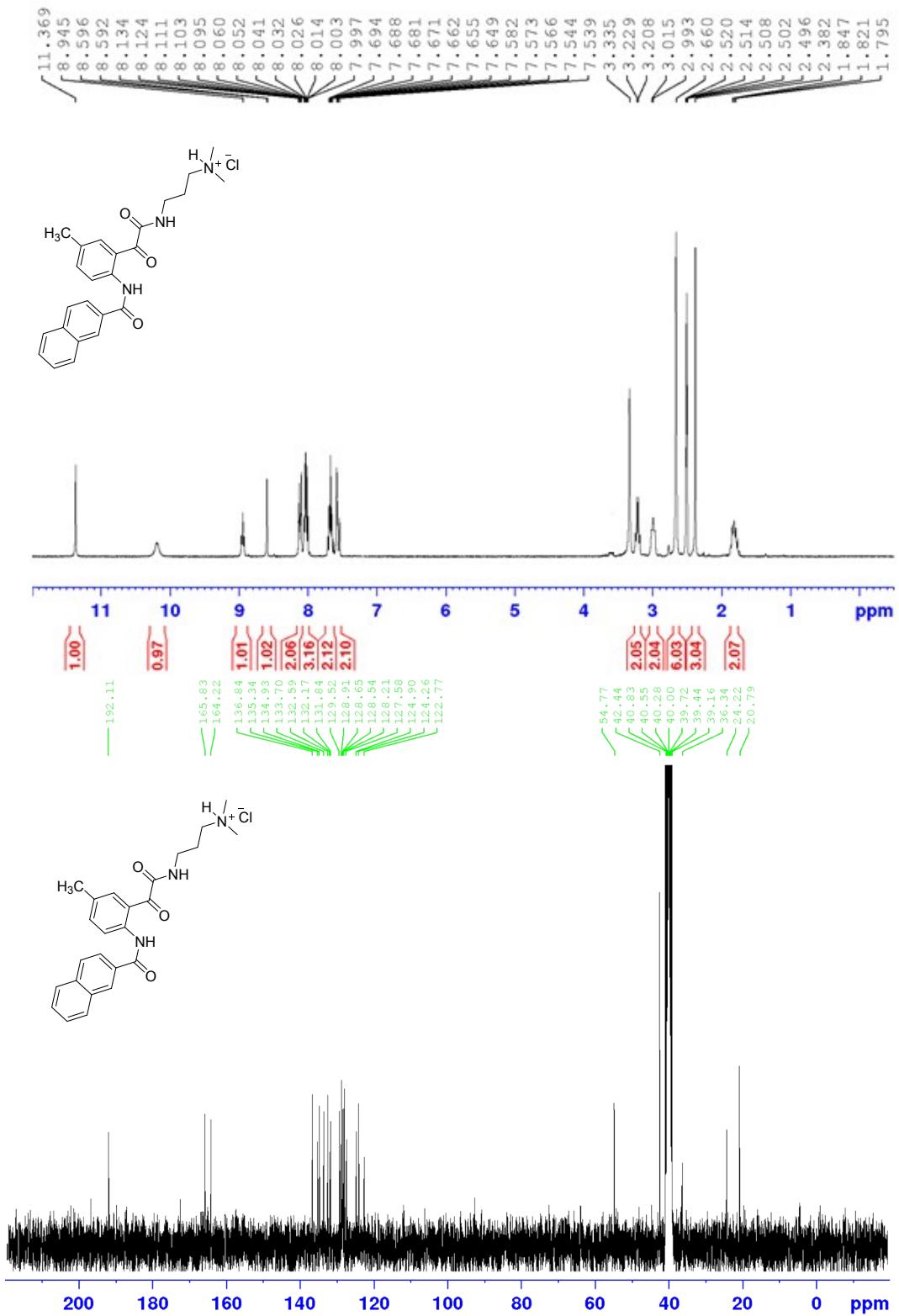
¹HNMR and ¹³CNMR spectra of 3-(2-(2-(2-naphthamido)-5-chlorophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (23b)



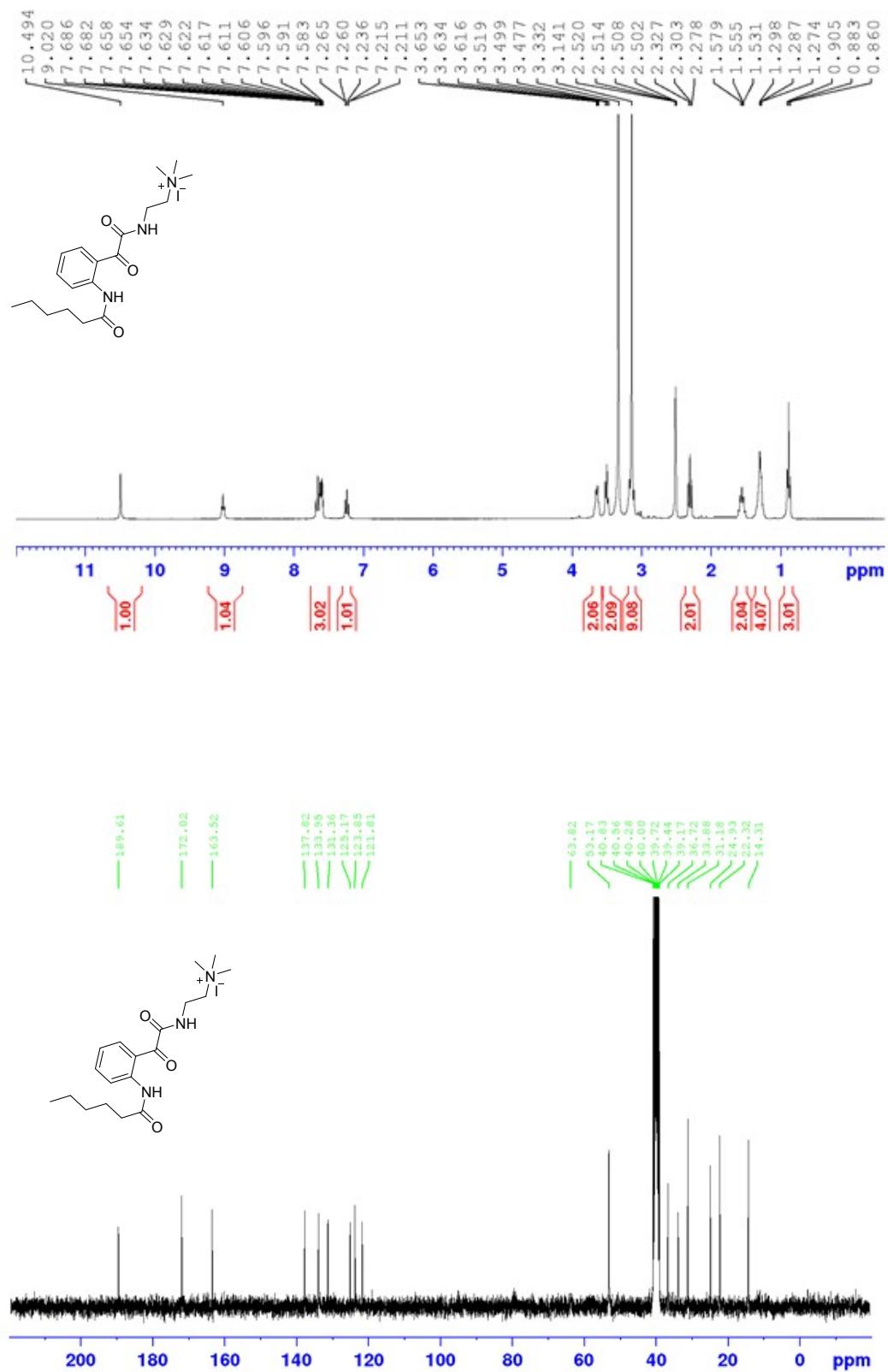
¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)-5-fluorophenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (24b)



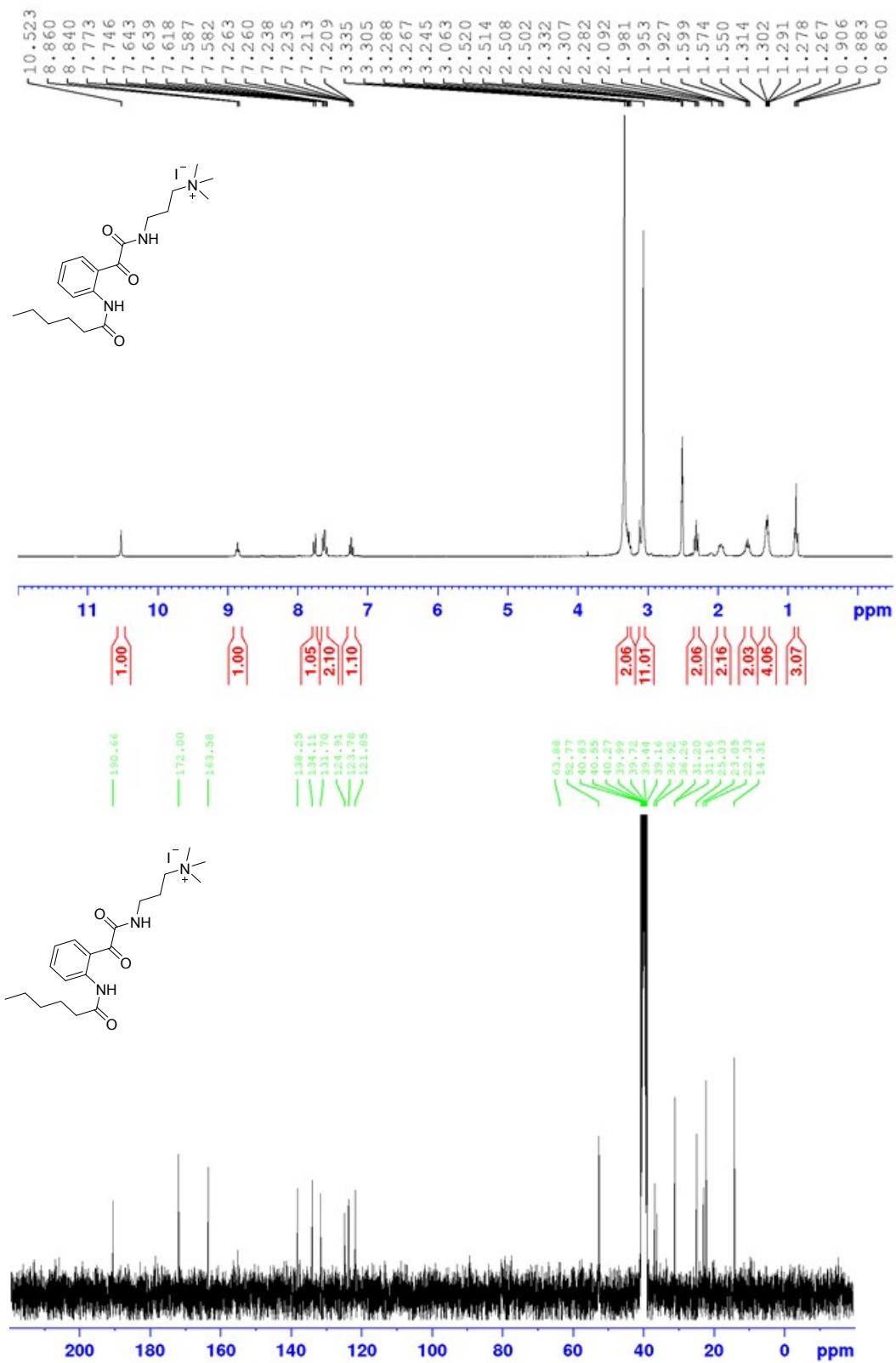
¹HNMR and ¹³CNMR spectra of 3-(2-(2-(2-naphthamido)-5-methylphenyl)-2-oxoacetamido)-N,N-dimethylpropan-1-aminium chloride (25b)



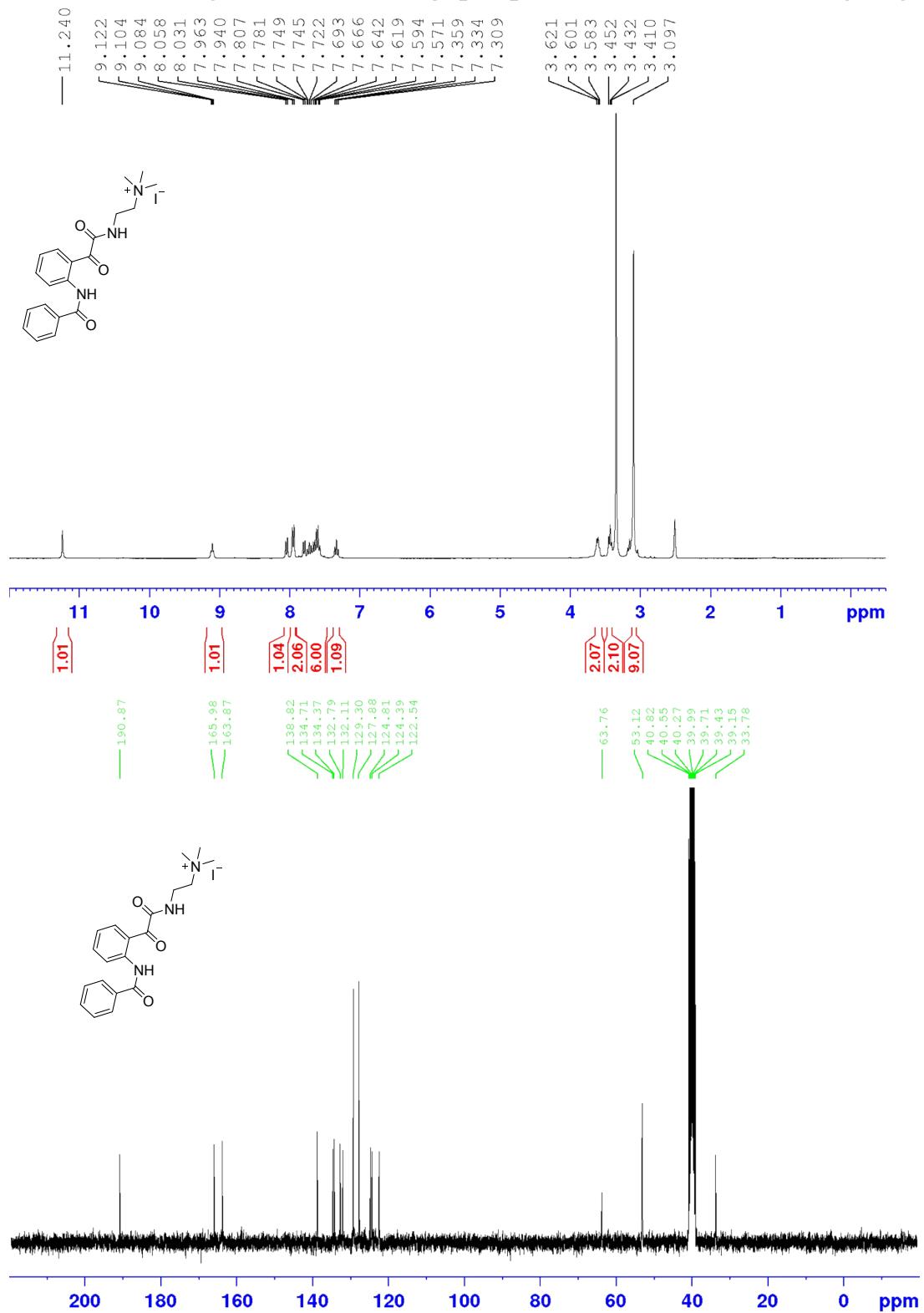
¹H NMR and ¹³C NMR spectra of 2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N,N-trimethylethan-1-aminium iodide (**16c**)



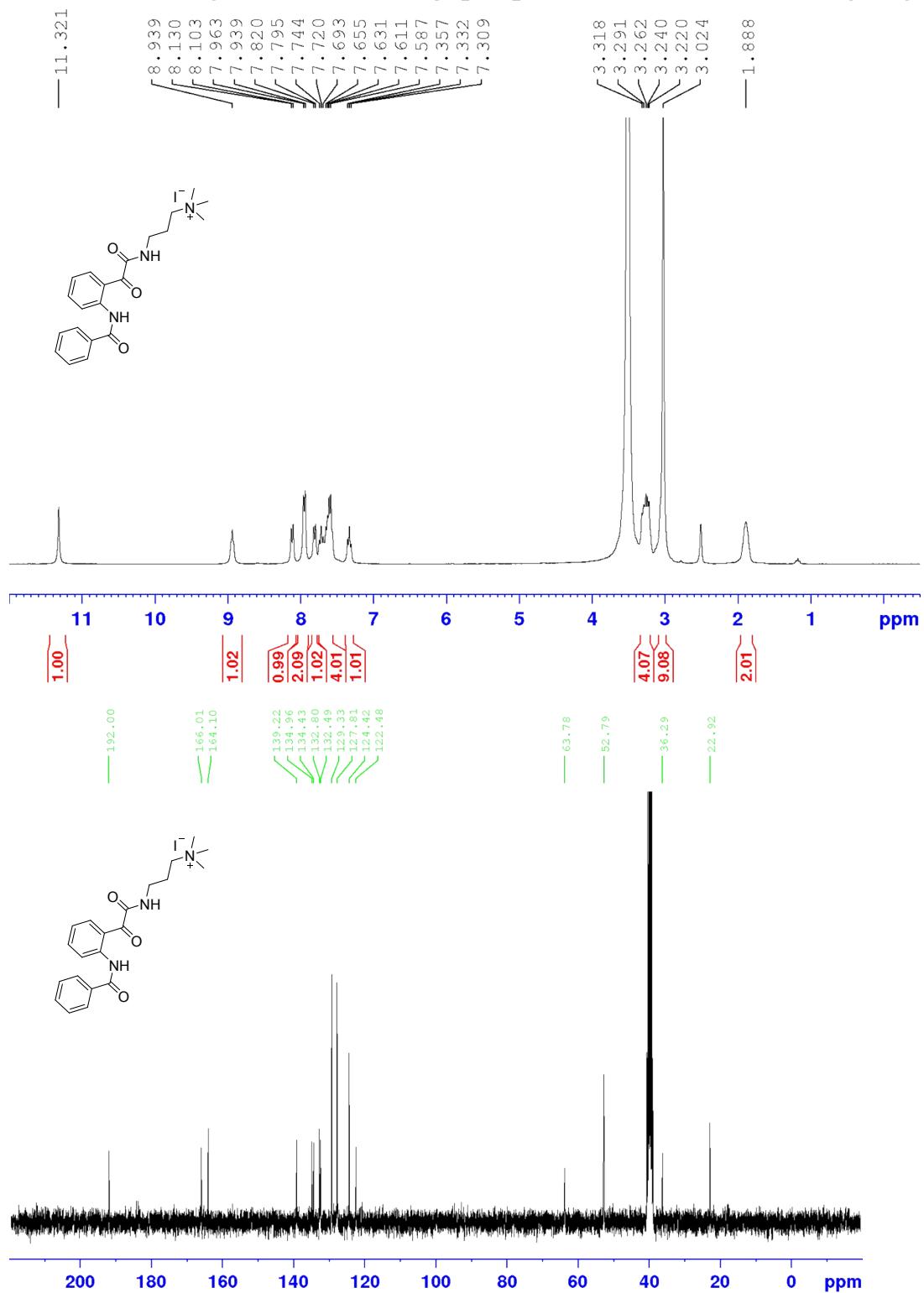
¹HNMR and ¹³CNMR spectra of 3-(2-(2-hexanamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (**17c**)



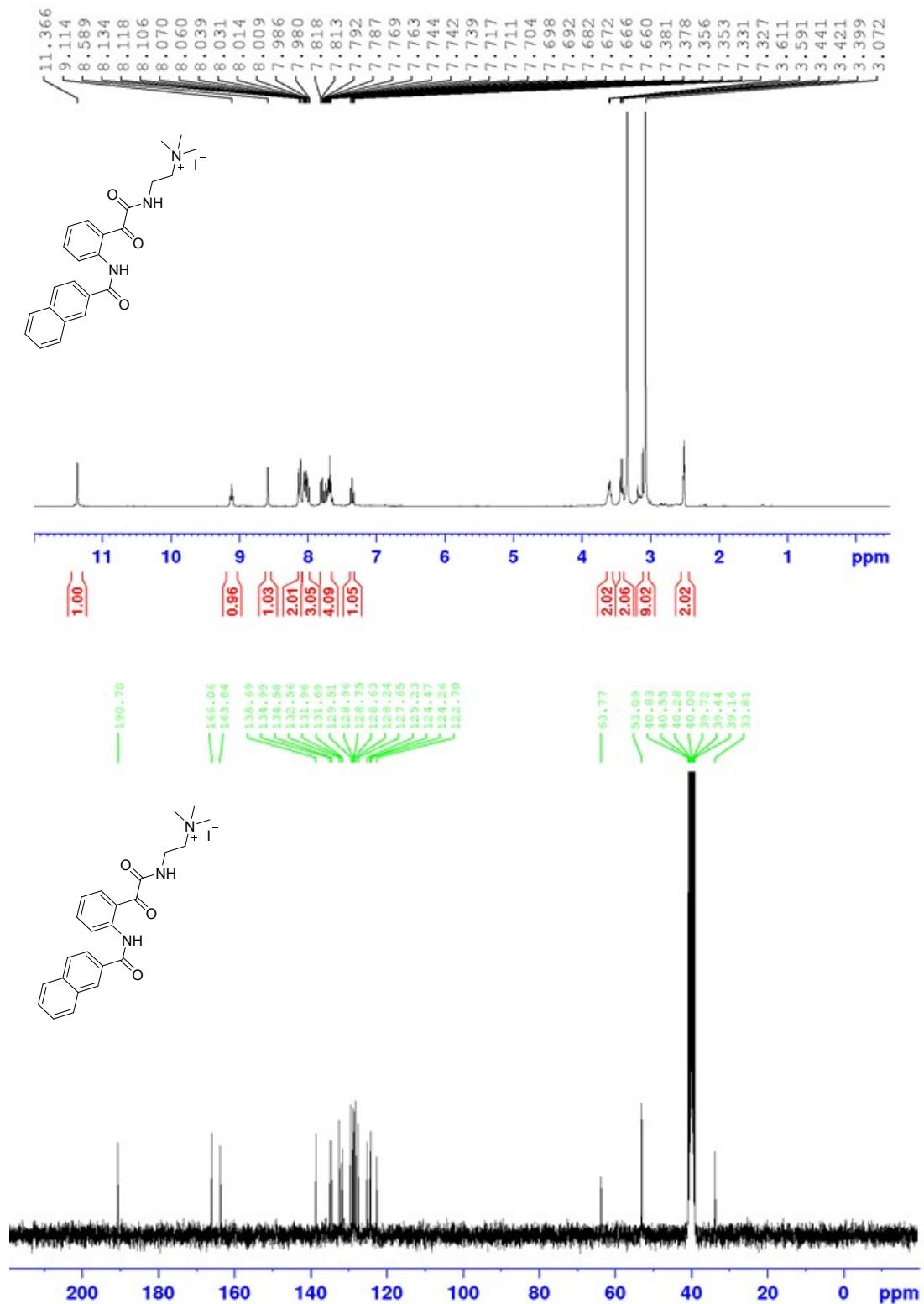
¹H NMR and ¹³C NMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (18c)



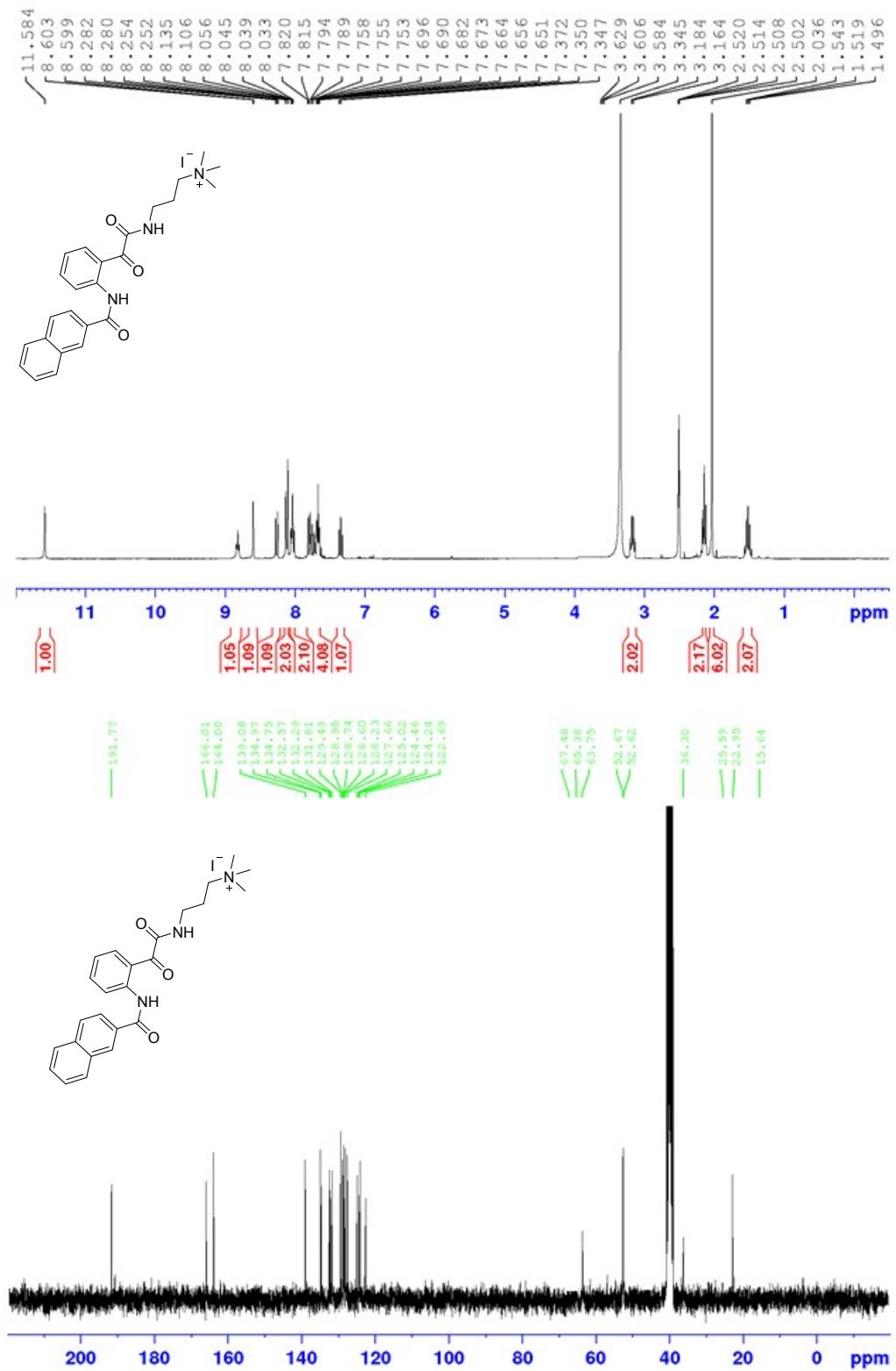
¹H NMR and ¹³C NMR spectra of 3-(2-(2-benzamidophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (19c)



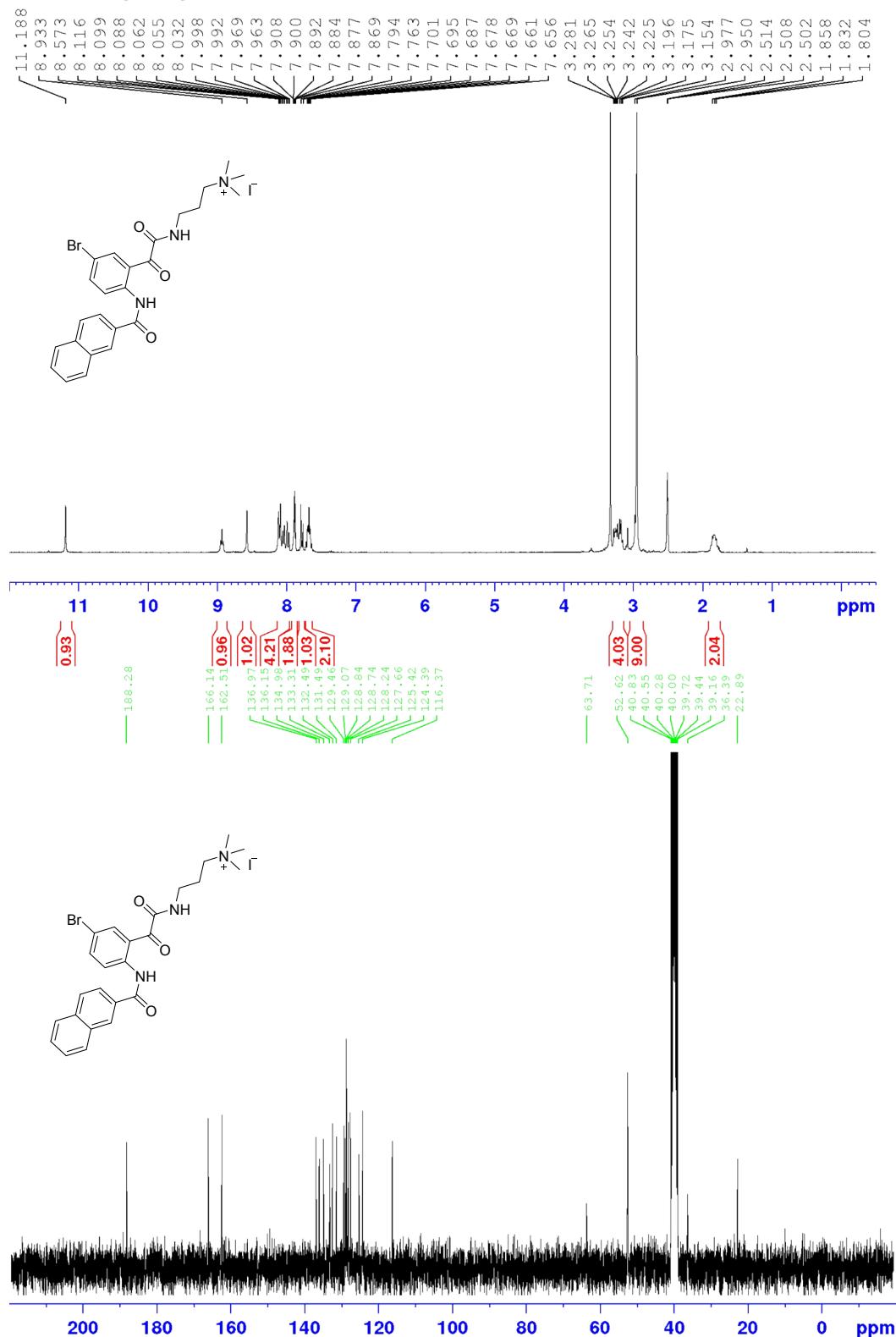
¹H NMR and ¹³C NMR spectra of 2-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N,N-trimethylethan-1-aminium iodide (20c)



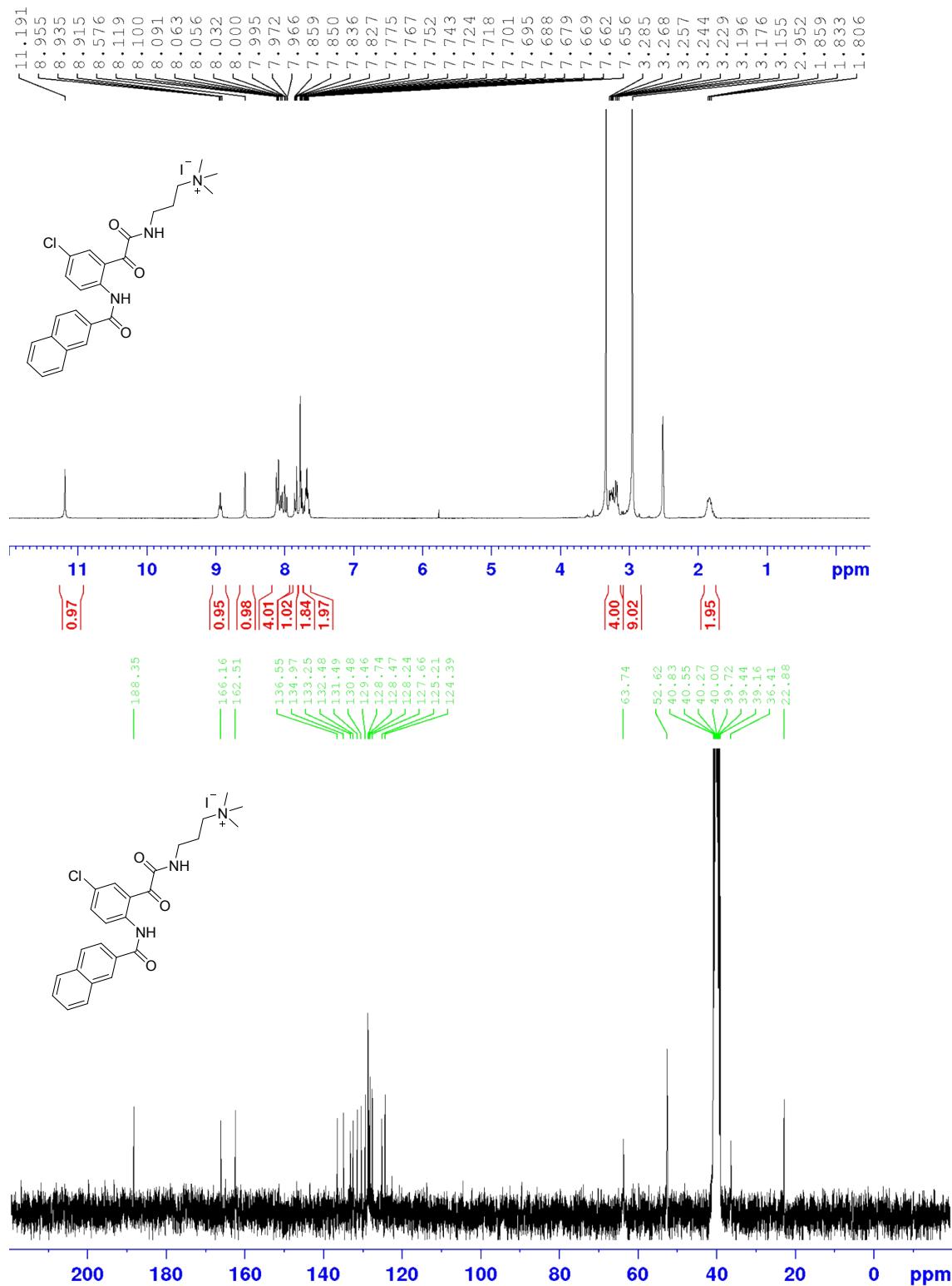
¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)phenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (21c)



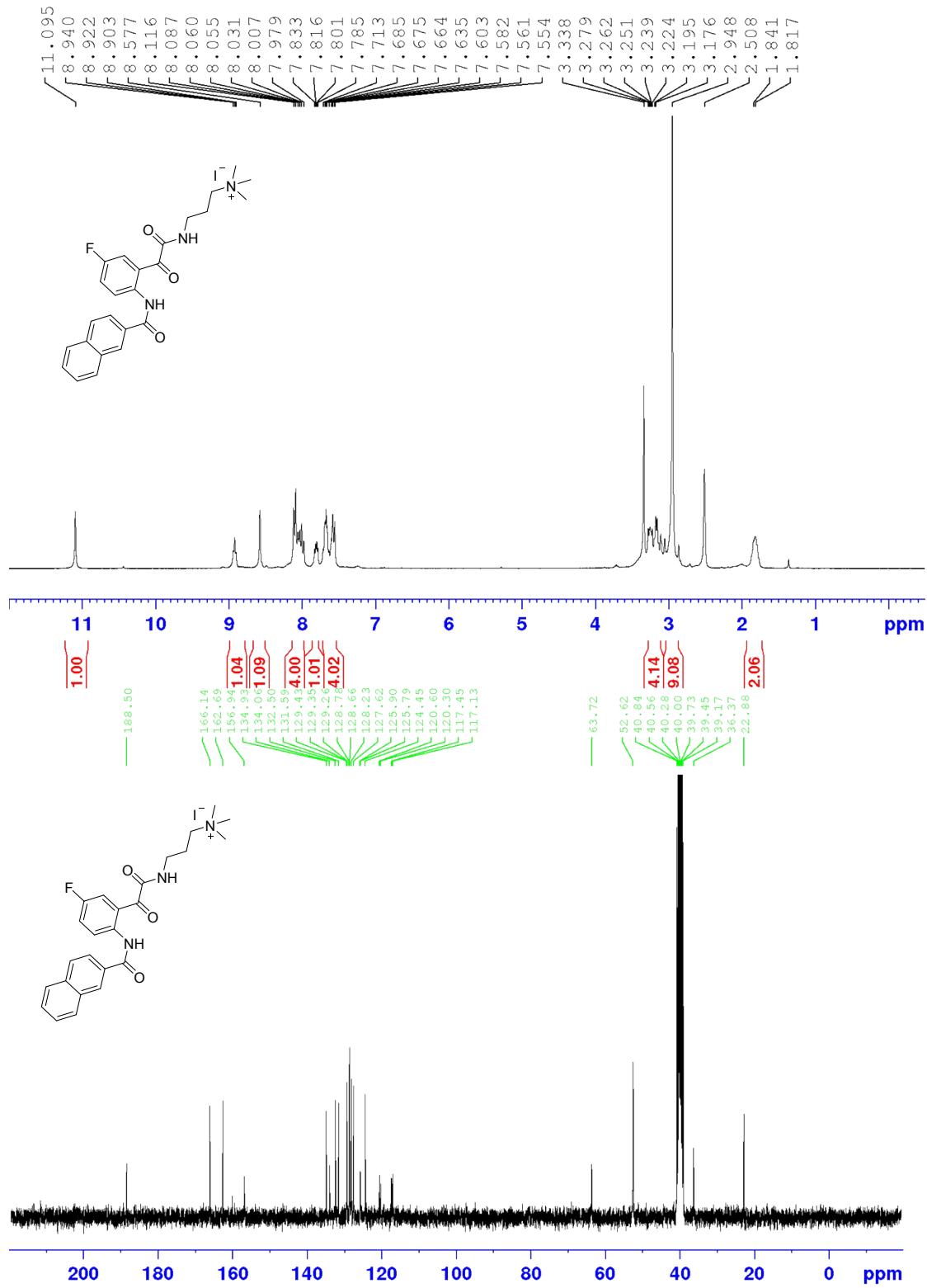
¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)-5-bromophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (22c)



¹HNMR and ¹³CNMR spectra of 3-(2-(2-naphthamido)-5-chlorophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide iodide (23c)



¹H NMR and ¹³C NMR spectra of 3-(2-(2-(2-naphthamido)-5-fluorophenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (24c)



¹H NMR and ¹³C NMR spectra of 3-(2-(2-naphthamido)-5-methylphenyl)-2-oxoacetamido)-N,N,N-trimethylpropan-1-aminium iodide (25c)

