

# **Supplementary information**

## Synthetic optimization of cystobactamid analogs as antibiotics

Von der Naturwissenschaftlichen Fakultät der  
Gottfried Wilhelm Leibniz Universität Hannover

zur Erlangung des Grades

Doktor der Naturwissenschaften (Dr. rer. nat.)

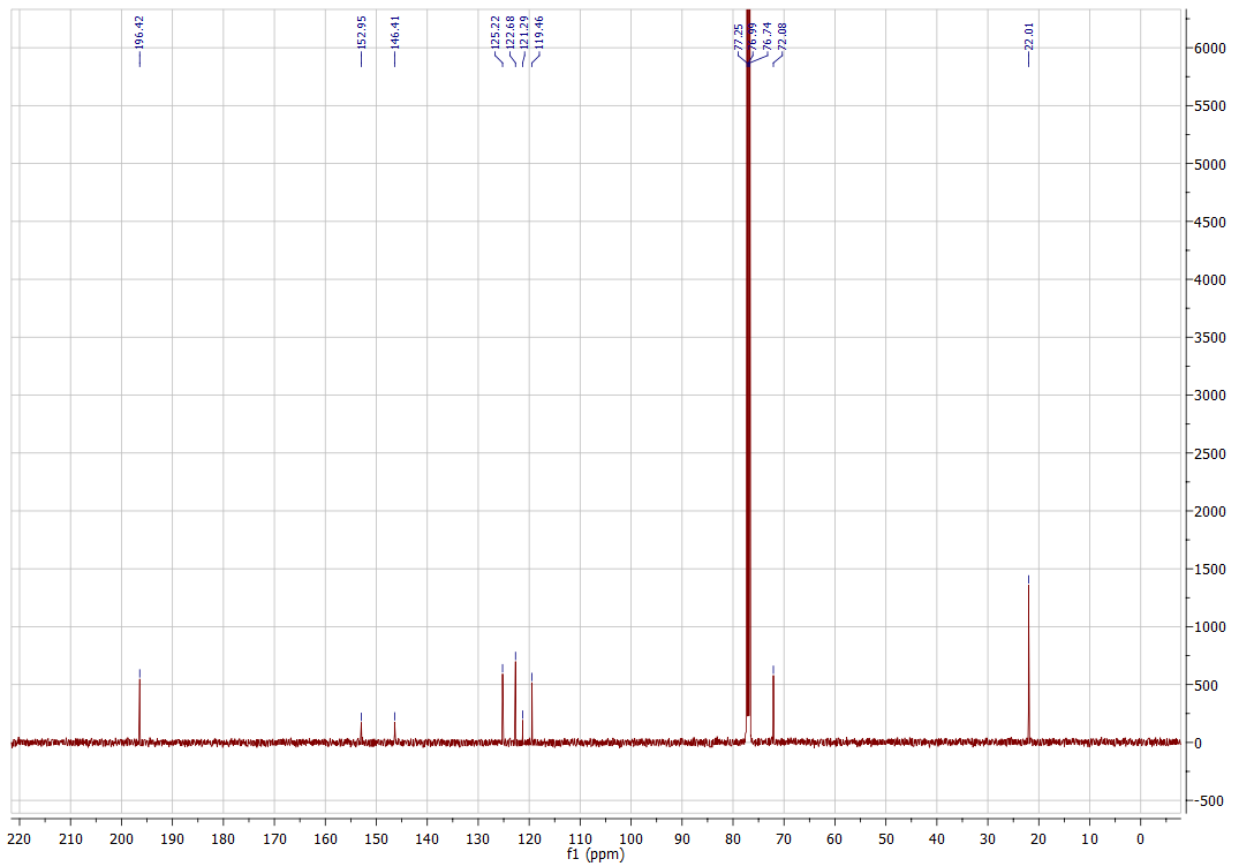
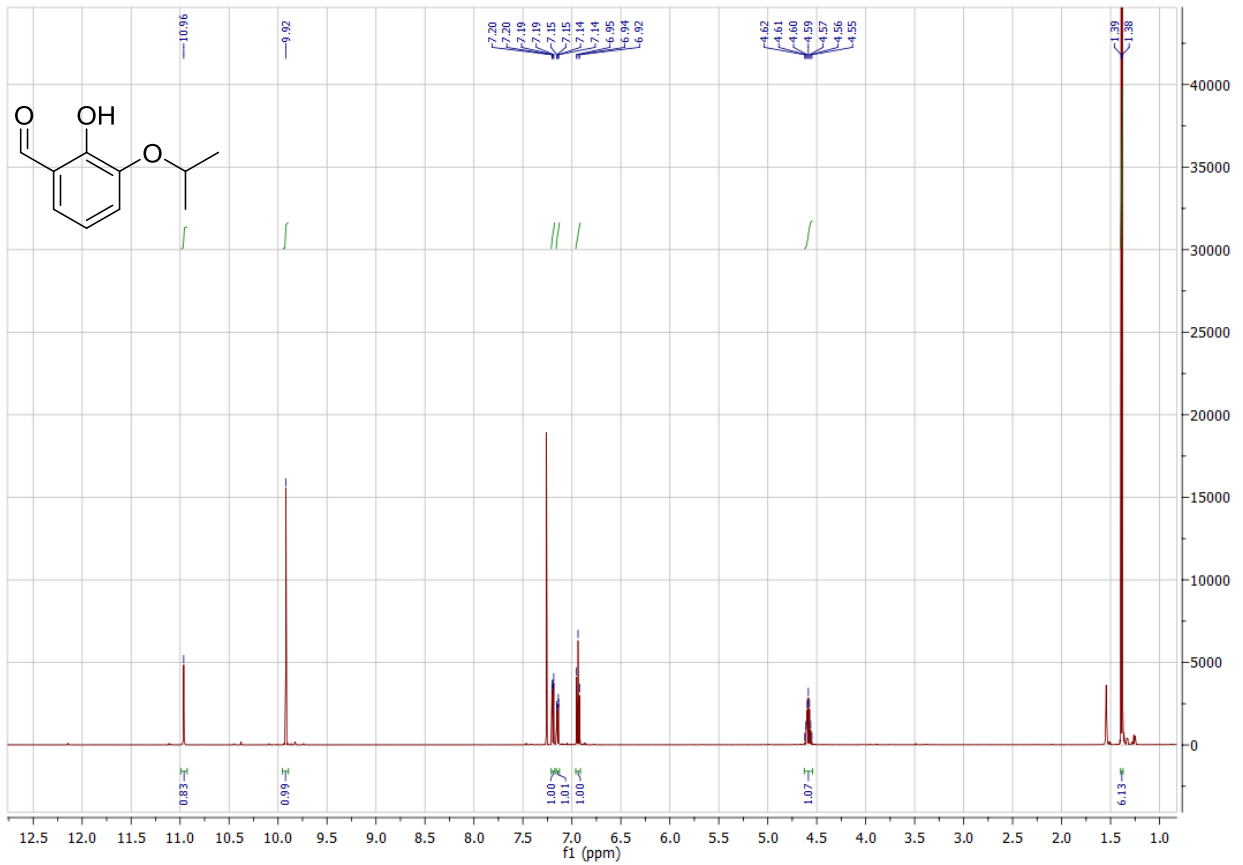
genehmigte Dissertation

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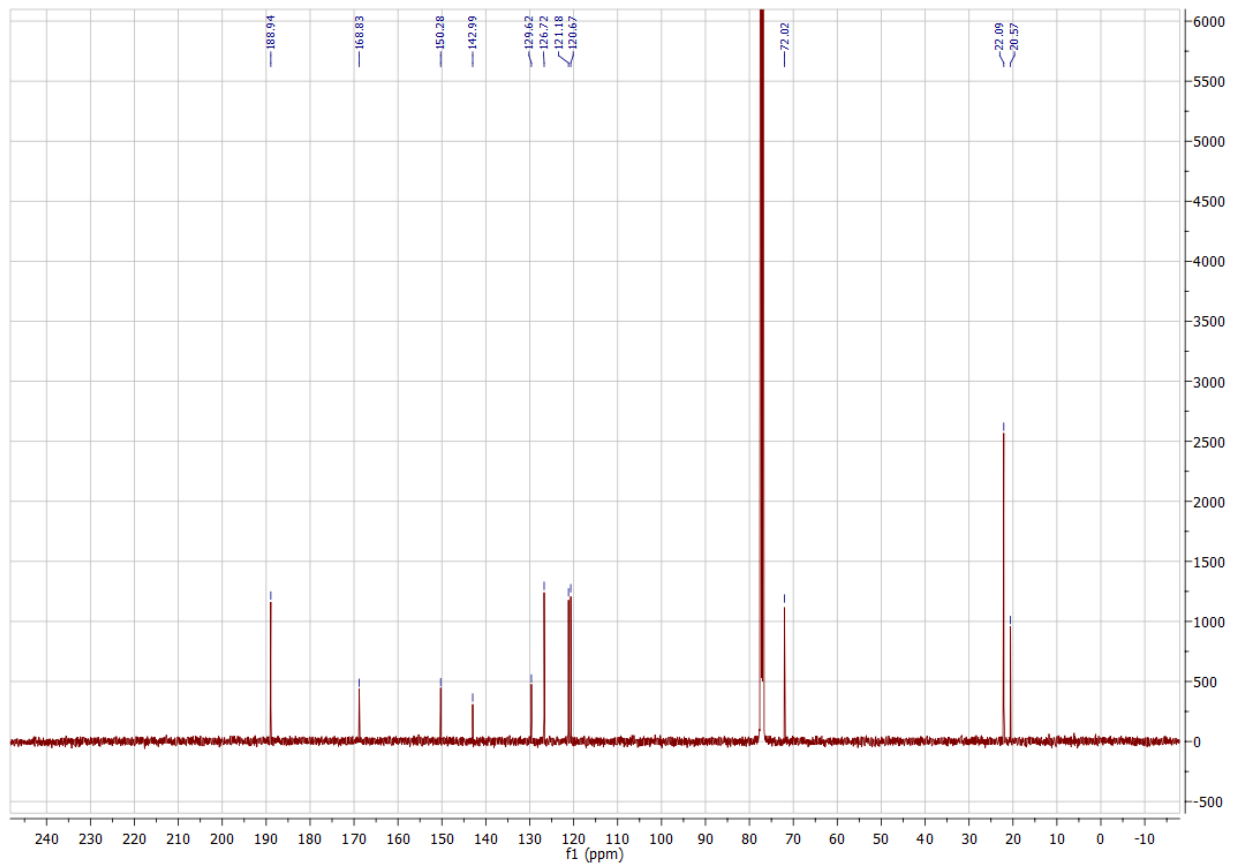
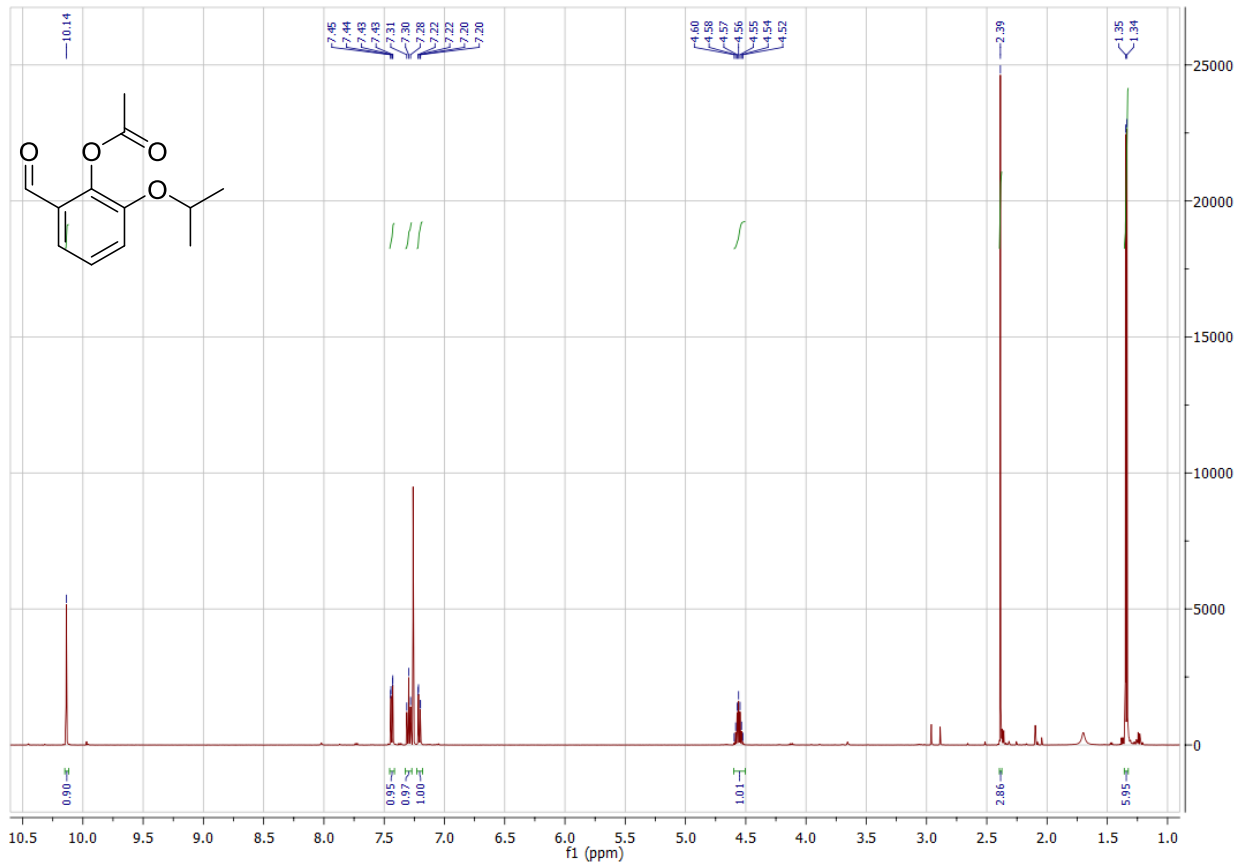
Daniel Kohnhäuser

2021

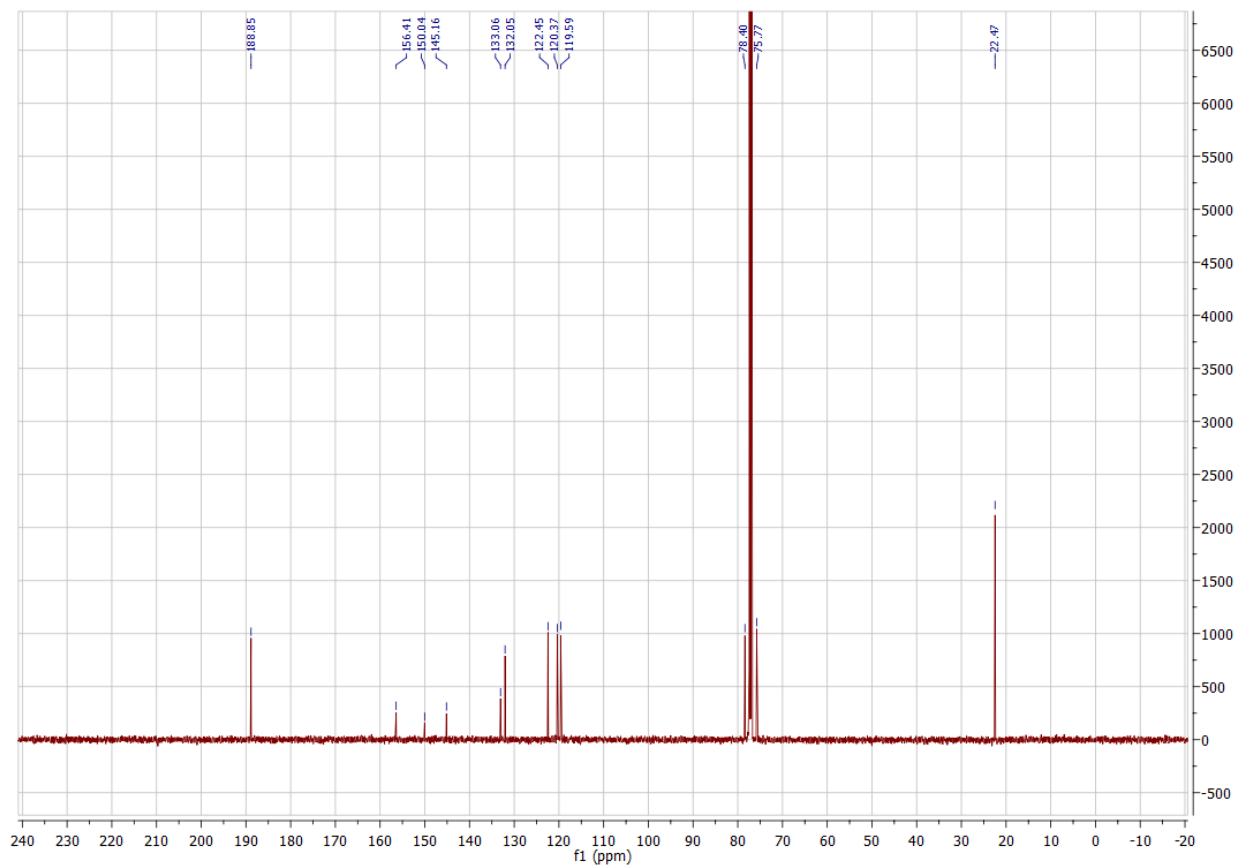
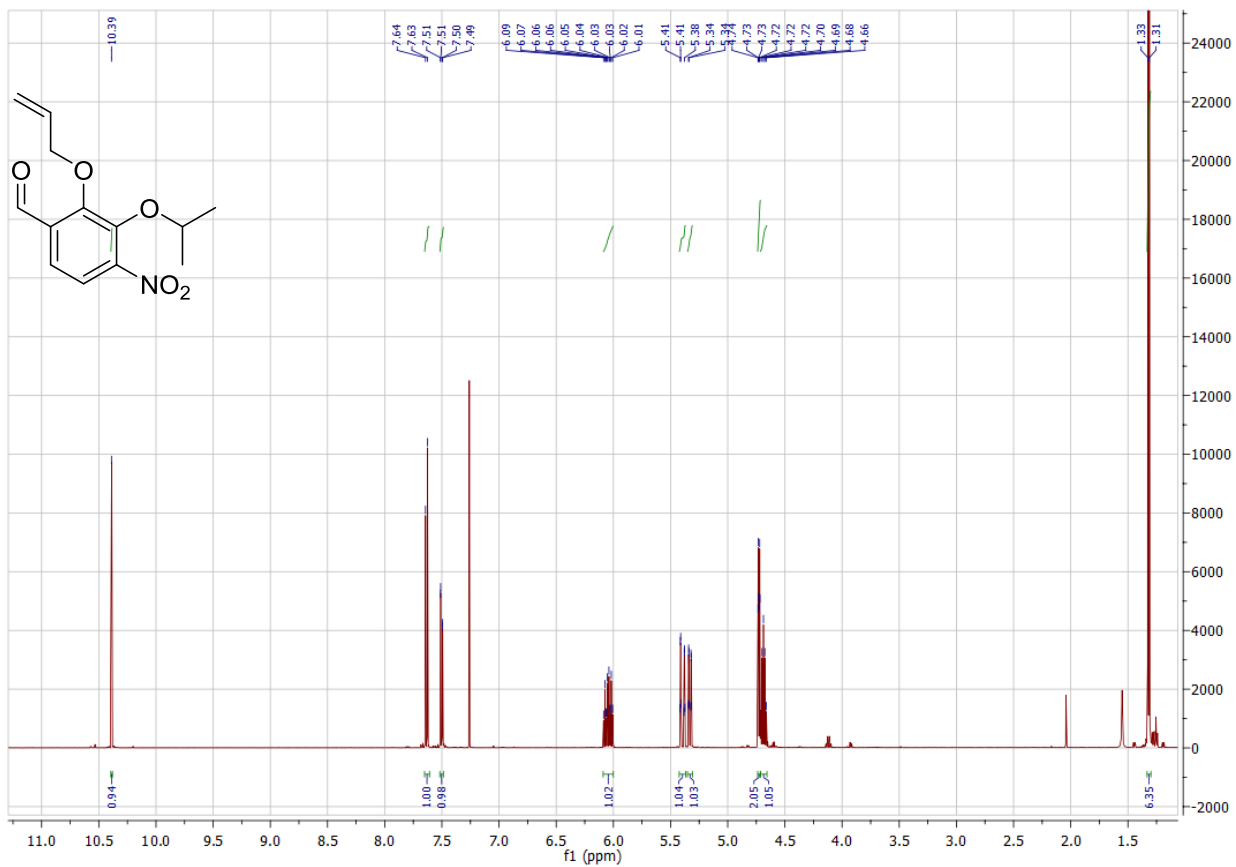
# 2-Hydroxy-3-isopropoxybenzaldehyde (11)



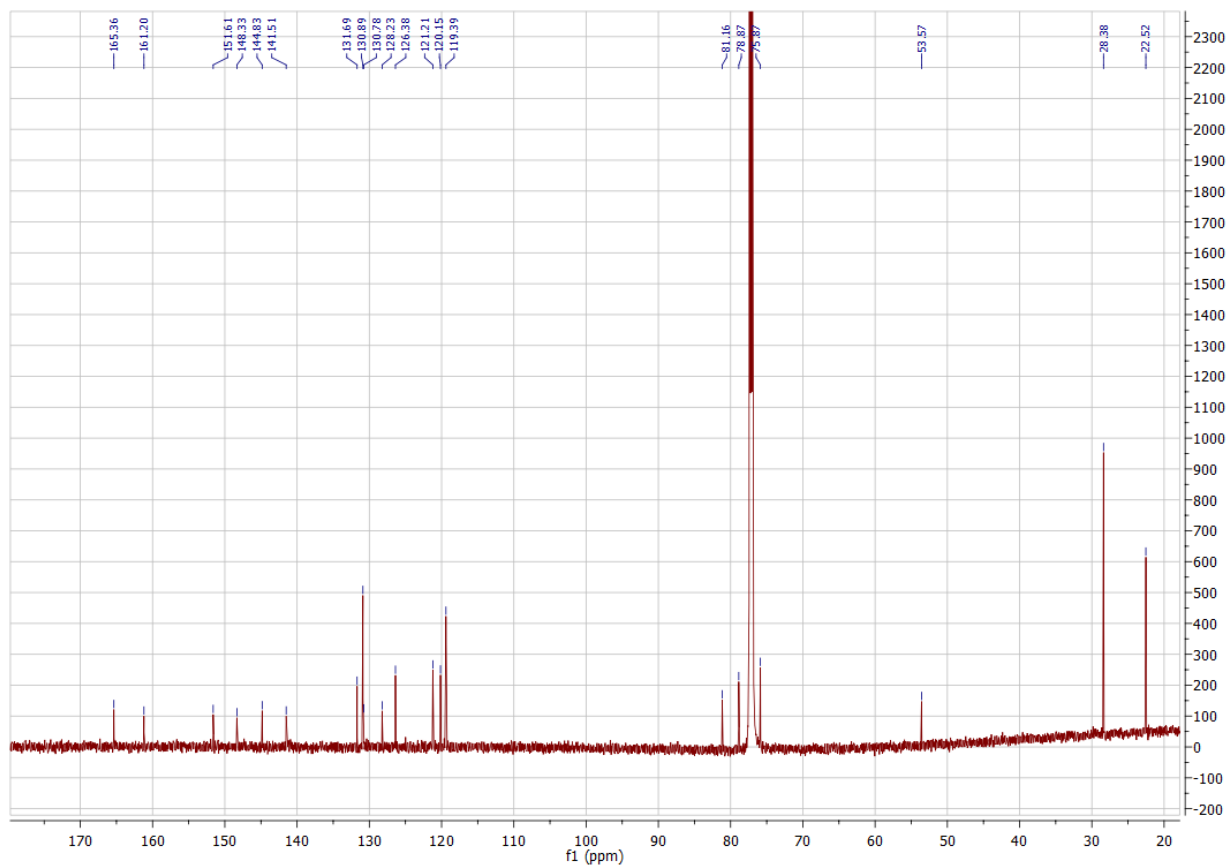
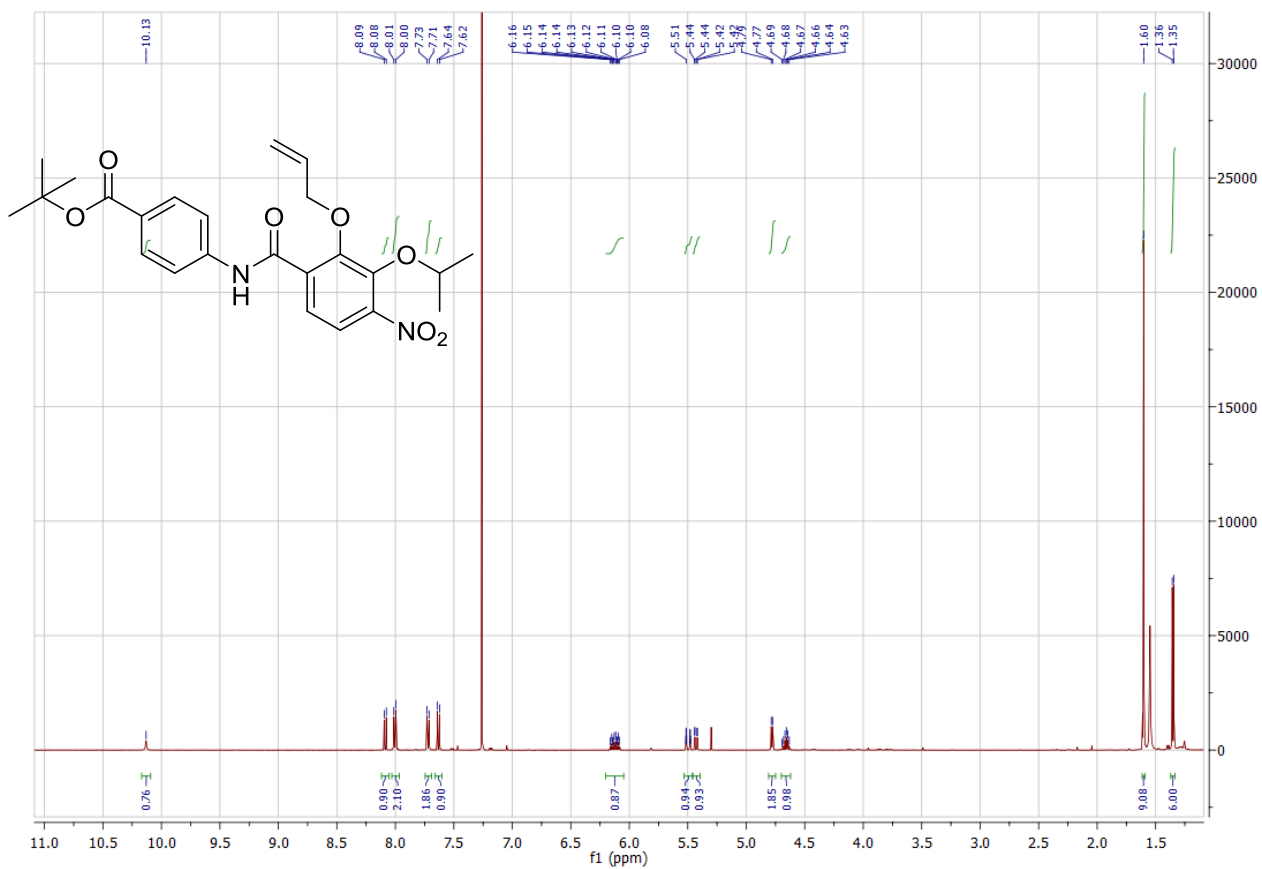
# 2-Formyl-6-isopropoxyphenyl acetate (12)



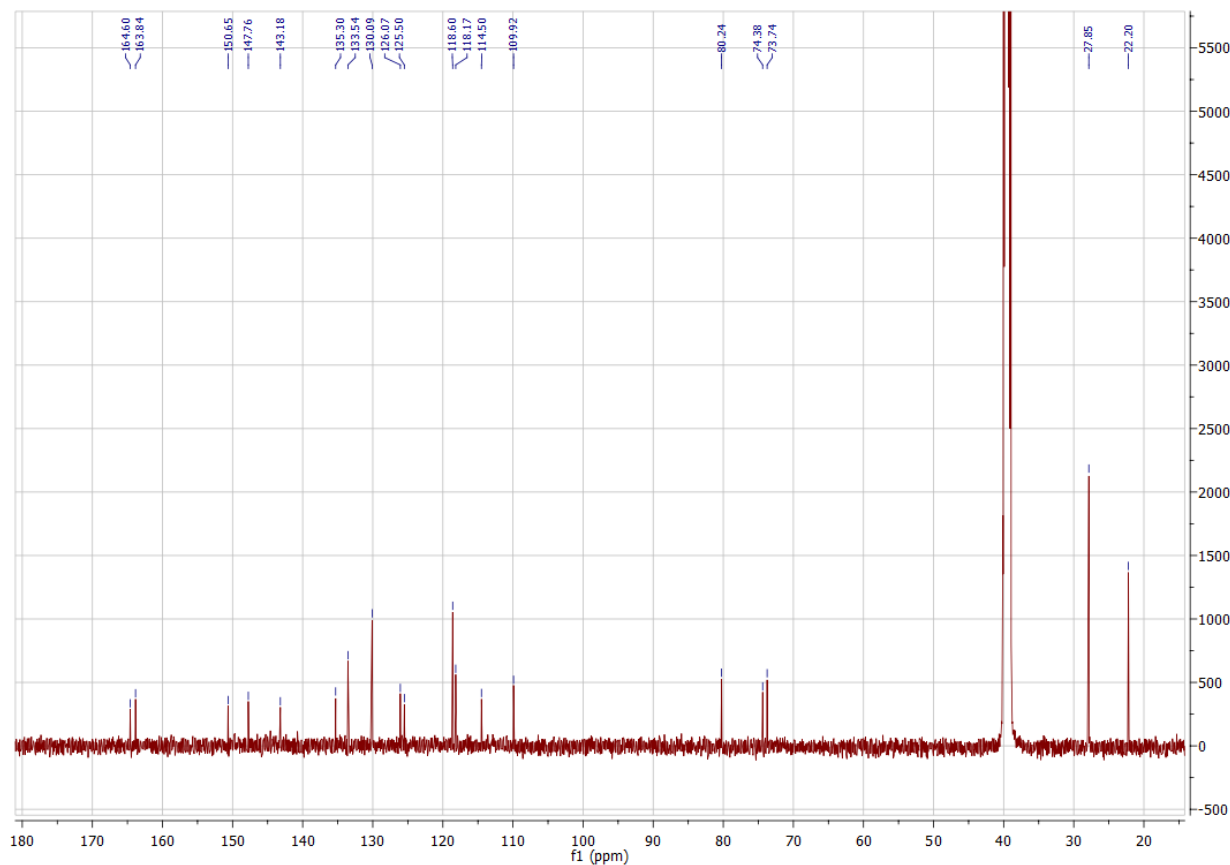
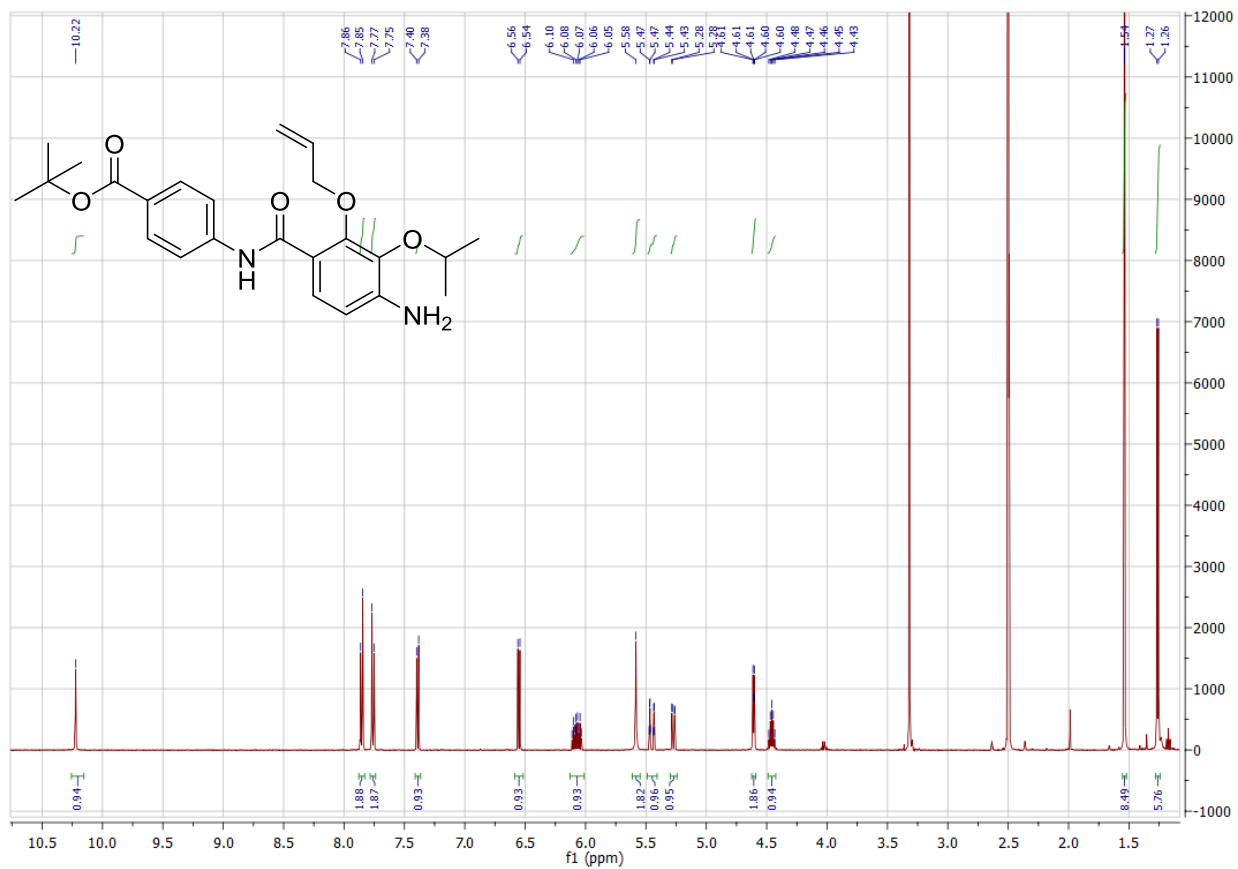
# 2-(Allyloxy)-3-isopropoxy-4-nitrobenzaldehyde (13)



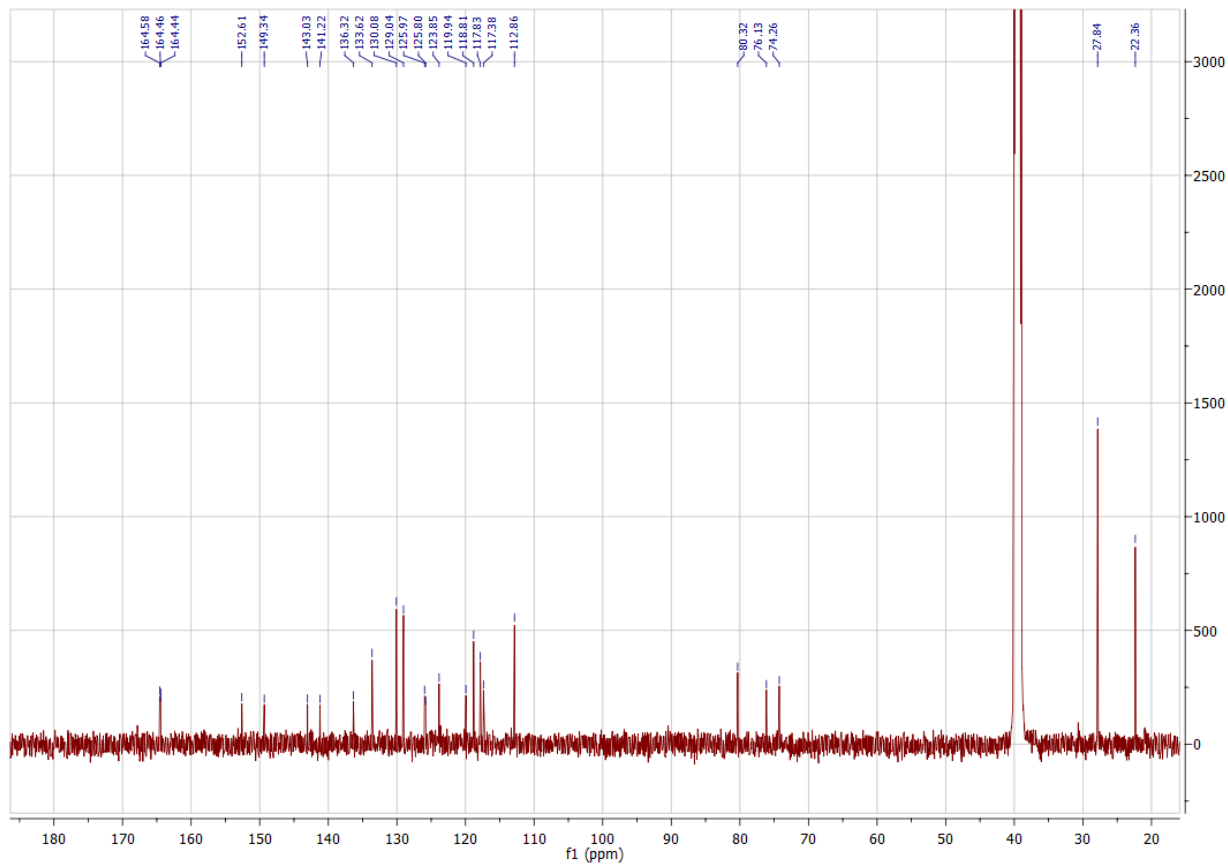
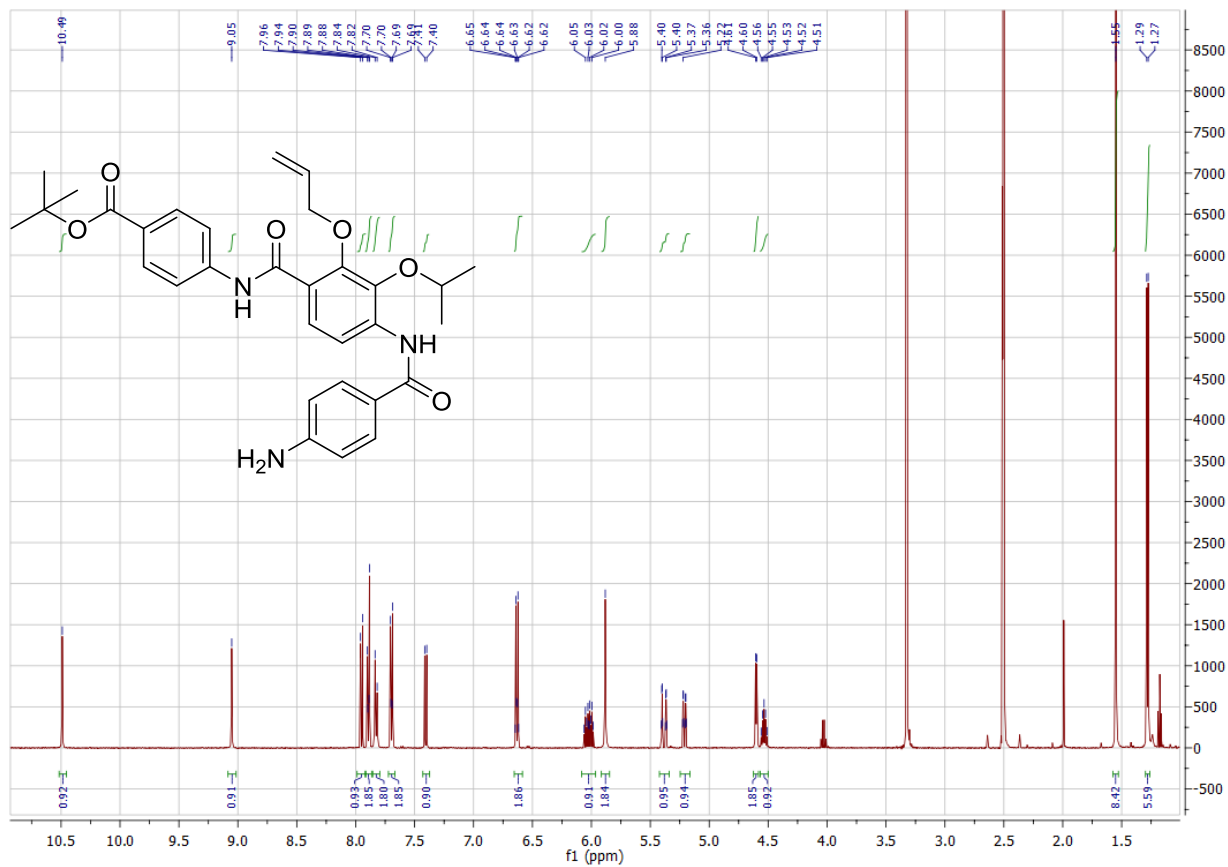
**tert-Butyl 4-(2-(allyloxy)-3-isopropoxy-4-nitrobenzamido)benzoate (14)**



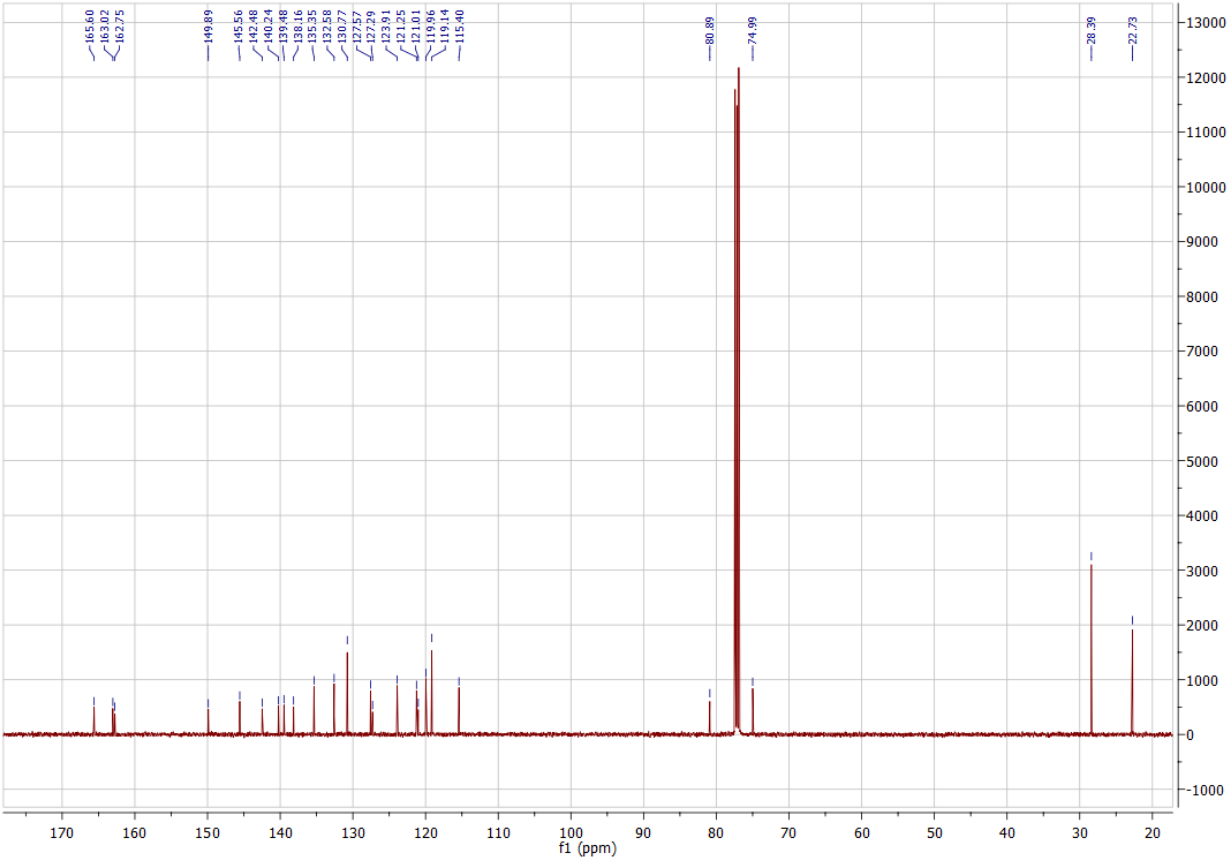
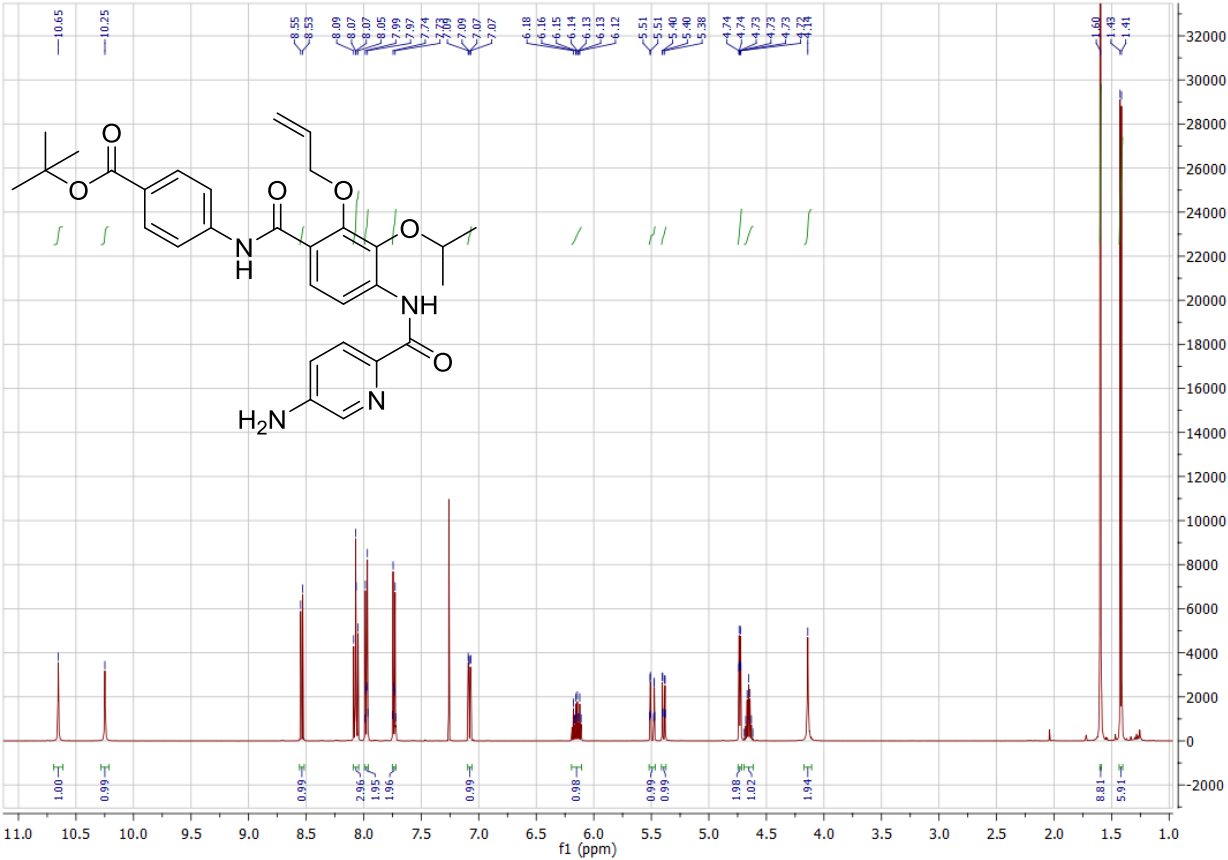
**tert-Butyl 4-(2-(allyloxy)-4-amino-3-isopropoxybenzamido)benzoate (15)**



**tert-Butyl 4-(2-(allyloxy)-4-(4-aminobenzamido)-3-isopropoxybenzamido)benzoate (16)**

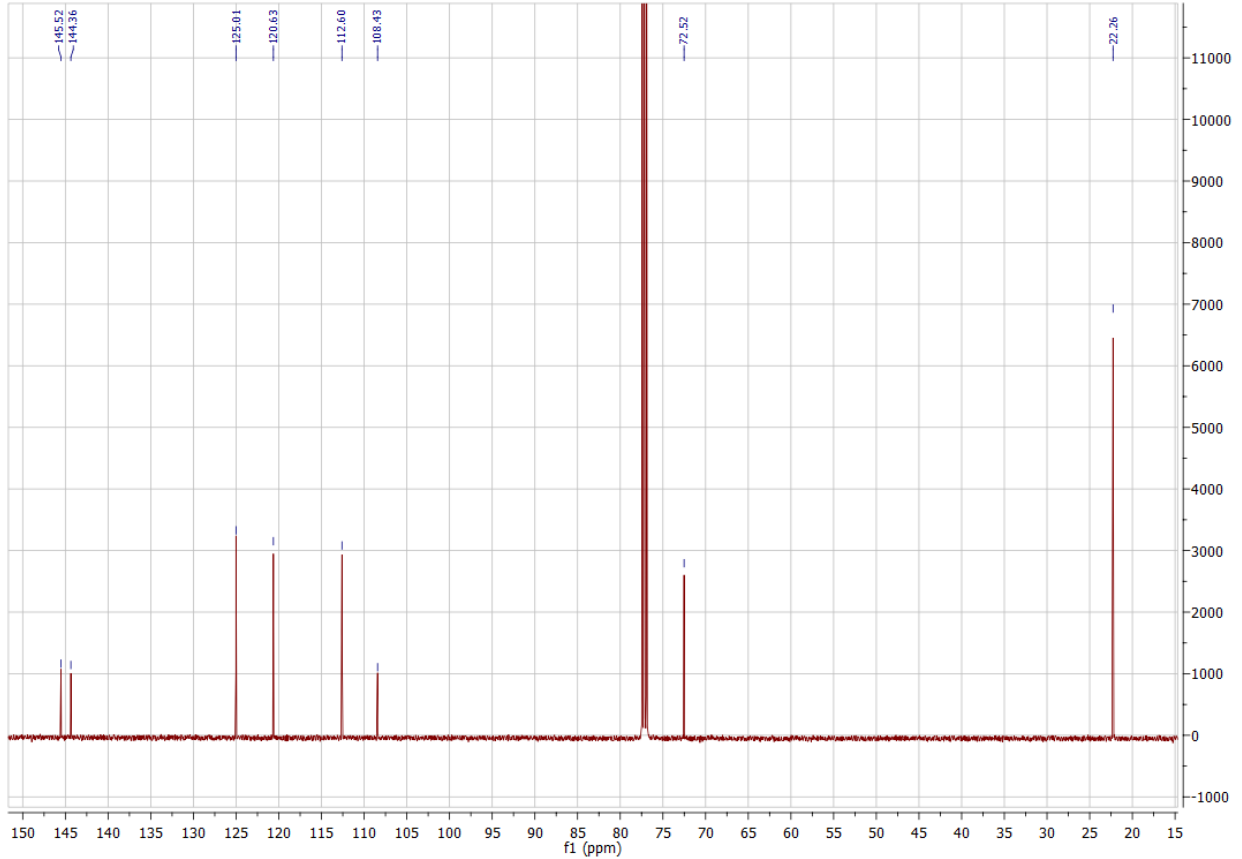
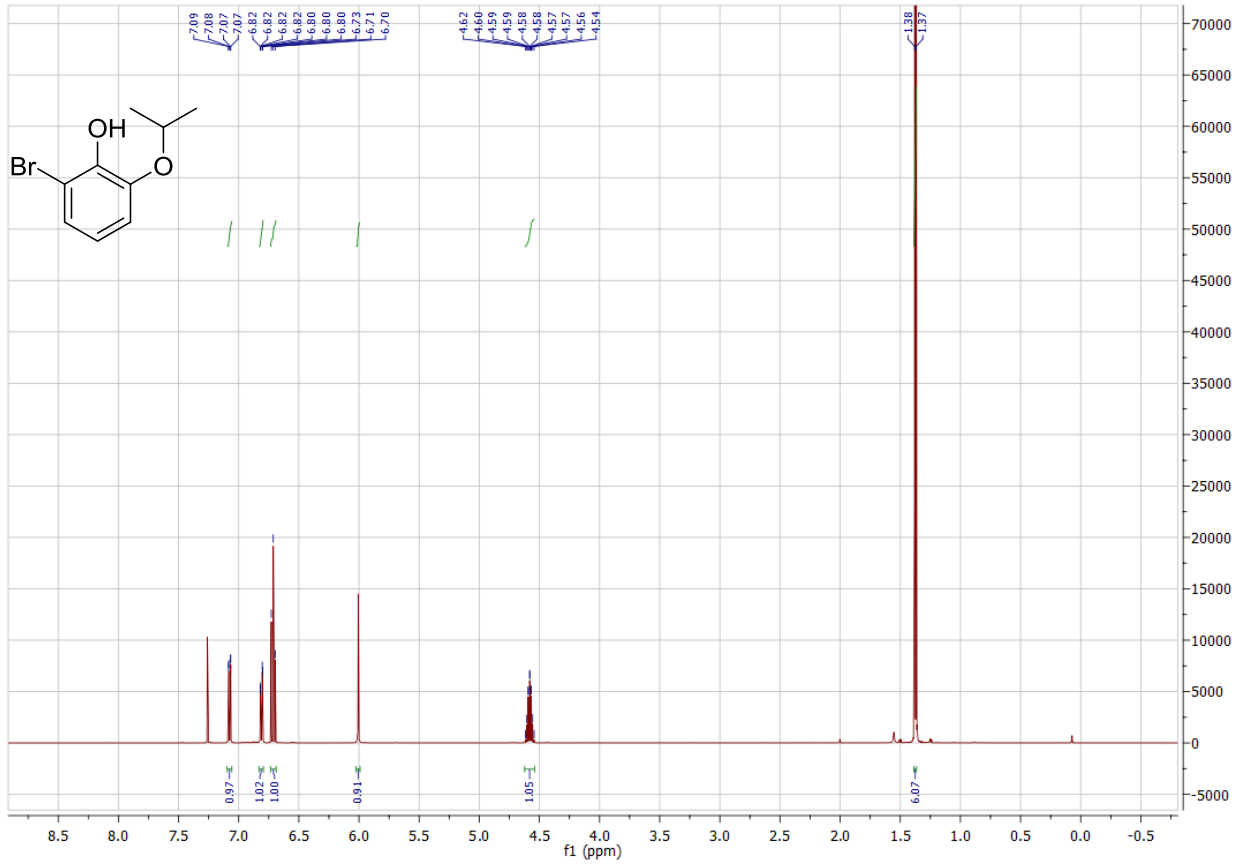


**tert-Butyl 4-(2-(allyloxy)-4-(5-aminopicolinamido)-3-isopropoxybenzamido)benzoate (98)**

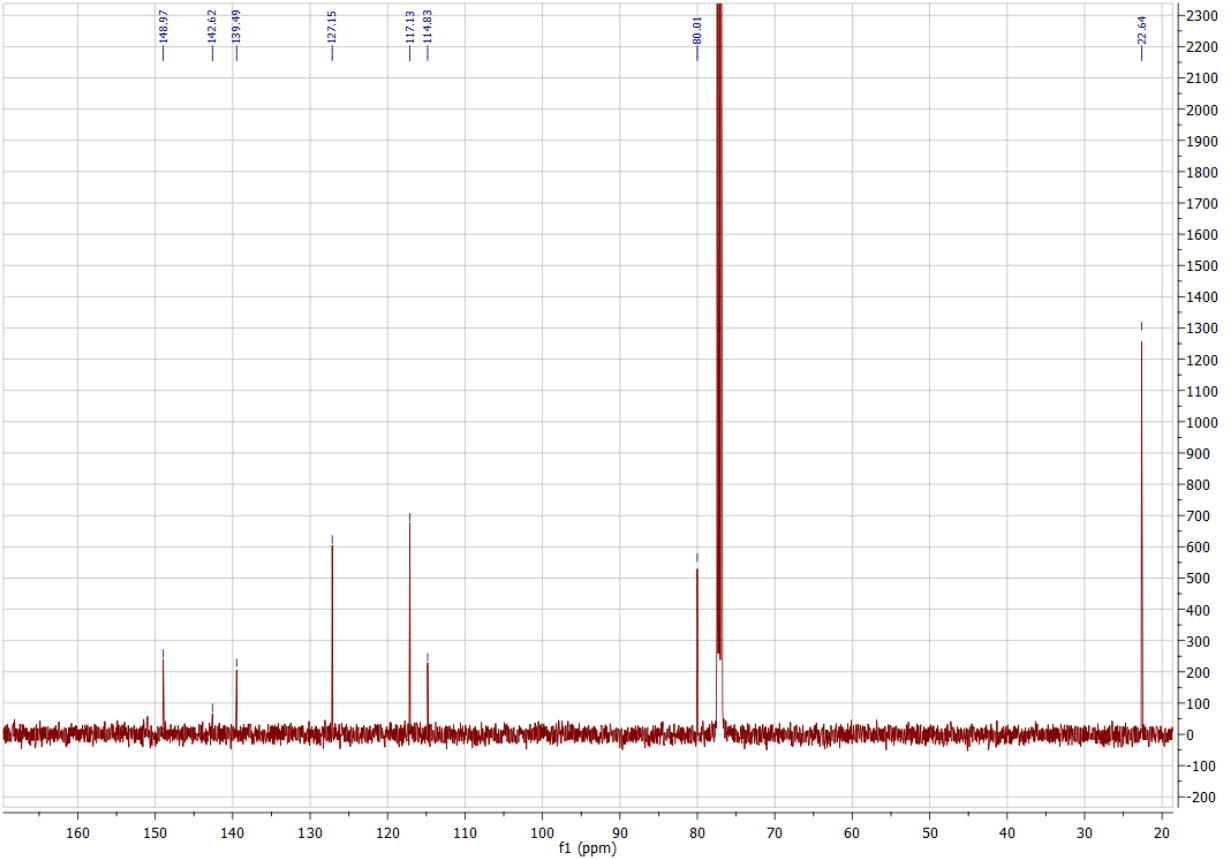
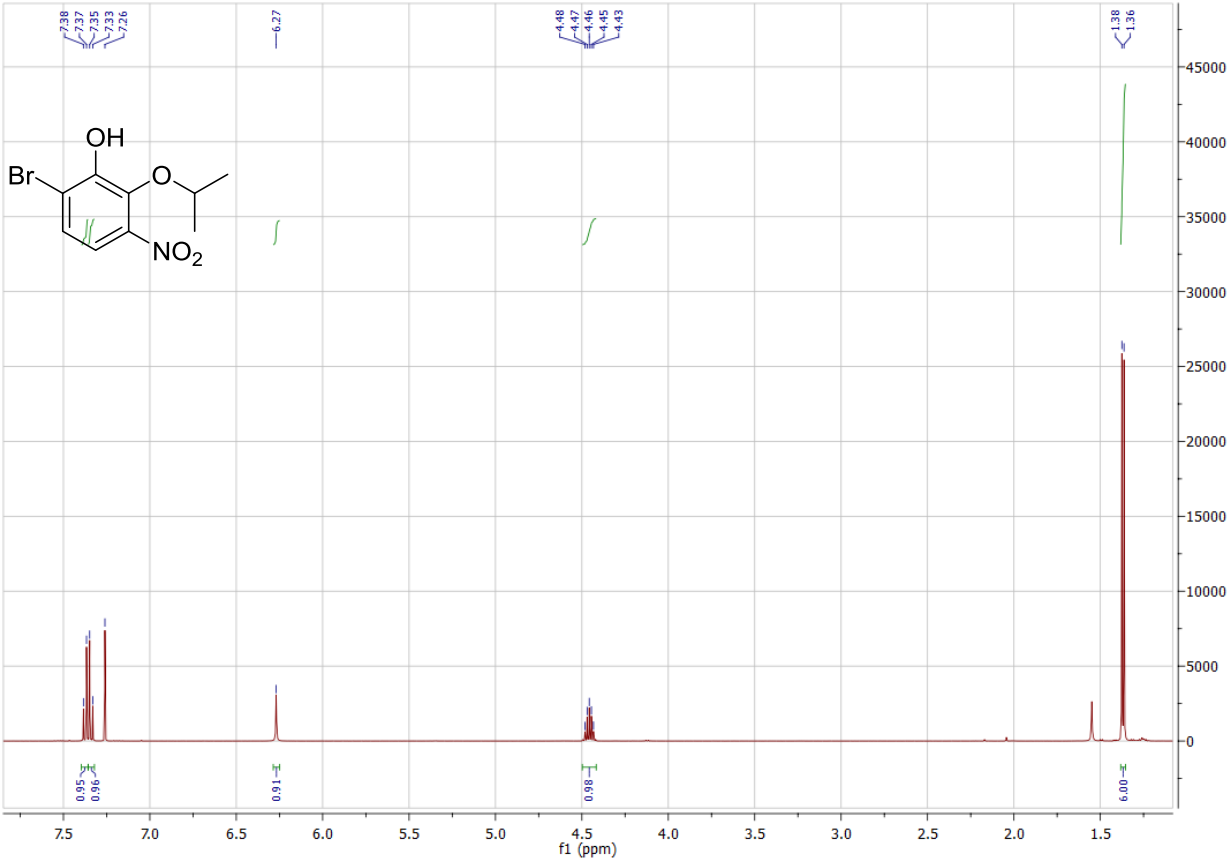




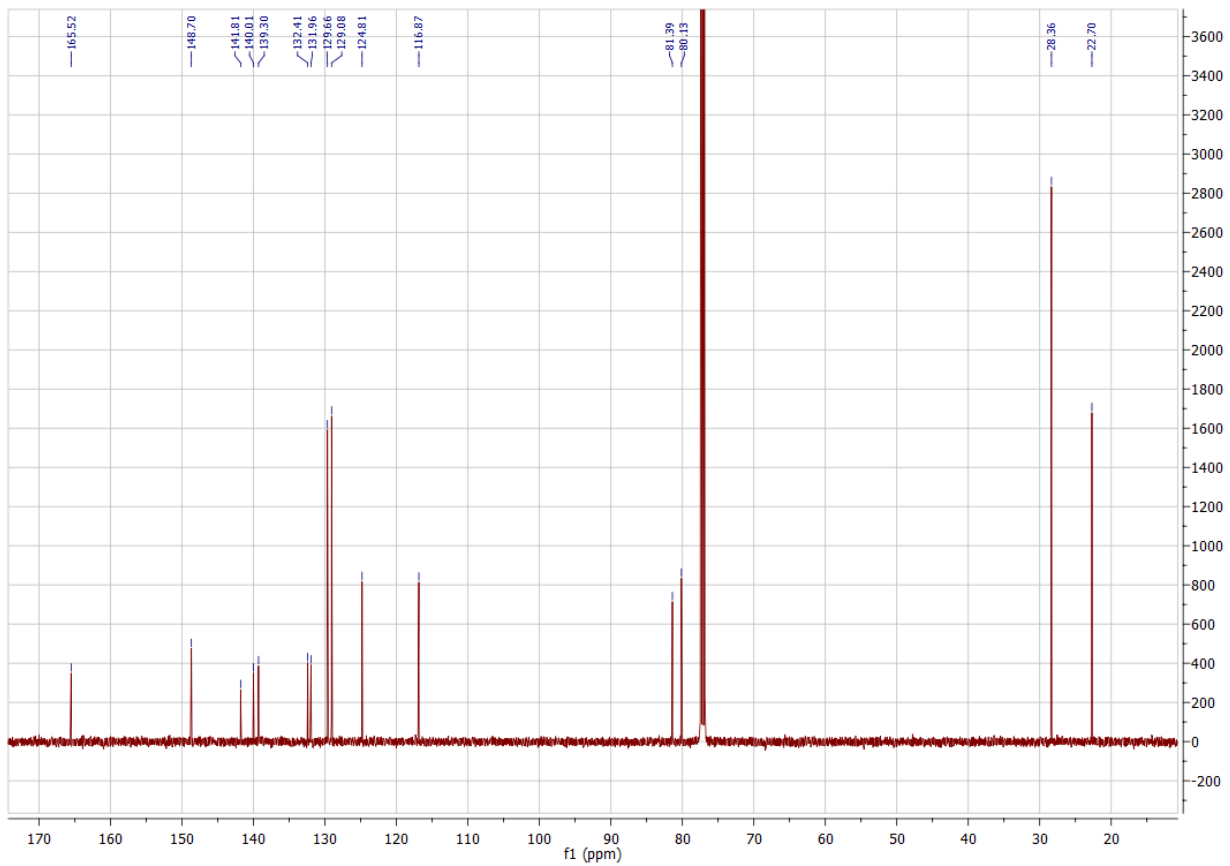
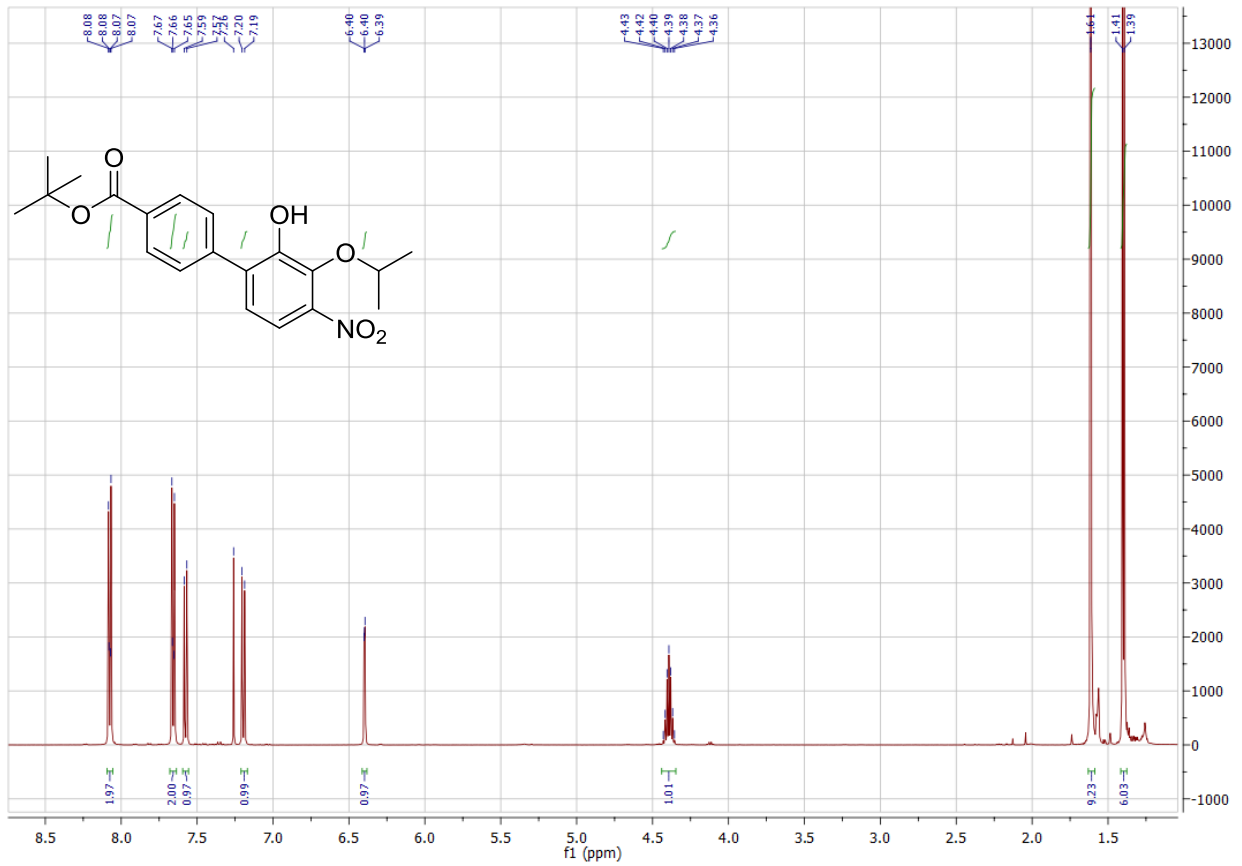
# 2-Bromo-6-isopropoxyphenol (73)



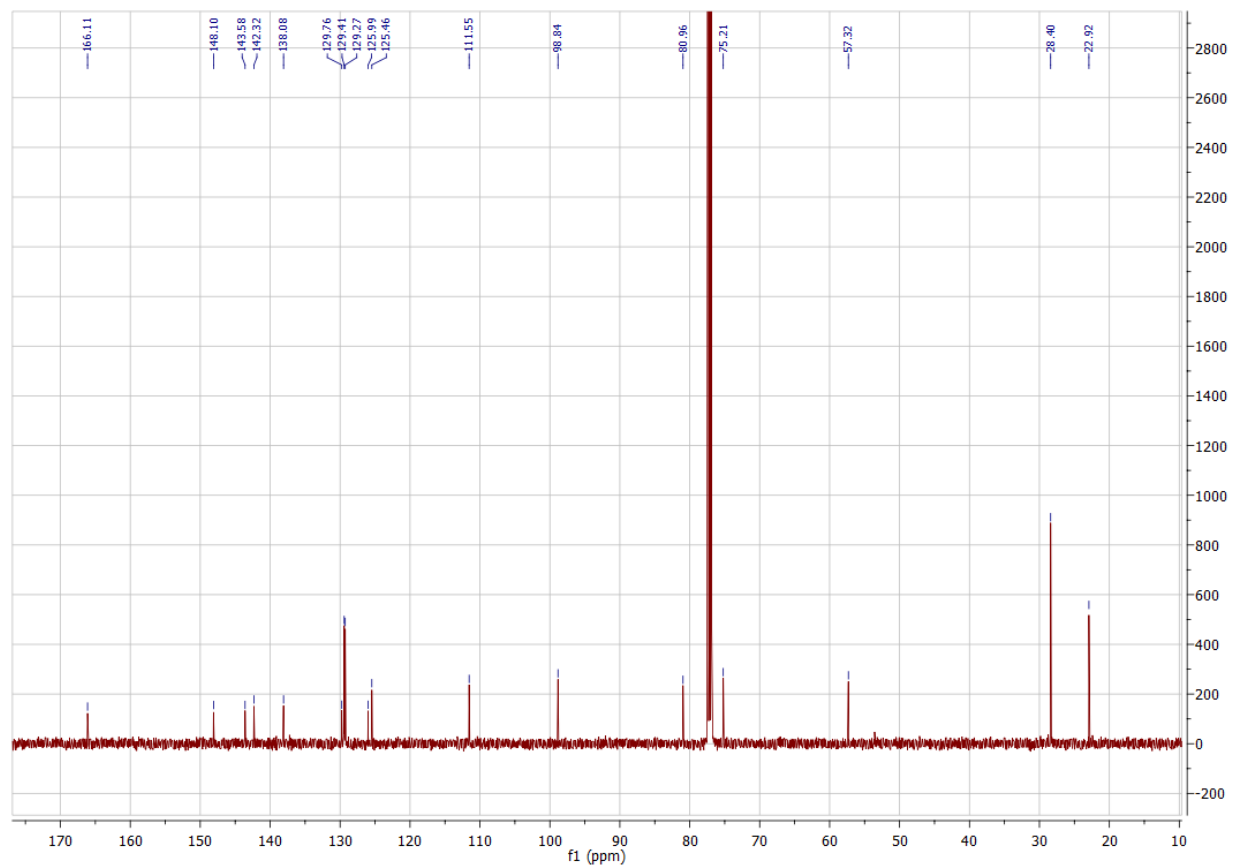
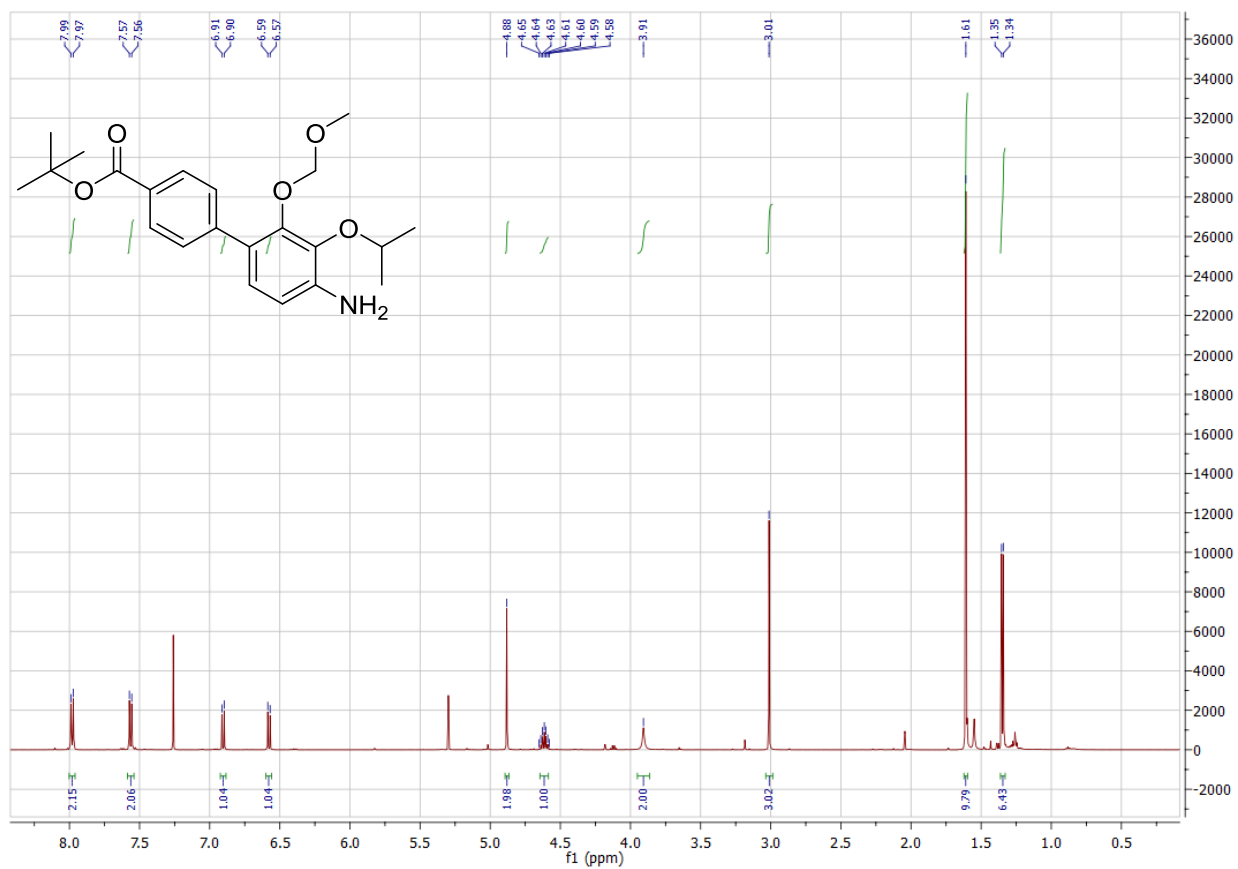
6-Bromo-2-isopropoxy-3-nitrophenol (74)



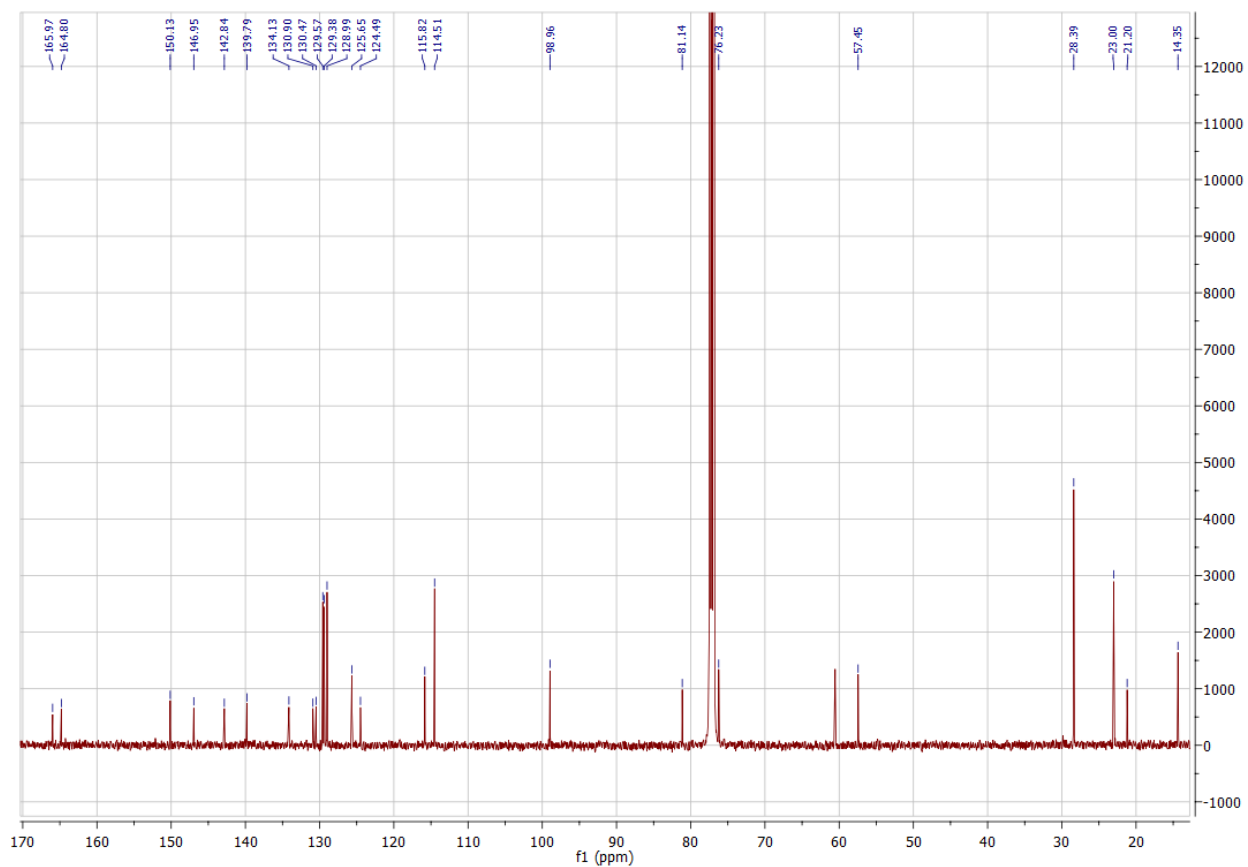
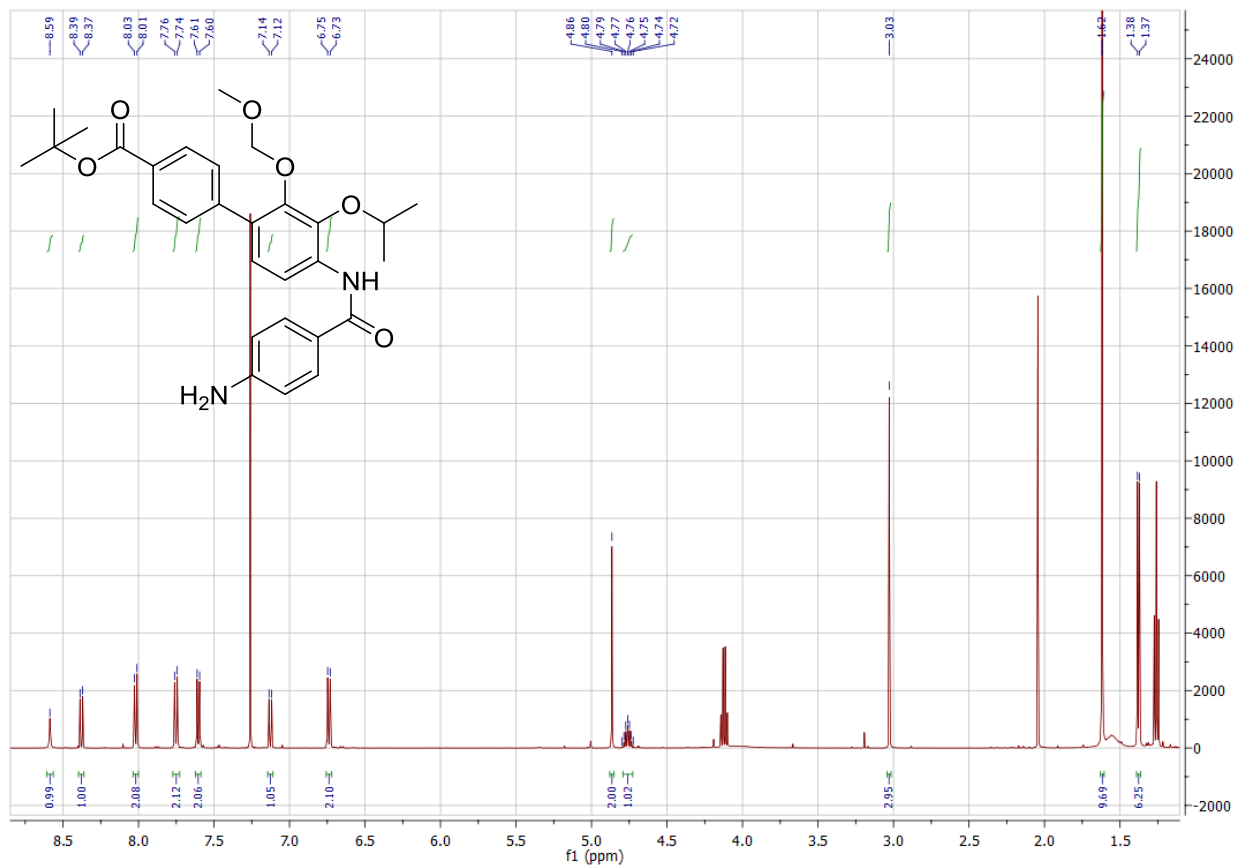
***tert*-Butyl 2'-hydroxy-3'-isopropoxy-4'-nitro-[1,1'-biphenyl]-4-carboxylate (82)**



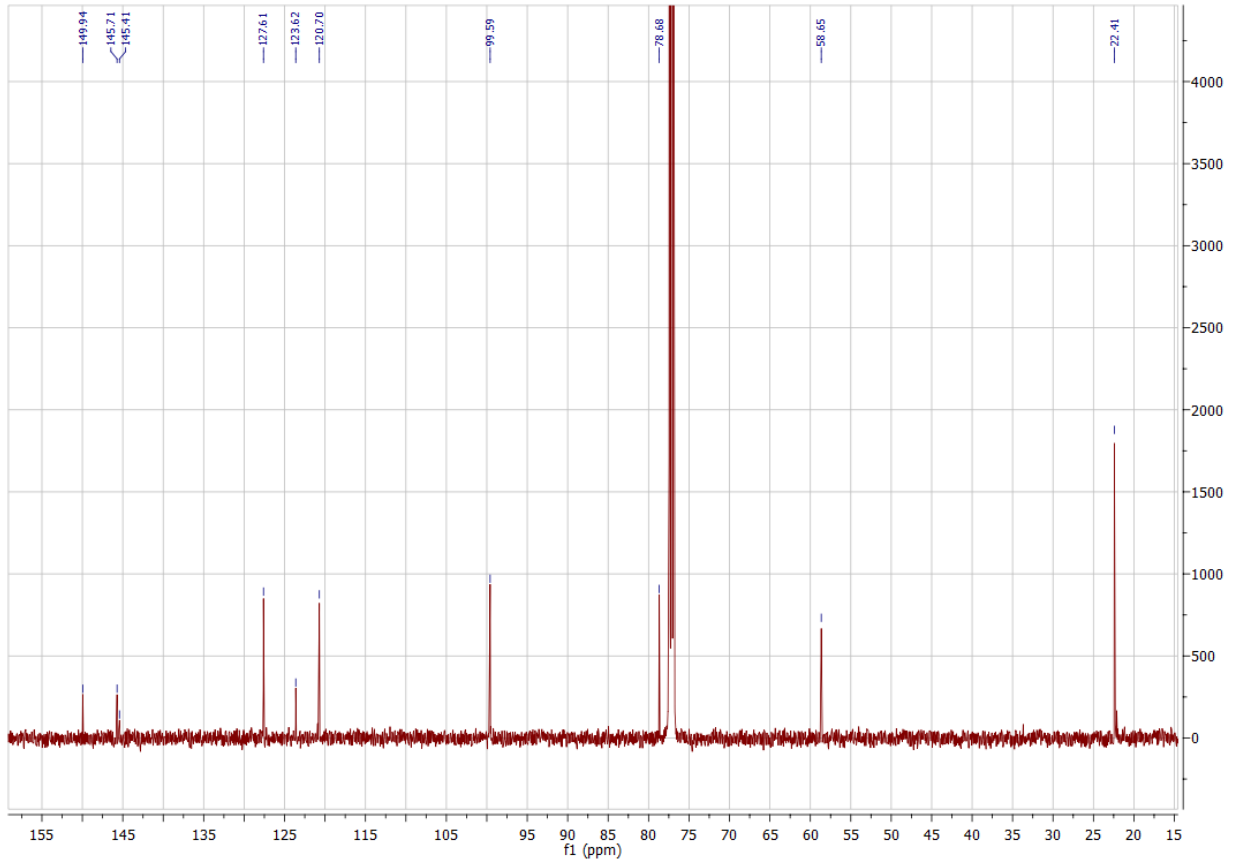
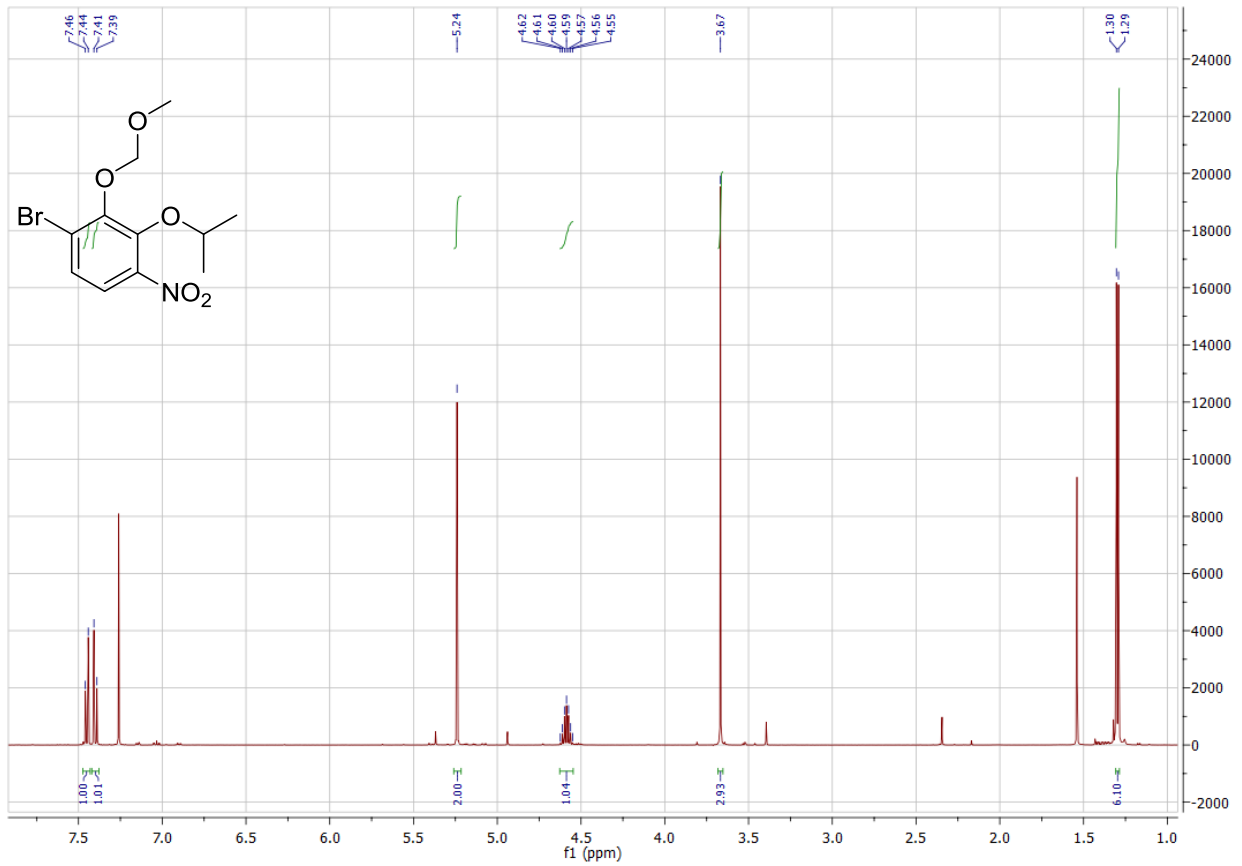
**tert-Butyl 4'-amino-3'-isopropoxy-2'-(methoxymethoxy)-[1,1'-biphenyl]-4-carboxylate (83)**



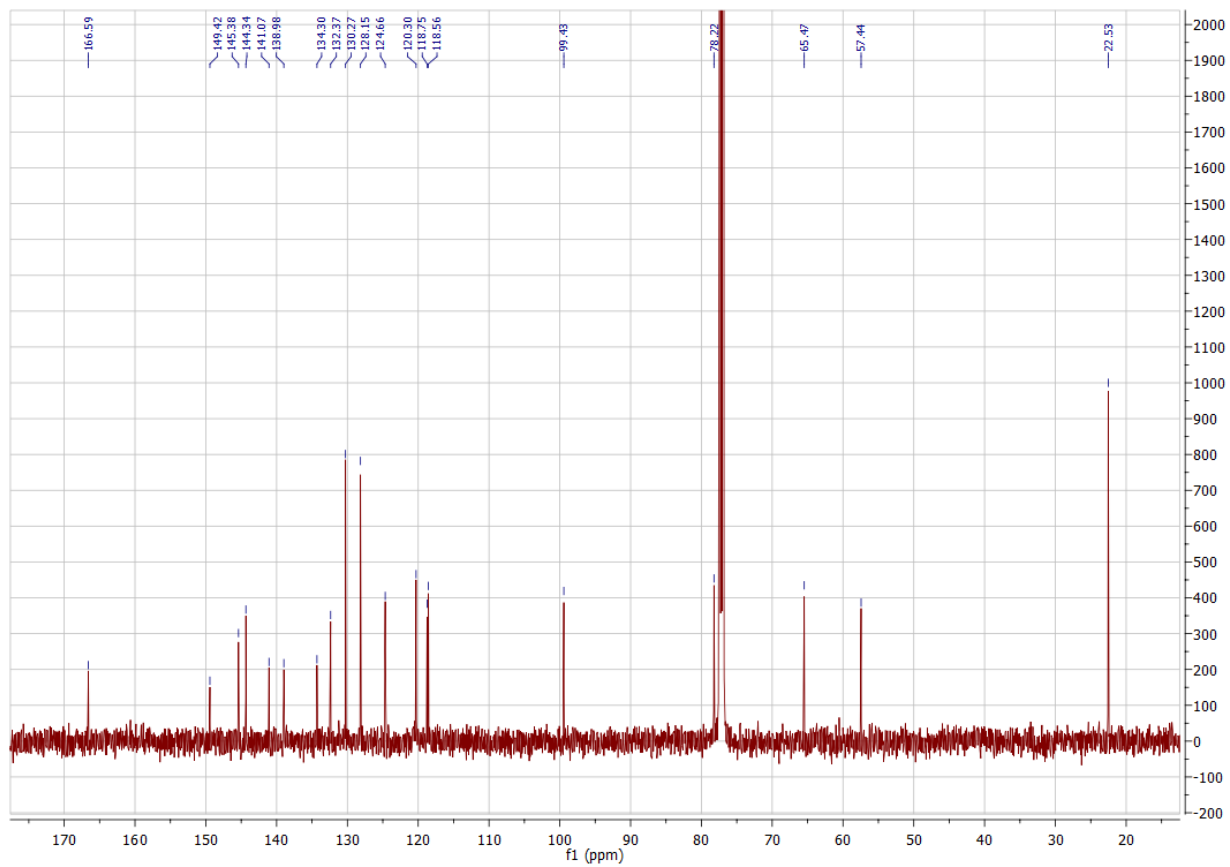
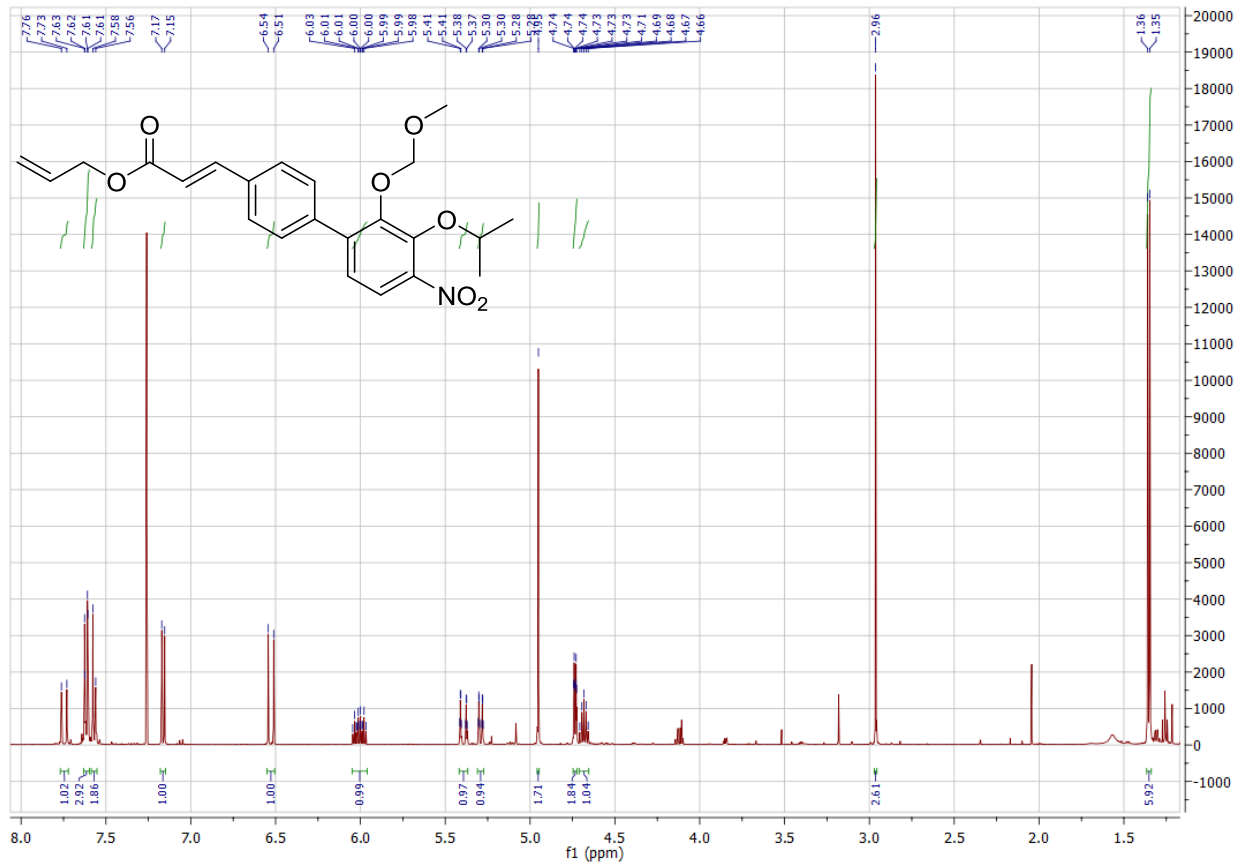
**tert-Butyl 4'-(4-aminobenzamido)-3'-isopropoxy-2'-(methoxymethoxy)-[1,1'-biphenyl]-4-carboxylate (84)**



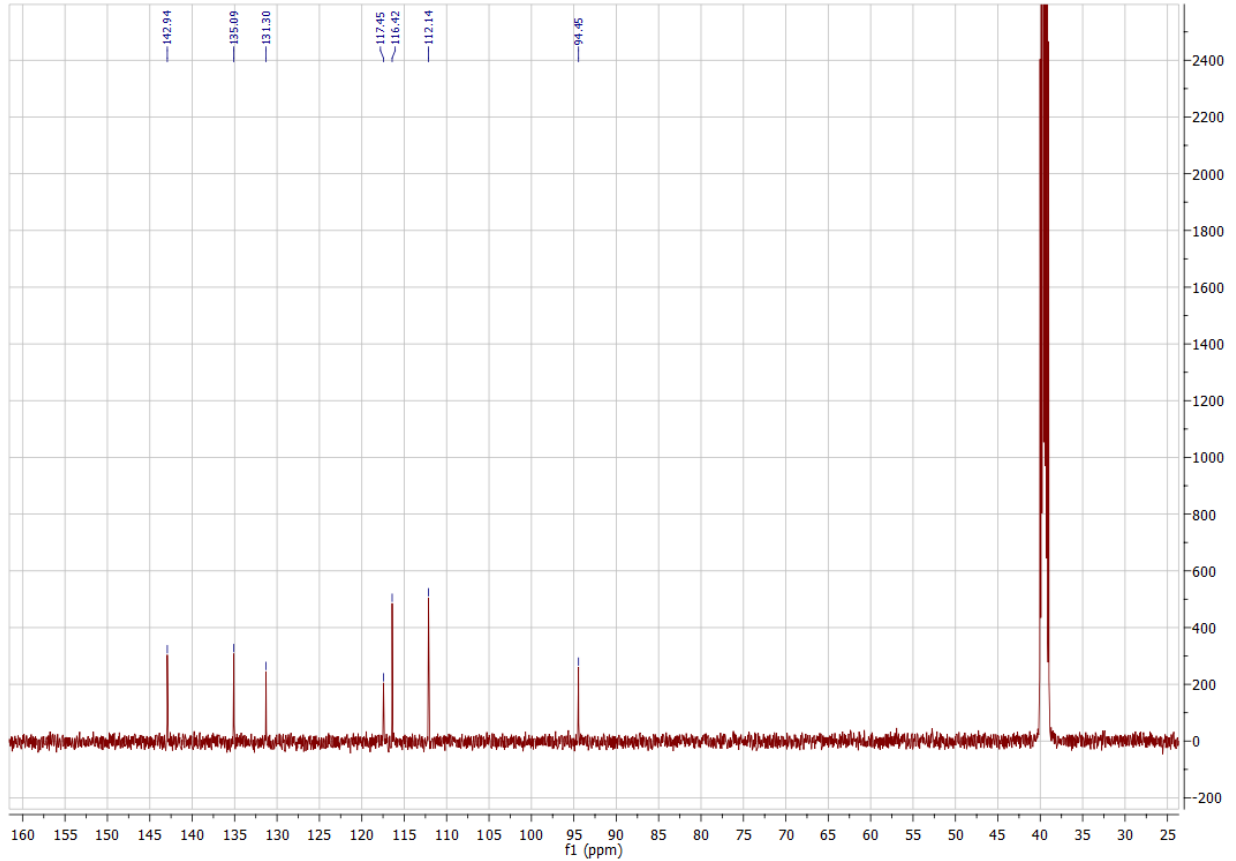
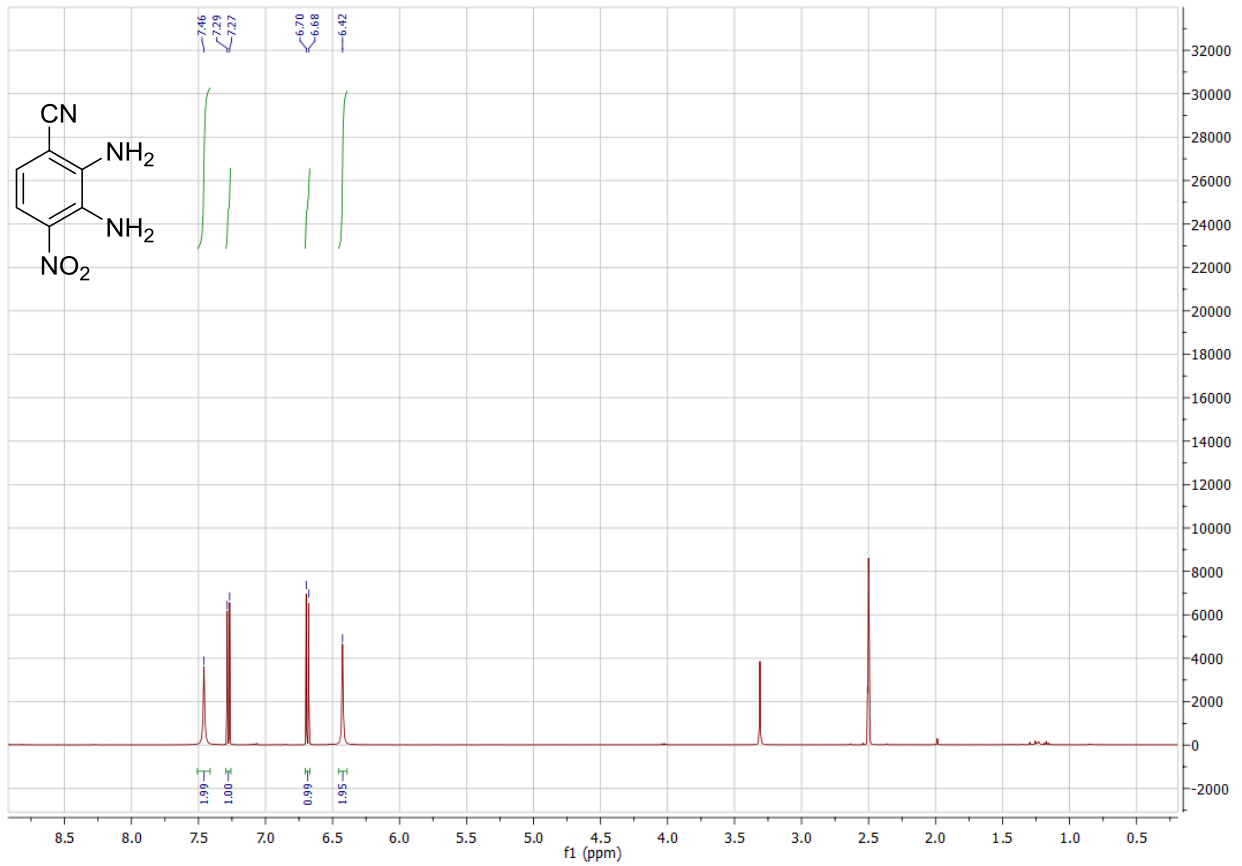
# 1-Bromo-3-isopropoxy-2-(methoxymethoxy)-4-nitrobenzene (75)



Allyl (E)-3-(3'-isopropoxy-2'-(methoxymethoxy)-4'-nitro-[1,1'-biphenyl]-4-yl)acrylate (81)

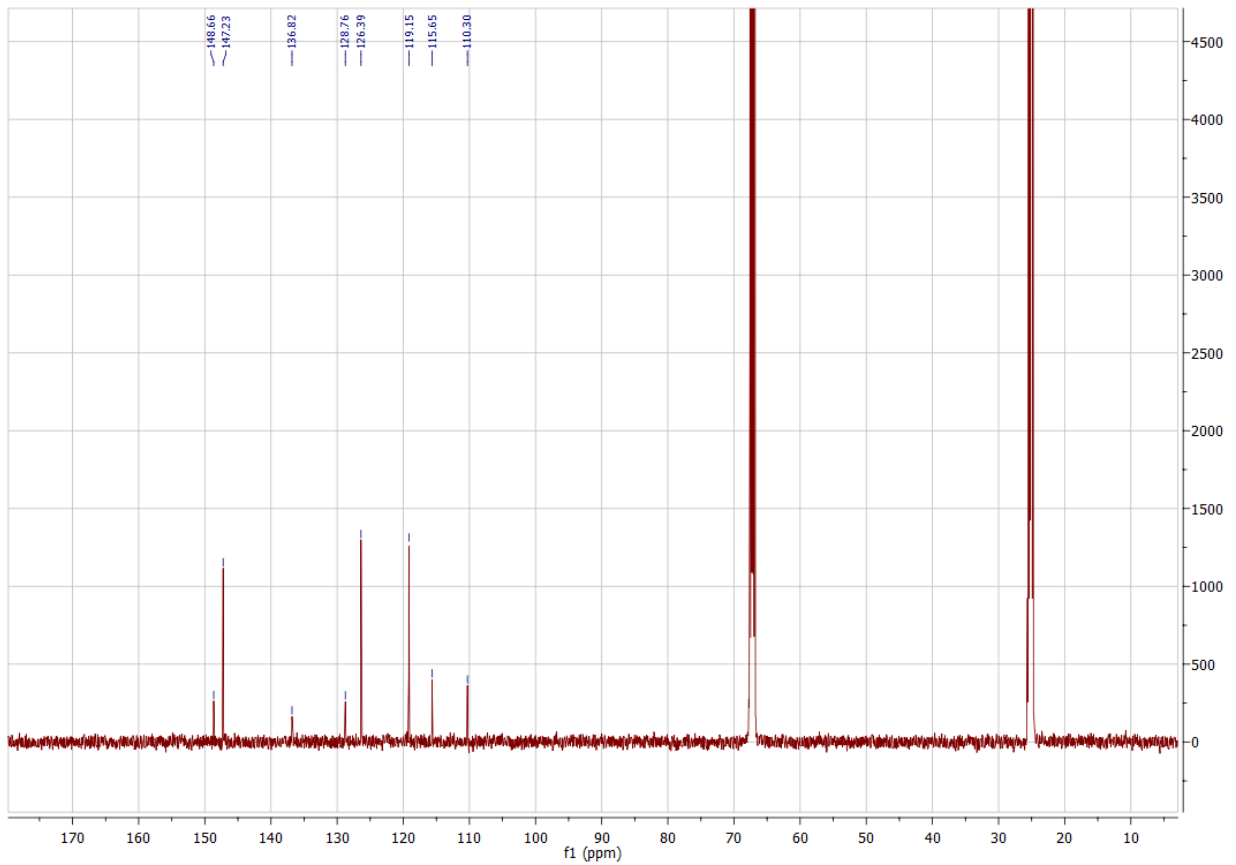
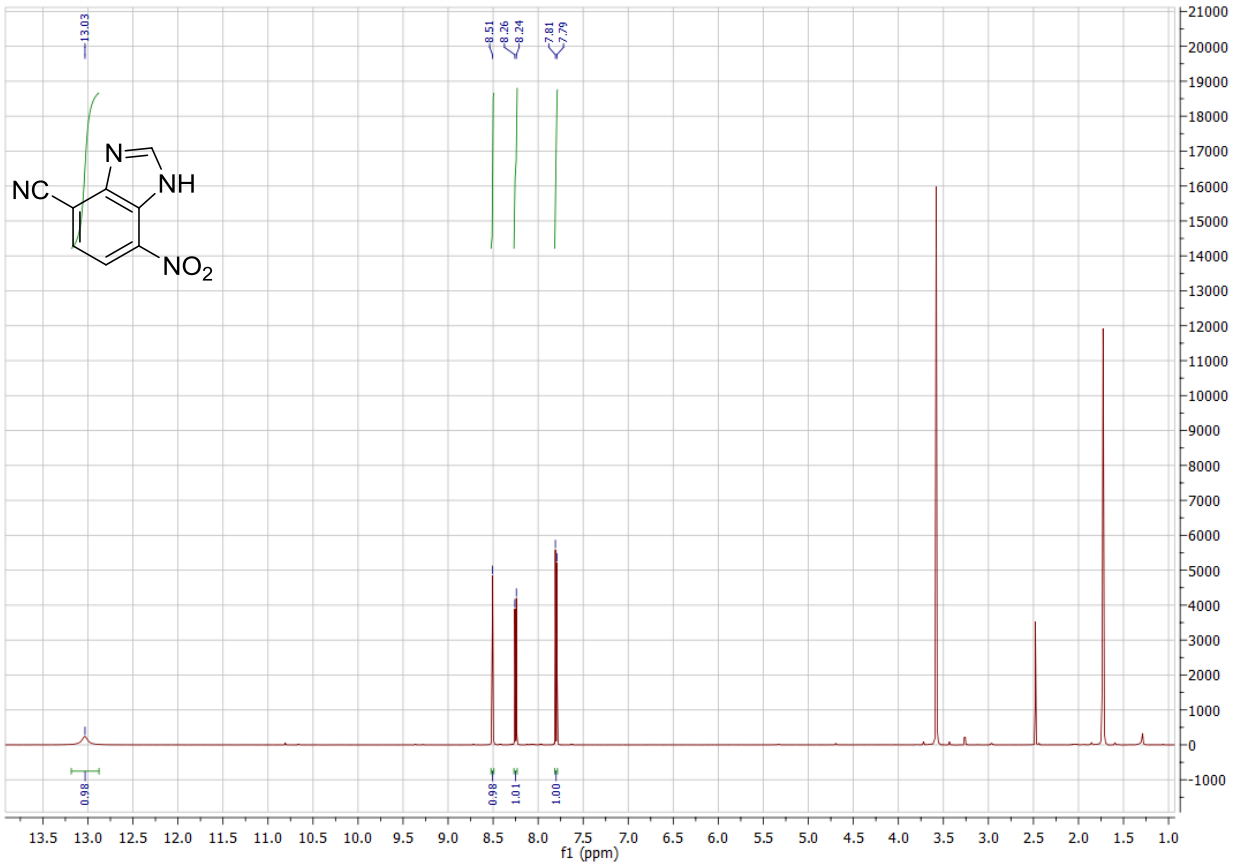


## 2,3-Diamino-4-nitrobenzonitrile (85)

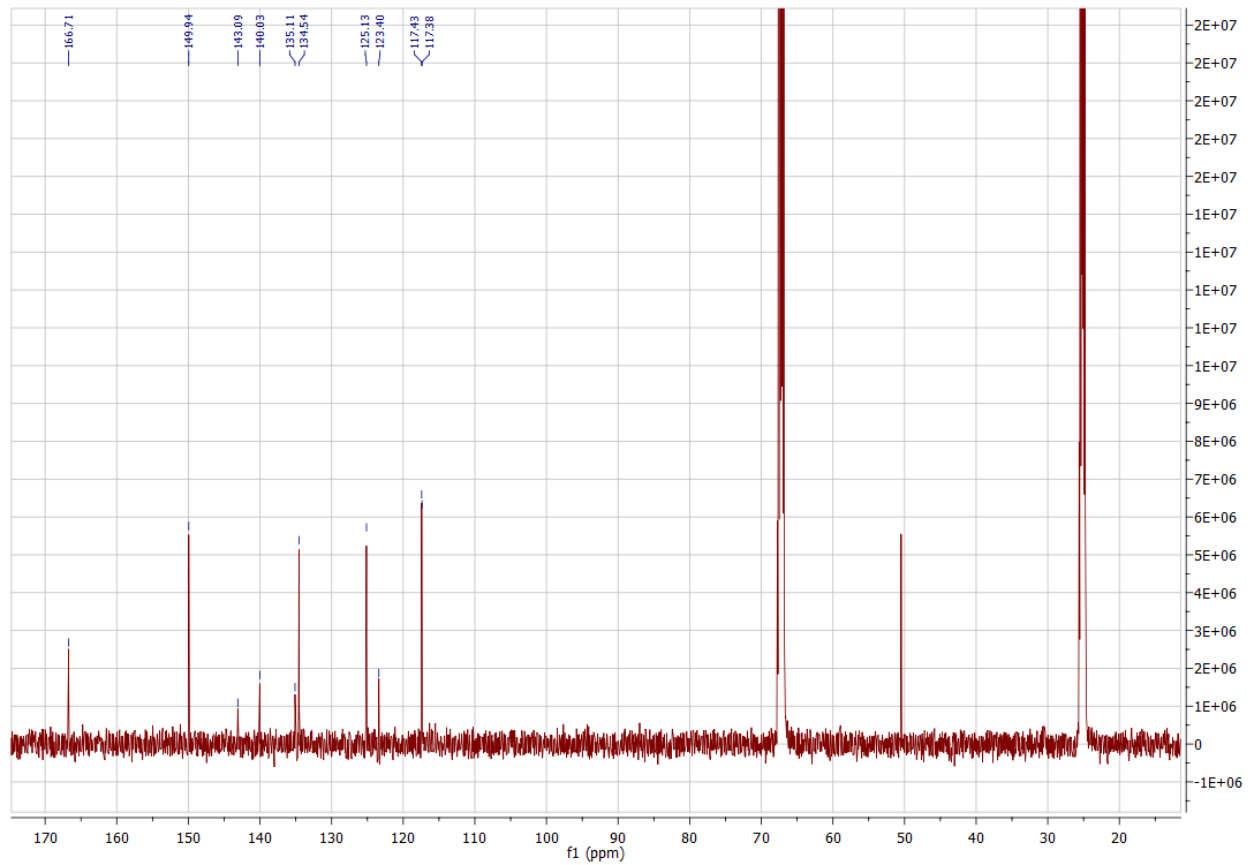
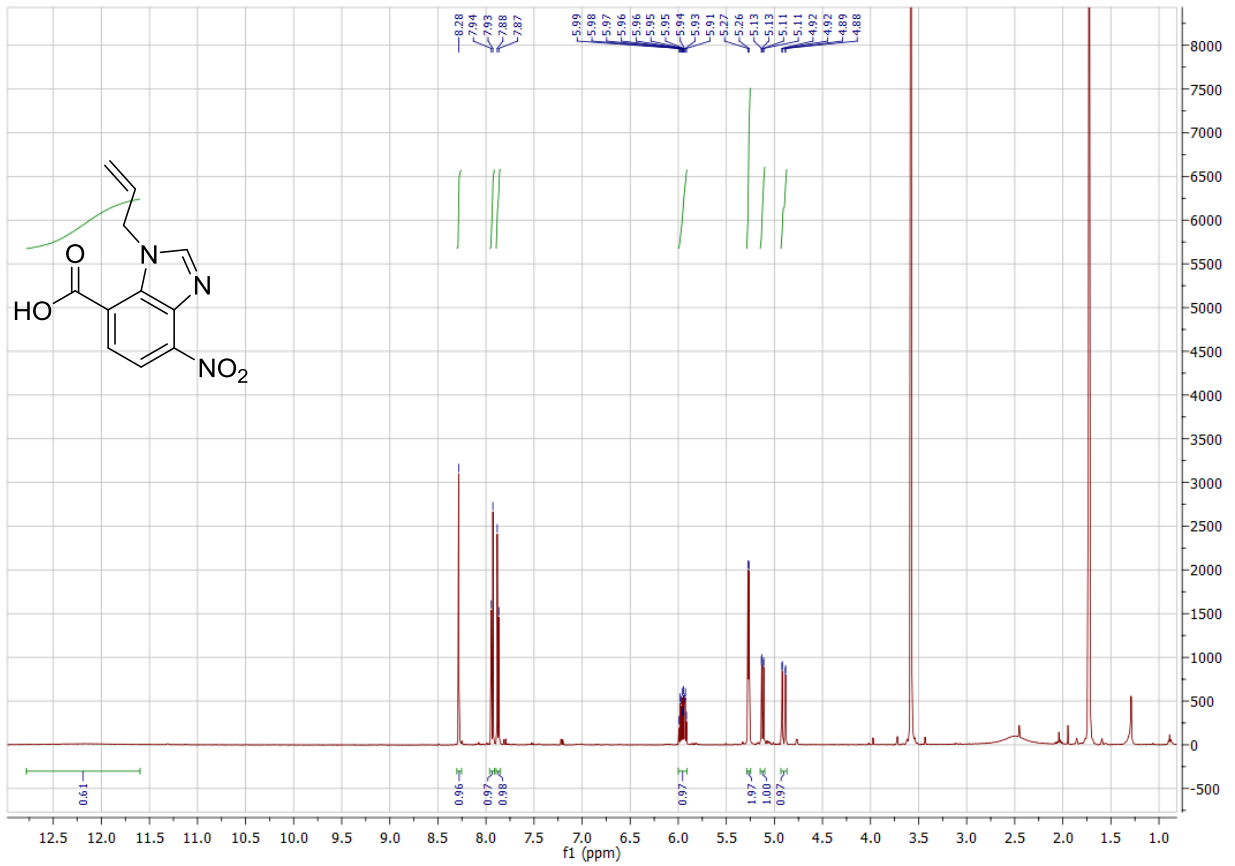




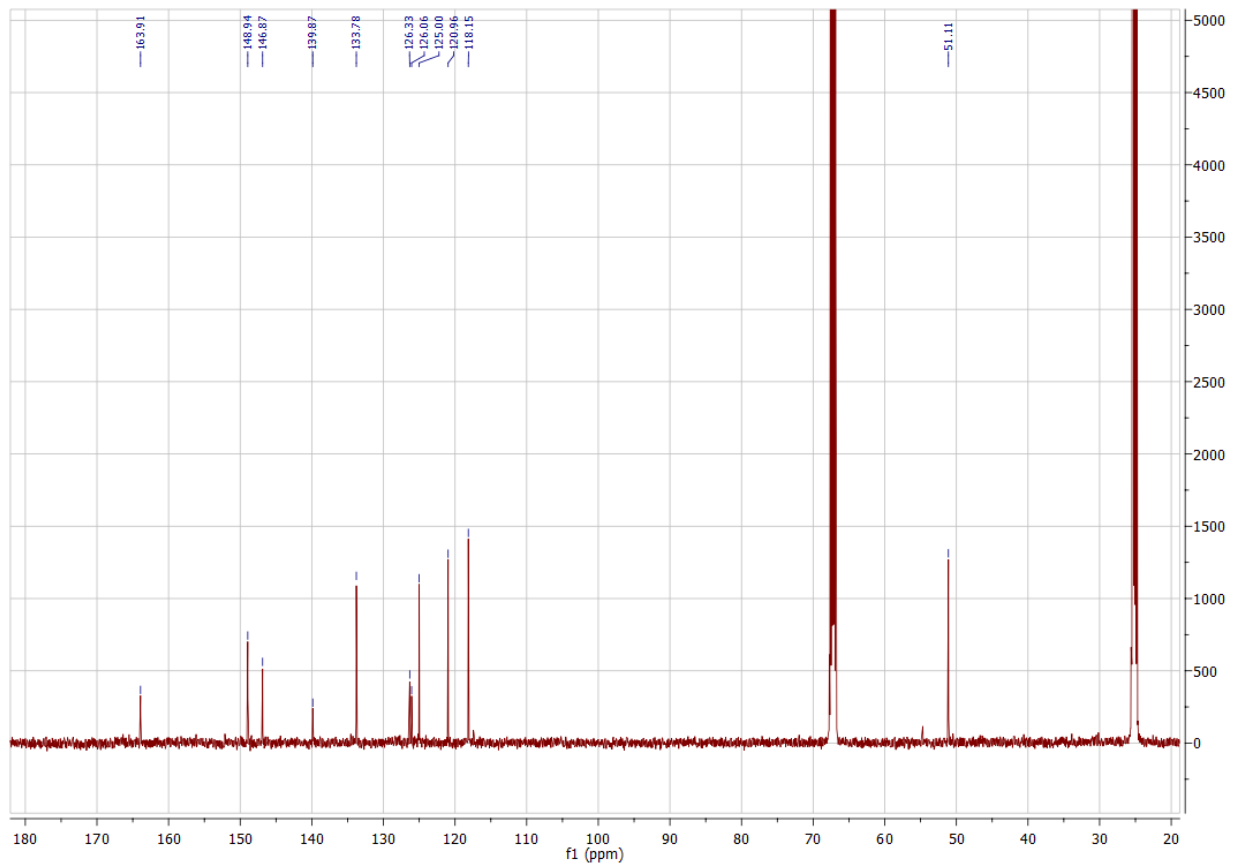
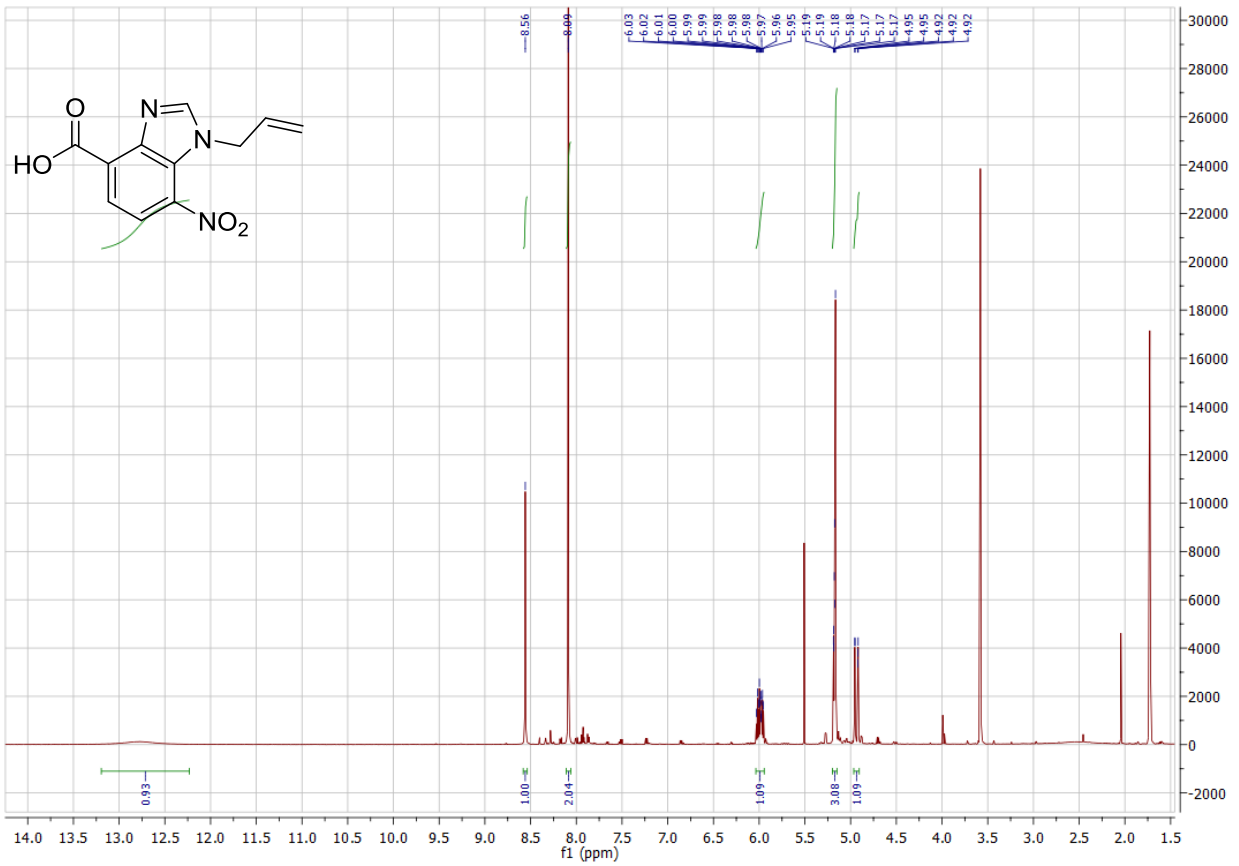
# 7-Nitro-1-benzo[d]imidazole-4-carbonitrile (86)



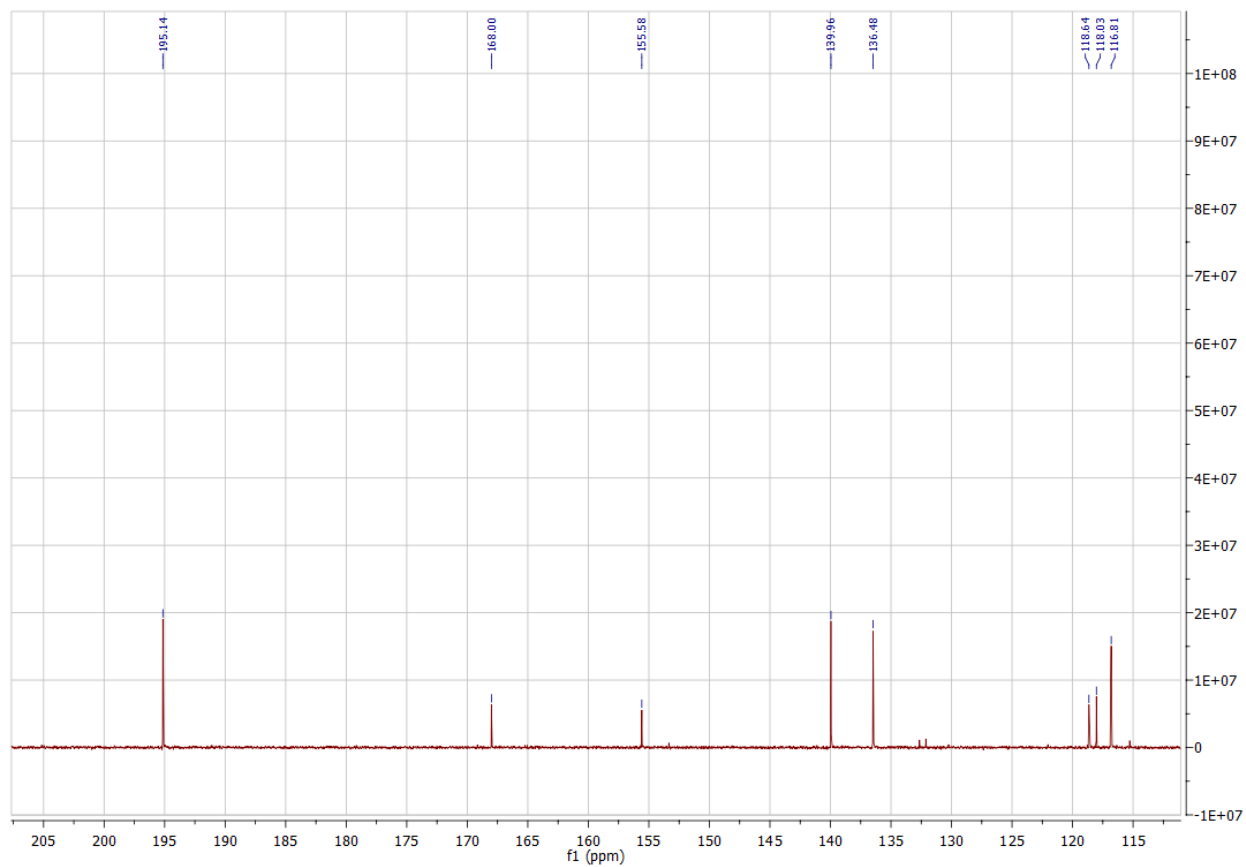
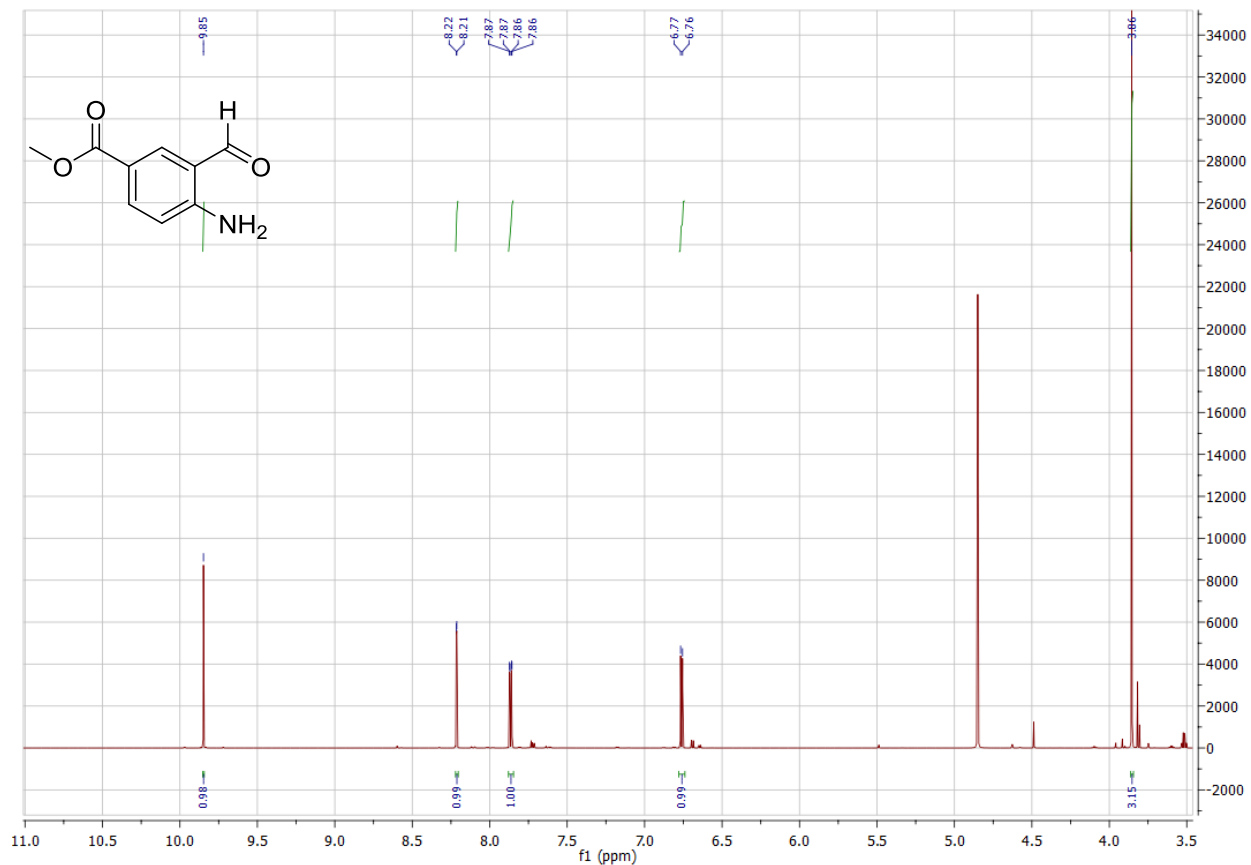
# 1-Allyl-4-nitro-1H-benzo[d]imidazole-7-carboxylic acid (87a)



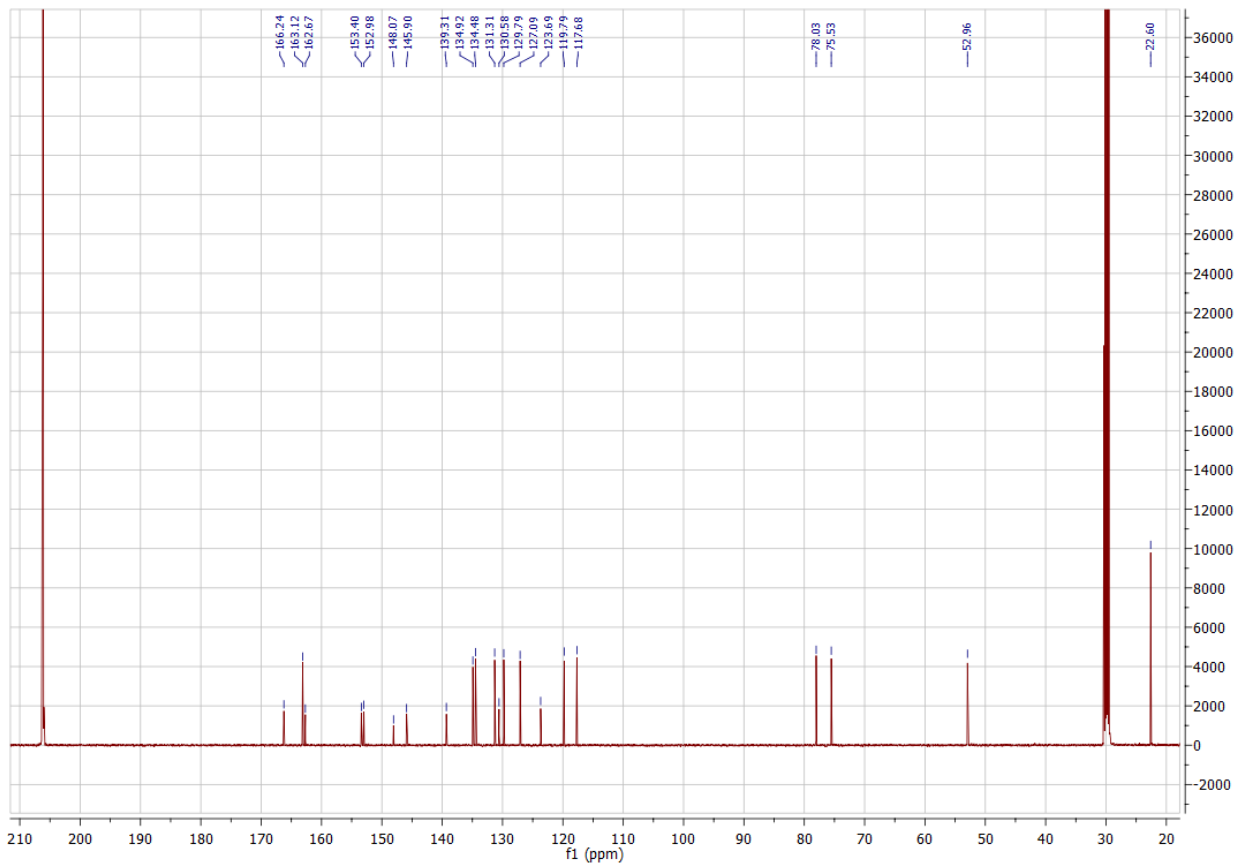
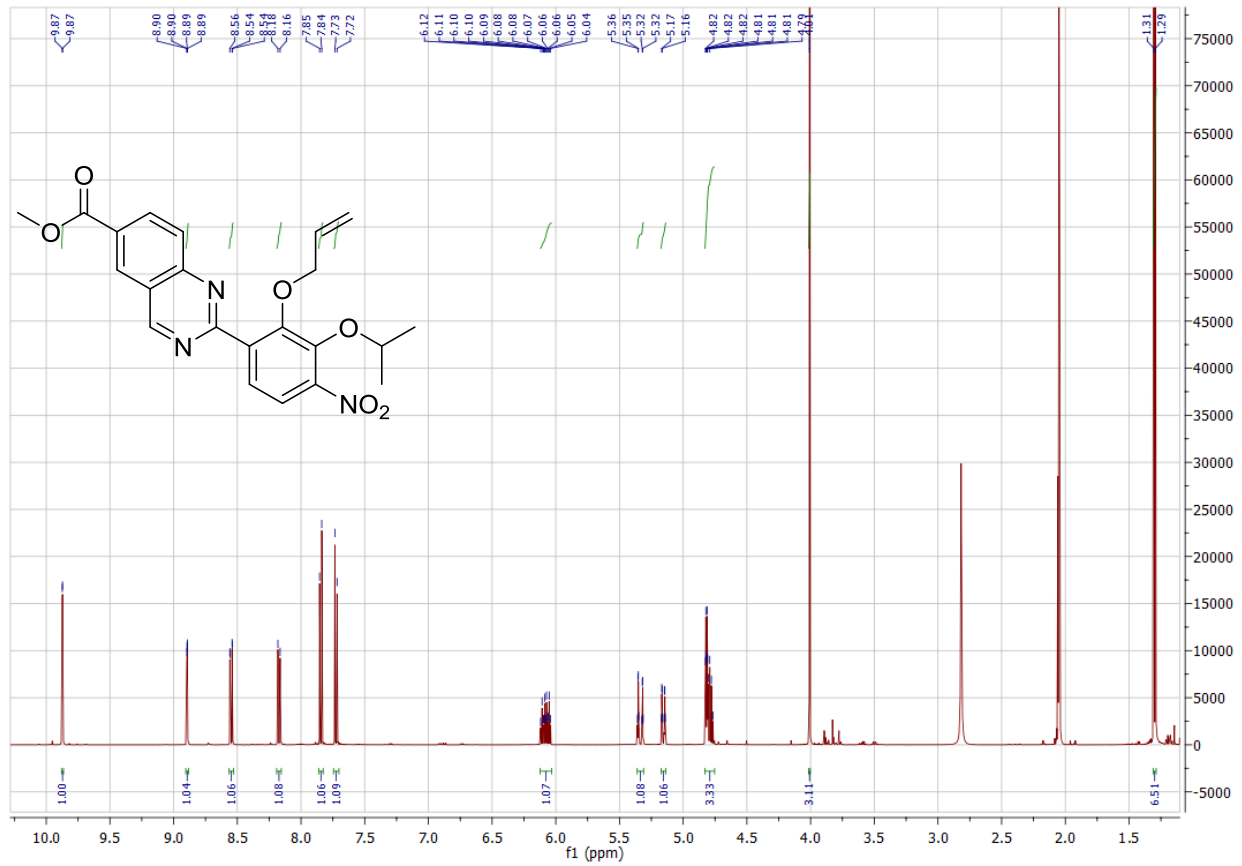
# 1-Allyl-7-nitro-1H-benzo[d]imidazole-4-carboxylic acid (87b)



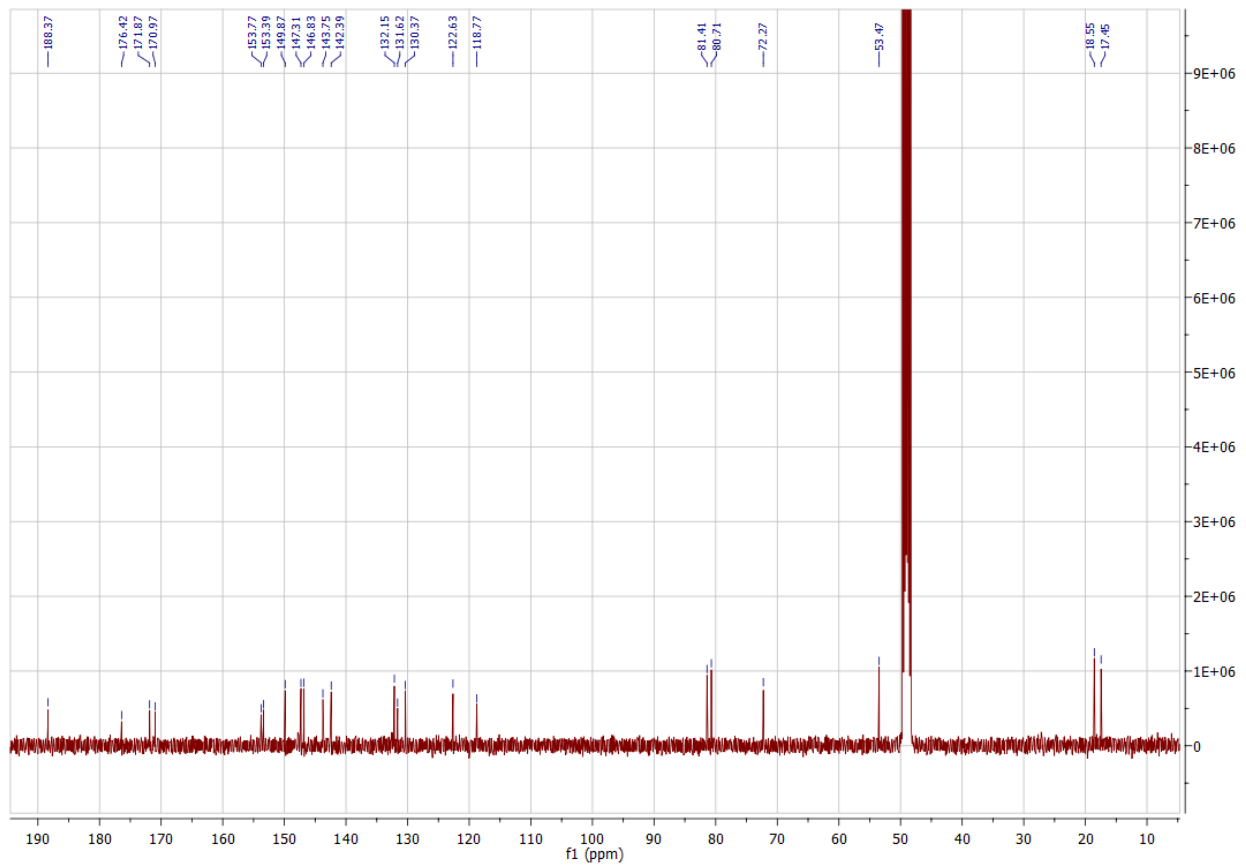
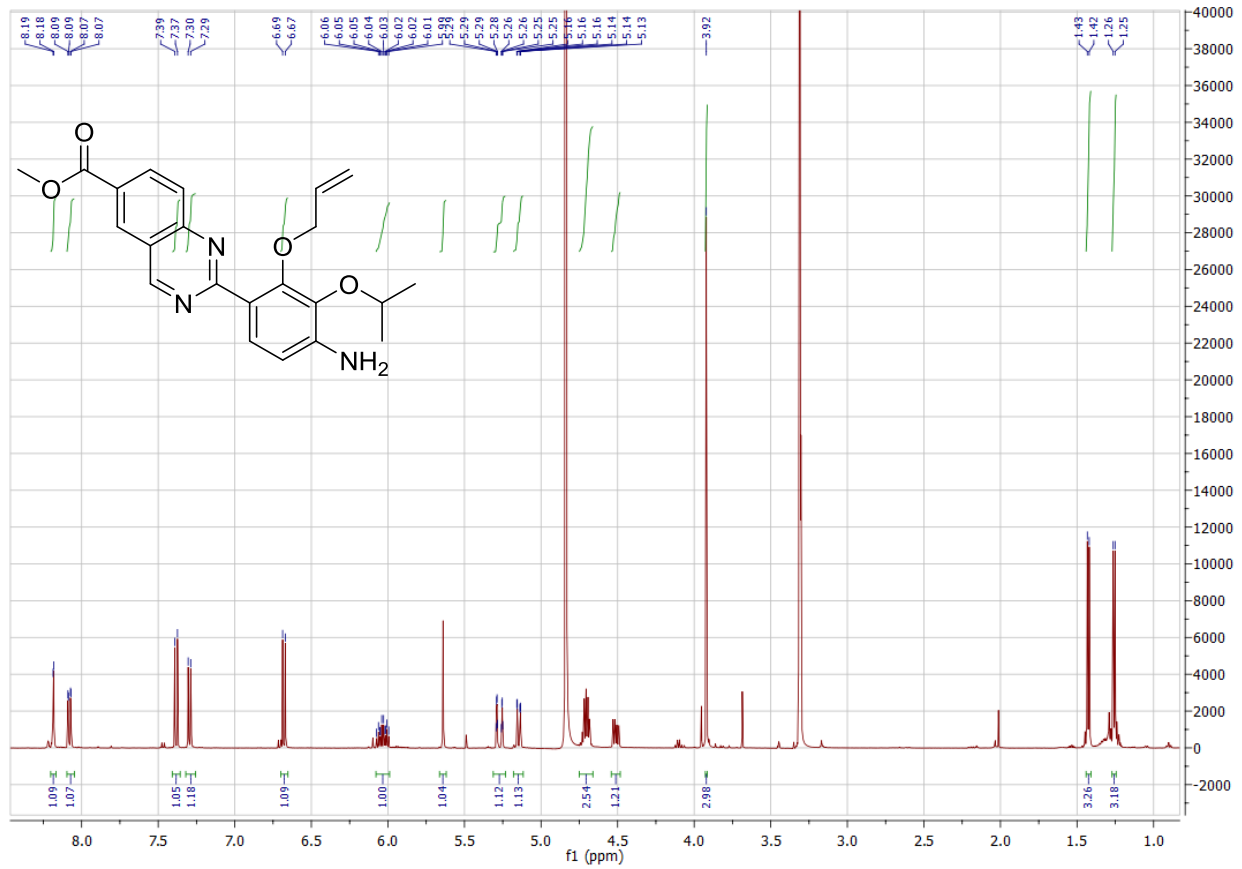
# Methyl 4-amino-3-formylbenzoate (76)



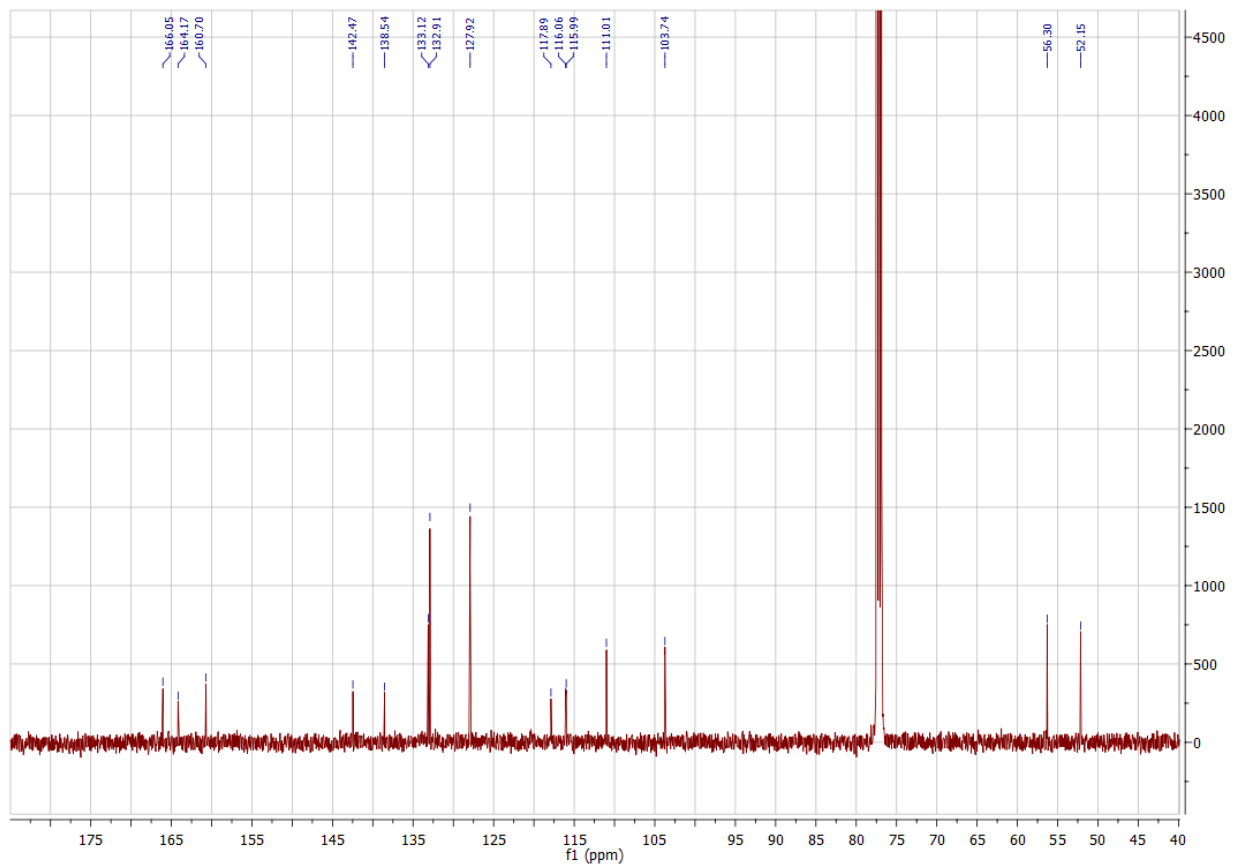
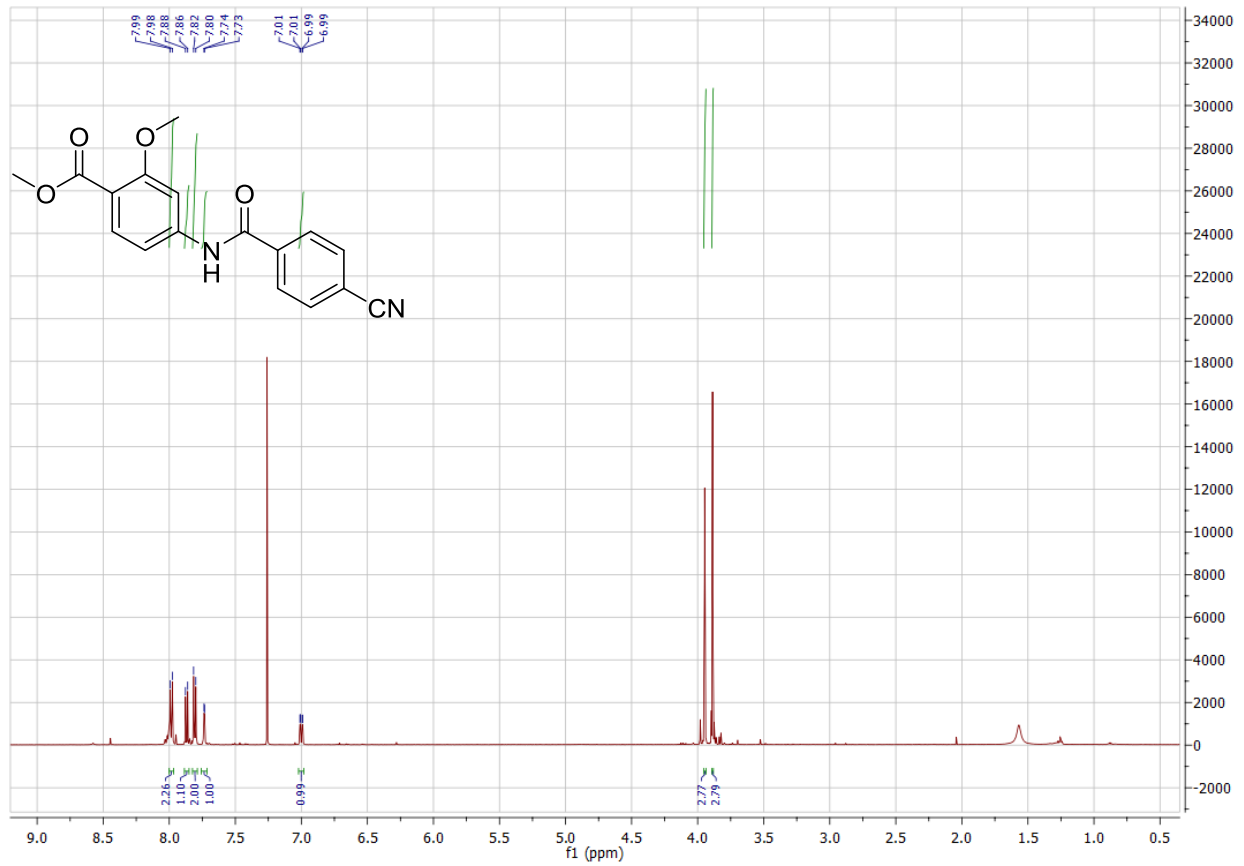
# Methyl 2-(2-(allyloxy)-3-isopropoxy-4-nitrophenyl)quinazoline-6-carboxylate (77)



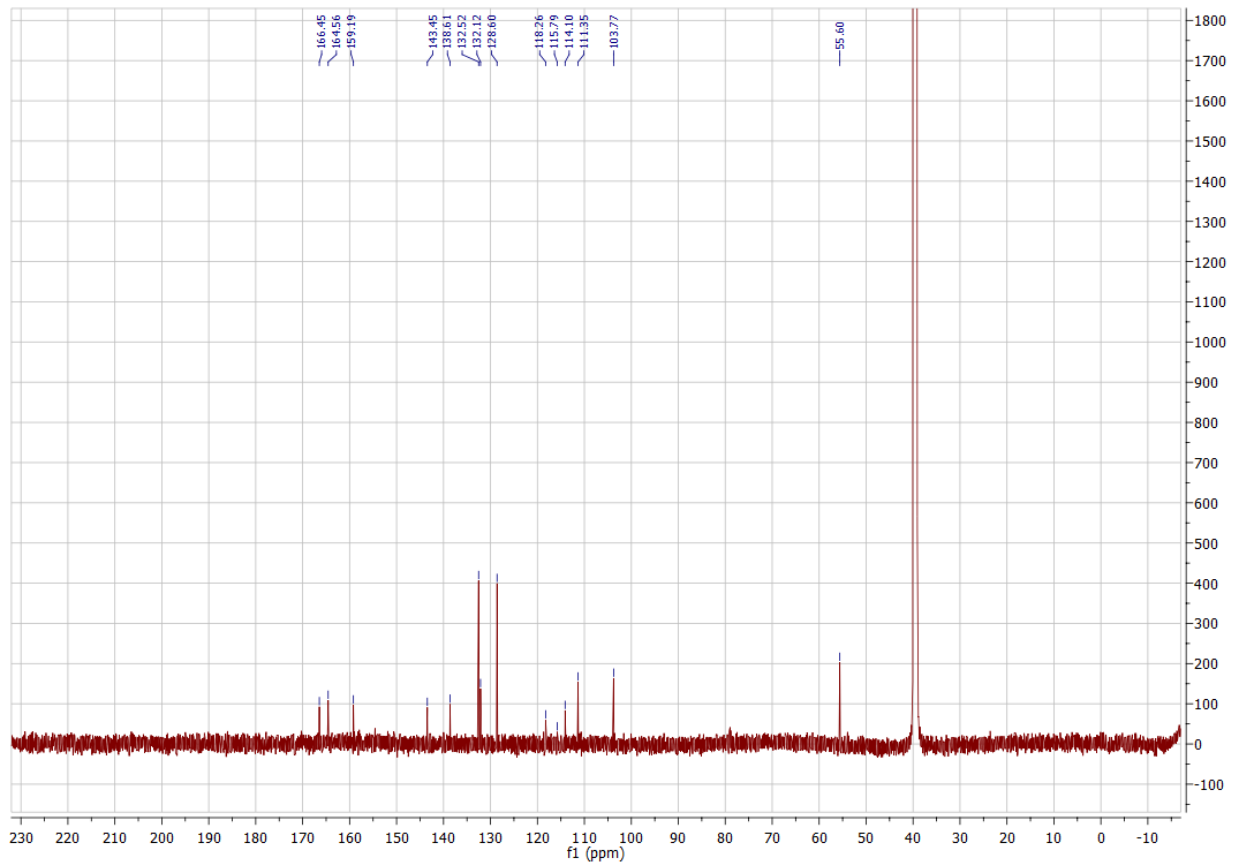
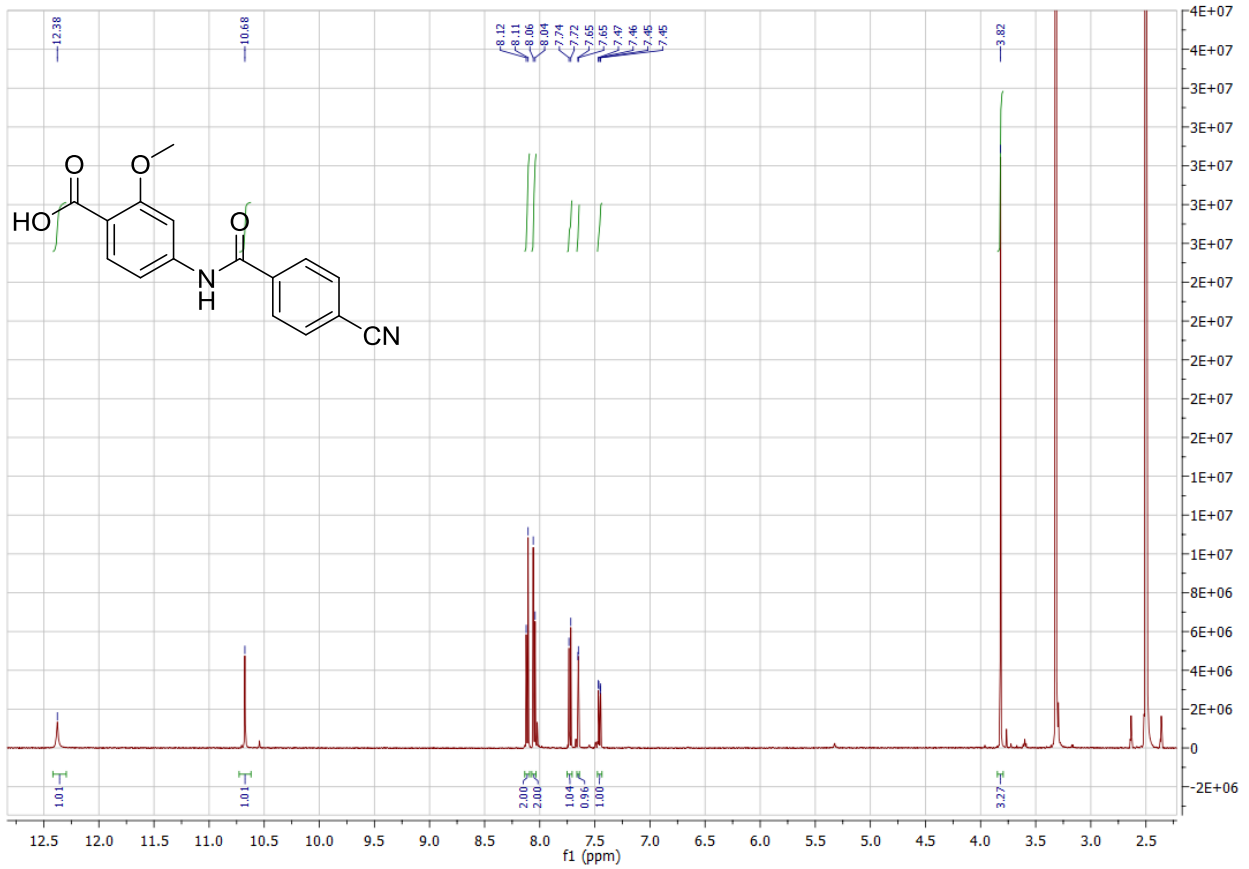
# Methyl 2-(2-(allyloxy)-4-amino-3-isopropoxyphenyl)quinazoline-6-carboxylate (78)



# Methyl 4-(4-cyanobenzamido)-2-methoxybenzoate (1)

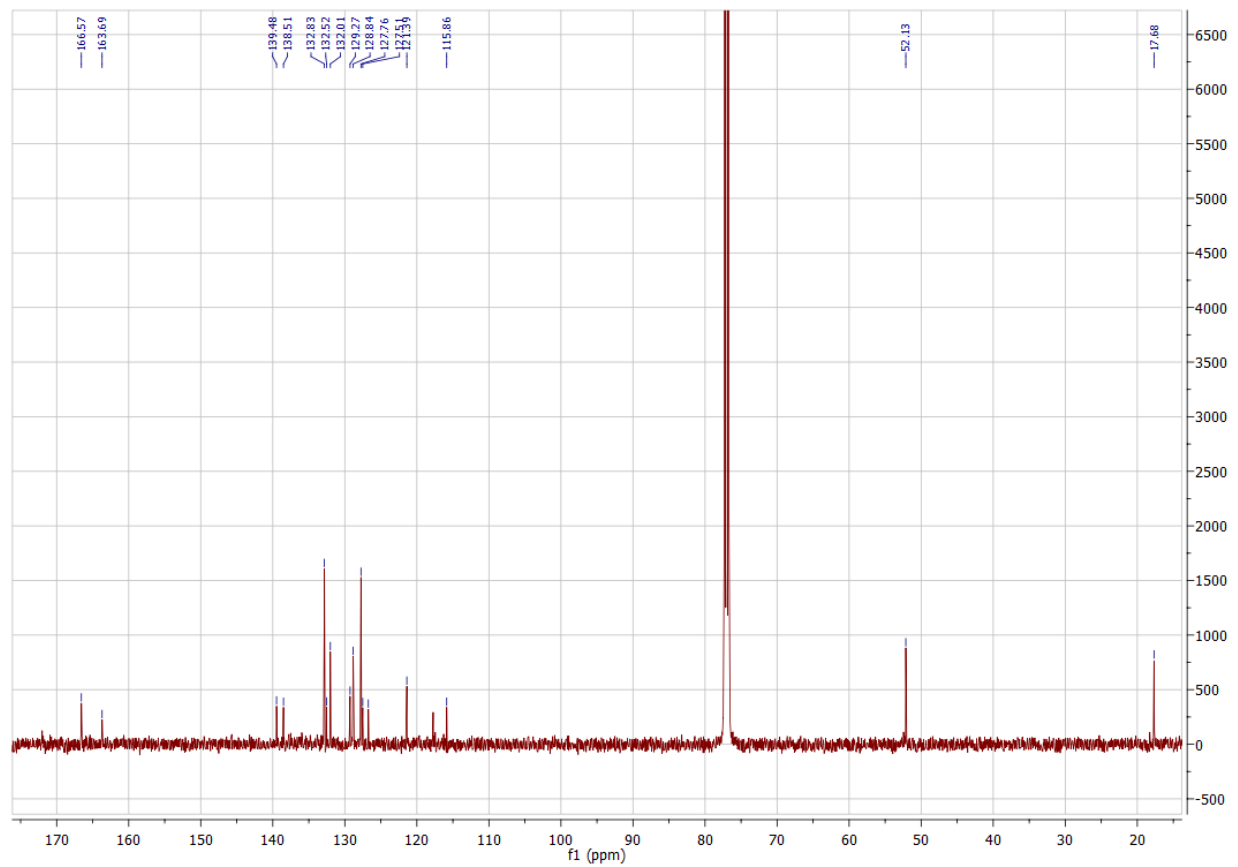
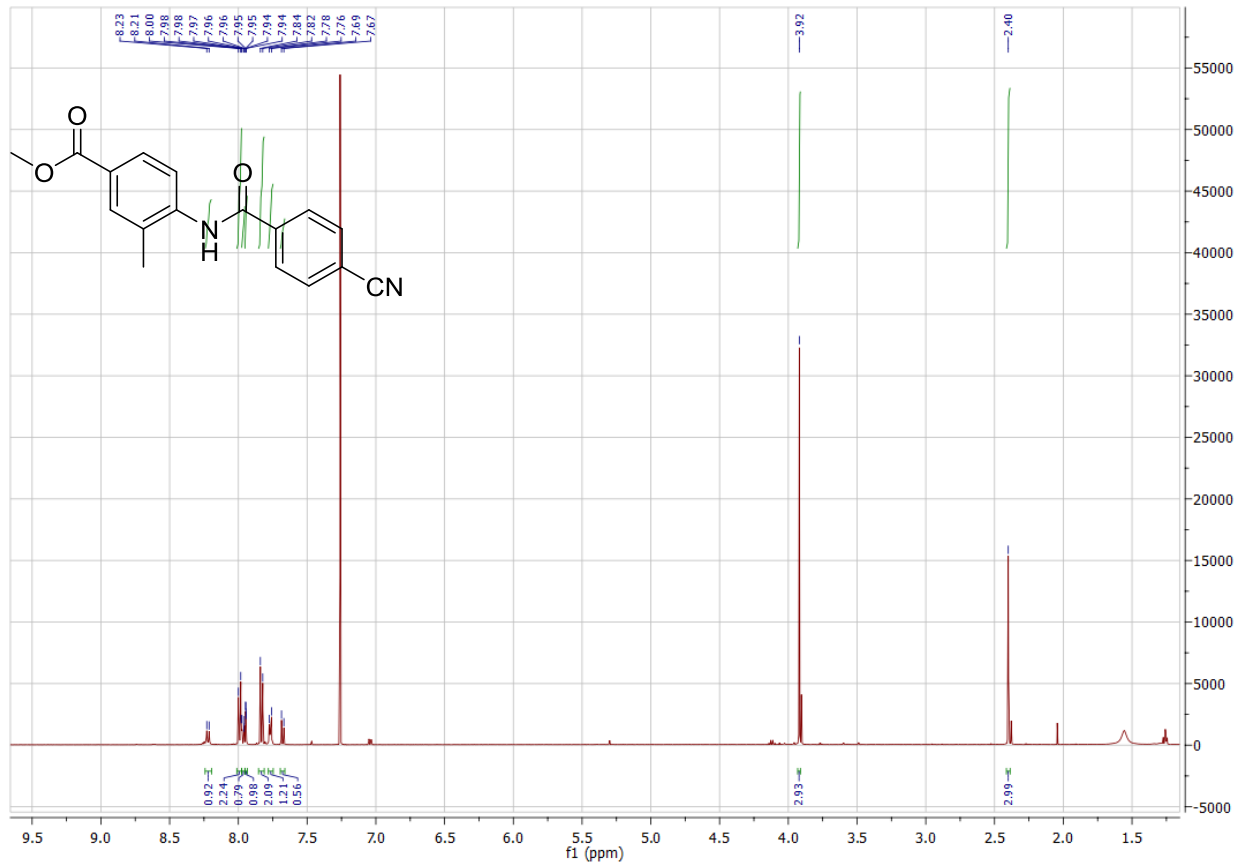


# 4-(4-cyanobenzamido)-2-methoxybenzoic acid

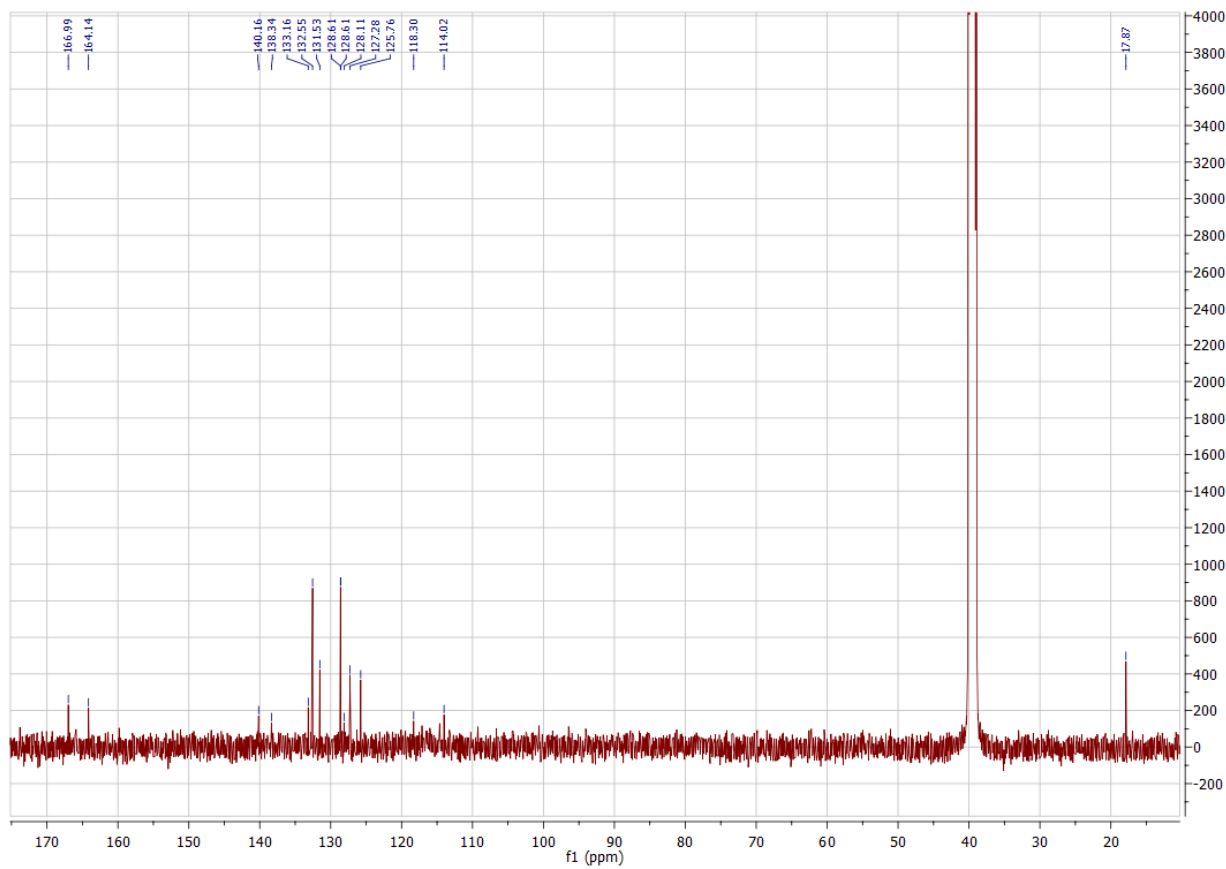
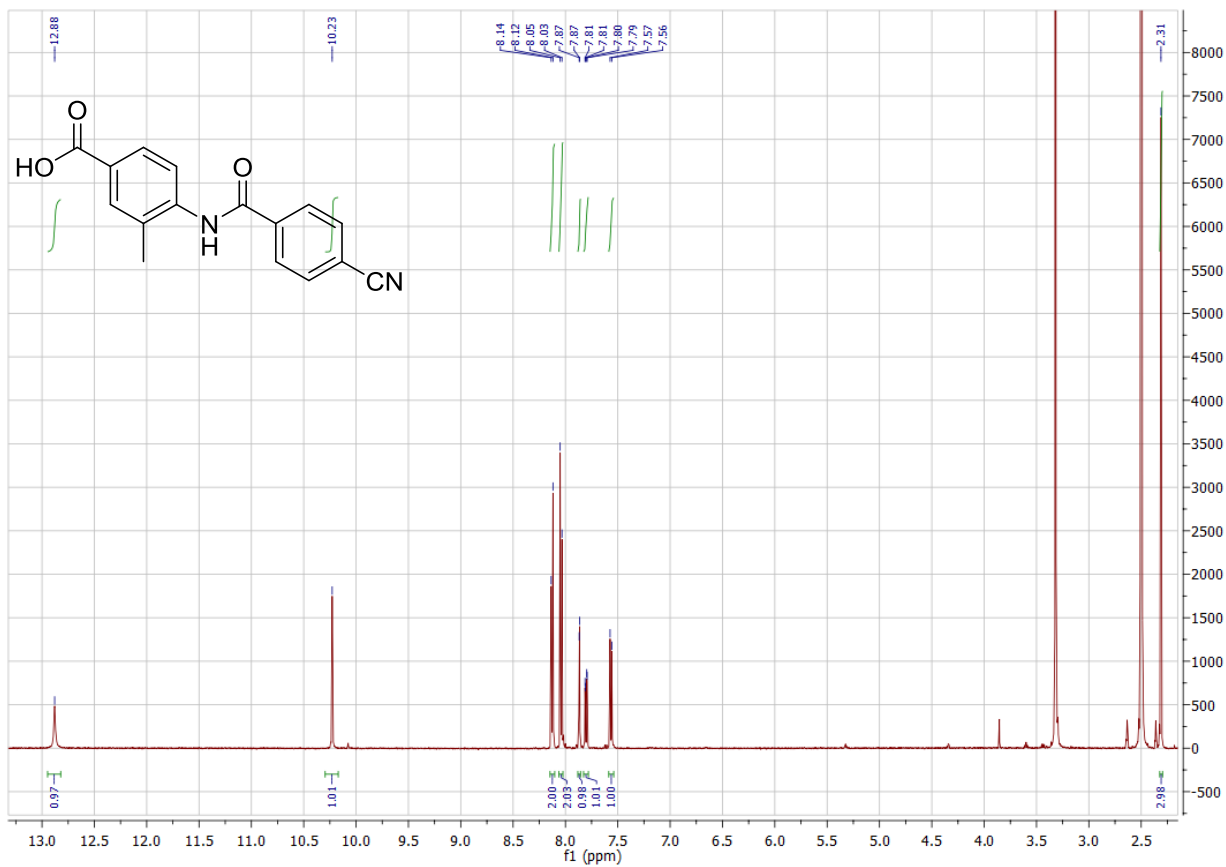




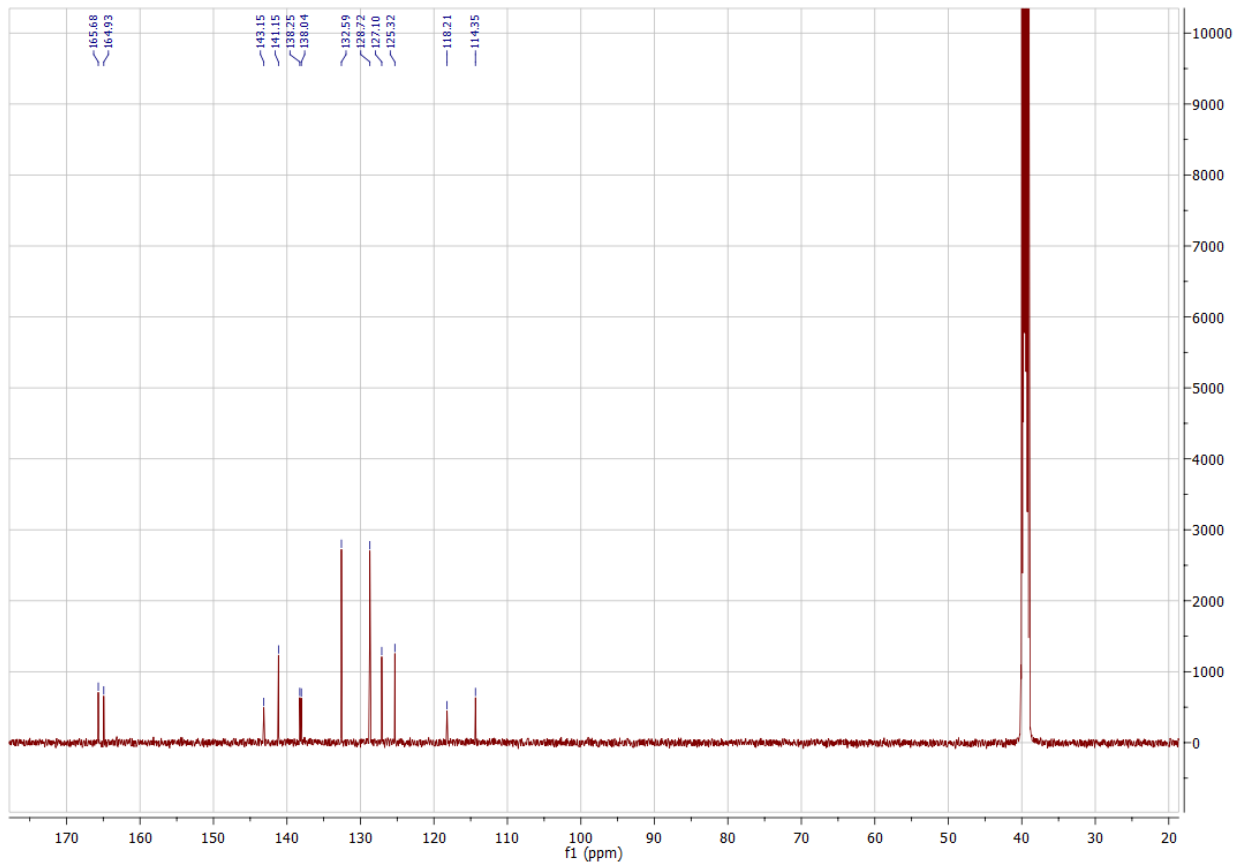
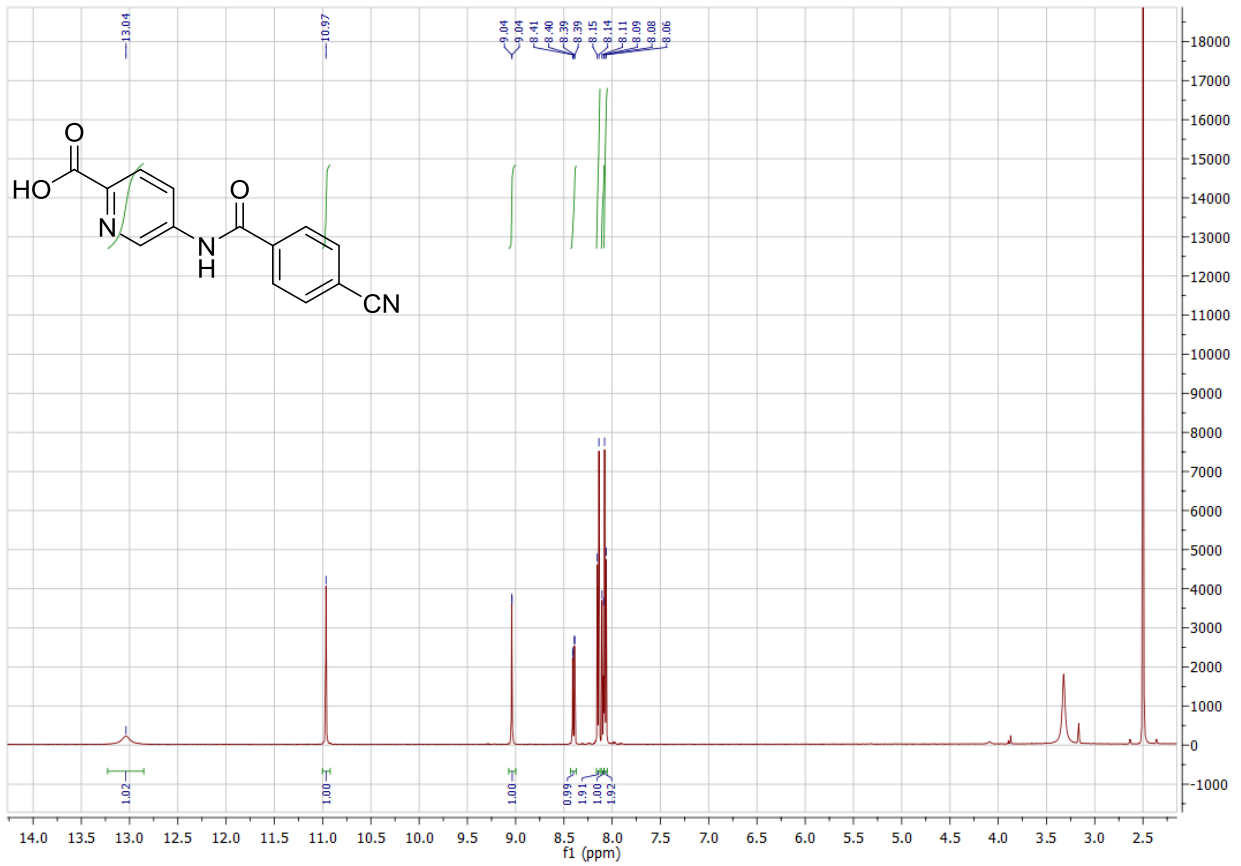
# Methyl 4-(4-cyanobenzamido)-3-methylbenzoate



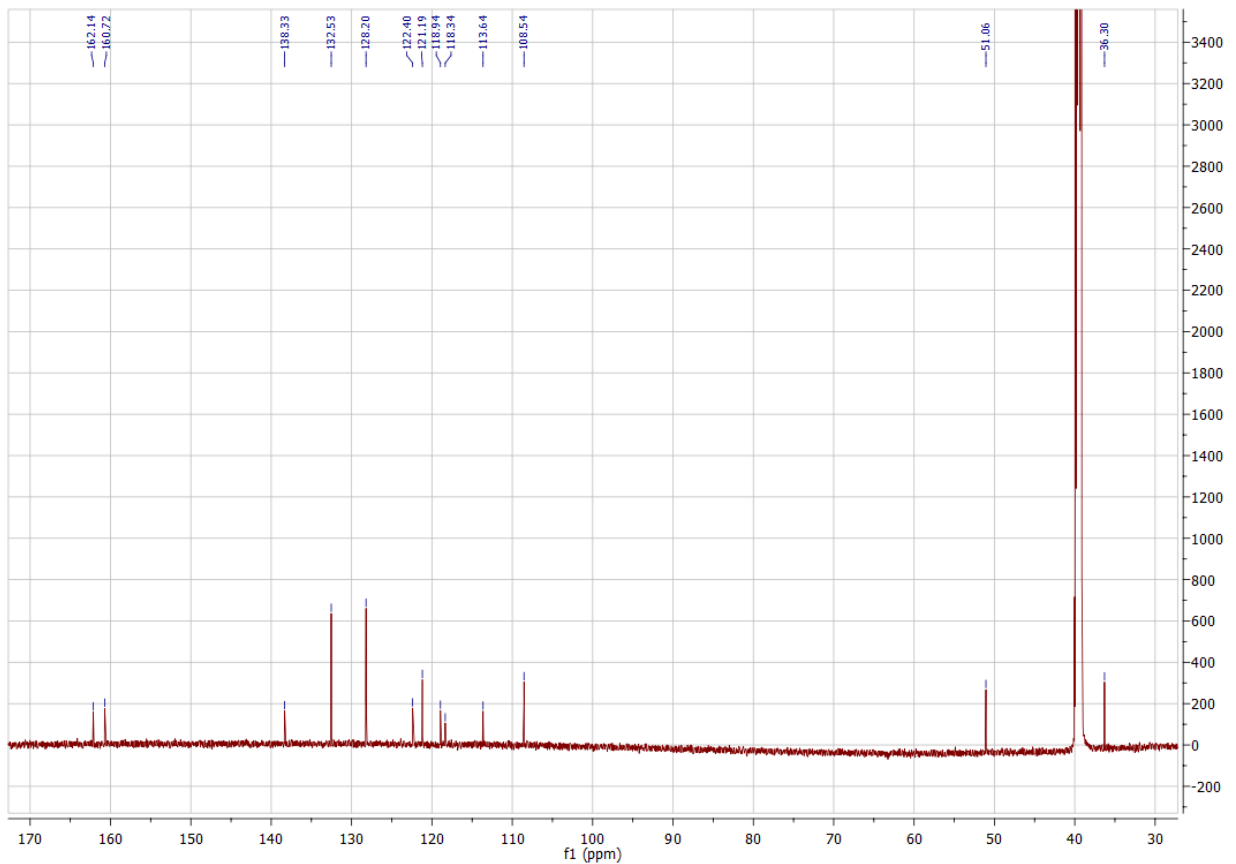
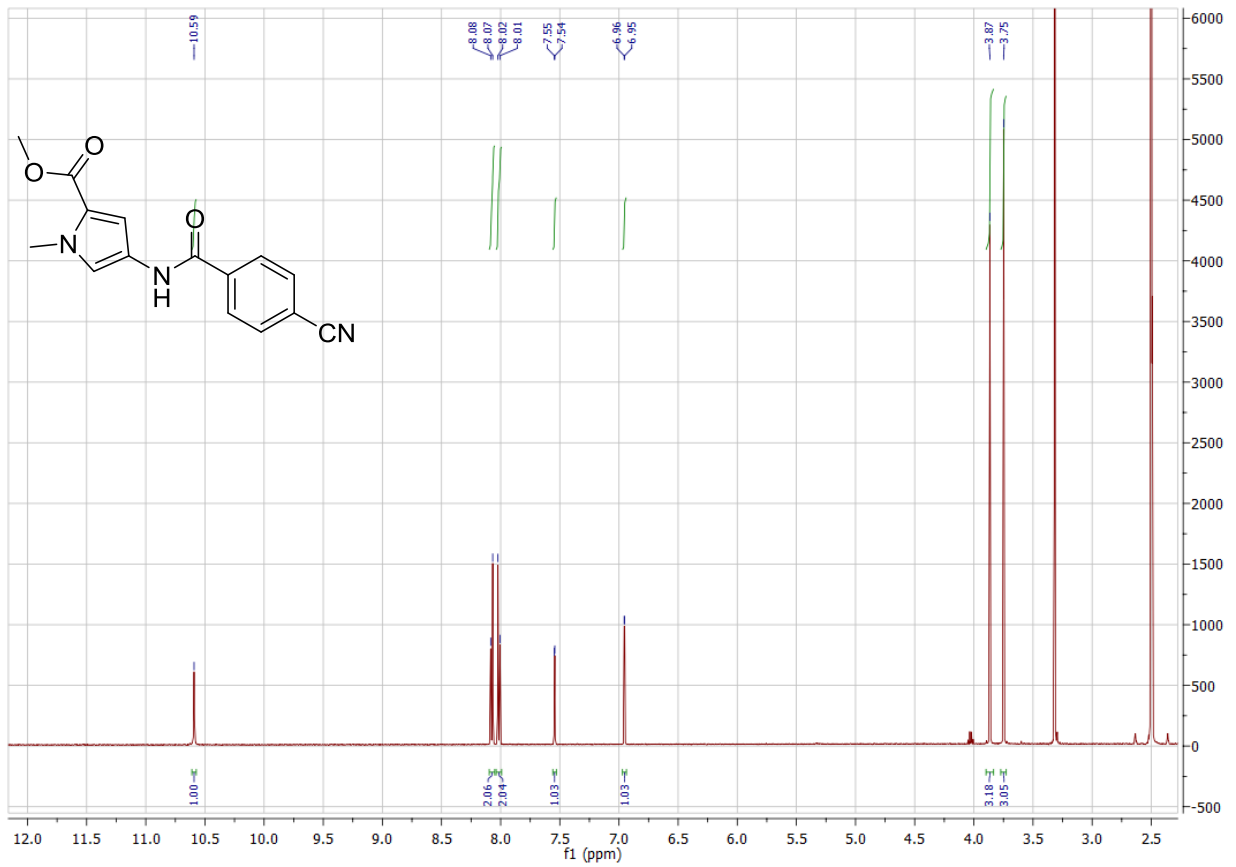
# 4-(4-cyanobenzamido)-3-methylbenzoic acid (18)



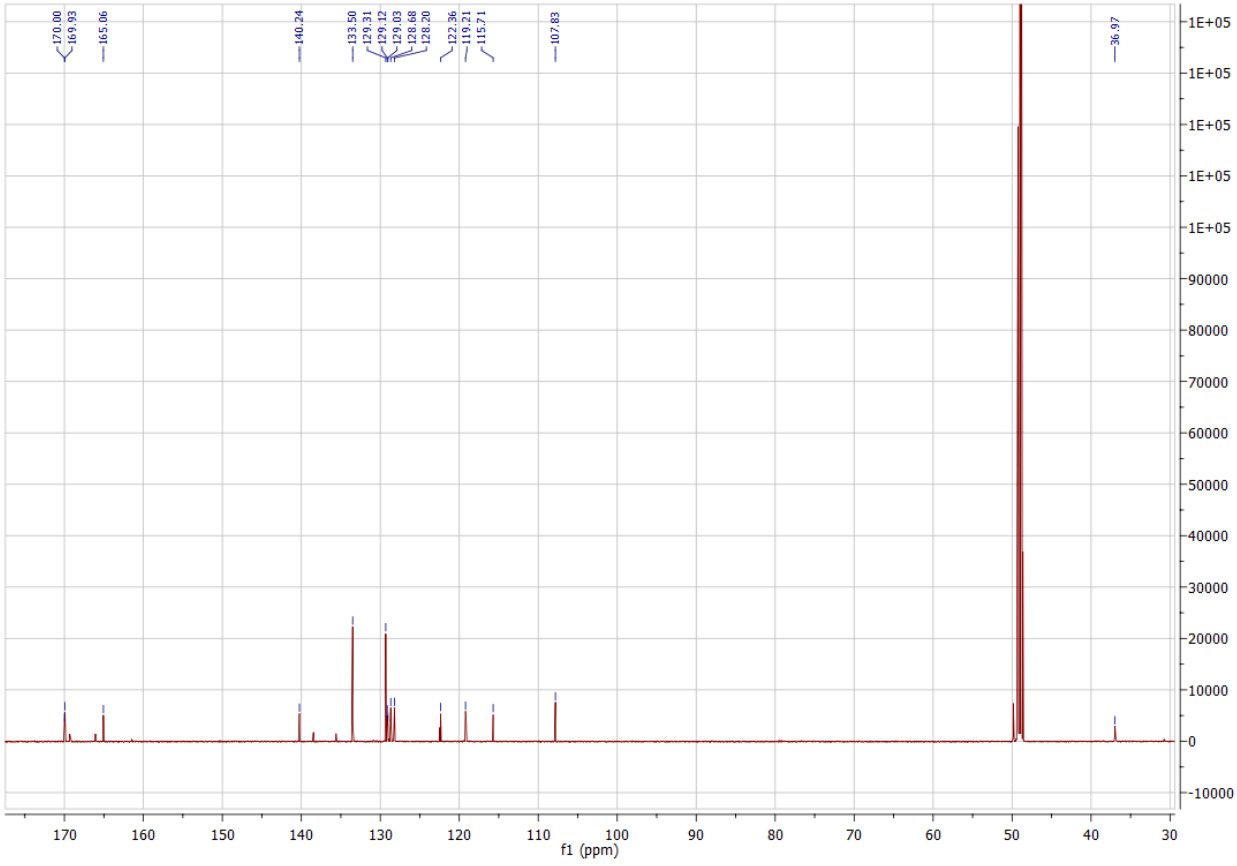
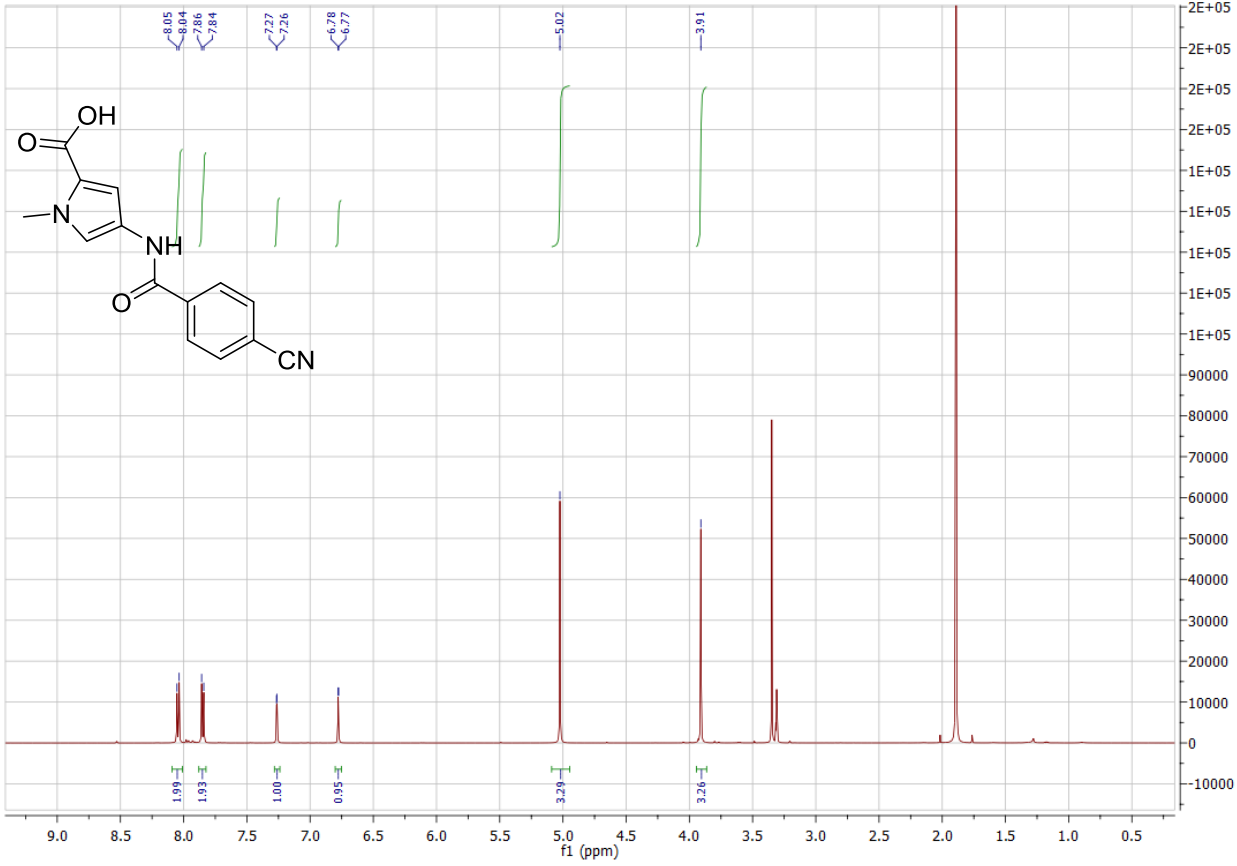
# 5-(4-cyanobenzamido)picolinic acid (9)



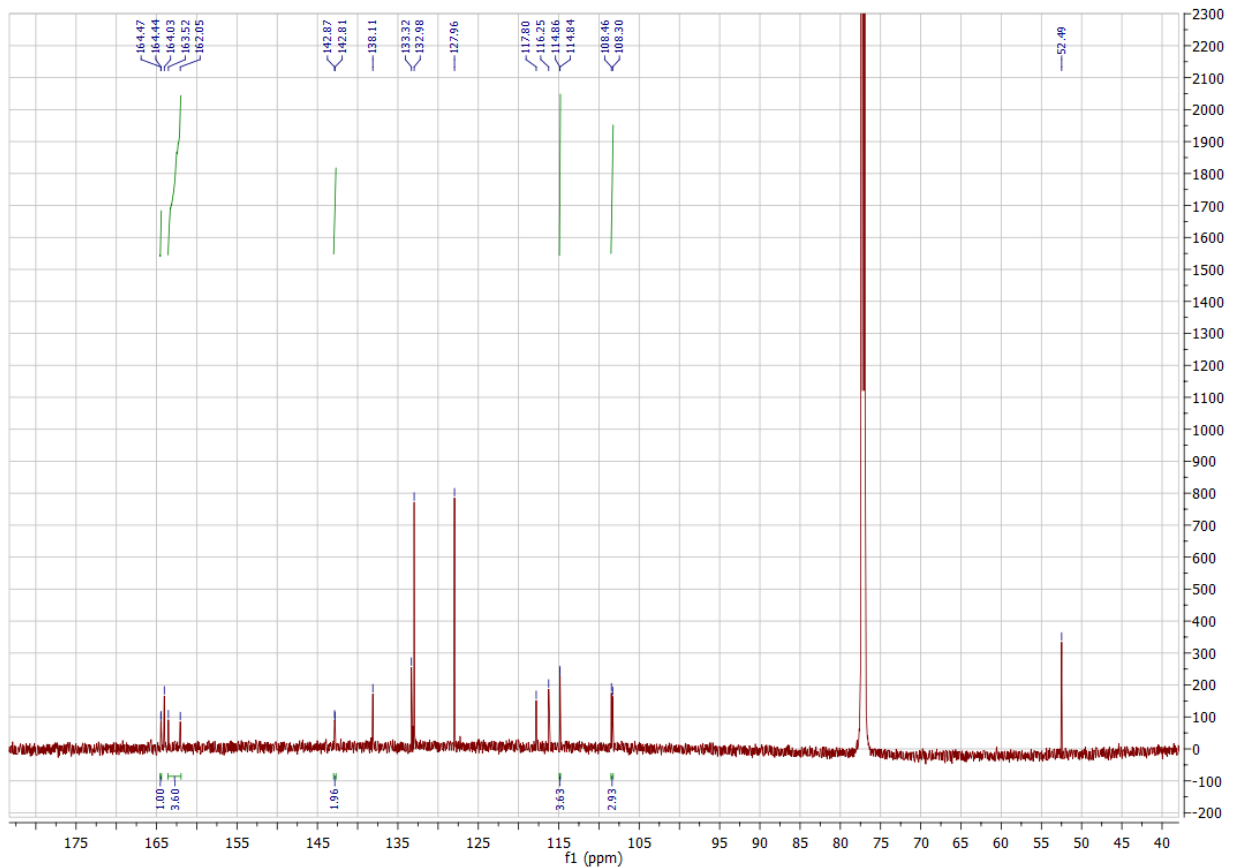
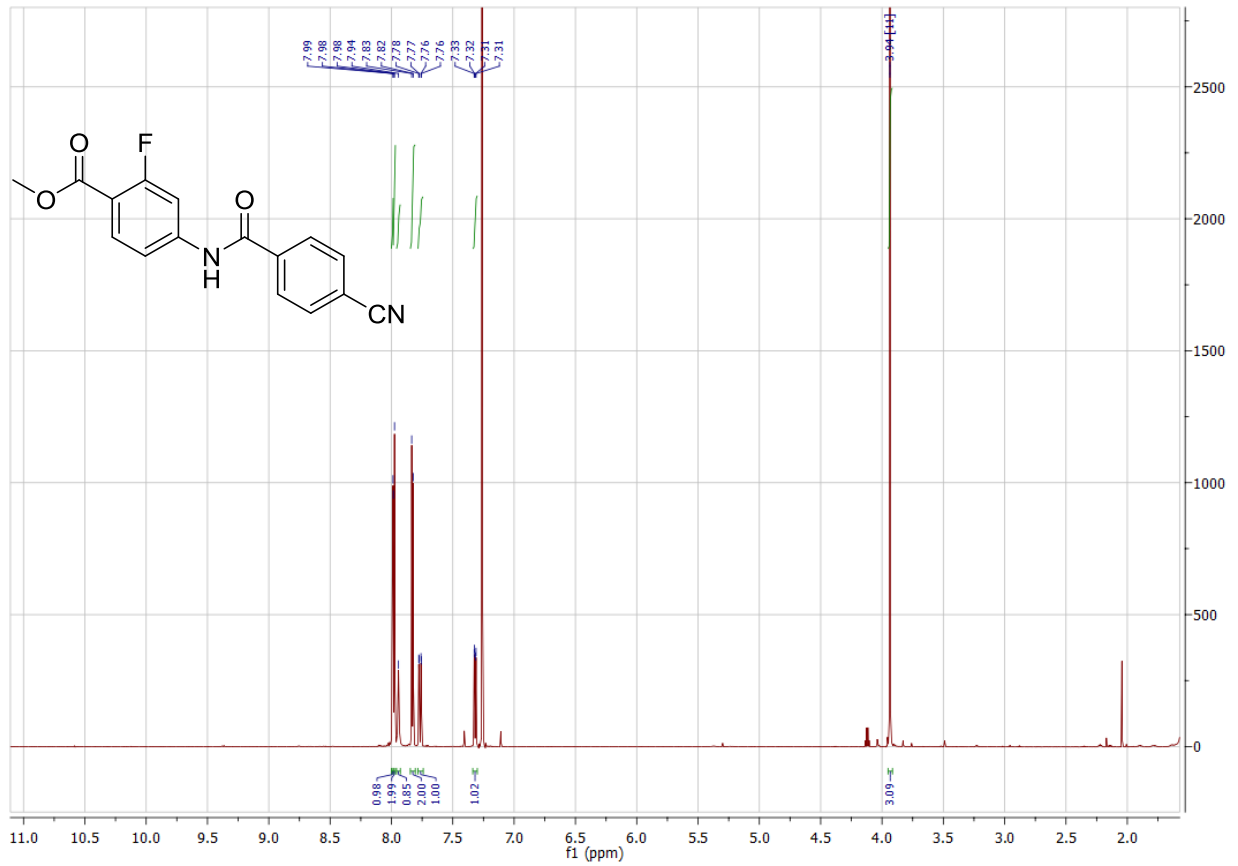
# Methyl 4-(4-cyanobenzamido)-1-methyl-1H-pyrrole-2-carboxylate

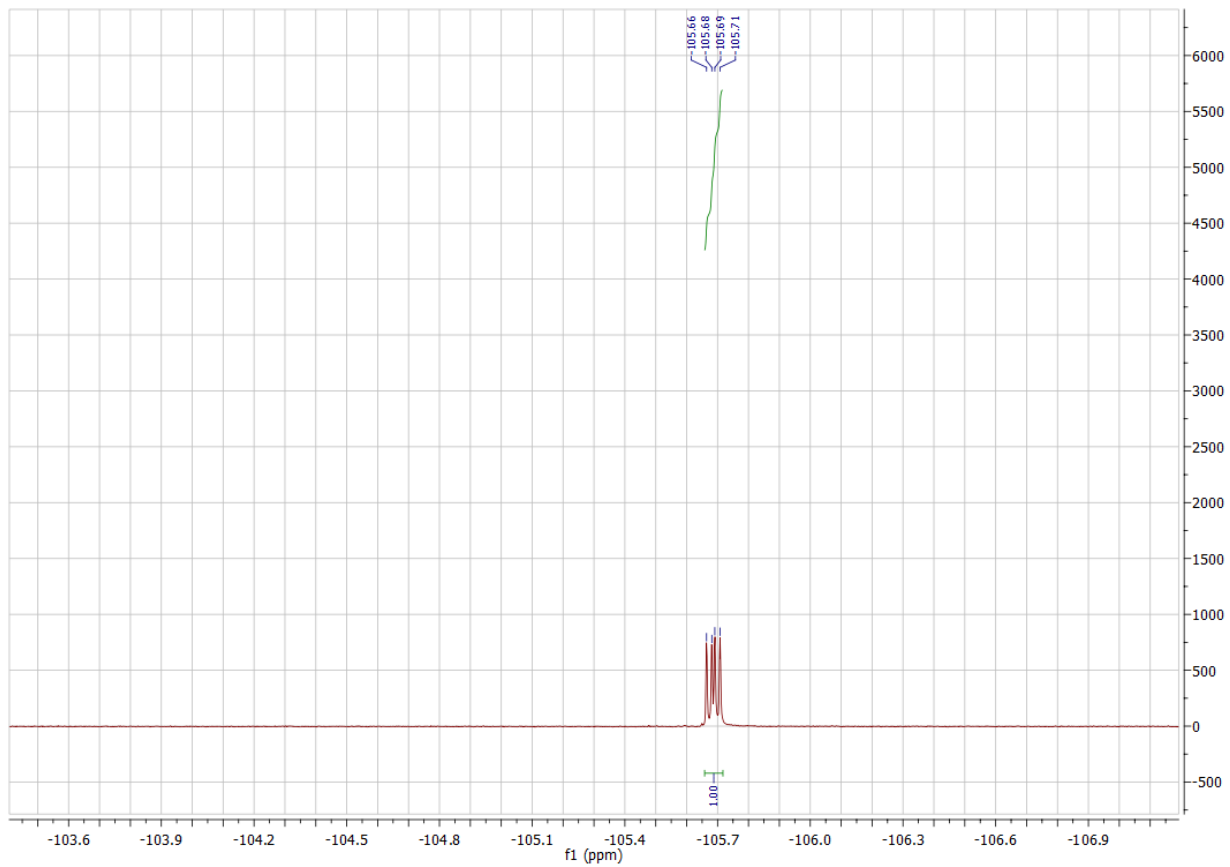


4-(4-cyanobenzamido)-1-methyl-1H-pyrrole-2-carboxylic acid

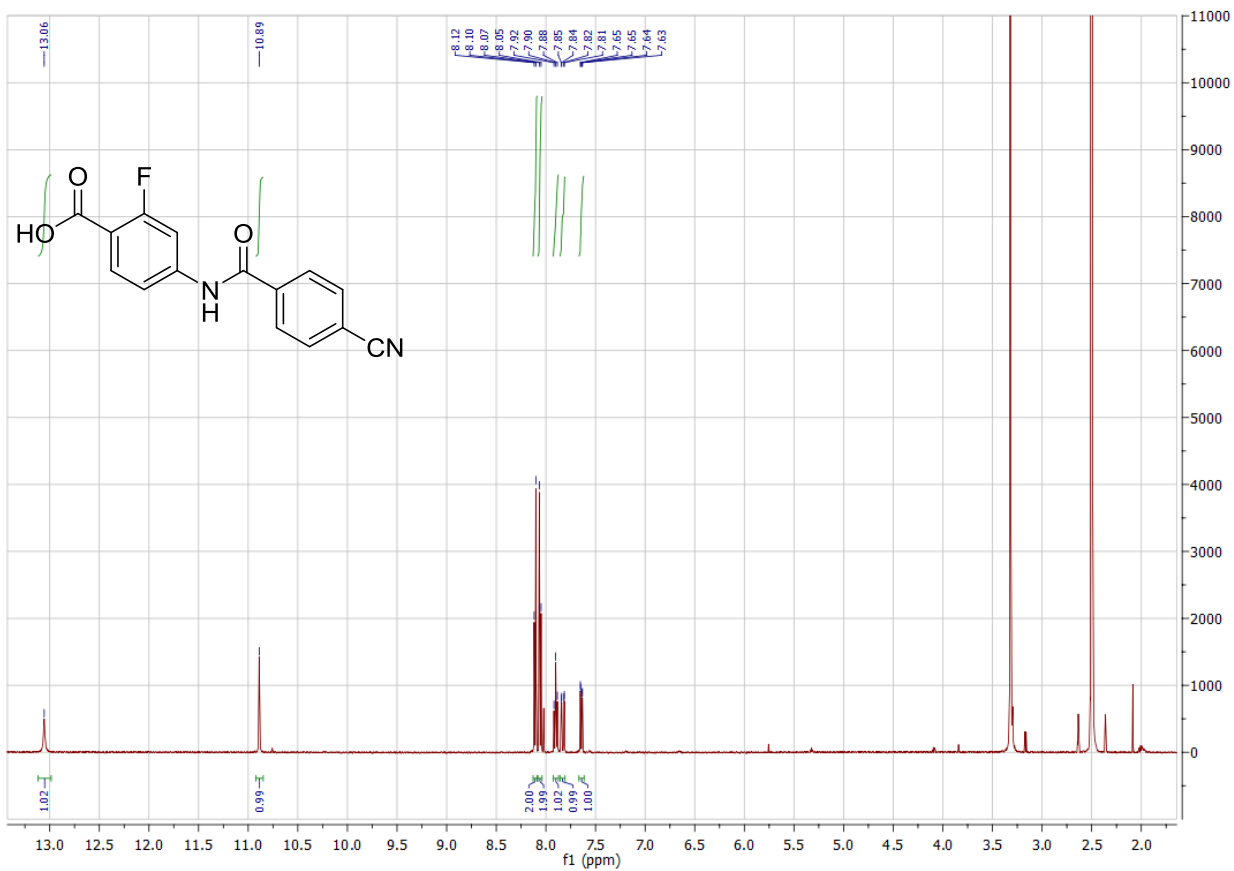


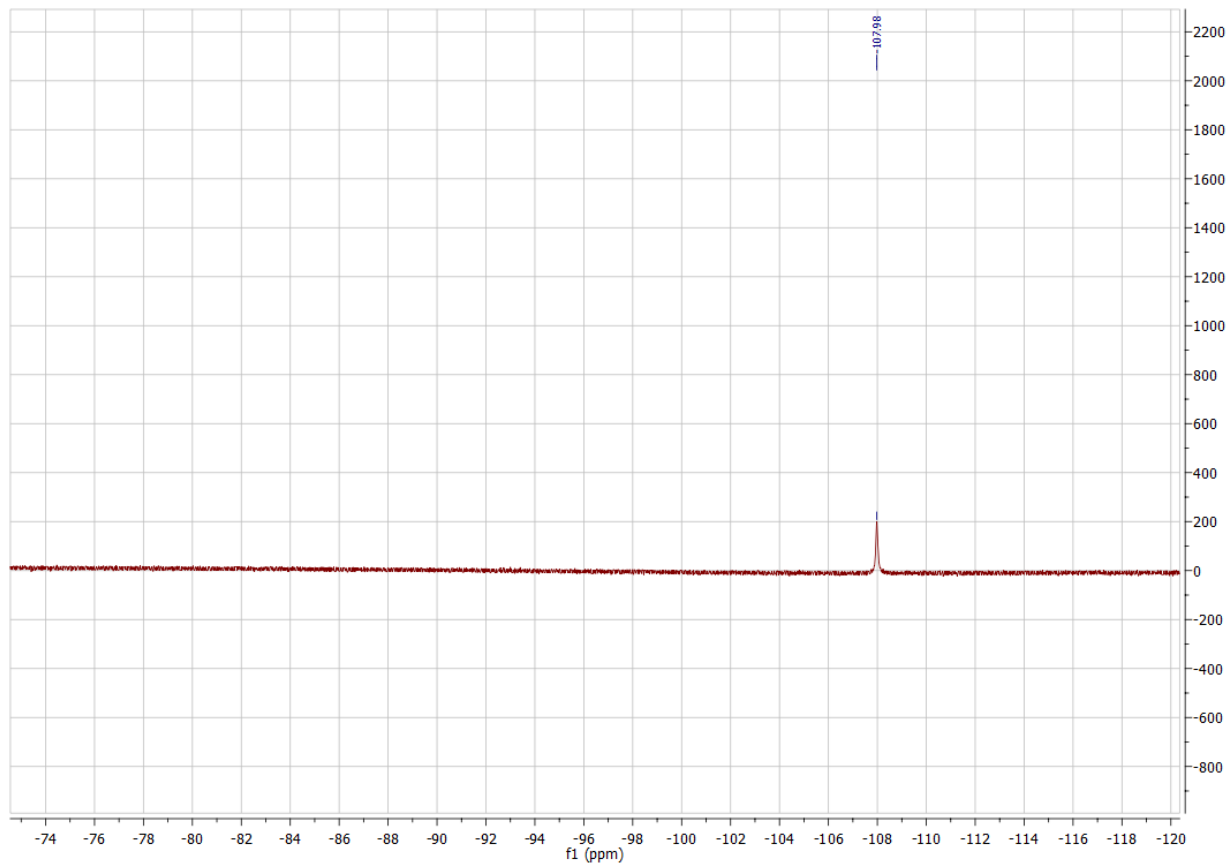
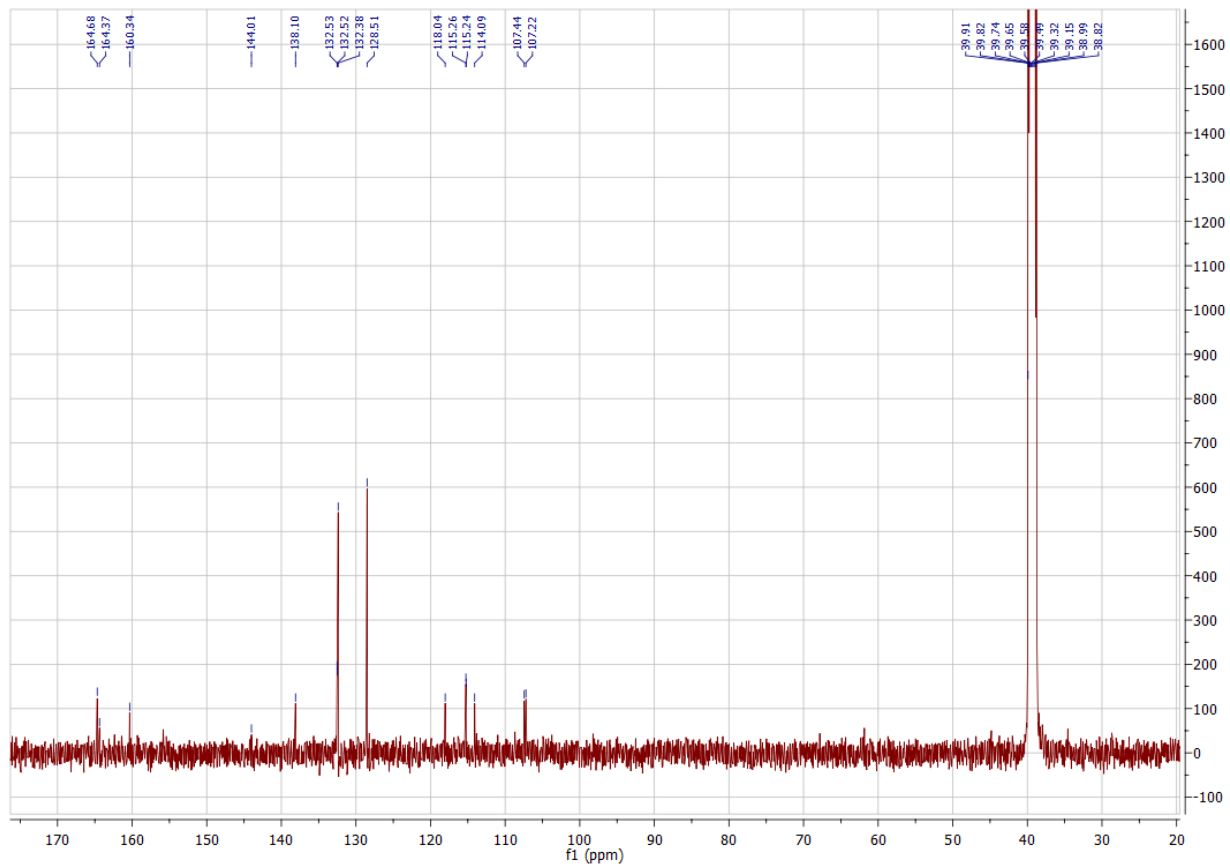
# Methyl 4-(4-cyanobenzamido)-2-fluorobenzoate (2)





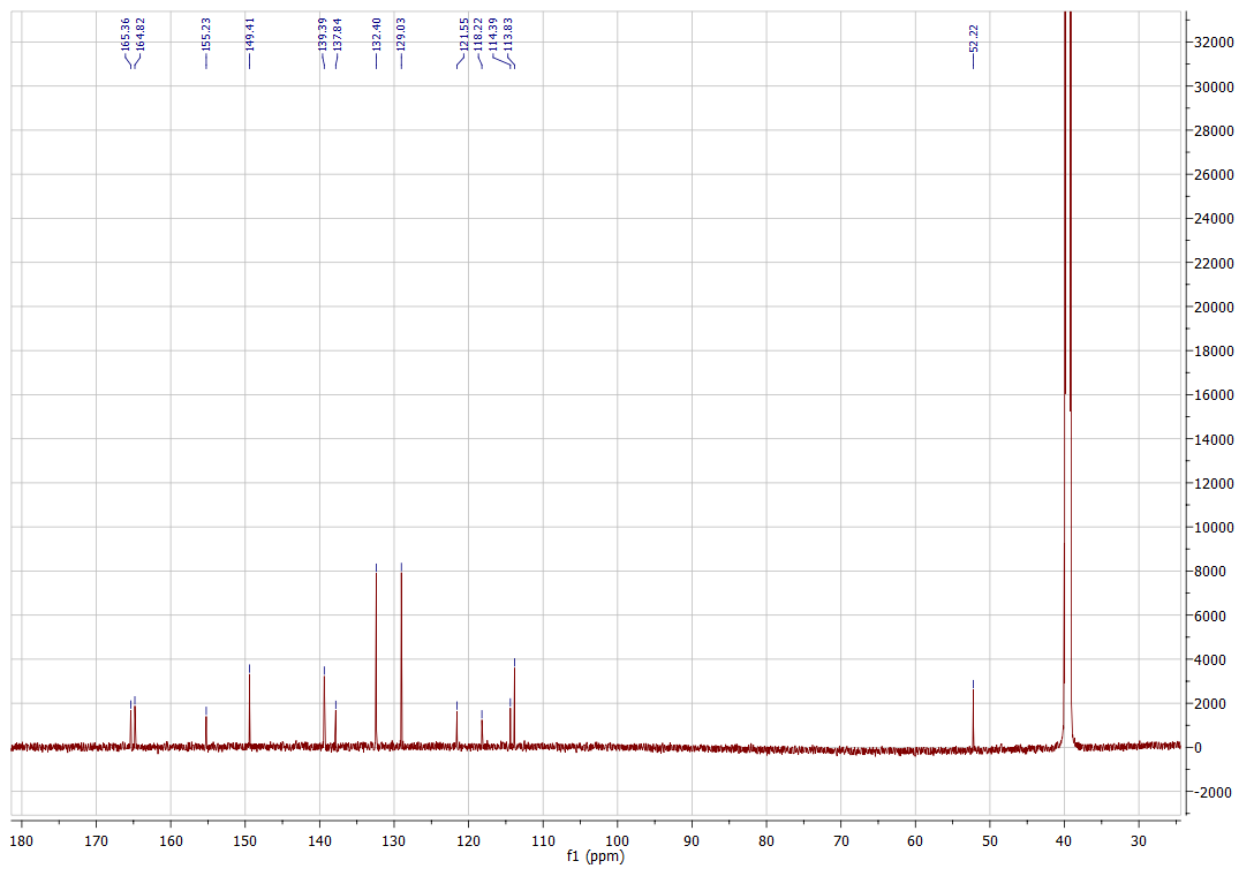
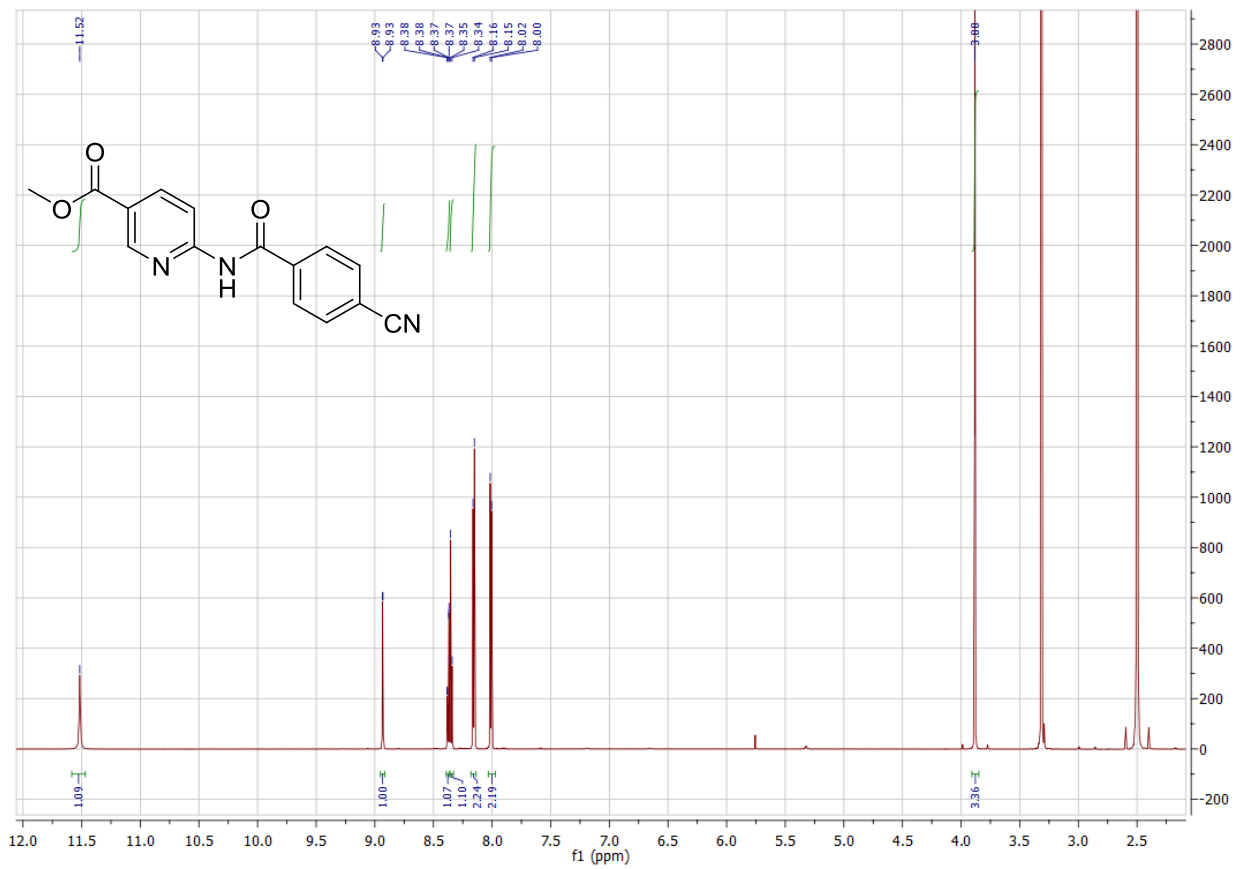
**4-(4-cyanobenzamido)-2-fluorobenzoic acid**



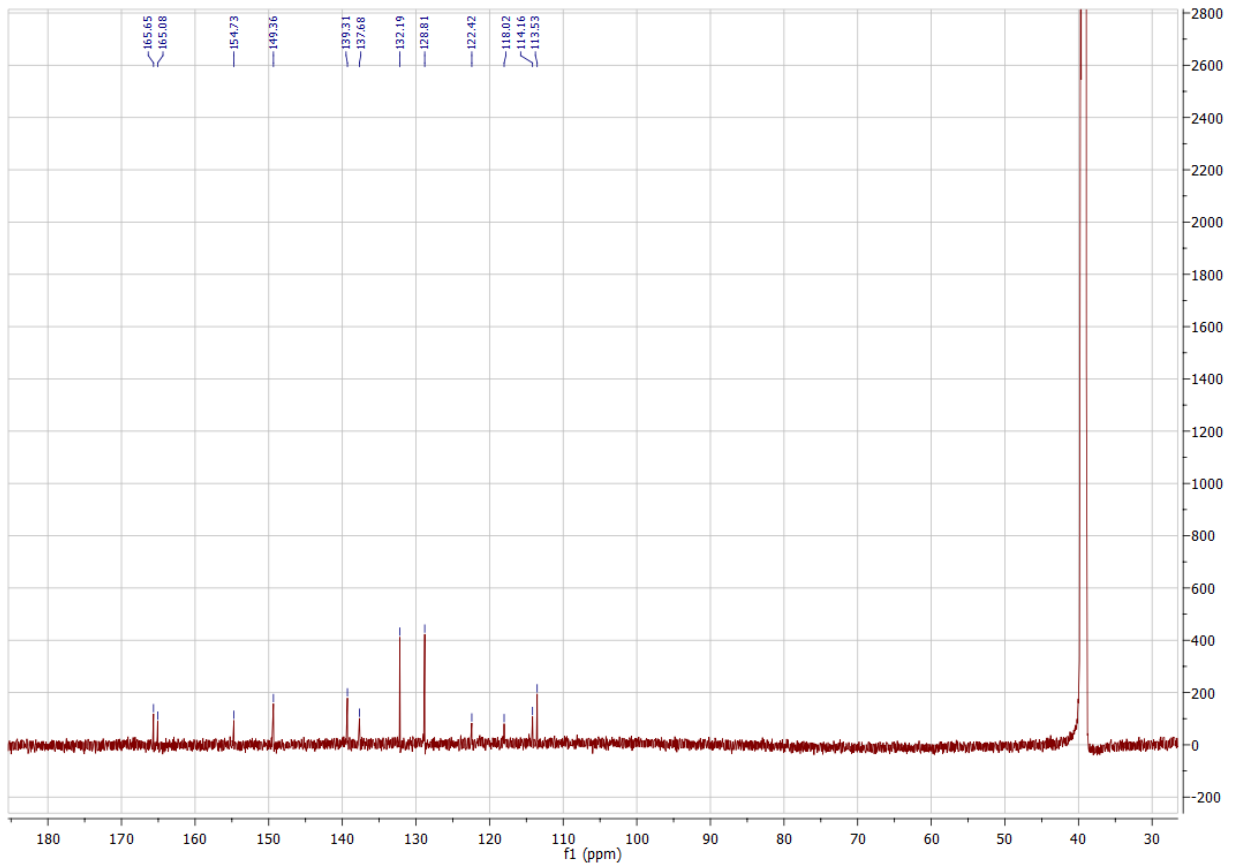
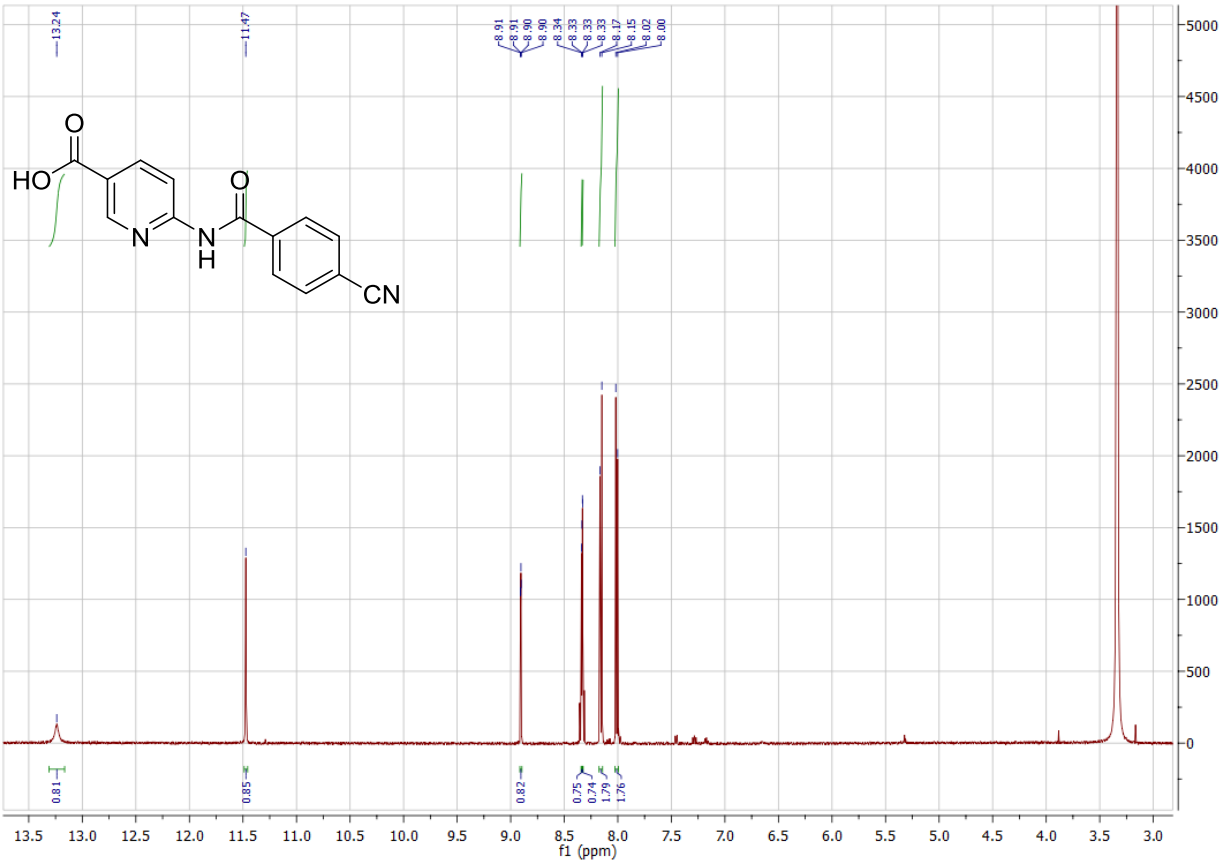




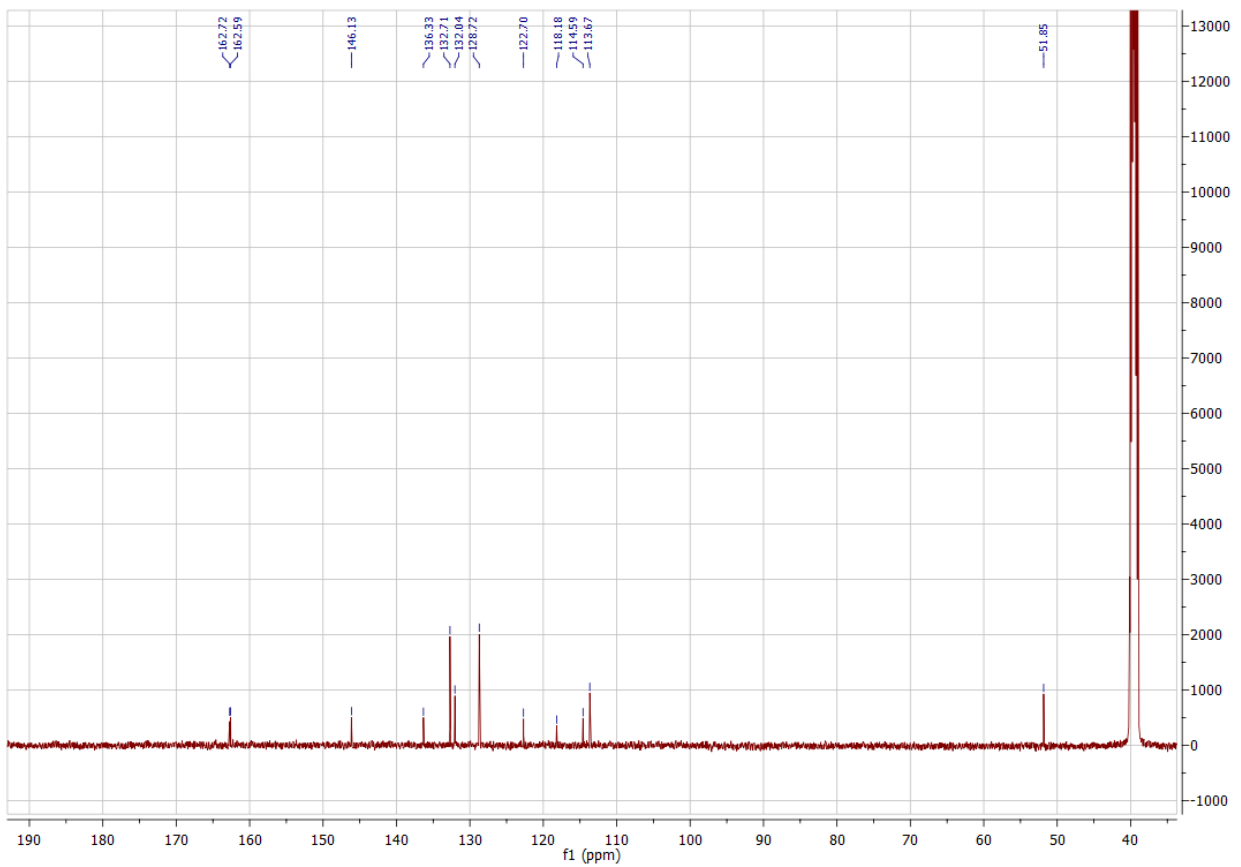
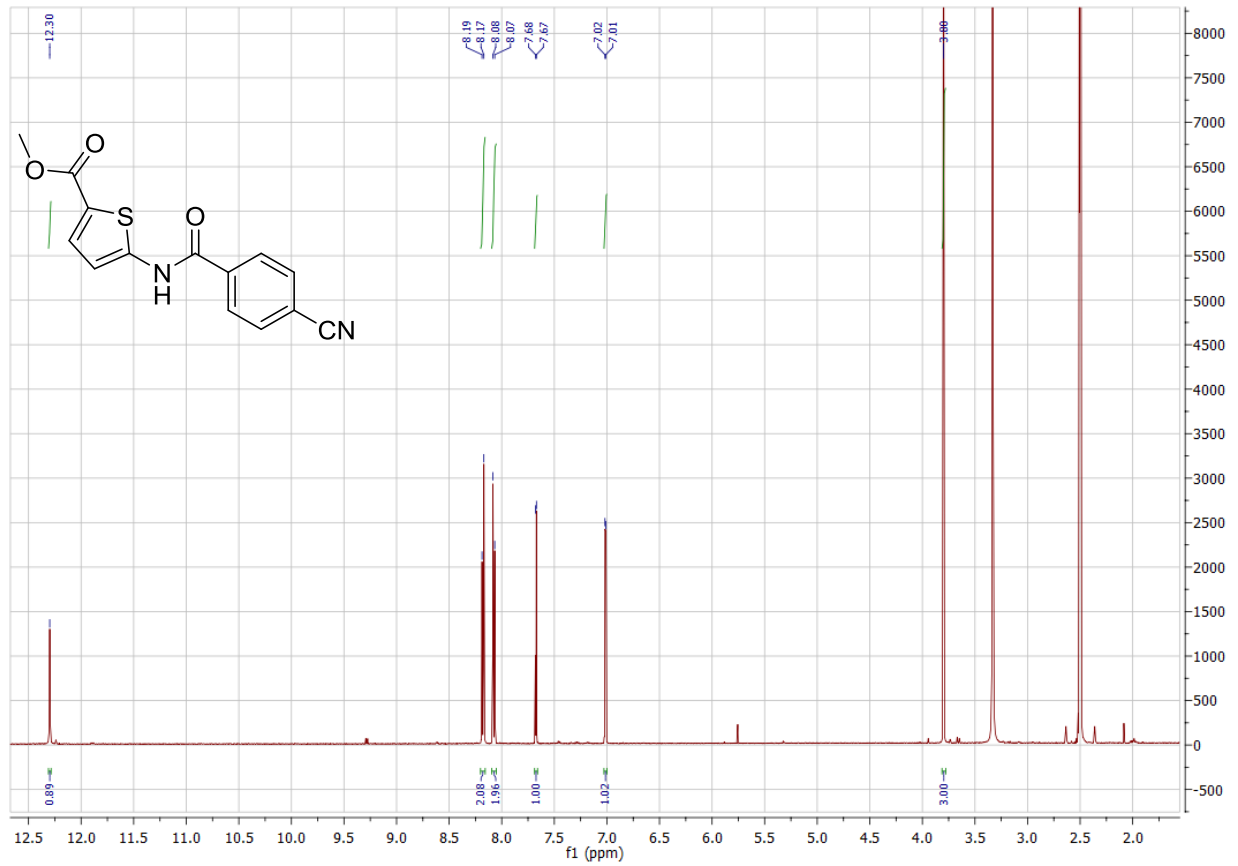
# Methyl 6-(4-cyanobenzamido)nicotinate



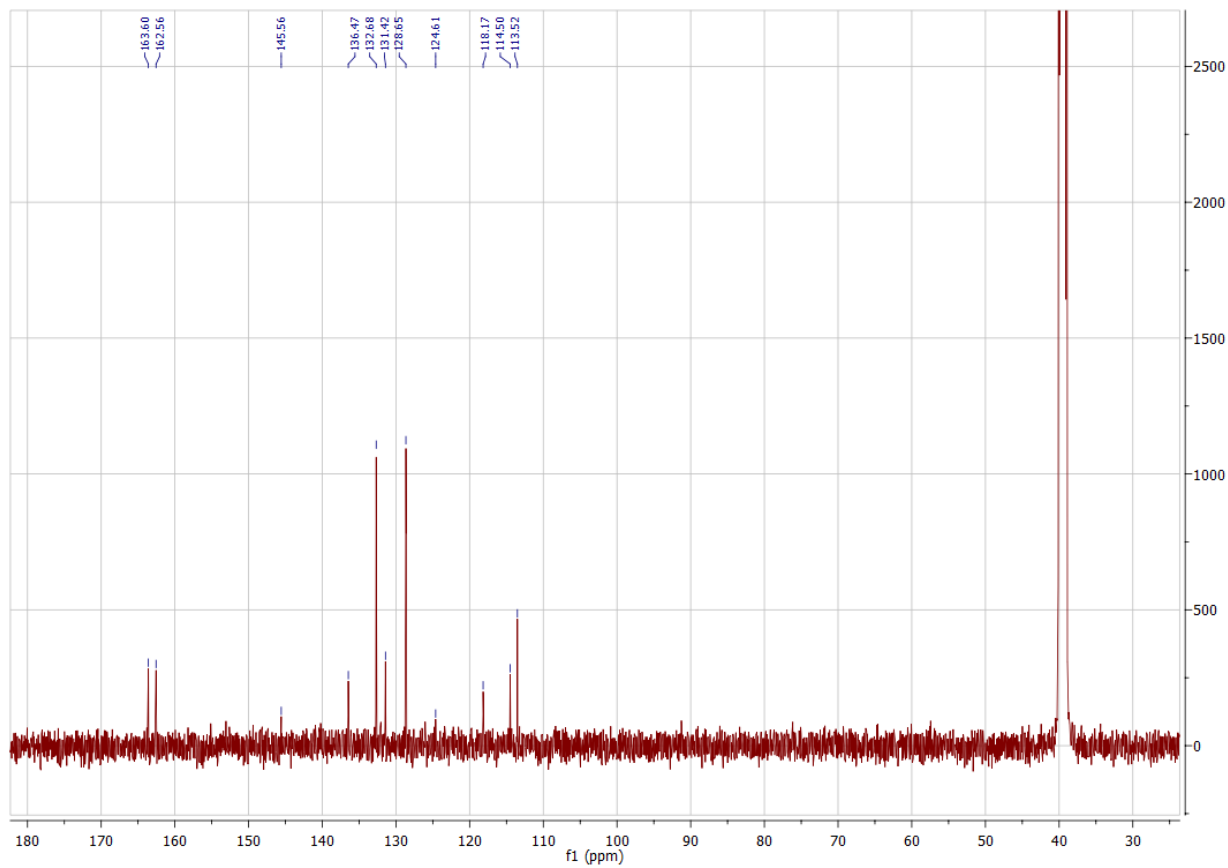
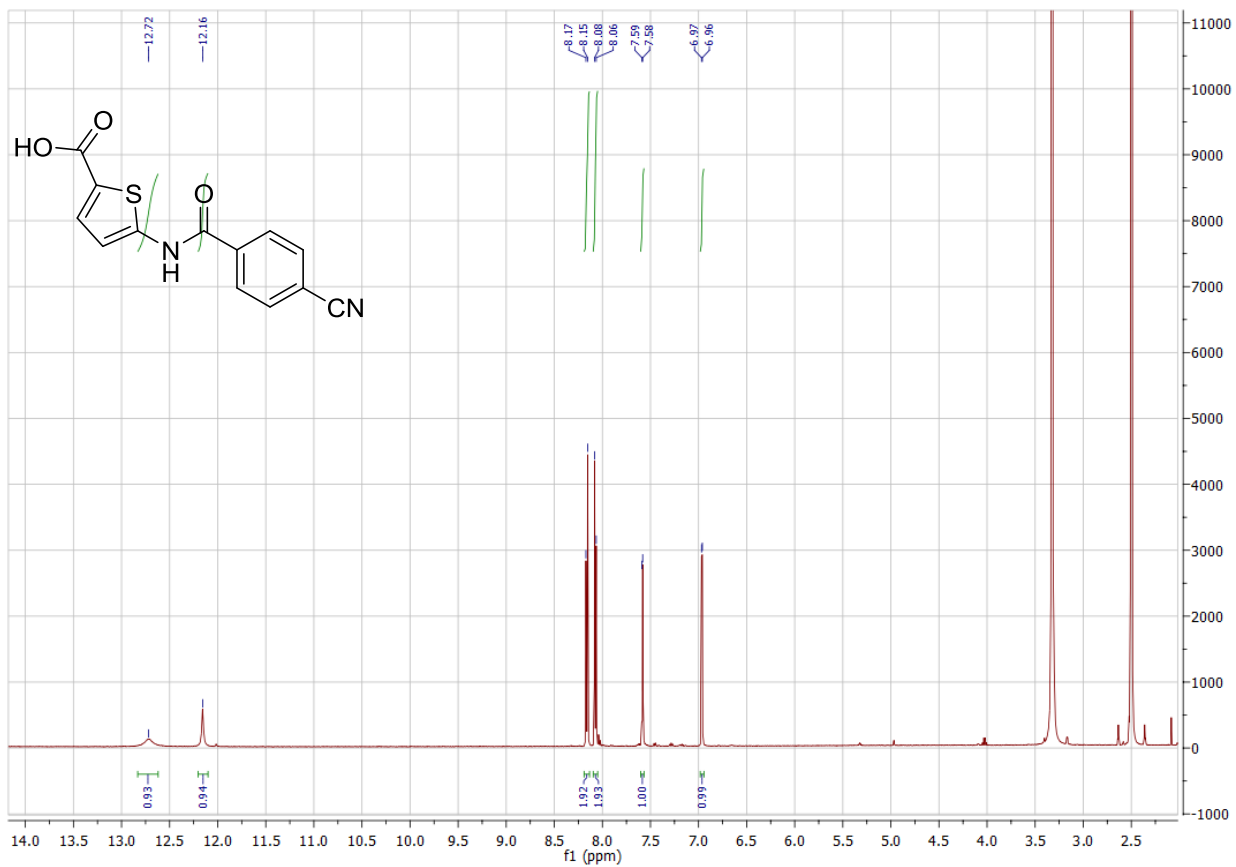
# 6-(4-cyanobenzamido)nicotinic acid



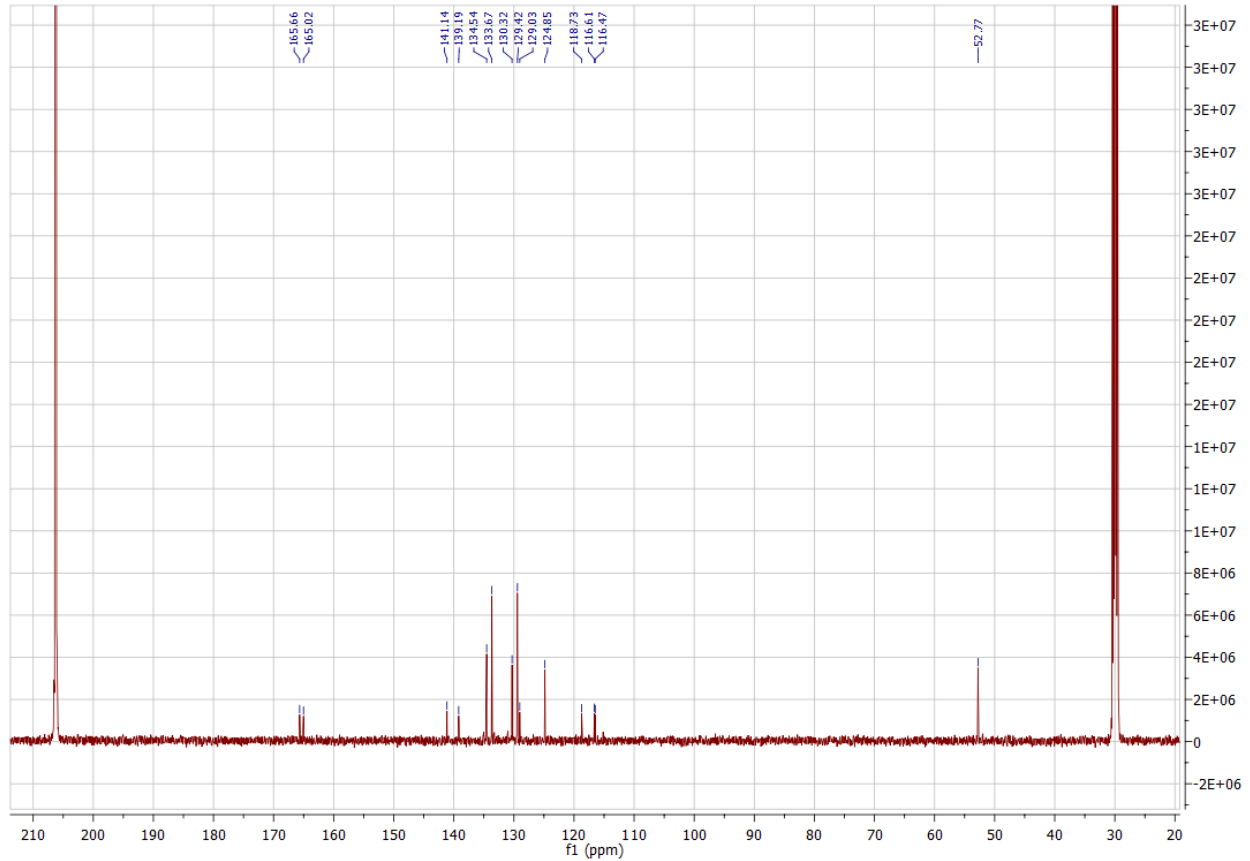
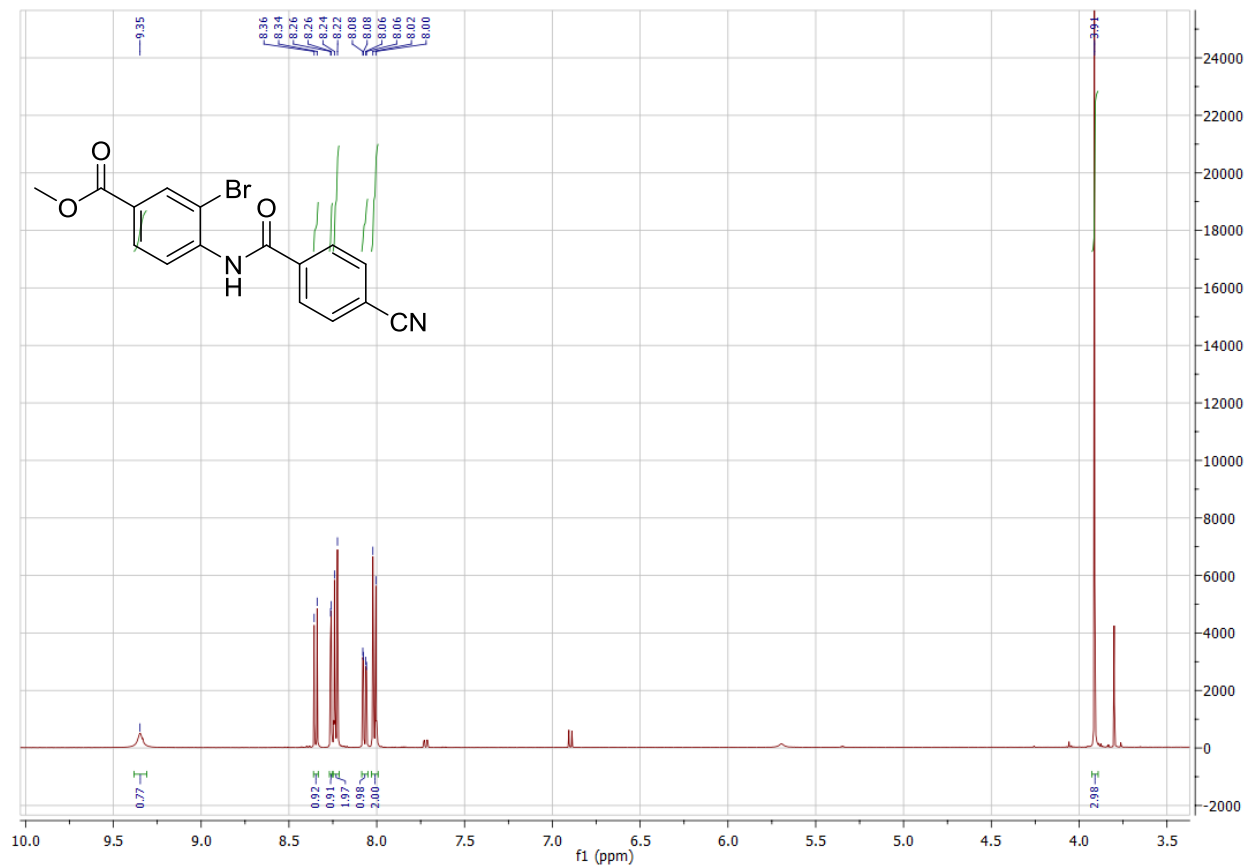
# Methyl 5-(4-cyanobenzamido)thiophene-2-carboxylate (3)



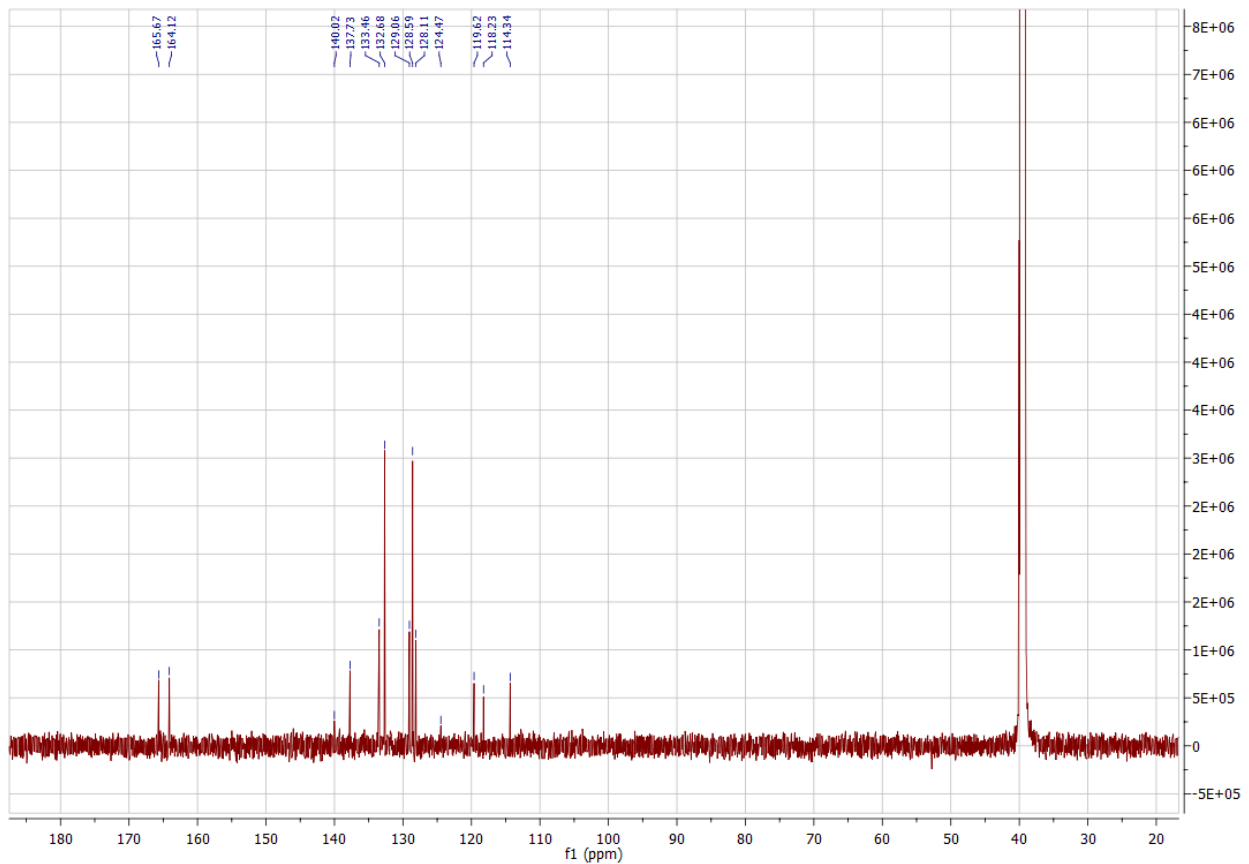
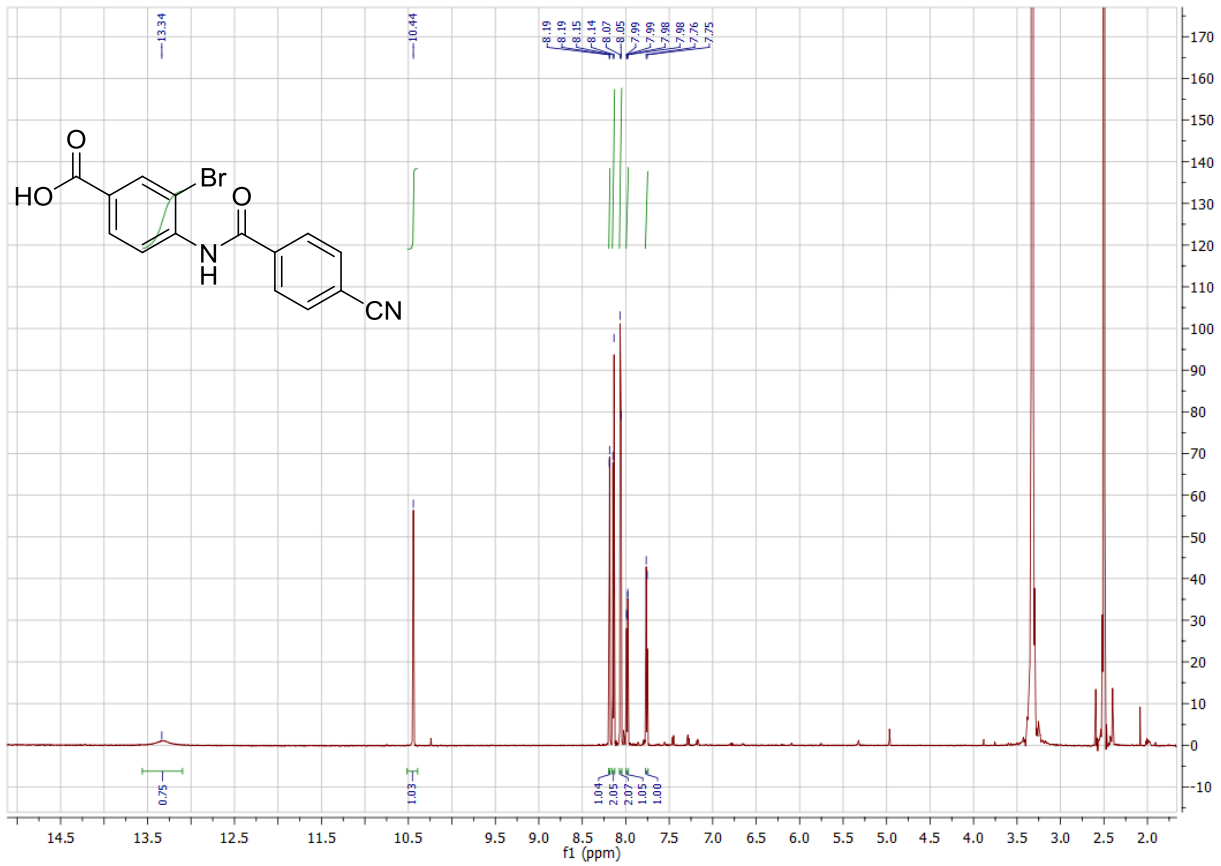
# 5-(4-cyanobenzamido)-thiophene-2-carboxylic acid (4)



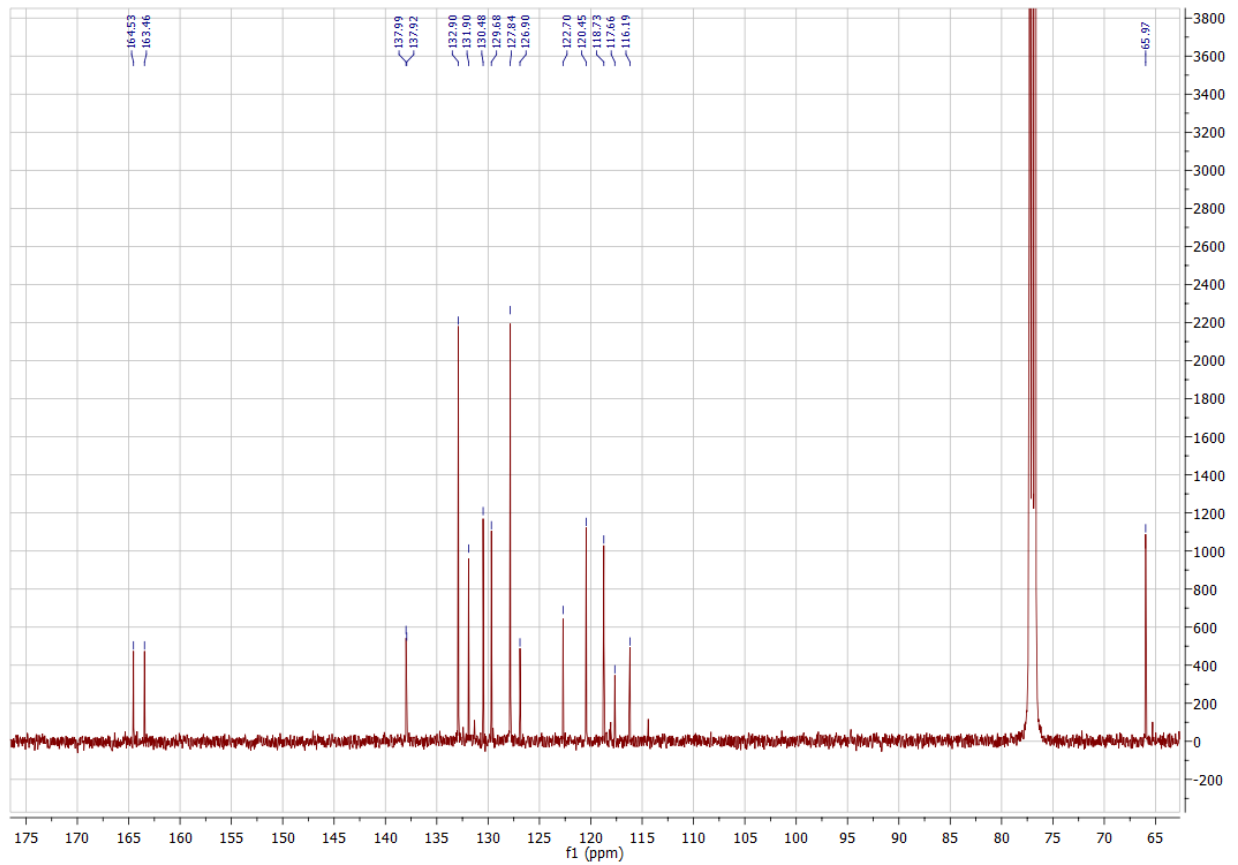
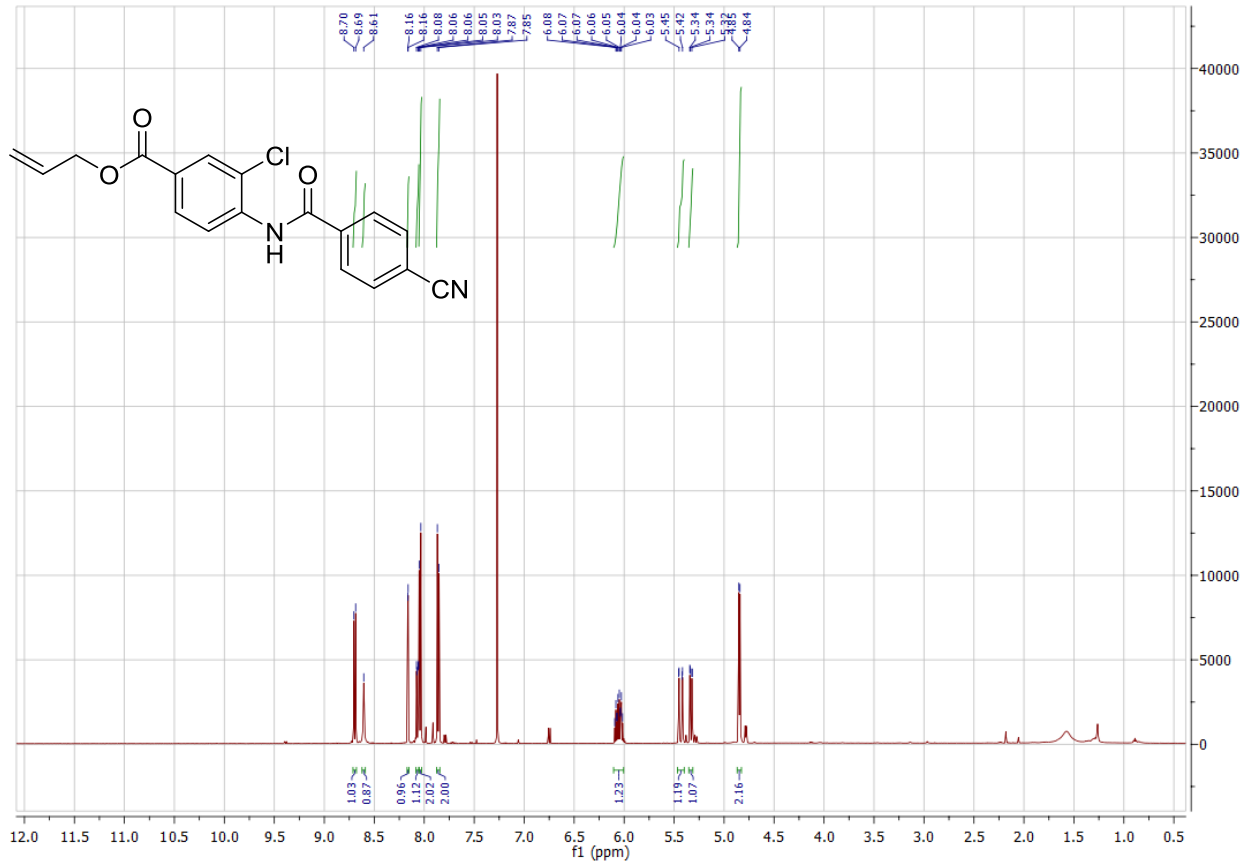
# Methyl 3-bromo-4-(4-cyanobenzamido)benzoate



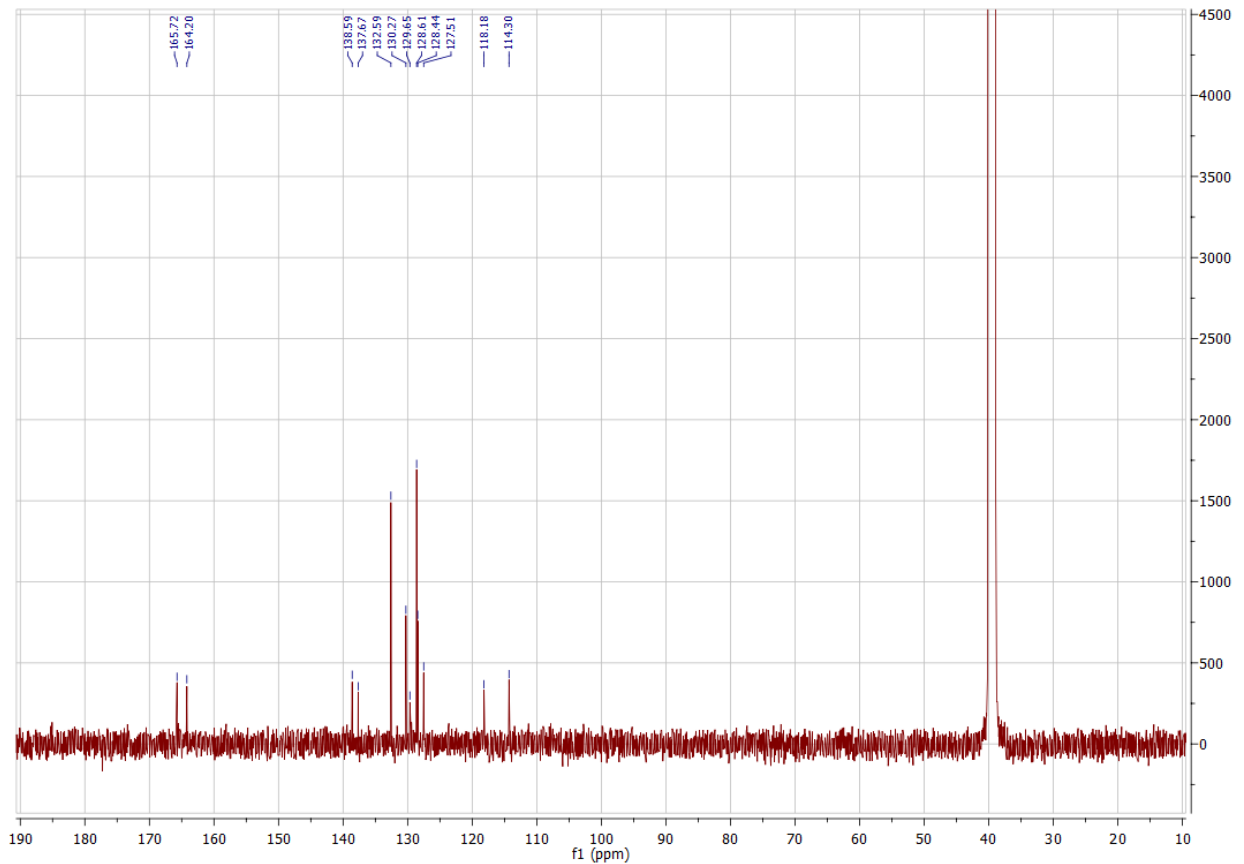
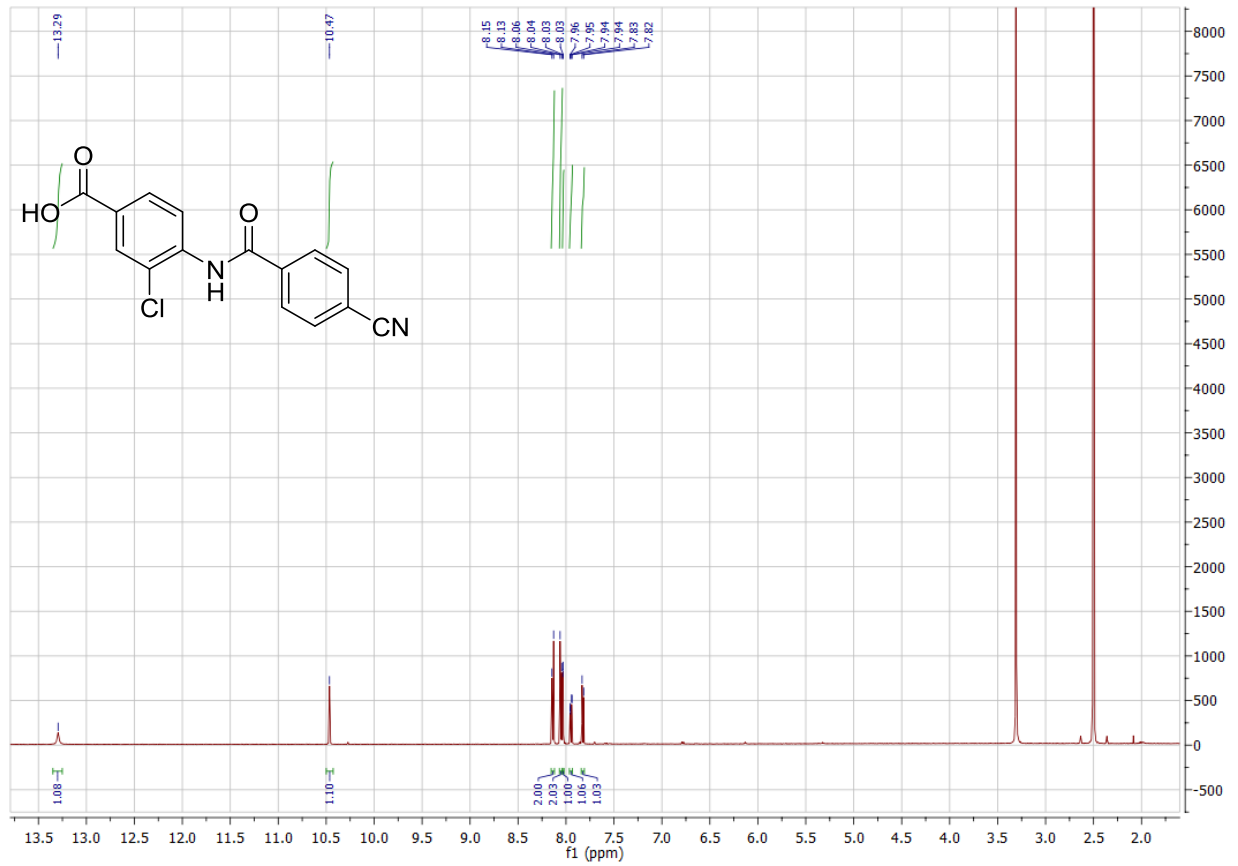
### 3-Bromo-4-(4-cyanobenzamido)benzoic acid



# Allyl 3-chloro-4-(4-cyanobenzamido)benzoate (5)

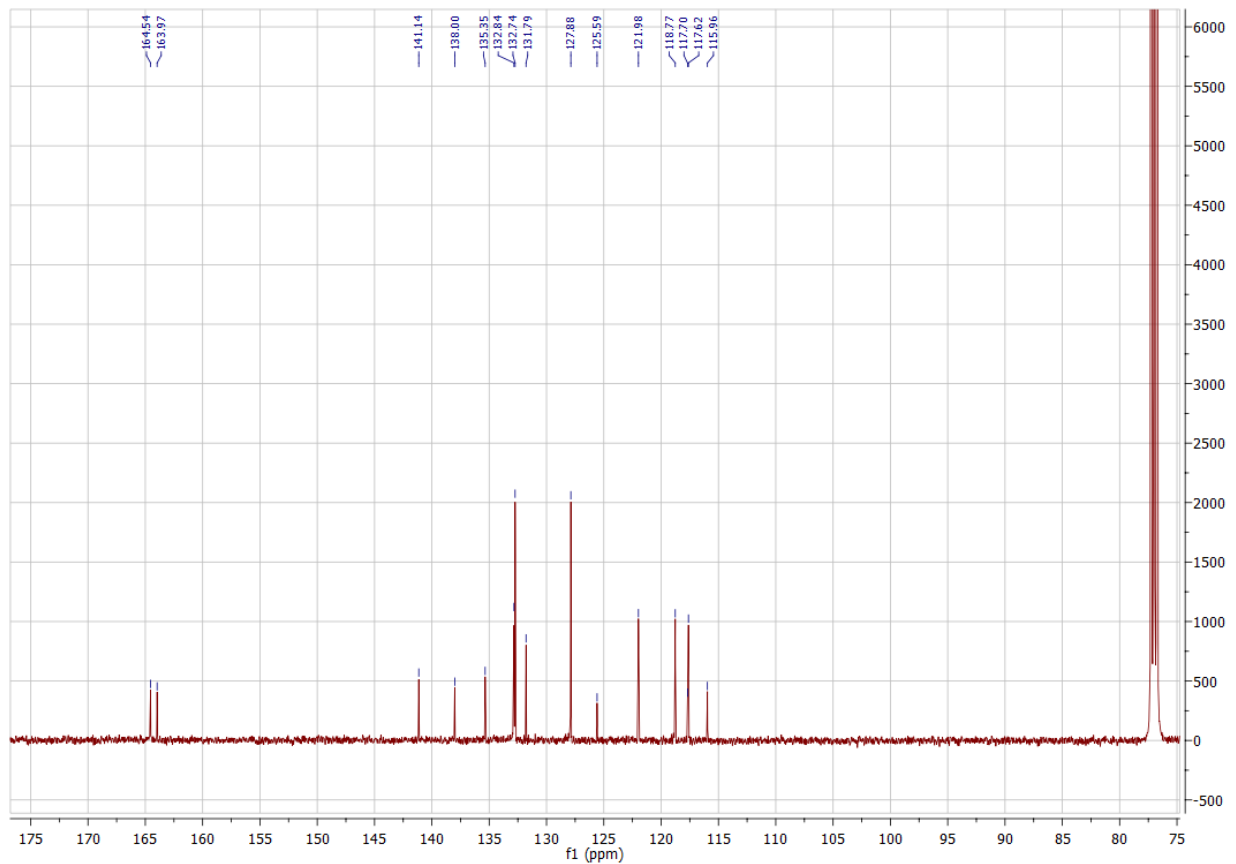
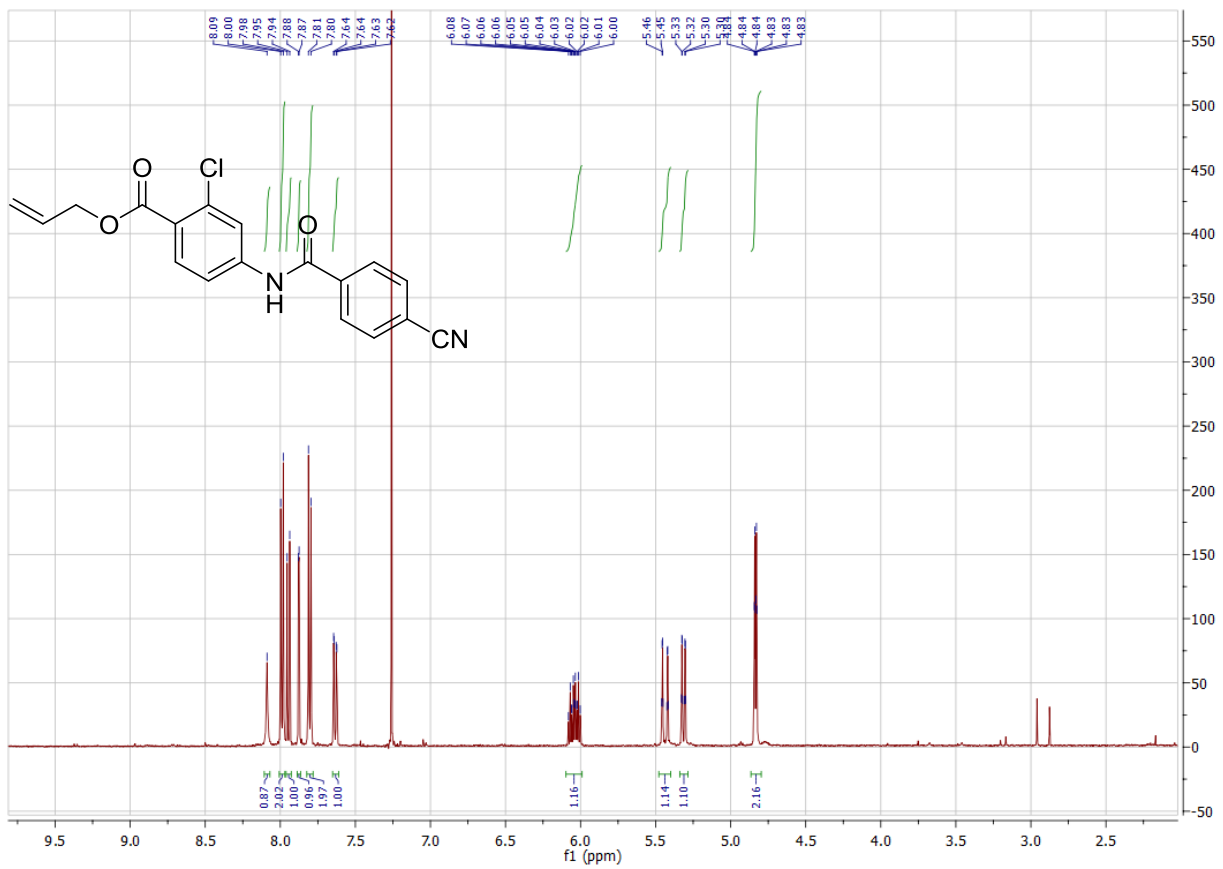


### 3-Chloro-4-(4-cyanobenzamido)benzoic acid (6)

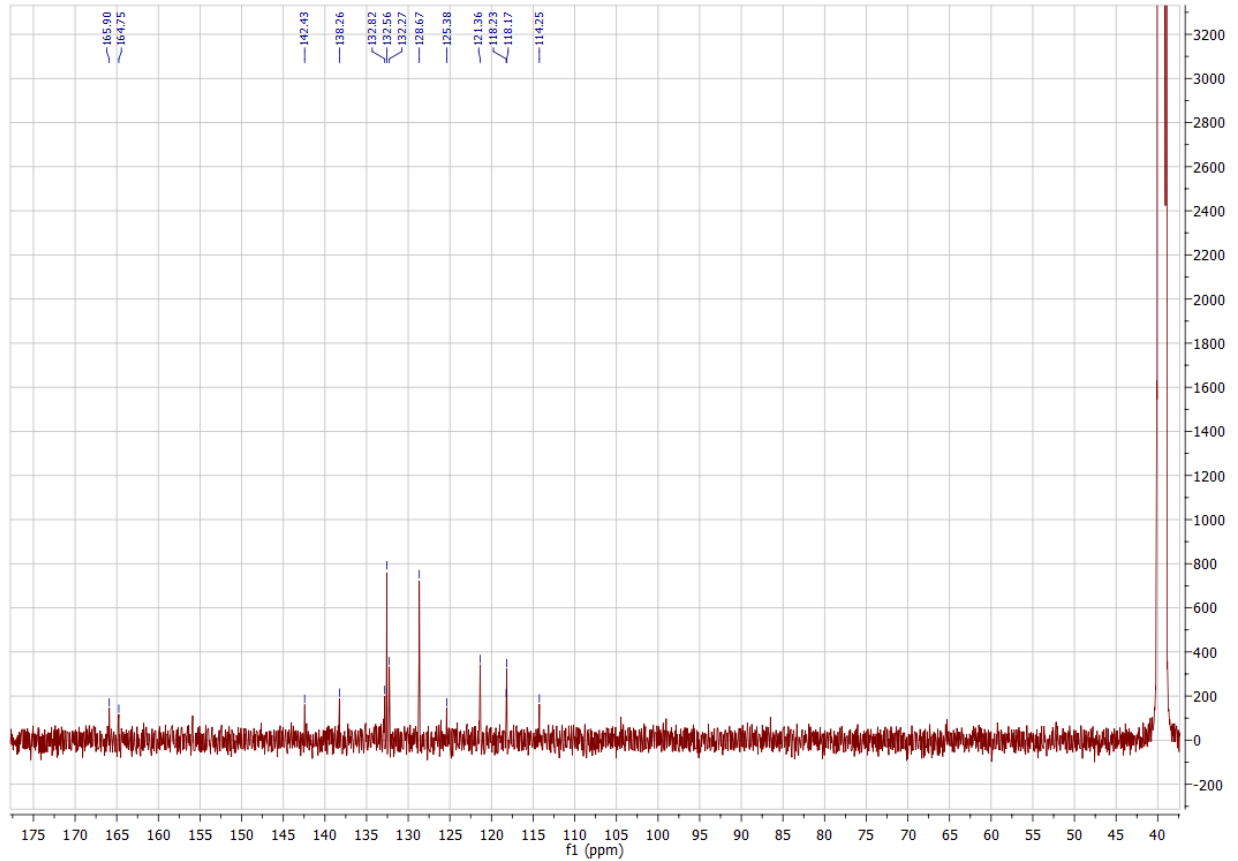
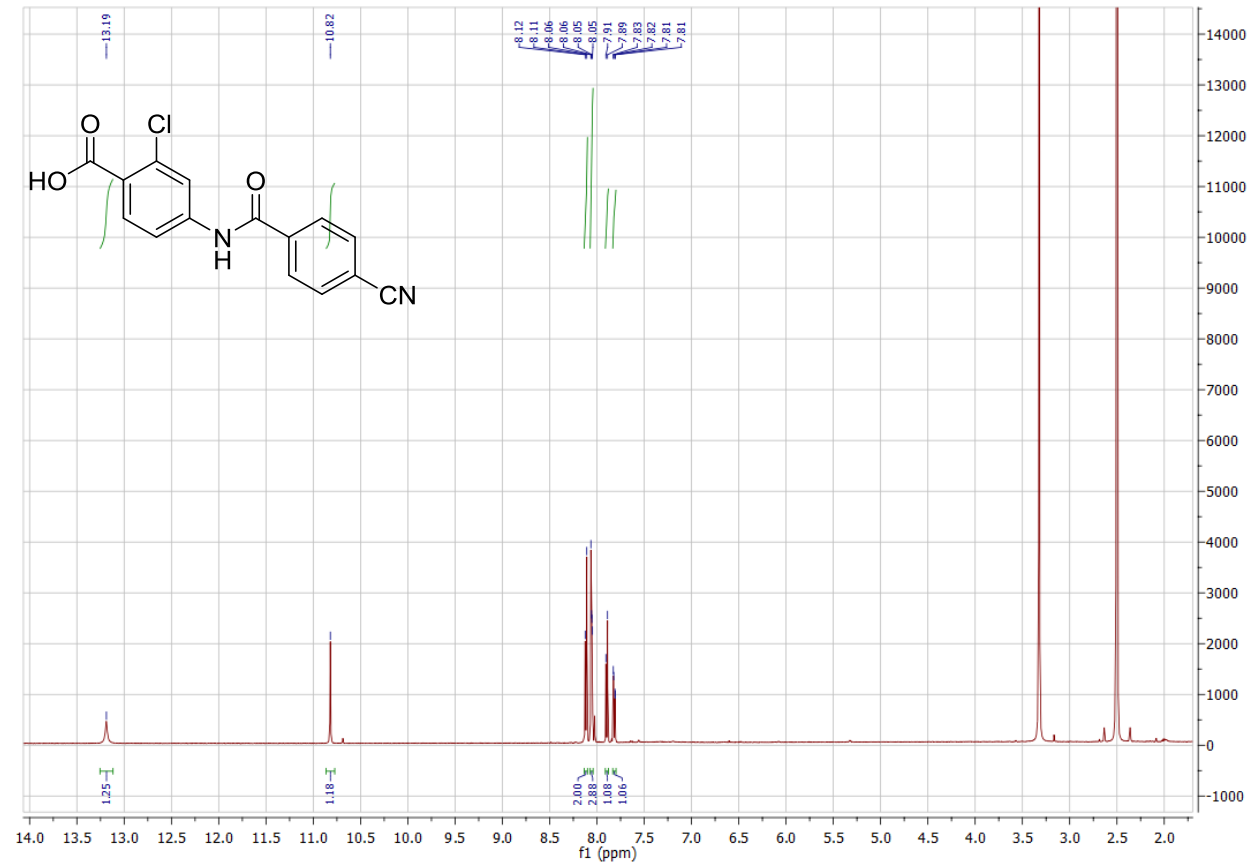




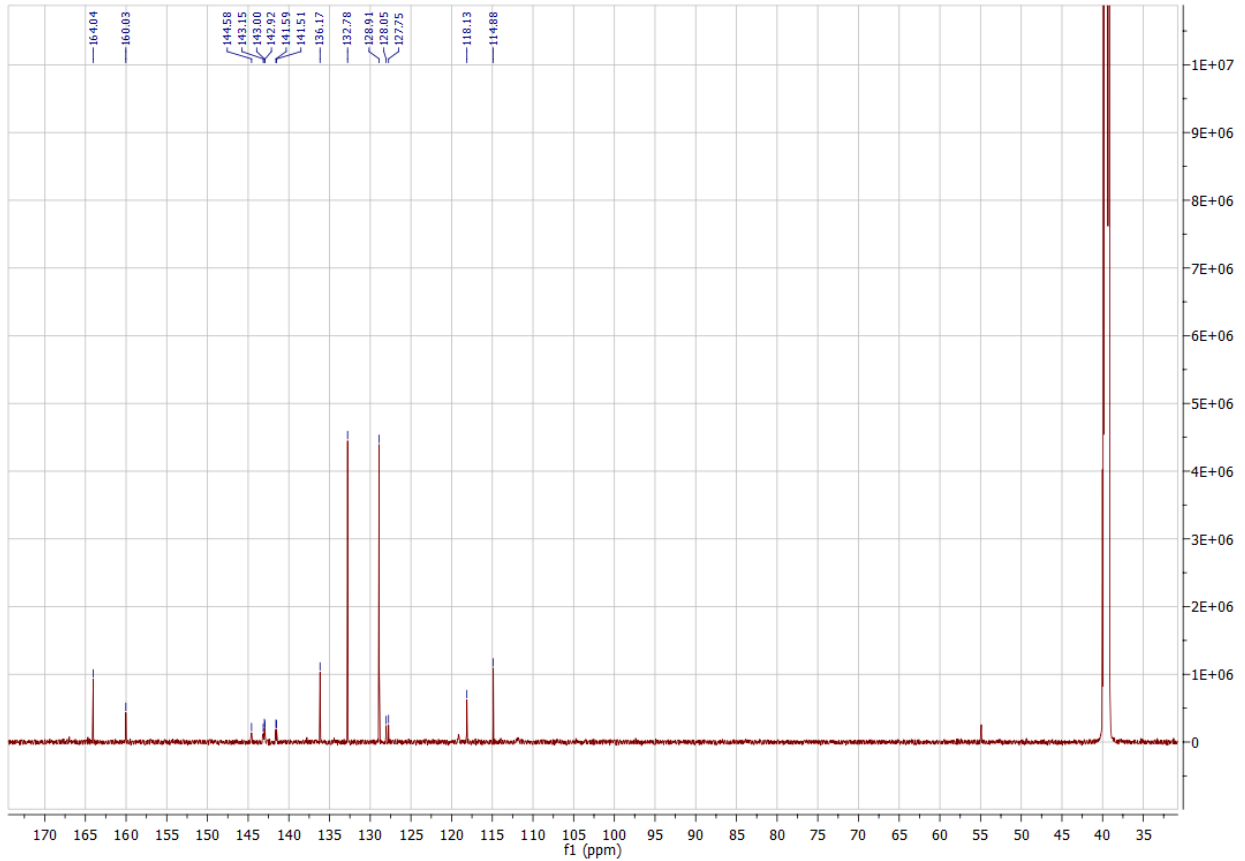
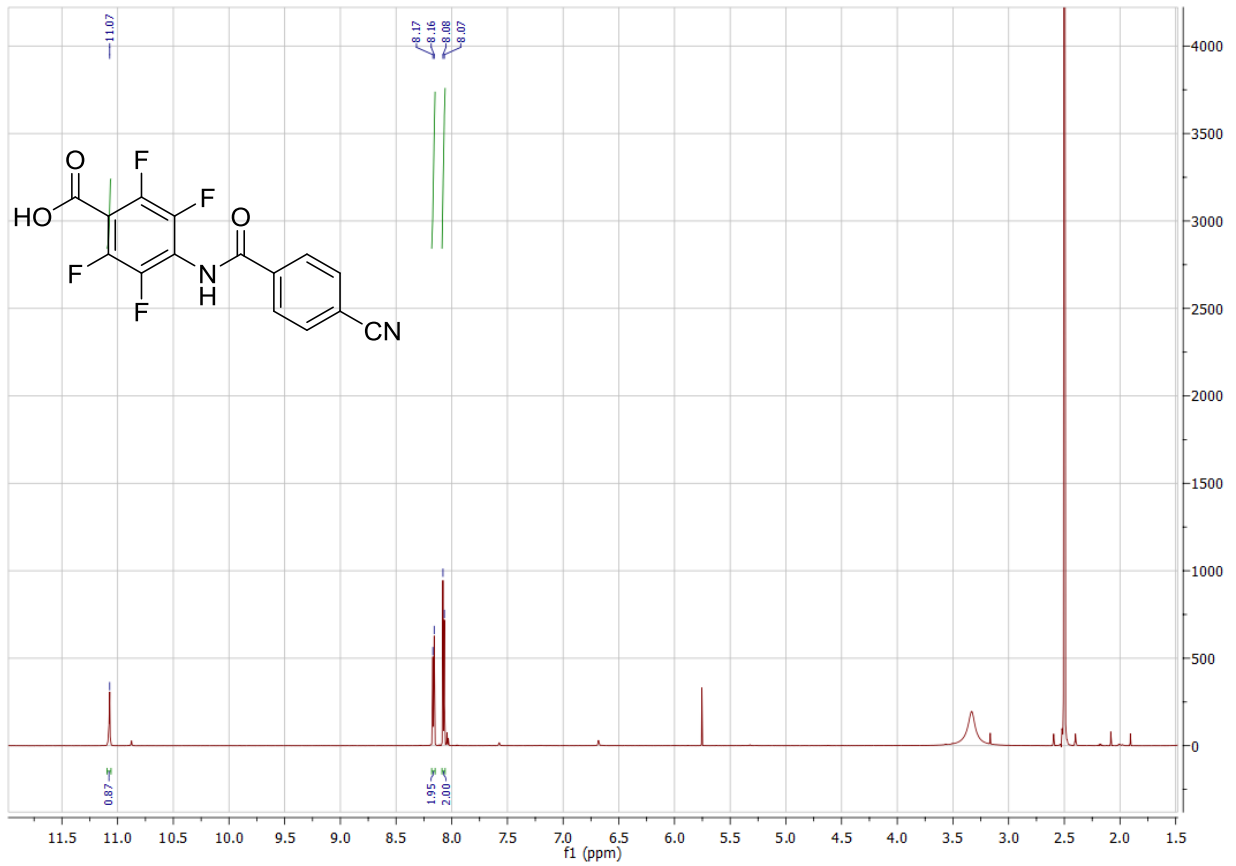
# Allyl 2-chloro-4-(4-cyanobenzamido)benzoate

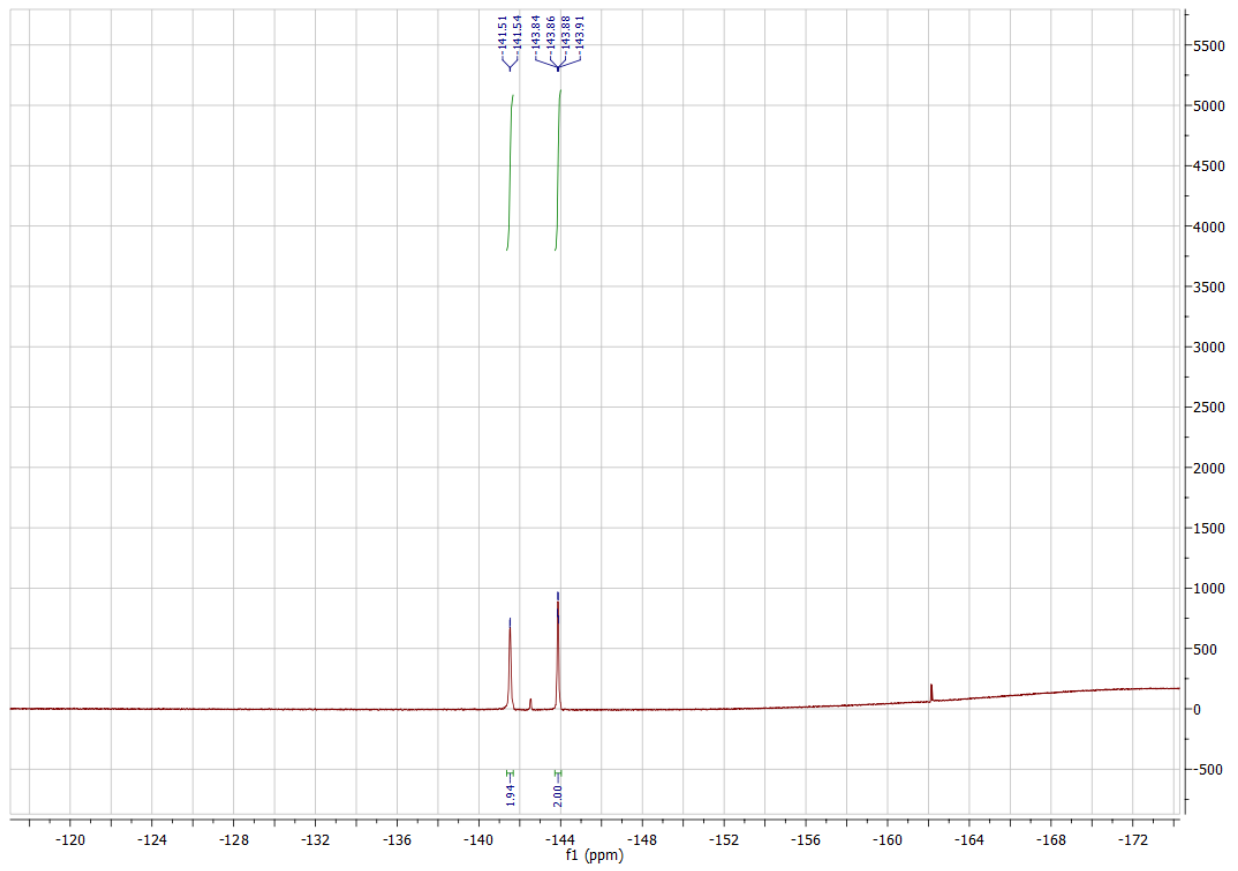


# 2-Chloro-4-(4-cyanobenzamido)benzoic acid

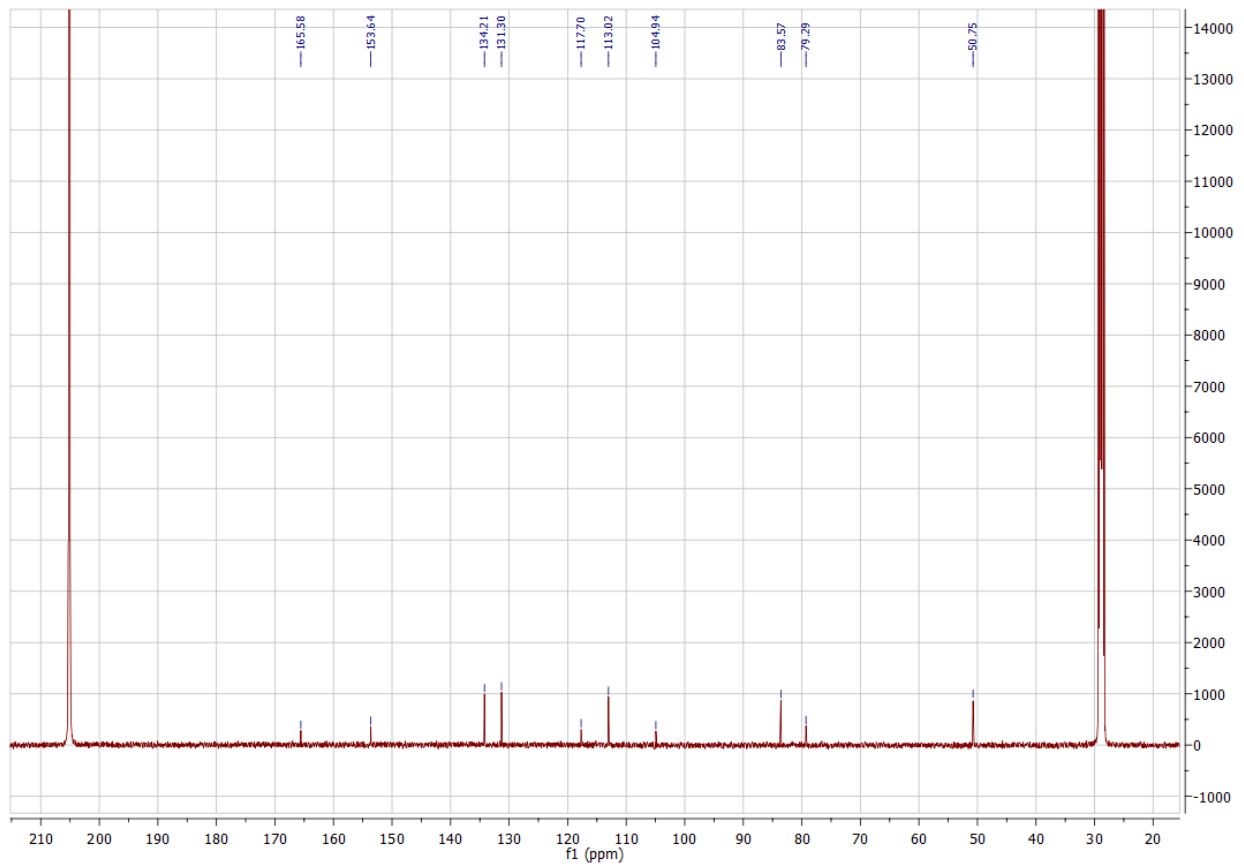
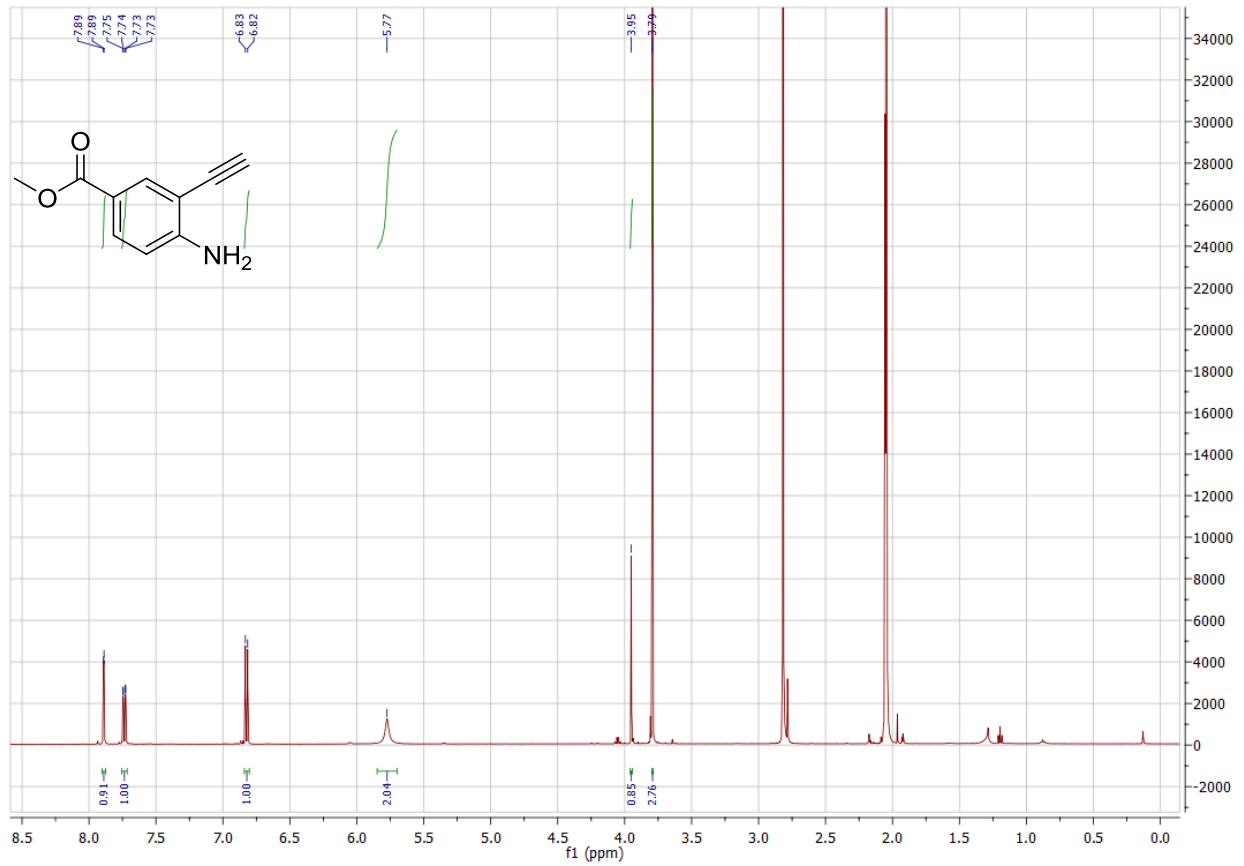


# 4-(4-cyanobenzamido)-2,3,5,6-tetrafluorobenzoic acid

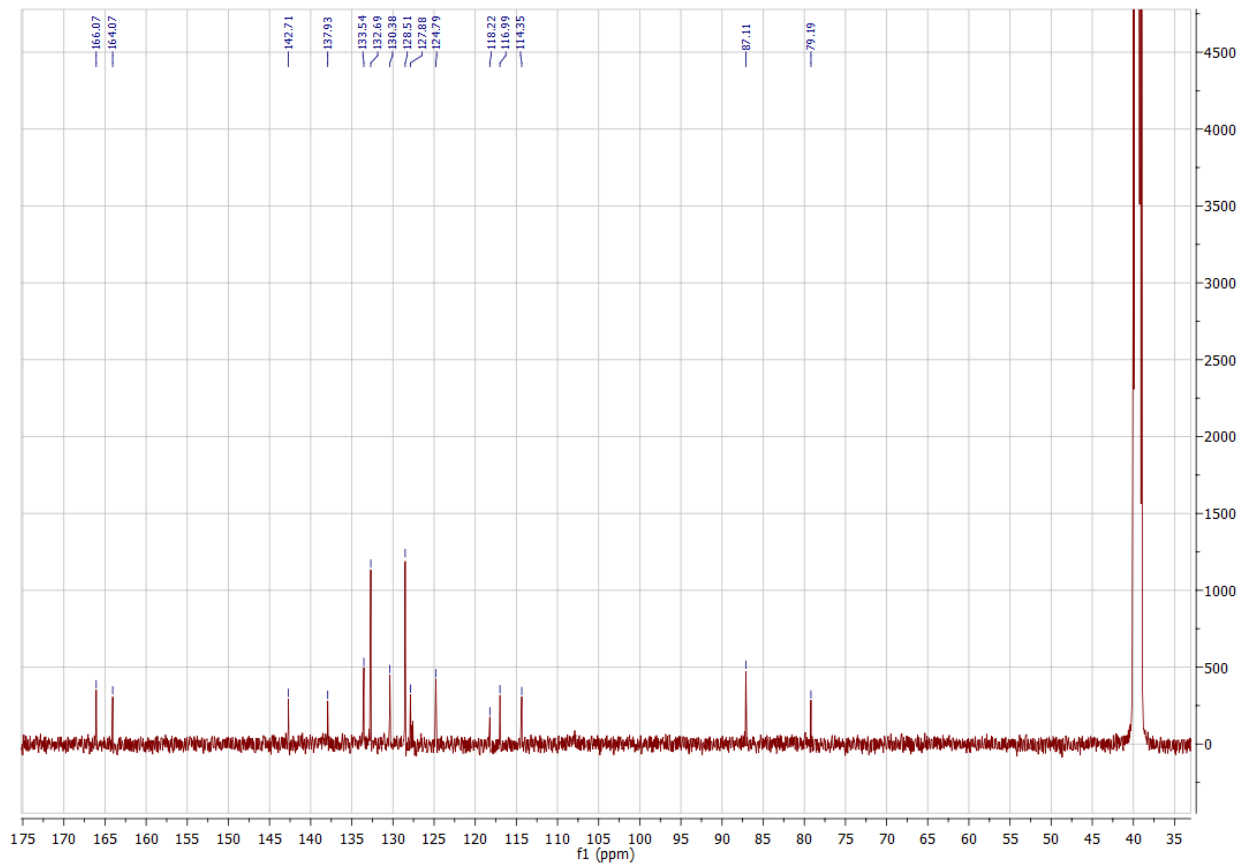
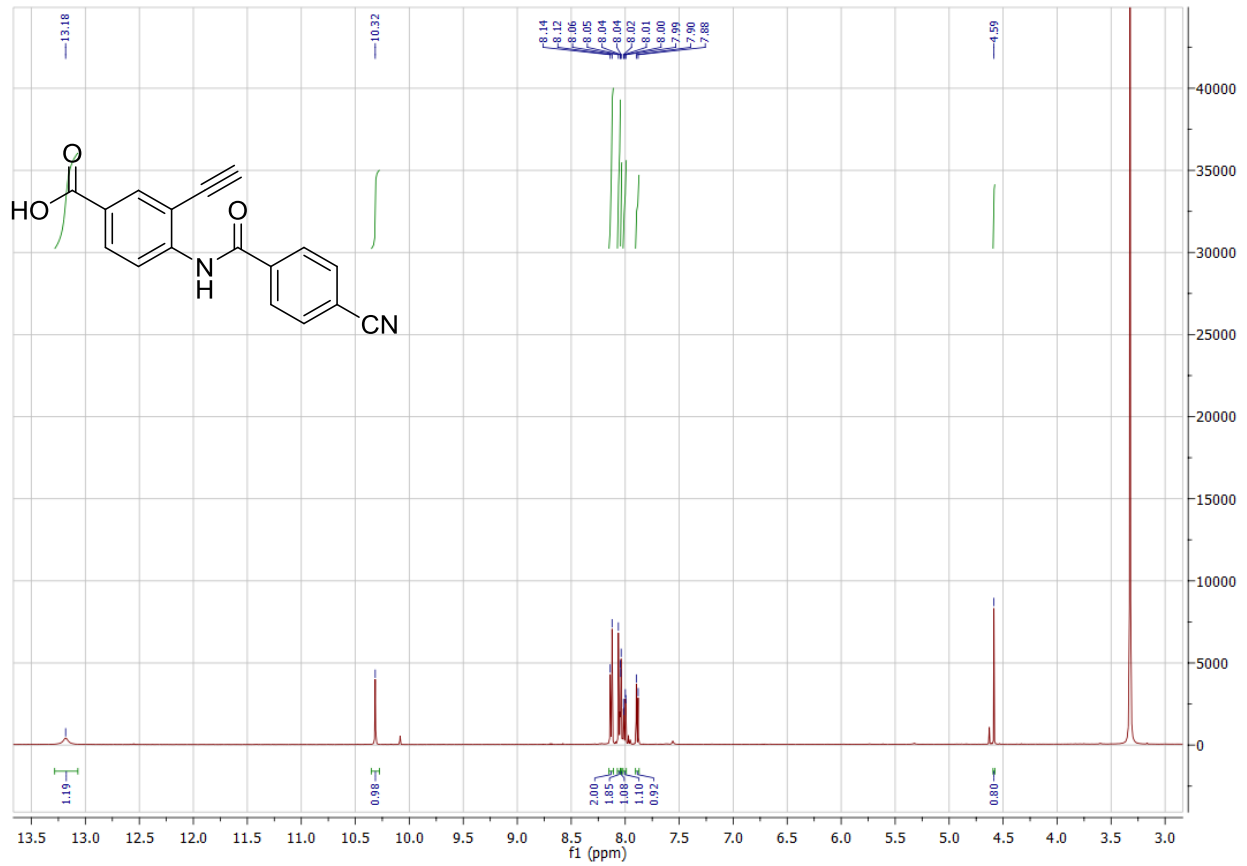




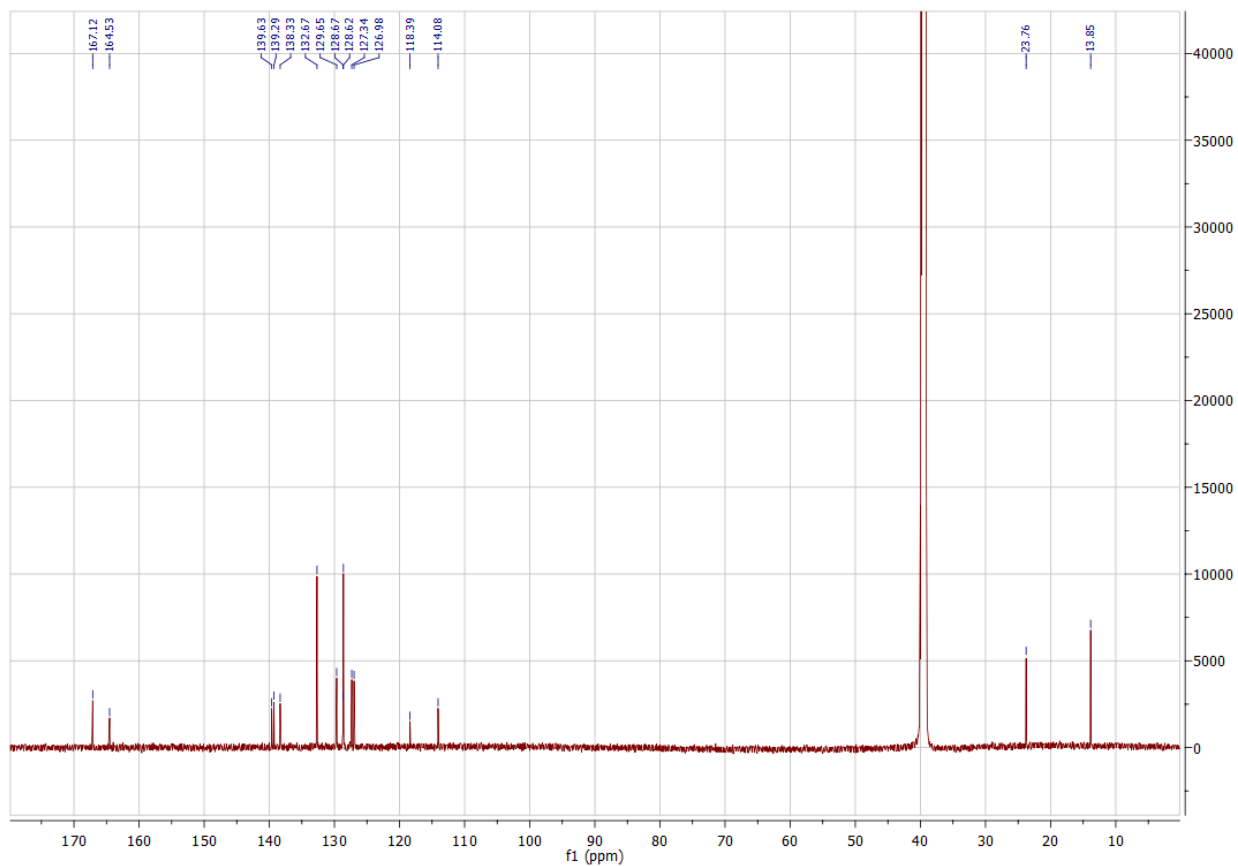
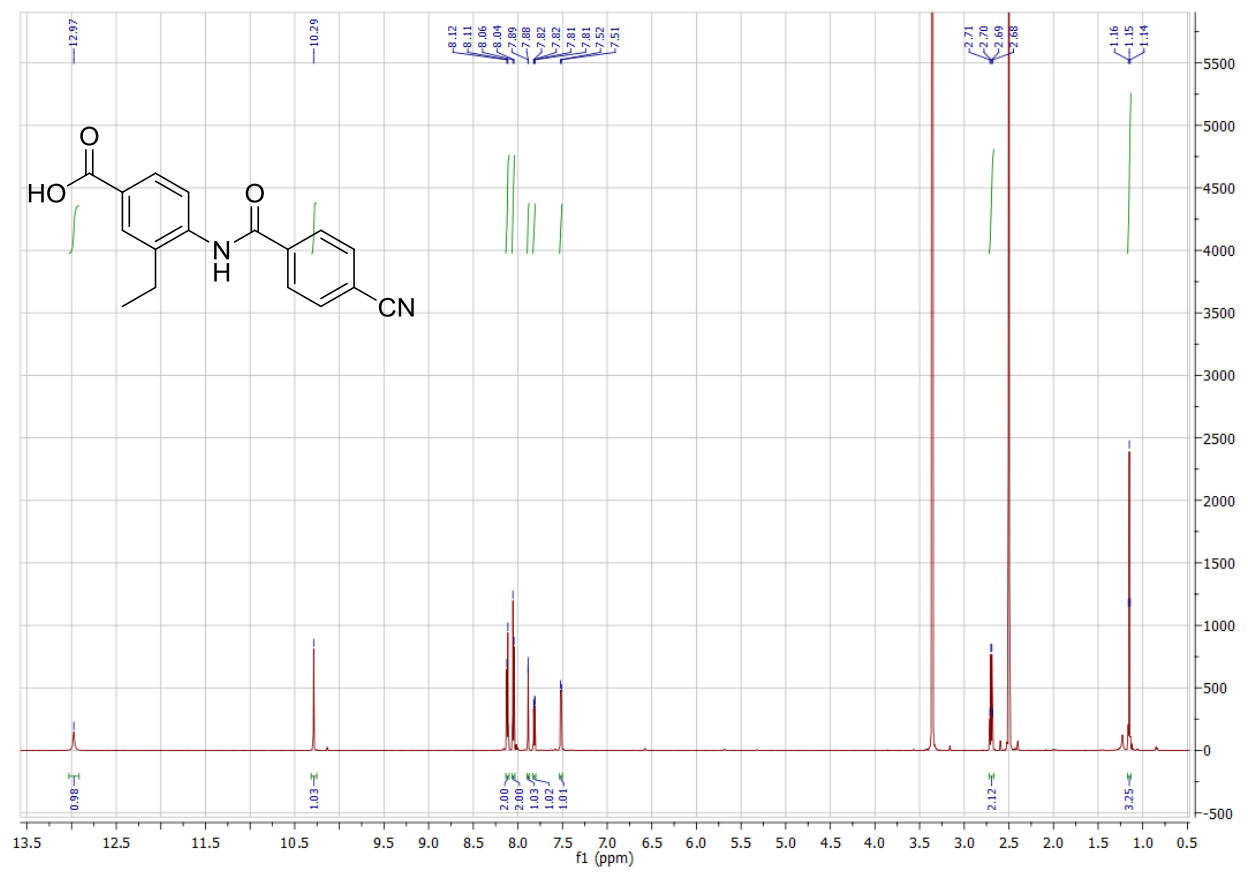
# Methyl 4-amino-3-ethynylbenzoate (32)



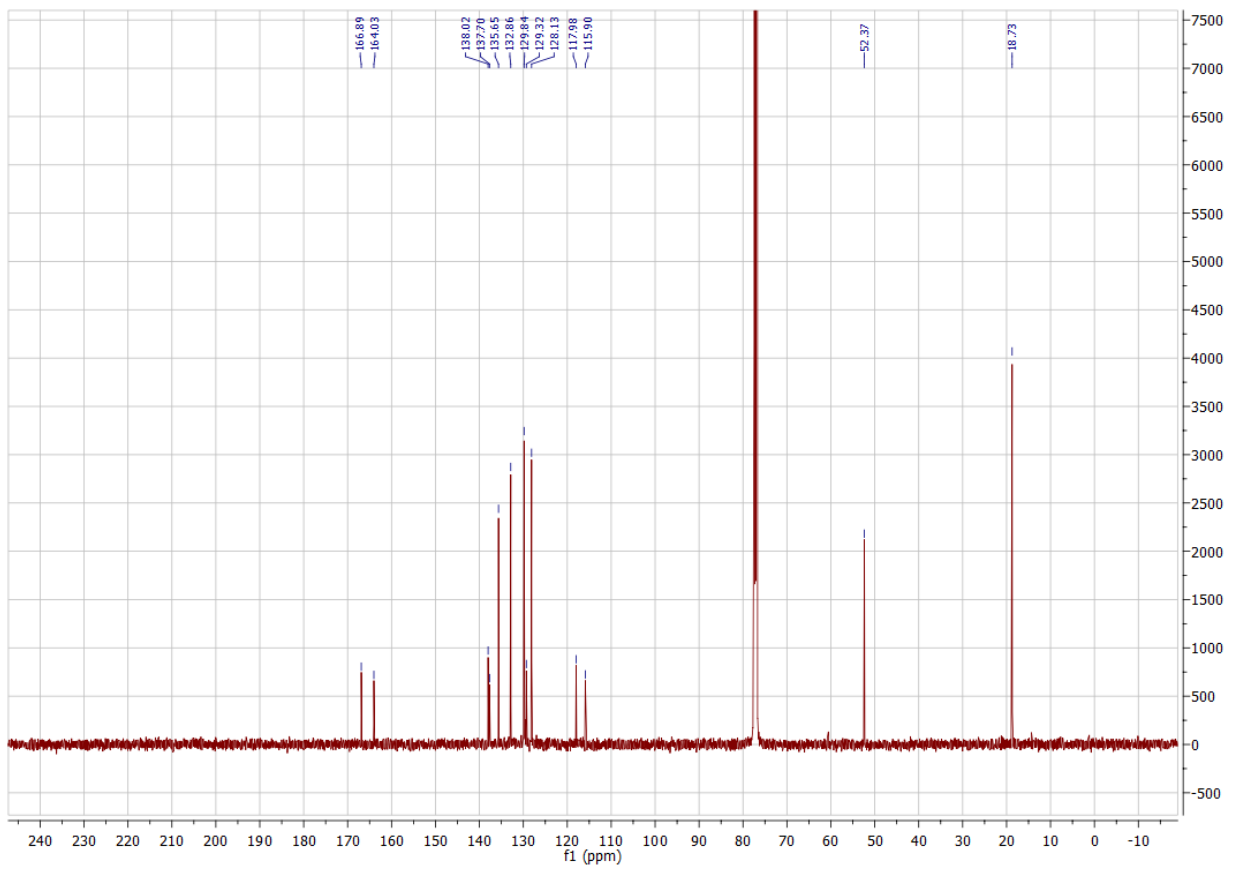
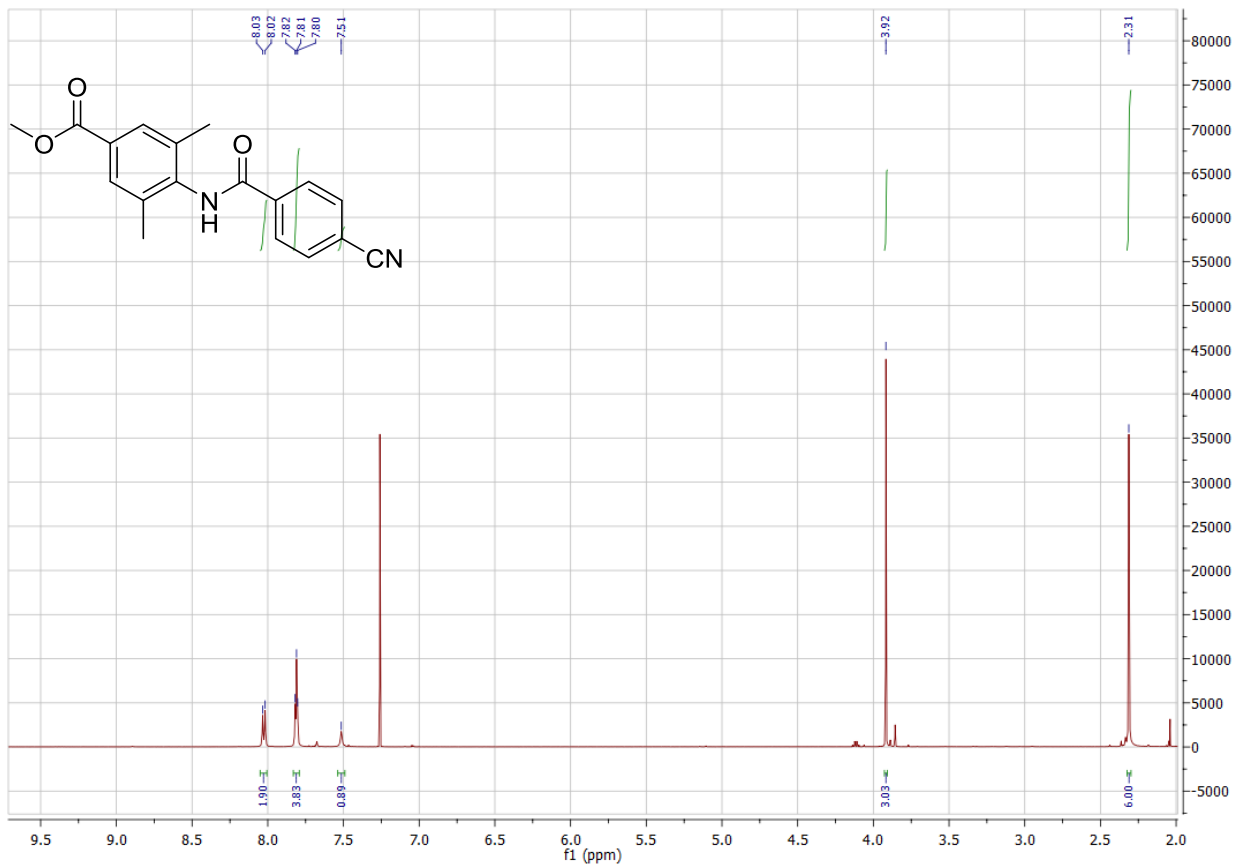
# 4-(4-cyanobenzamido)-3-ethynylbenzoic acid (33)



# 4-(4-cyanobenzamido)-3-ethylbenzoic acid (31)

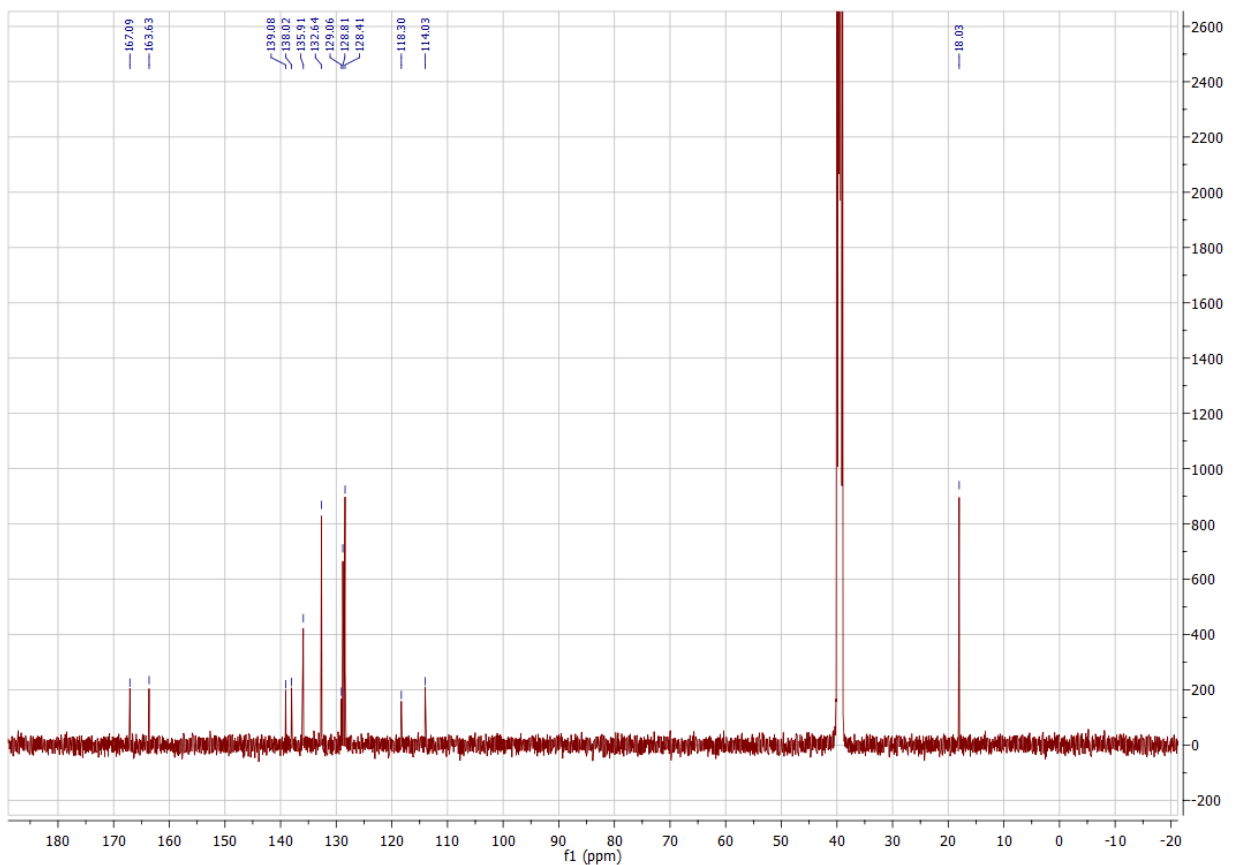
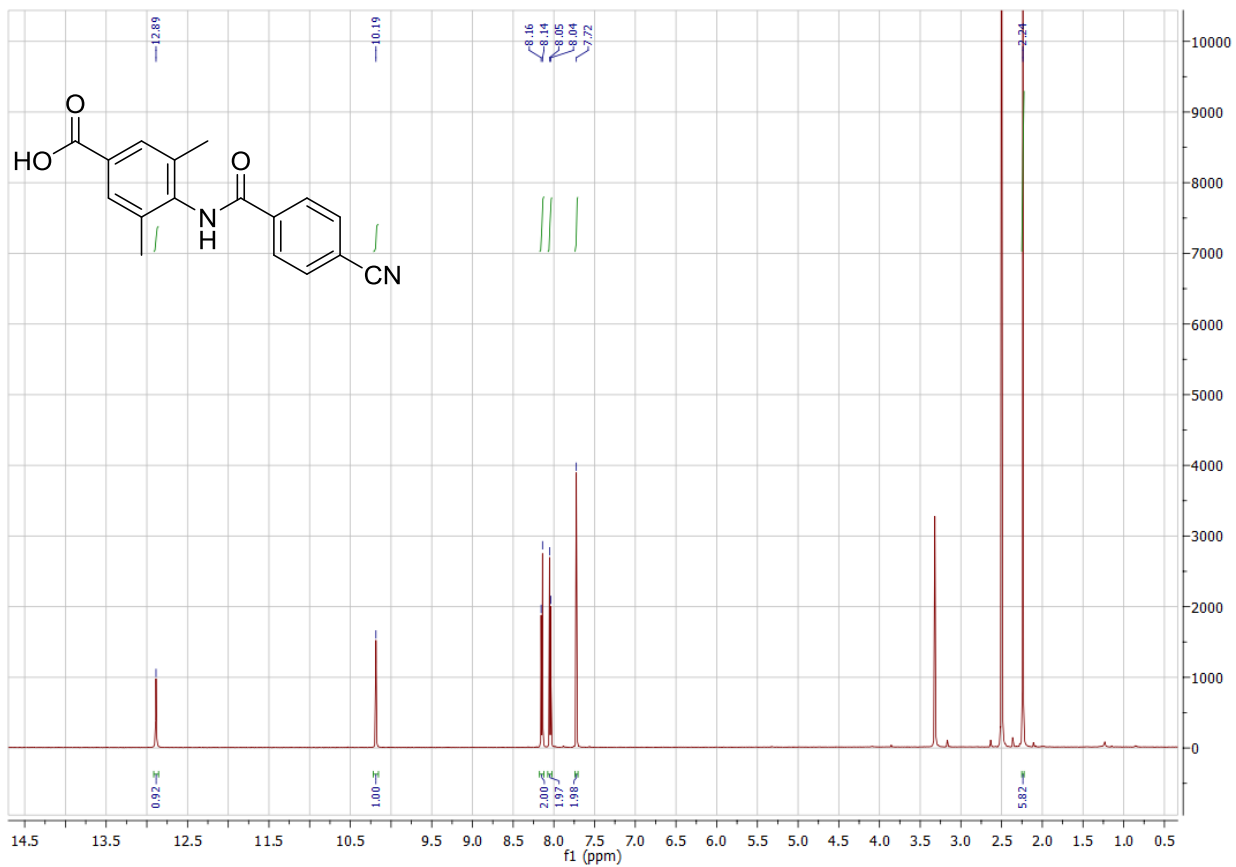


# Methyl 4-(4-cyanobenzamido)-3,5-dimethylbenzoate

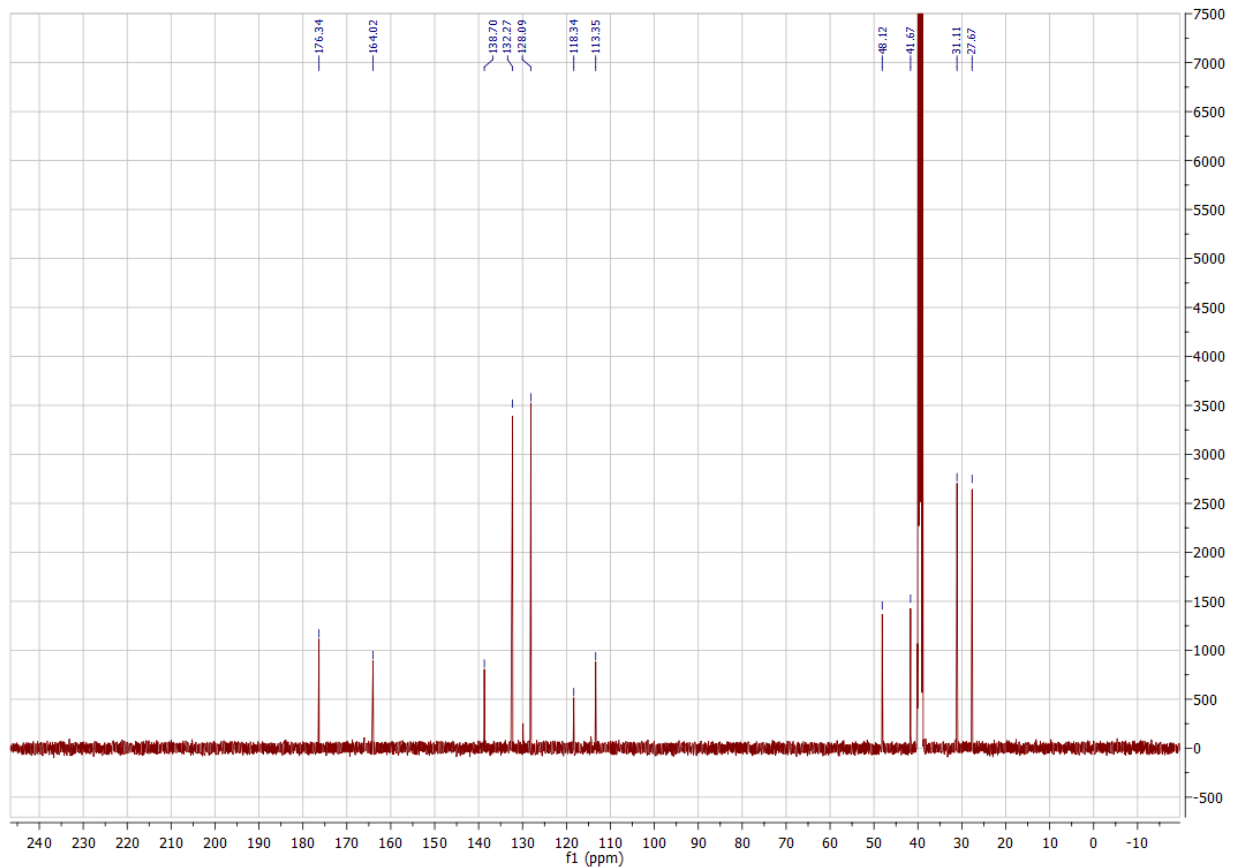
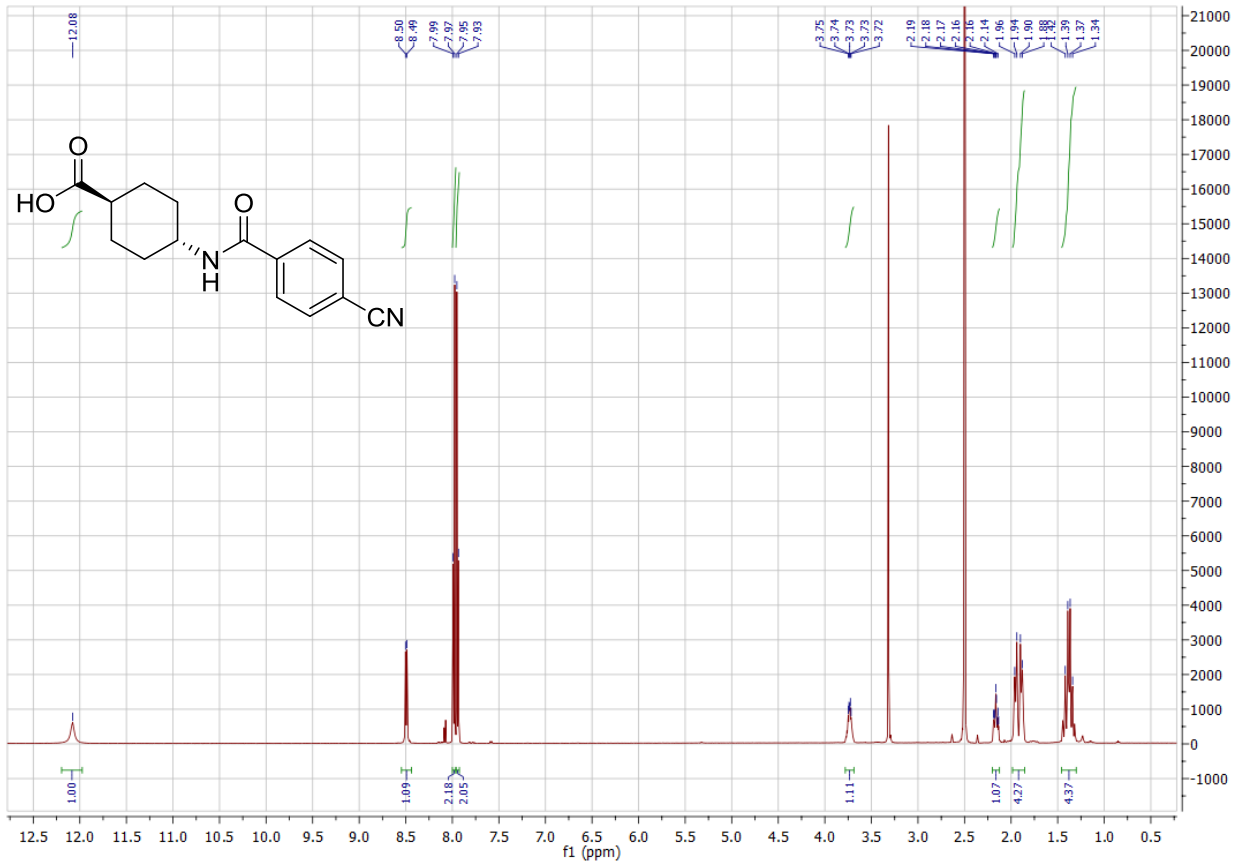




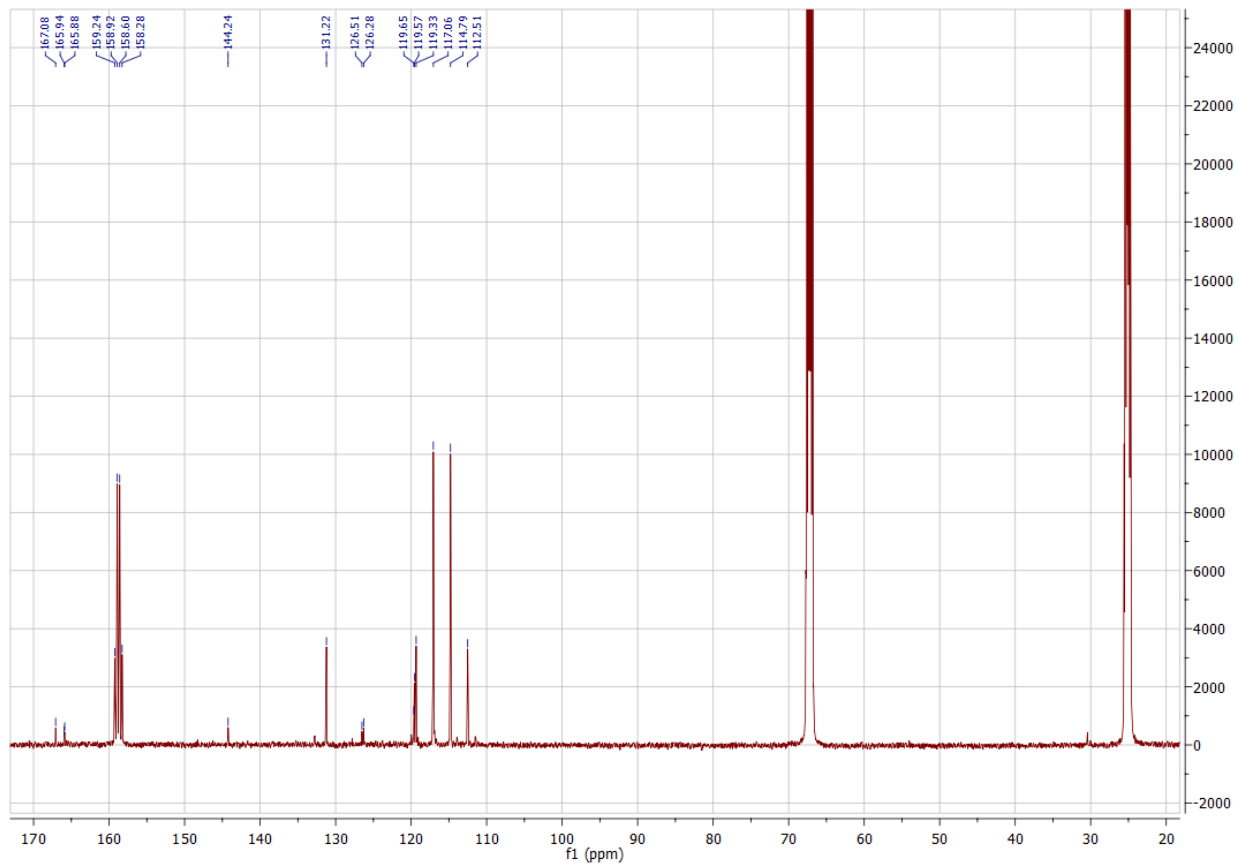
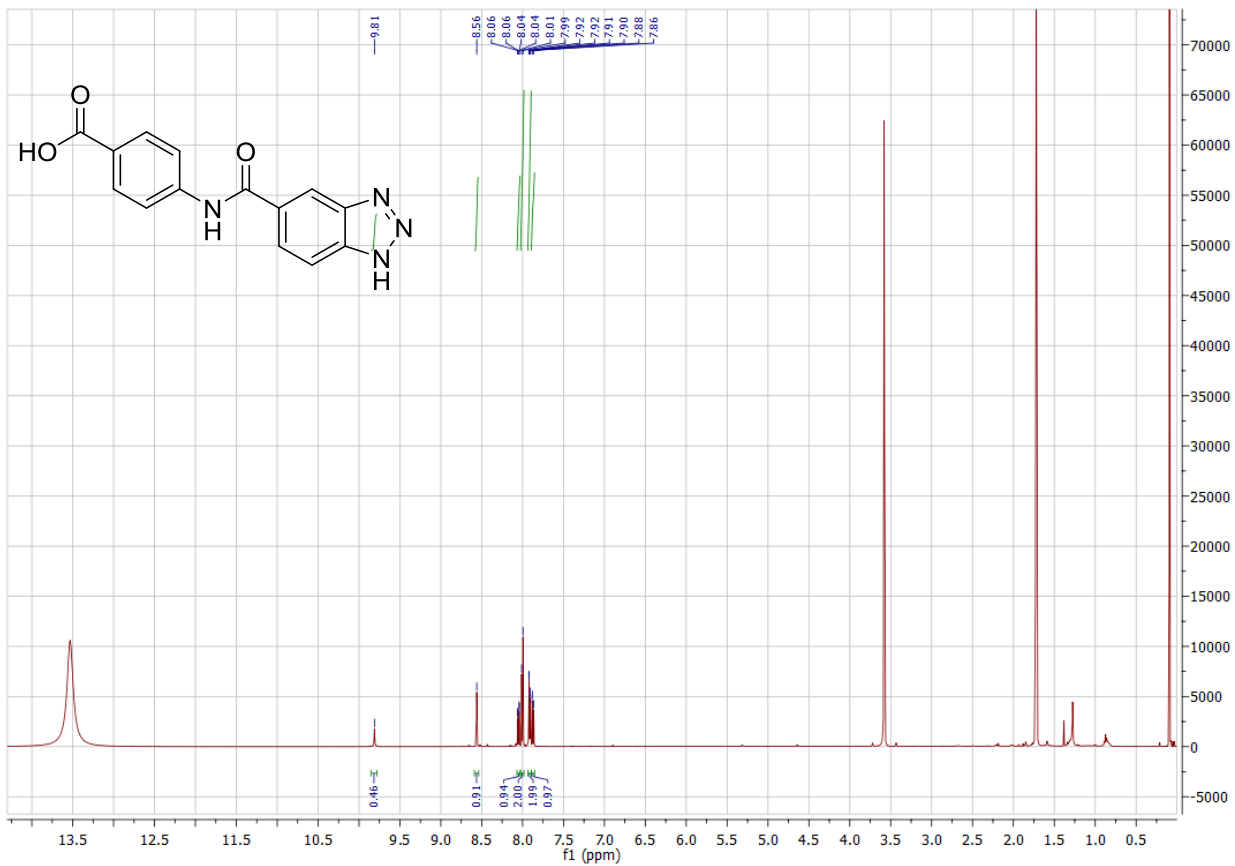
# 4-(4-cyanobenzamido)-3,5-dimethylbenzoic acid



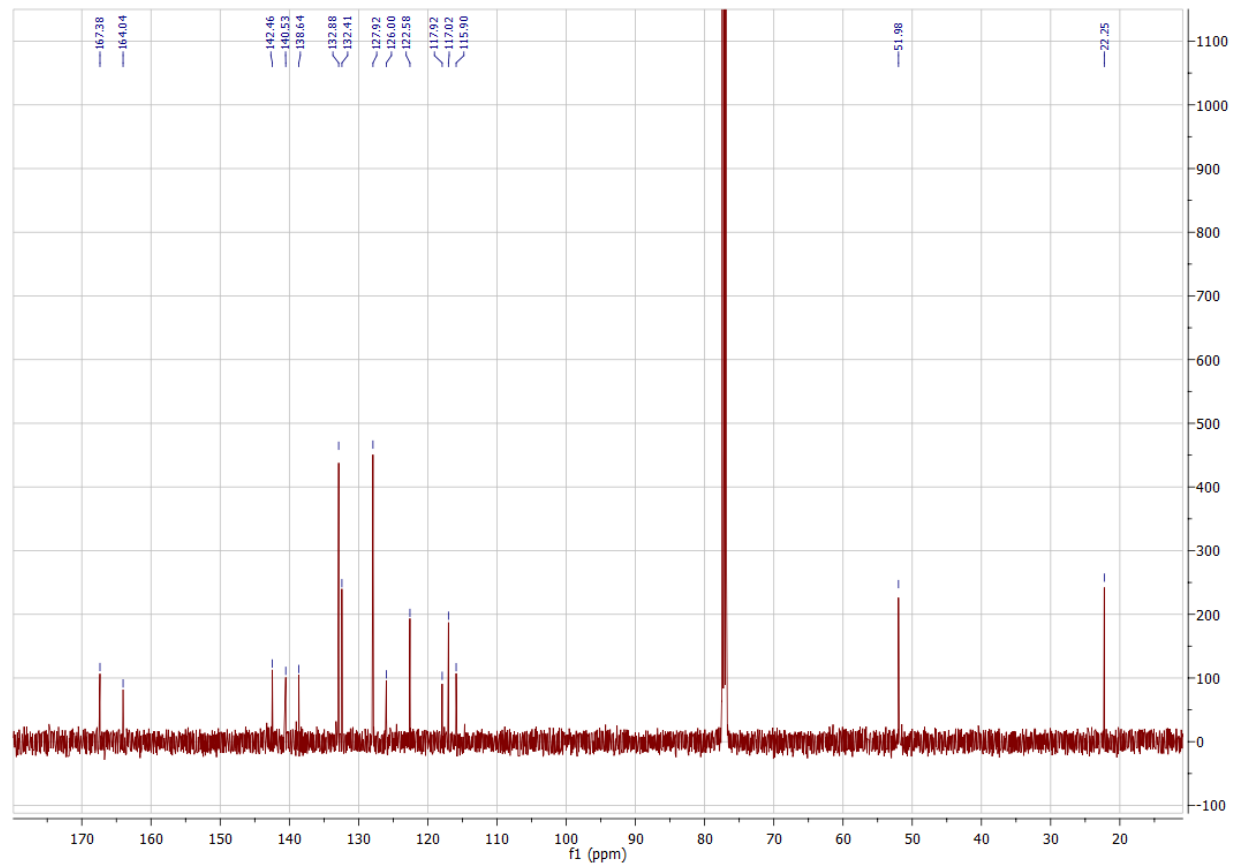
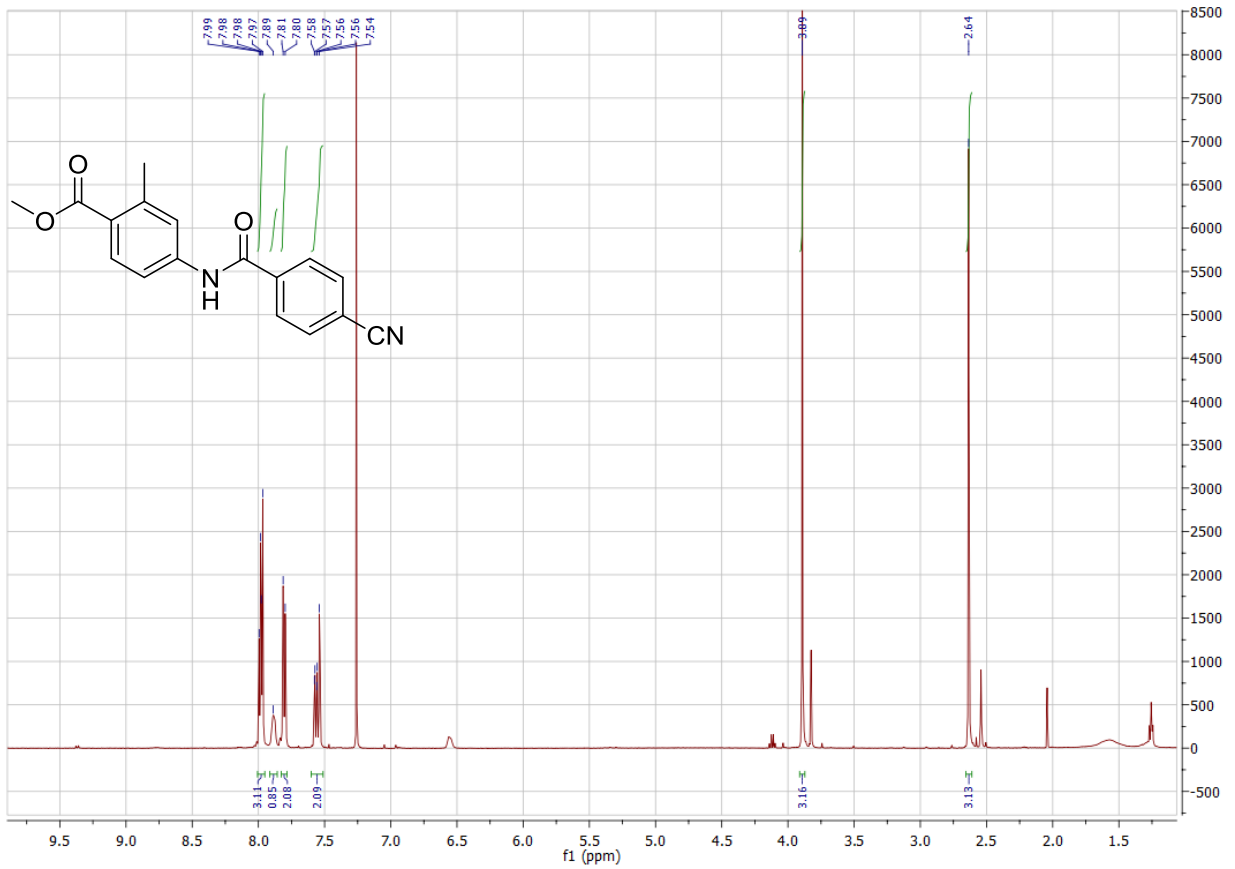
**(1*s*,4*s*)-4-(4-cyanobenzamido)cyclohexane-1-carboxylic acid (10)**



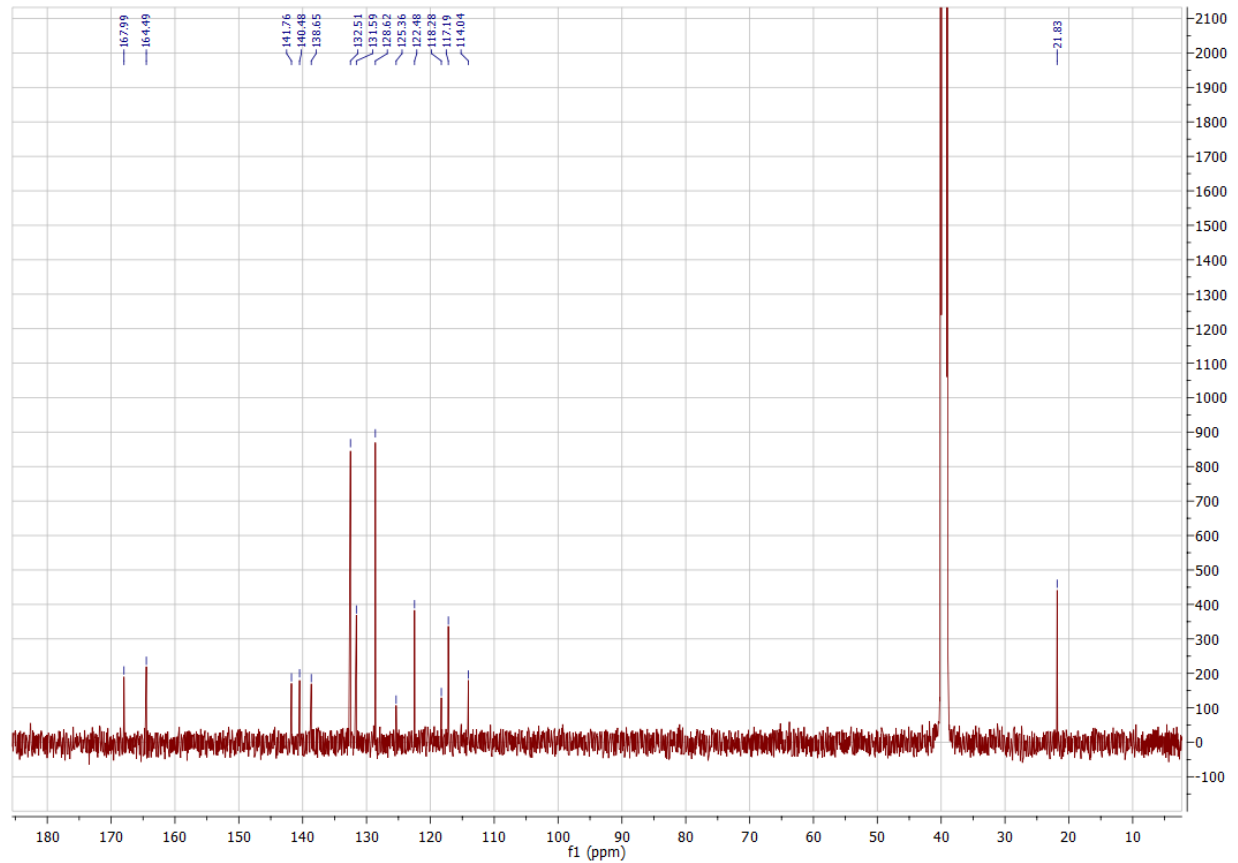
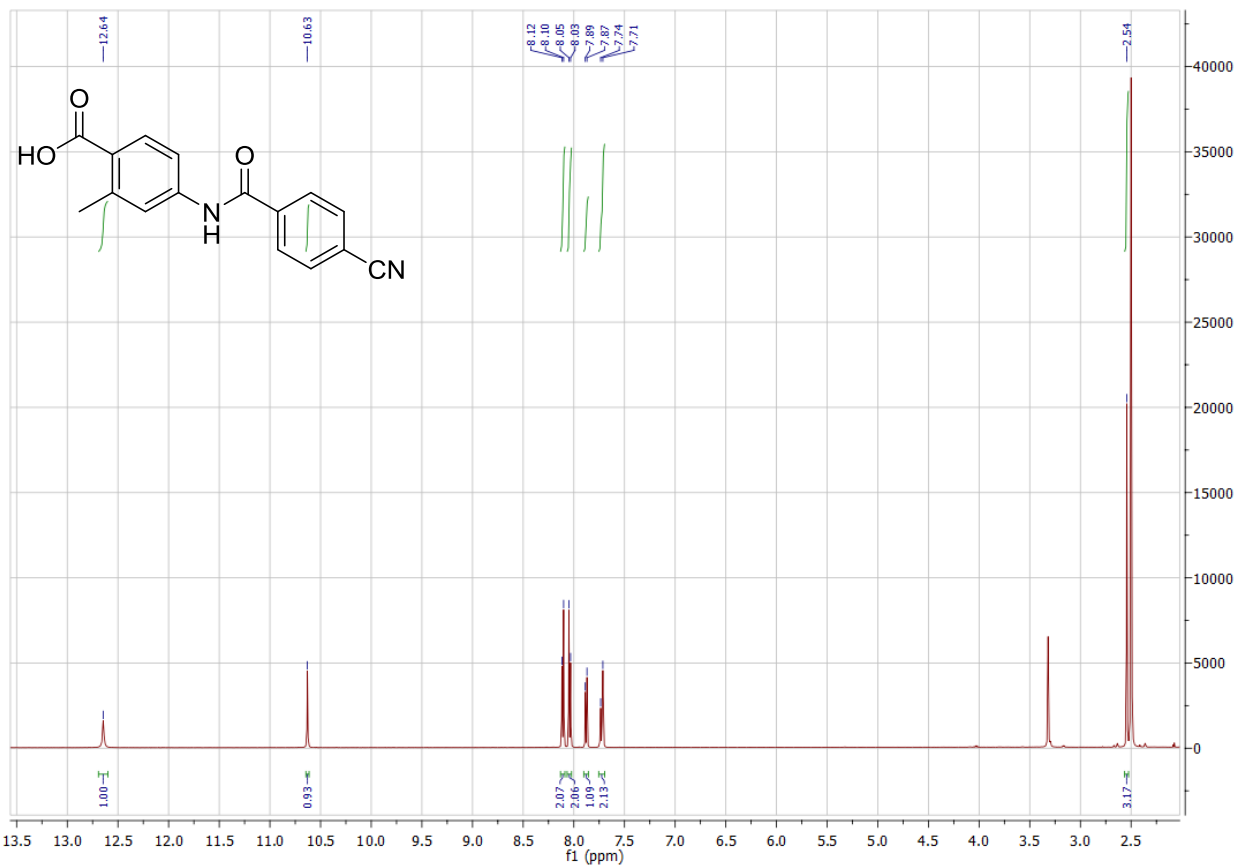
# 4-(benzo[d][1,2,3]triazole-5-carboxamido)benzoic acid



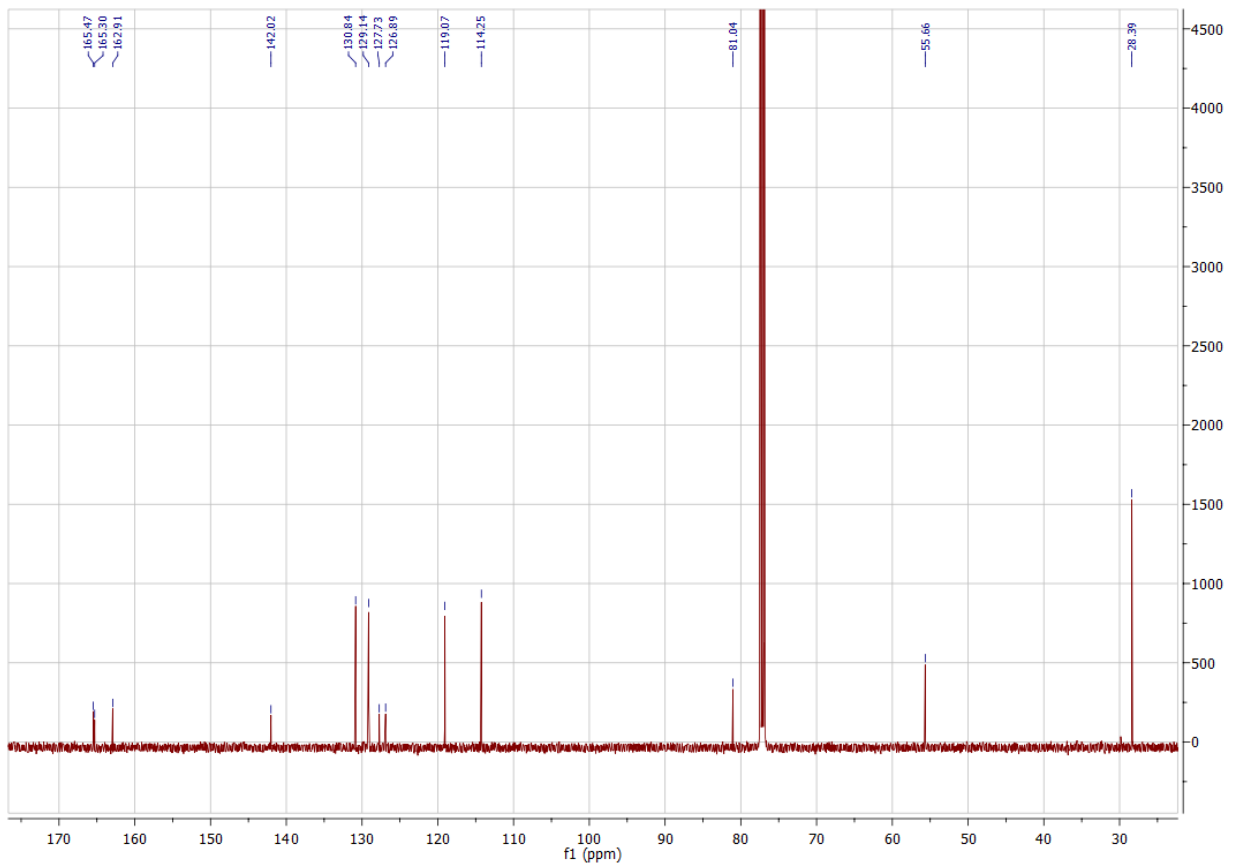
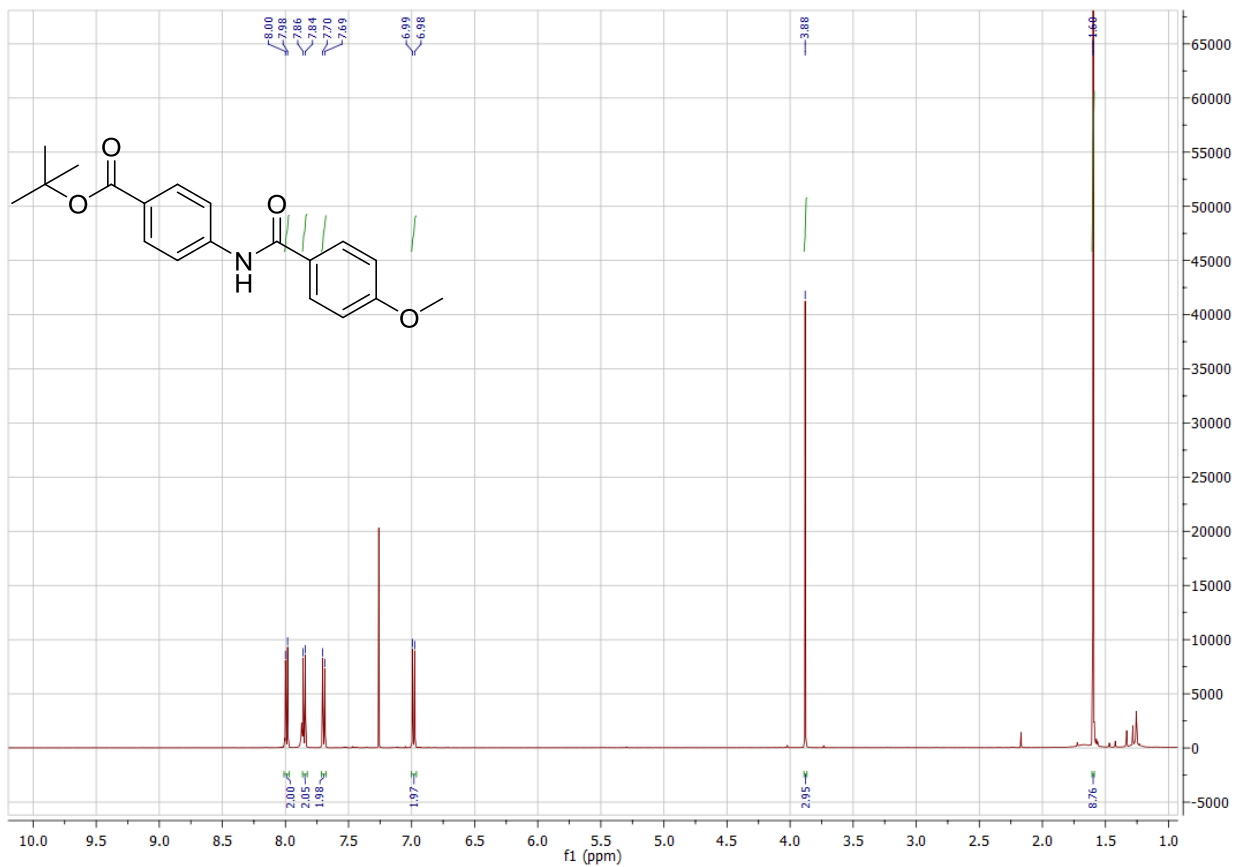
# Methyl 4-(4-cyanobenzamido)-2-methylbenzoate



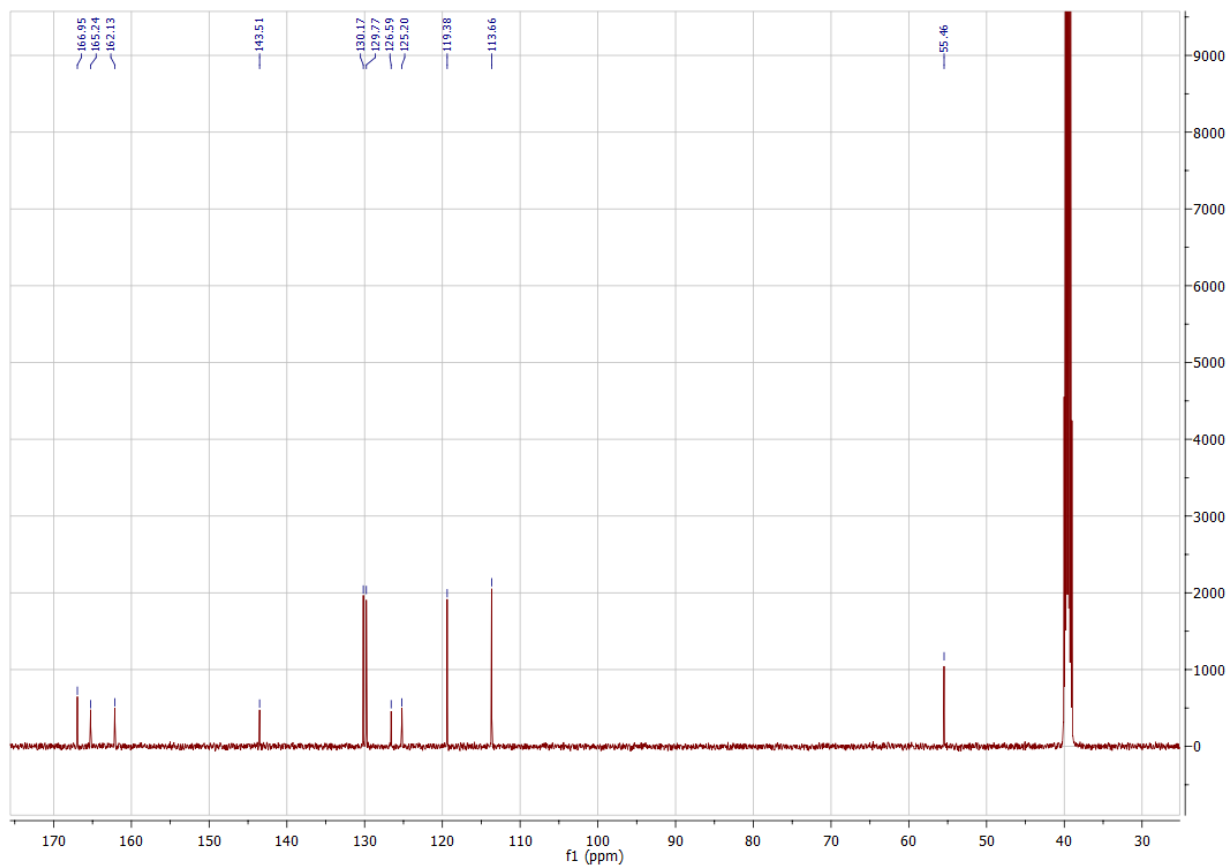
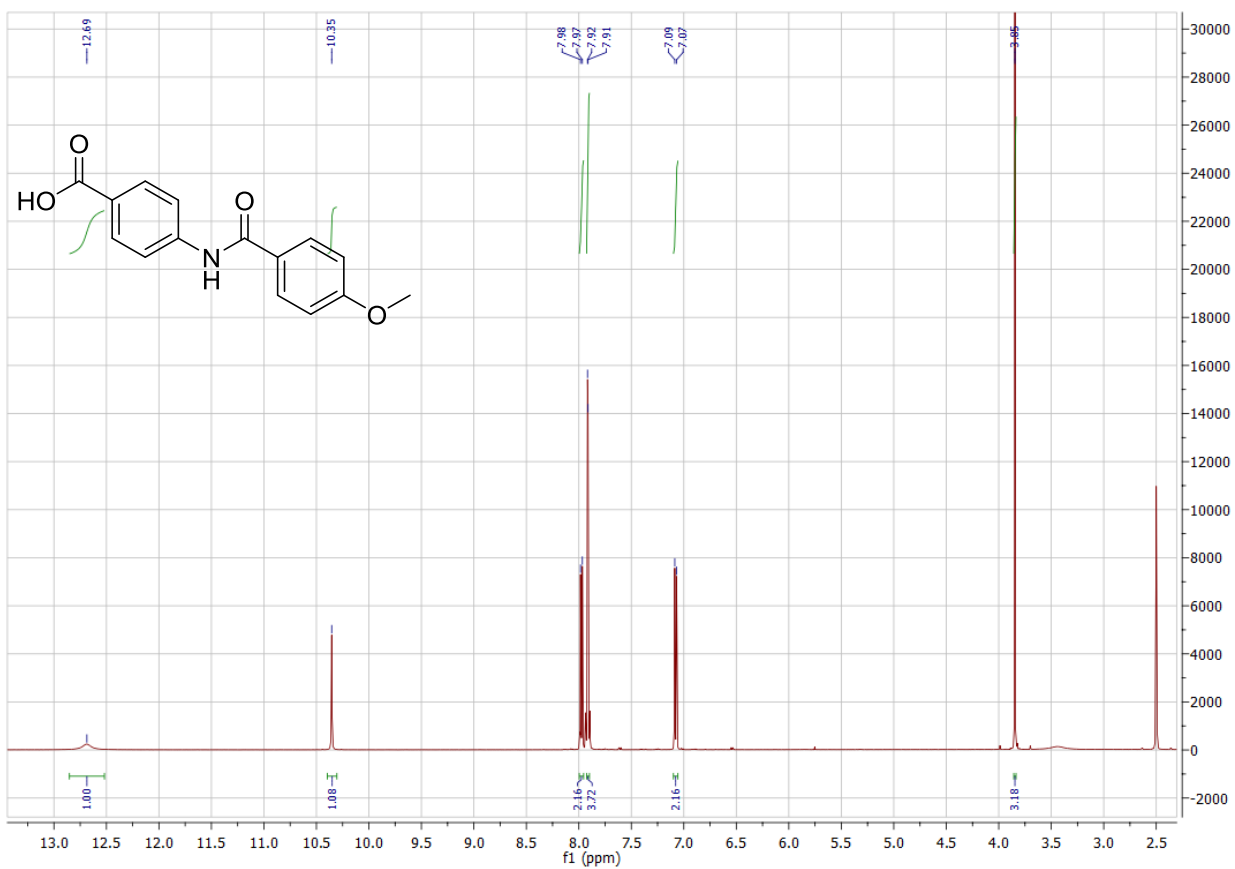
# 4-(4-cyanobenzamido)-2-methylbenzoic acid



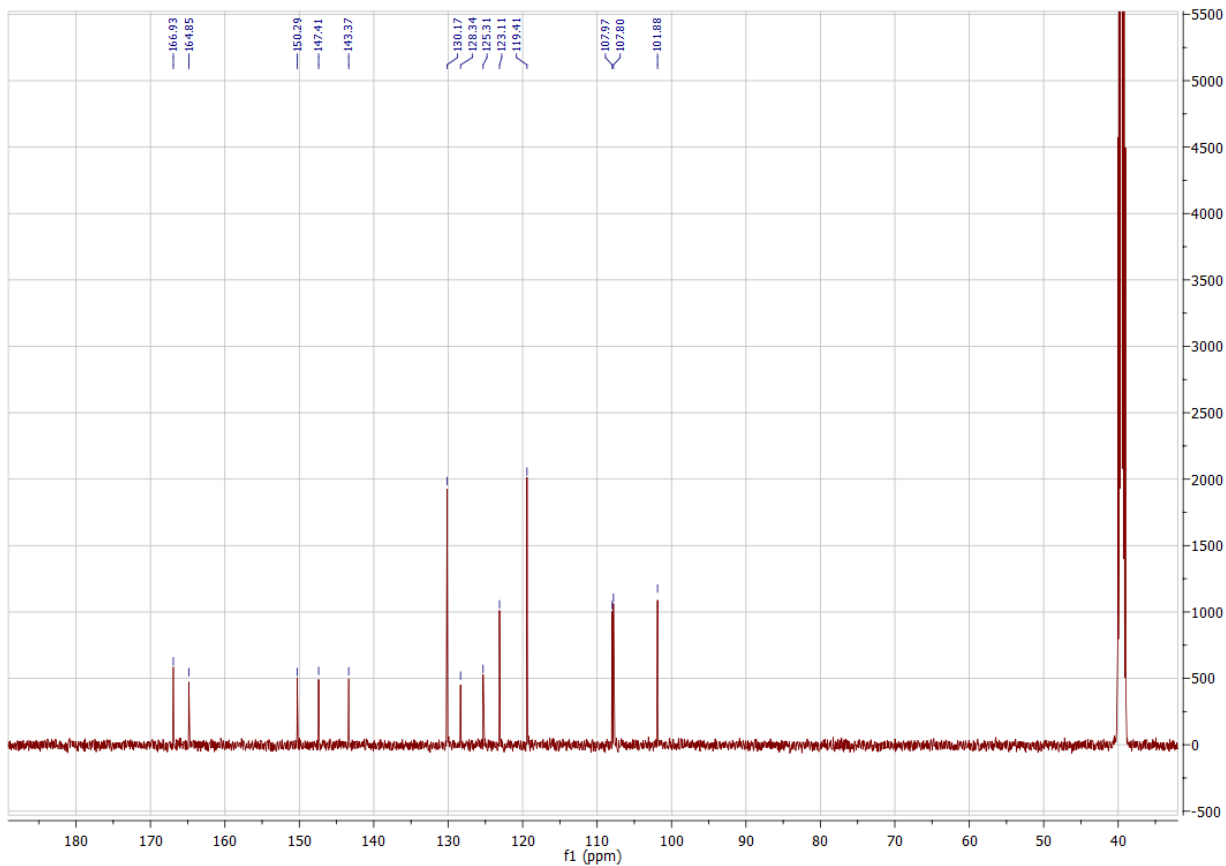
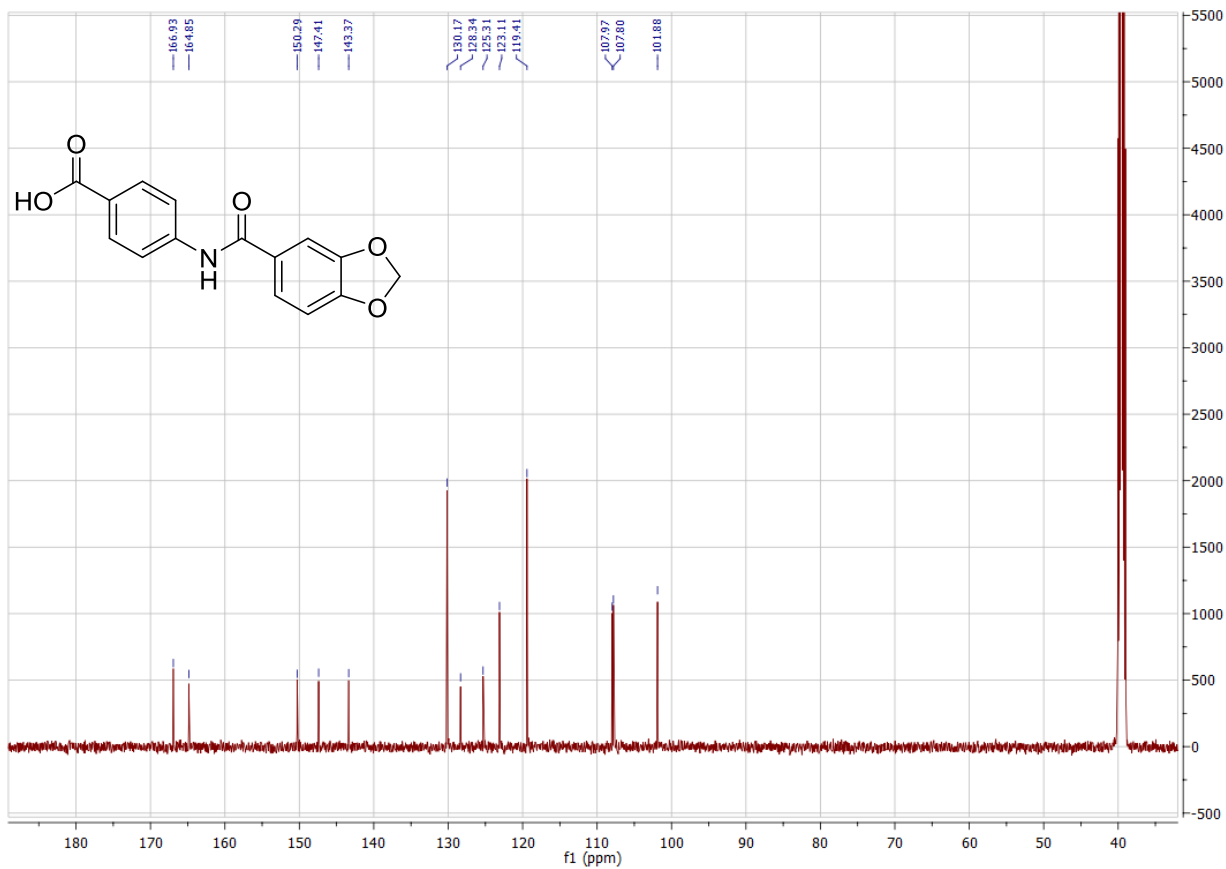
**tert-Butyl 4-(4-methoxybenzamido)benzoate (7)**



# 4-(4-methoxybenzamido)benzoic acid (8)

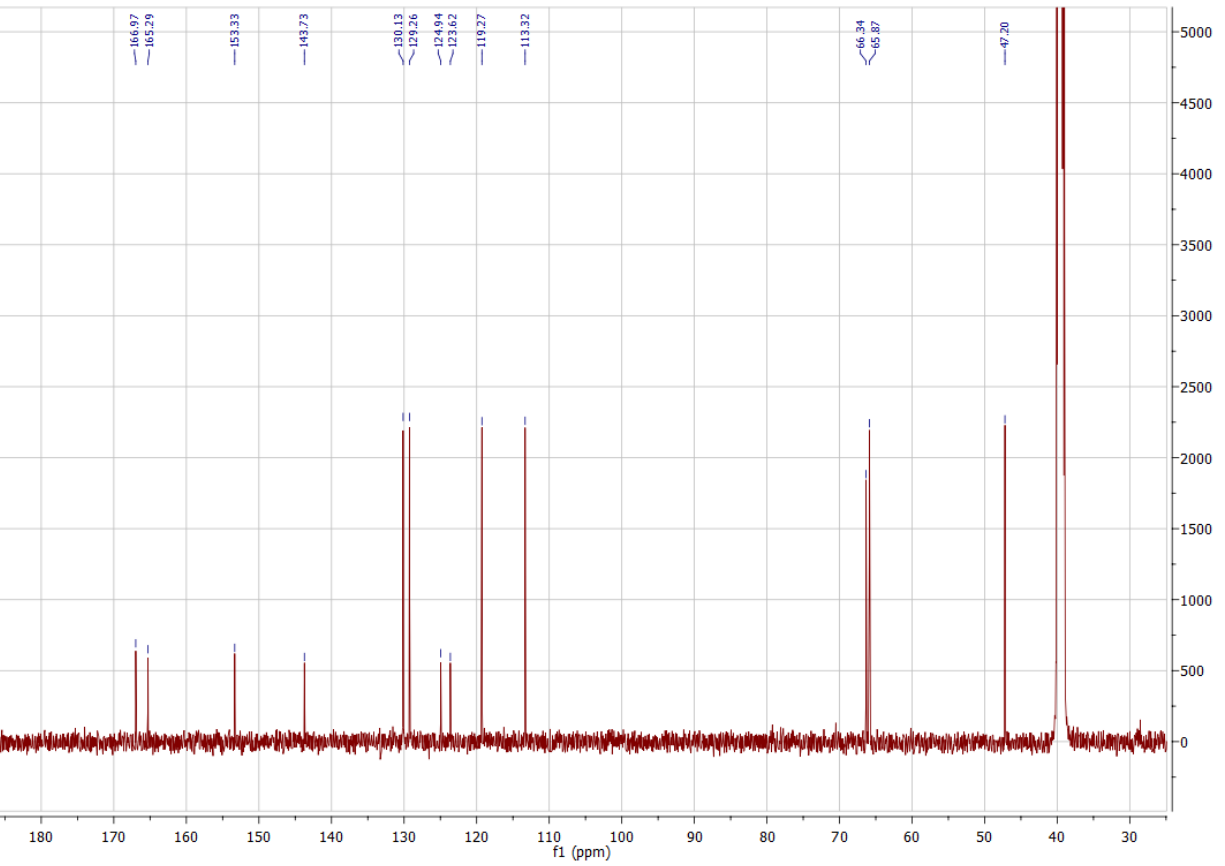
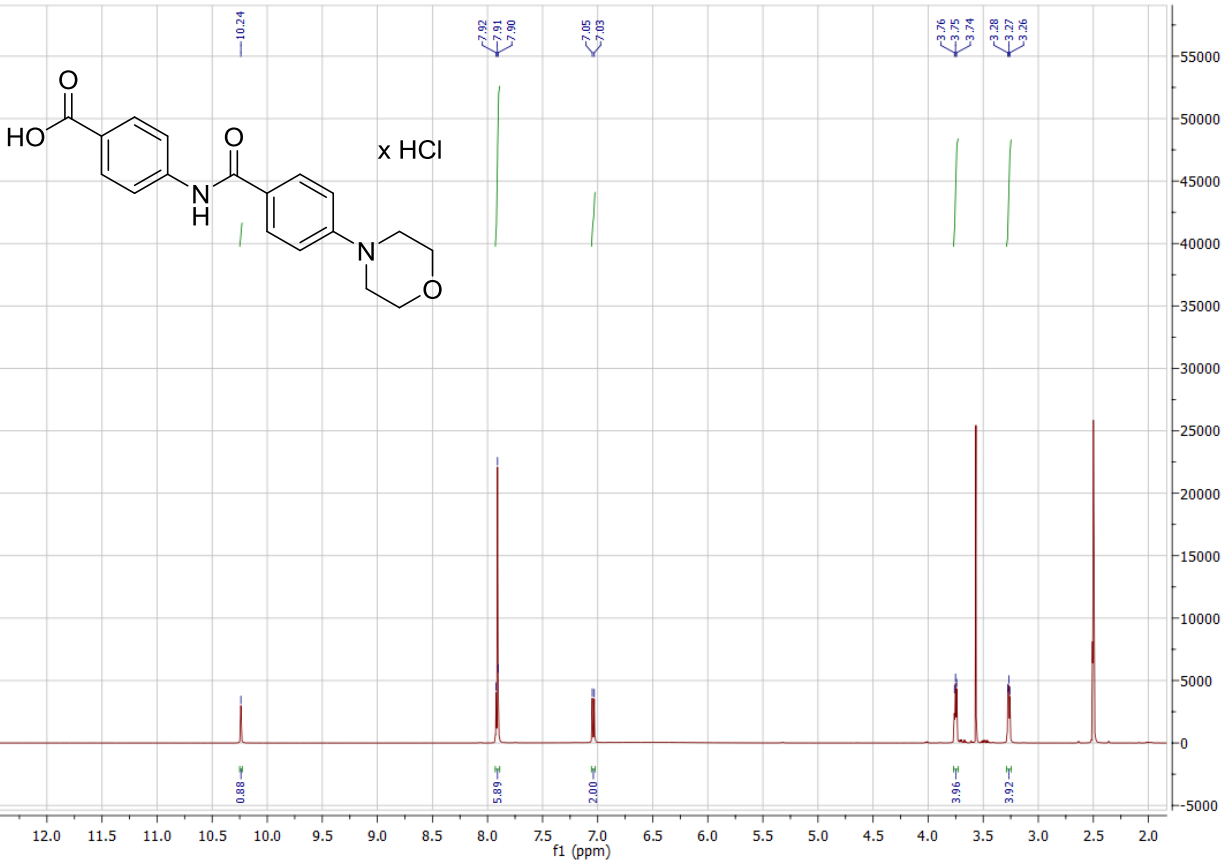


# 4-(benzo[d][1,3]dioxole-5-carboxamido)benzoic acid

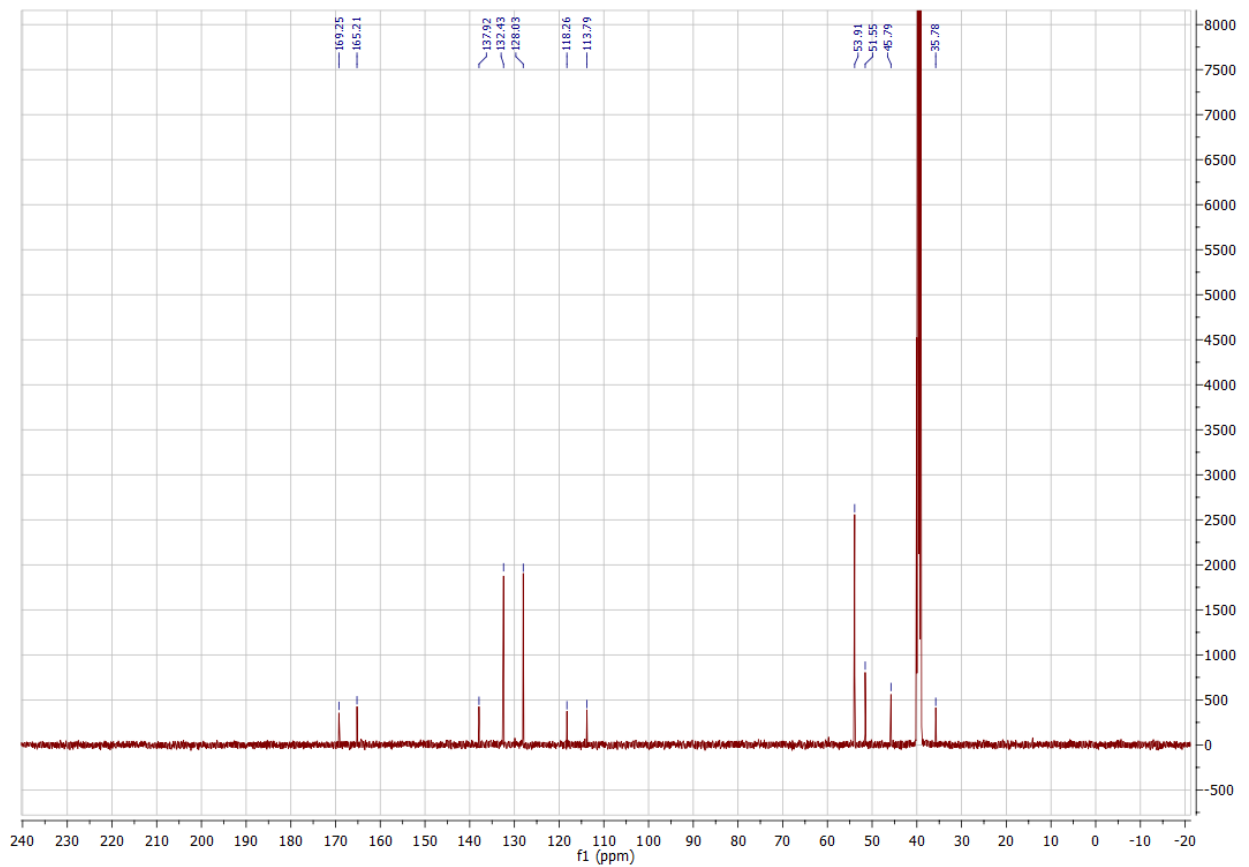
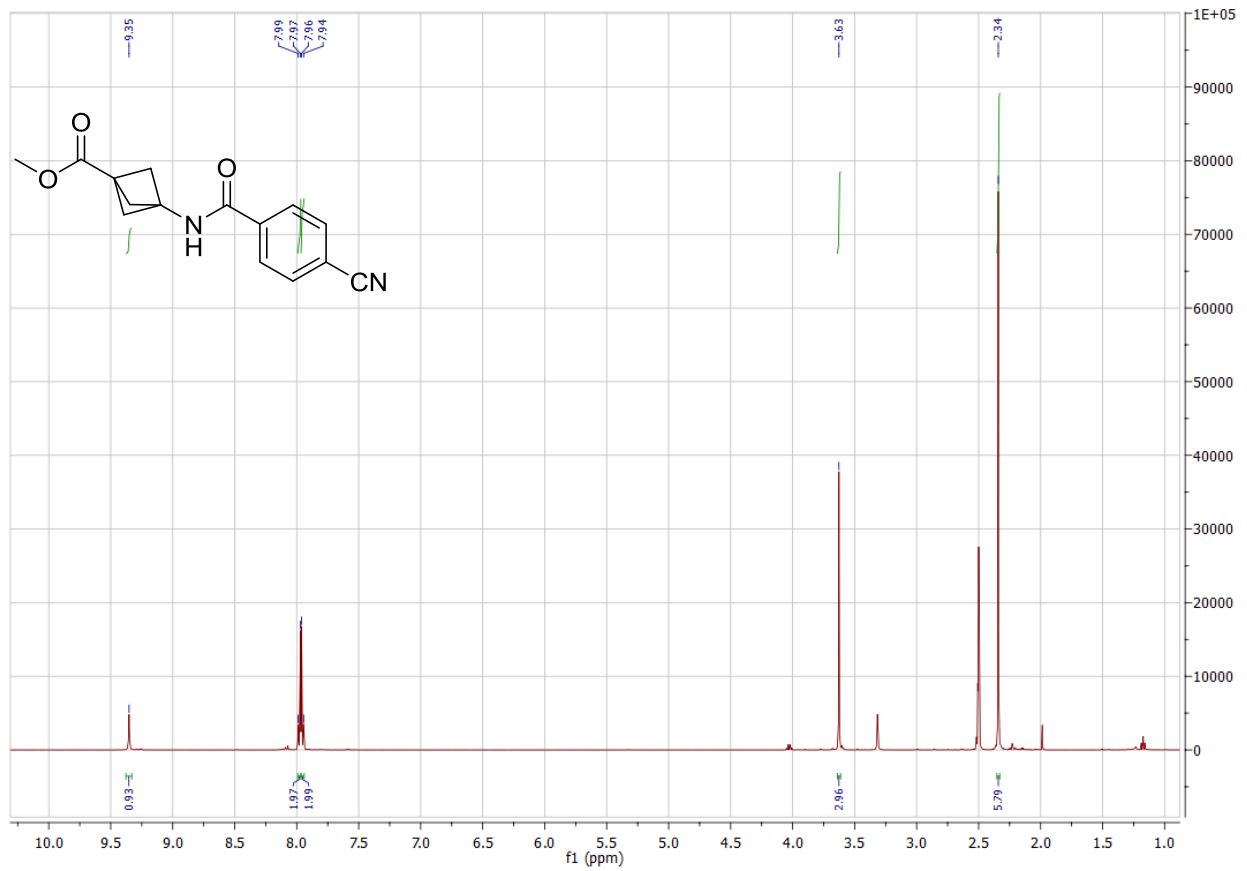




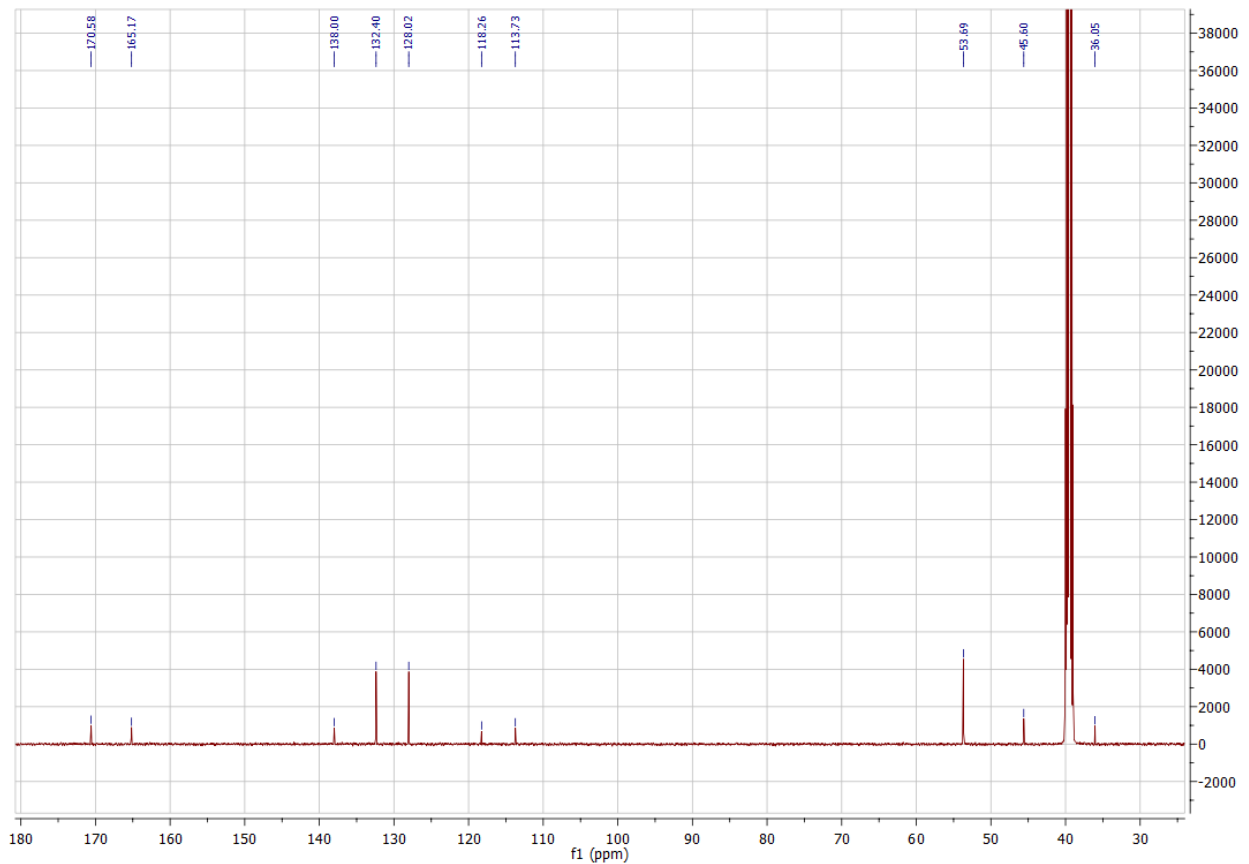
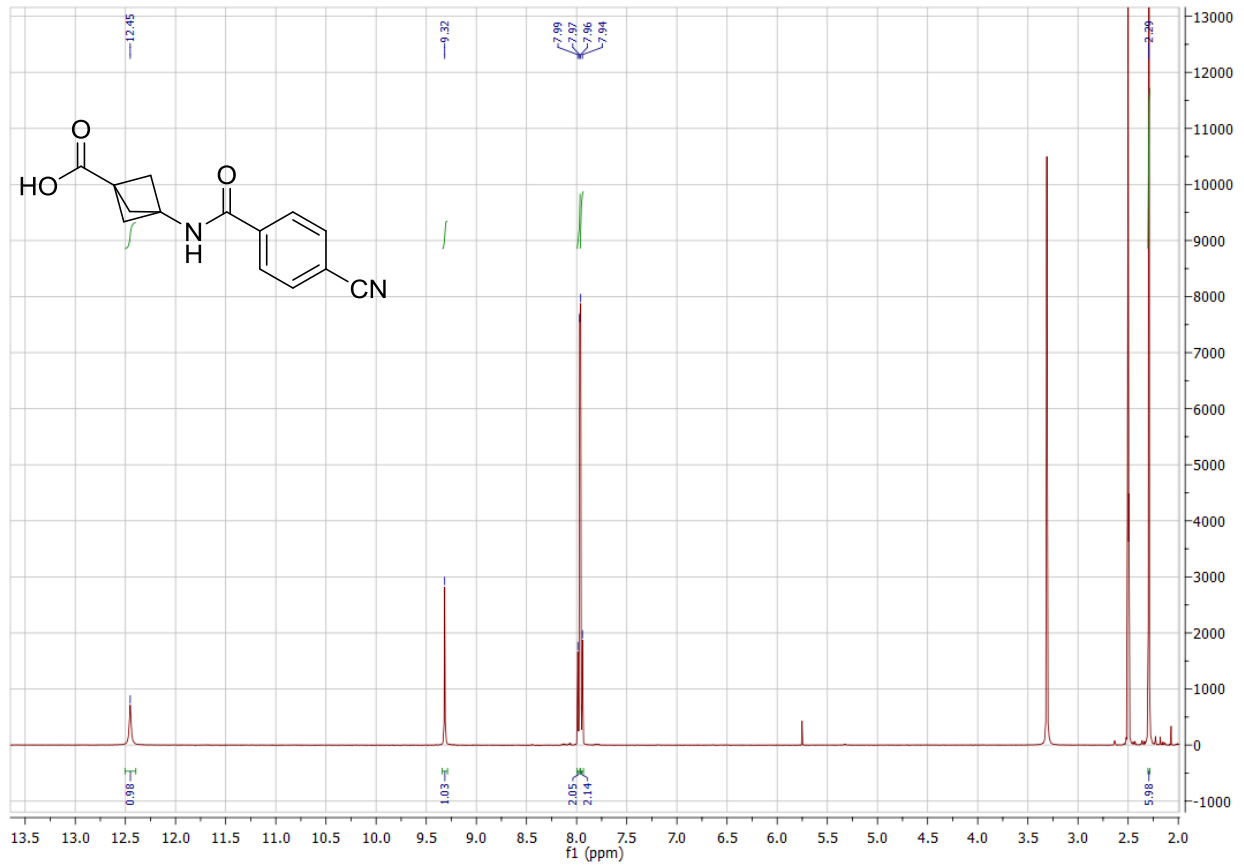
4-(4-morpholinobenzamido)benzoic acid hydrochloride



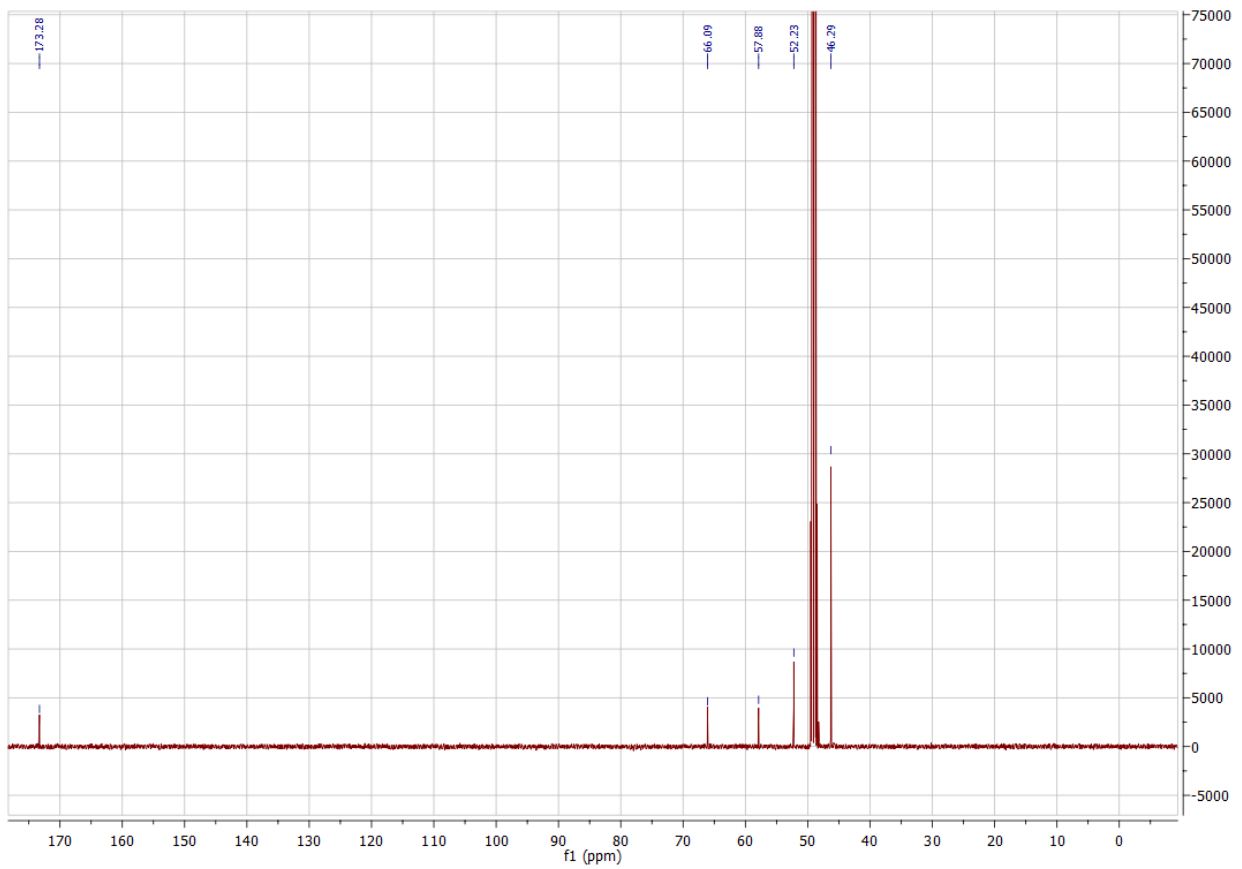
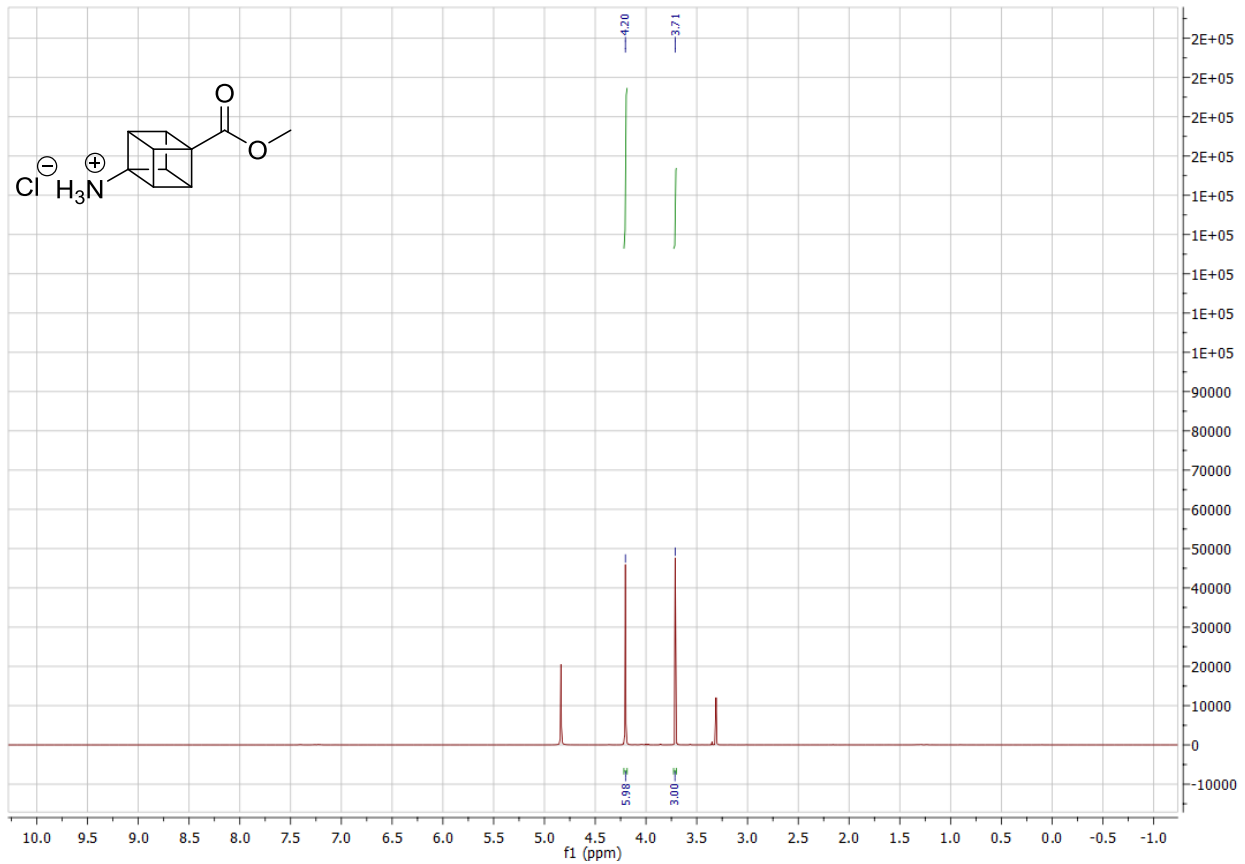
# Methyl 3-(4-cyanobenzamido)bicyclo[1.1.1]pentane-1-carboxylate (91)



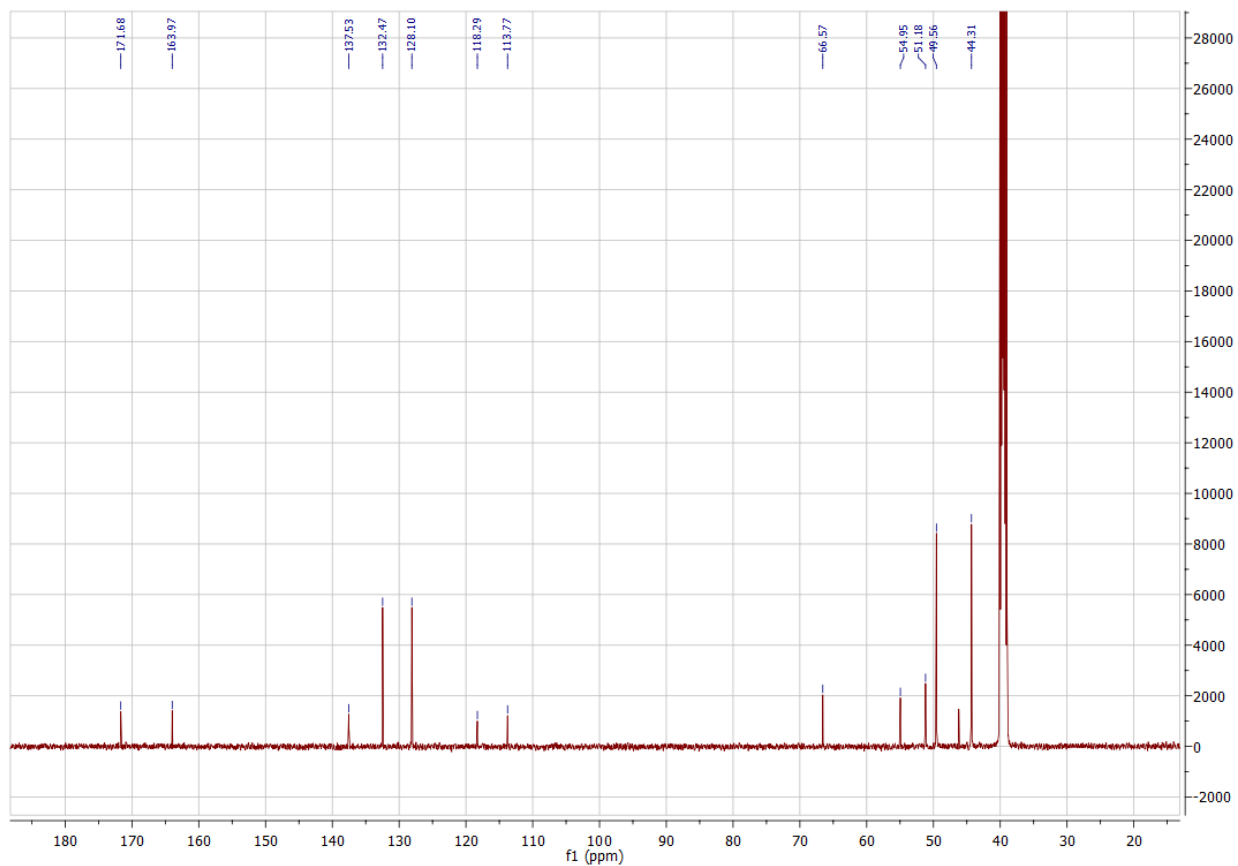
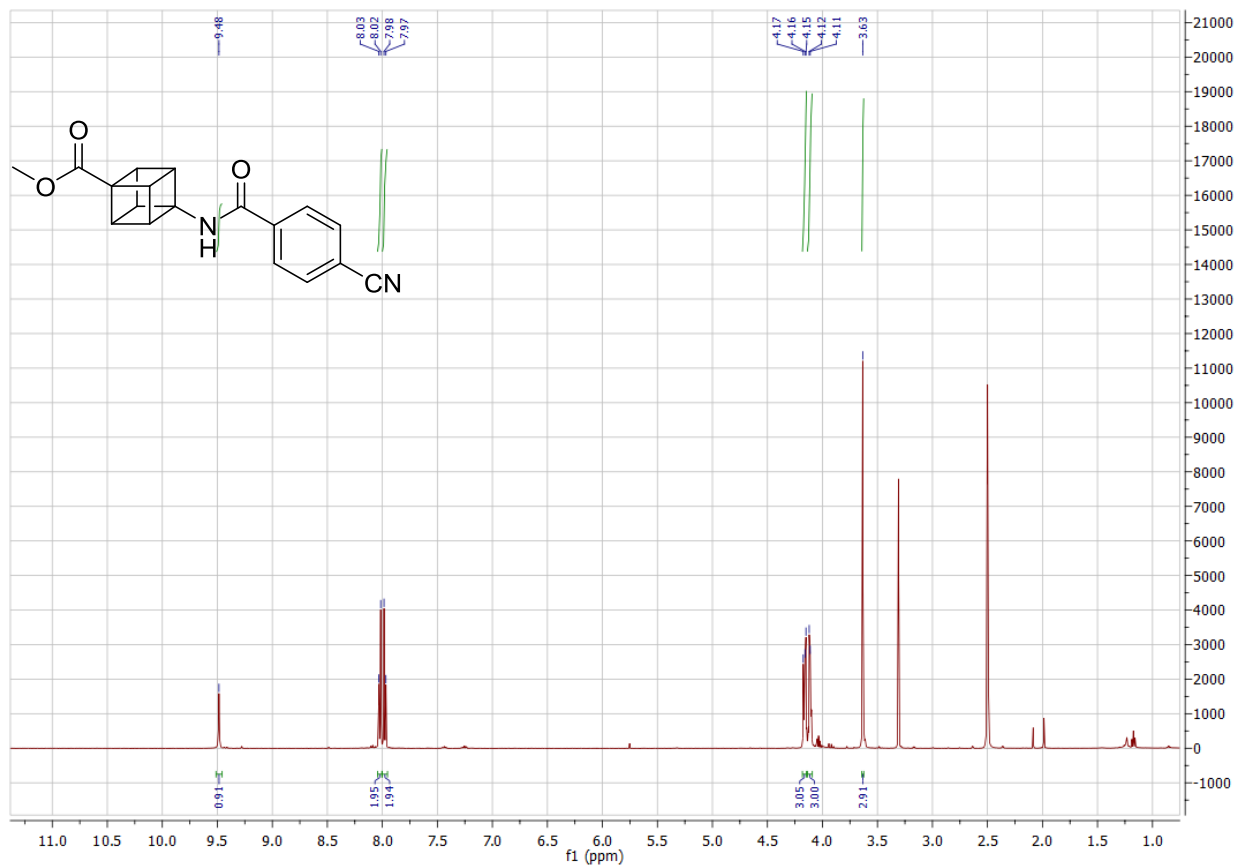
### 3-(4-cyanobenzamido)bicyclo[1.1.1]pentane-1-carboxylic acid (92)



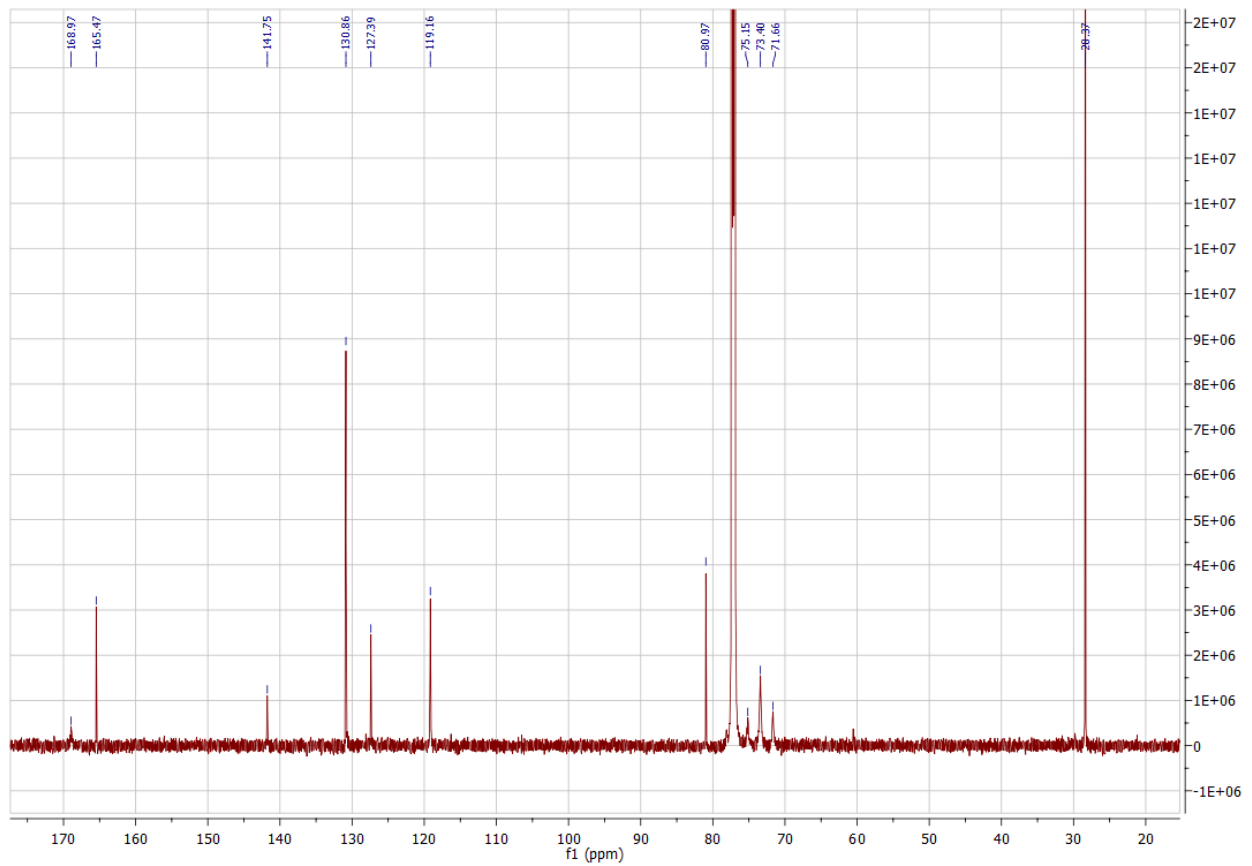
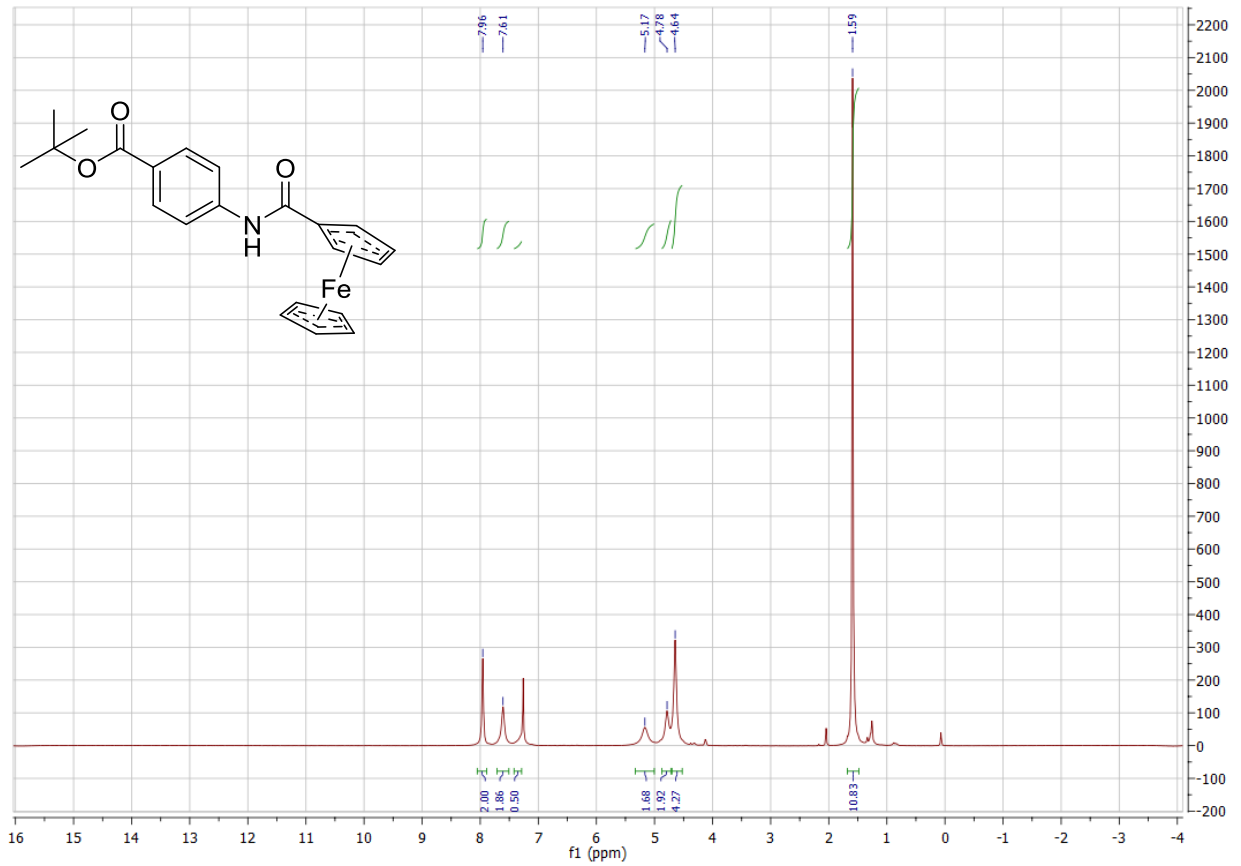
# Methyl (1*s*,2*R*,3*s*,4*r*,5*S*,6*r*,7*R*,8*S*)-4-aminocubane-1-carboxylate hydrochloride (93)



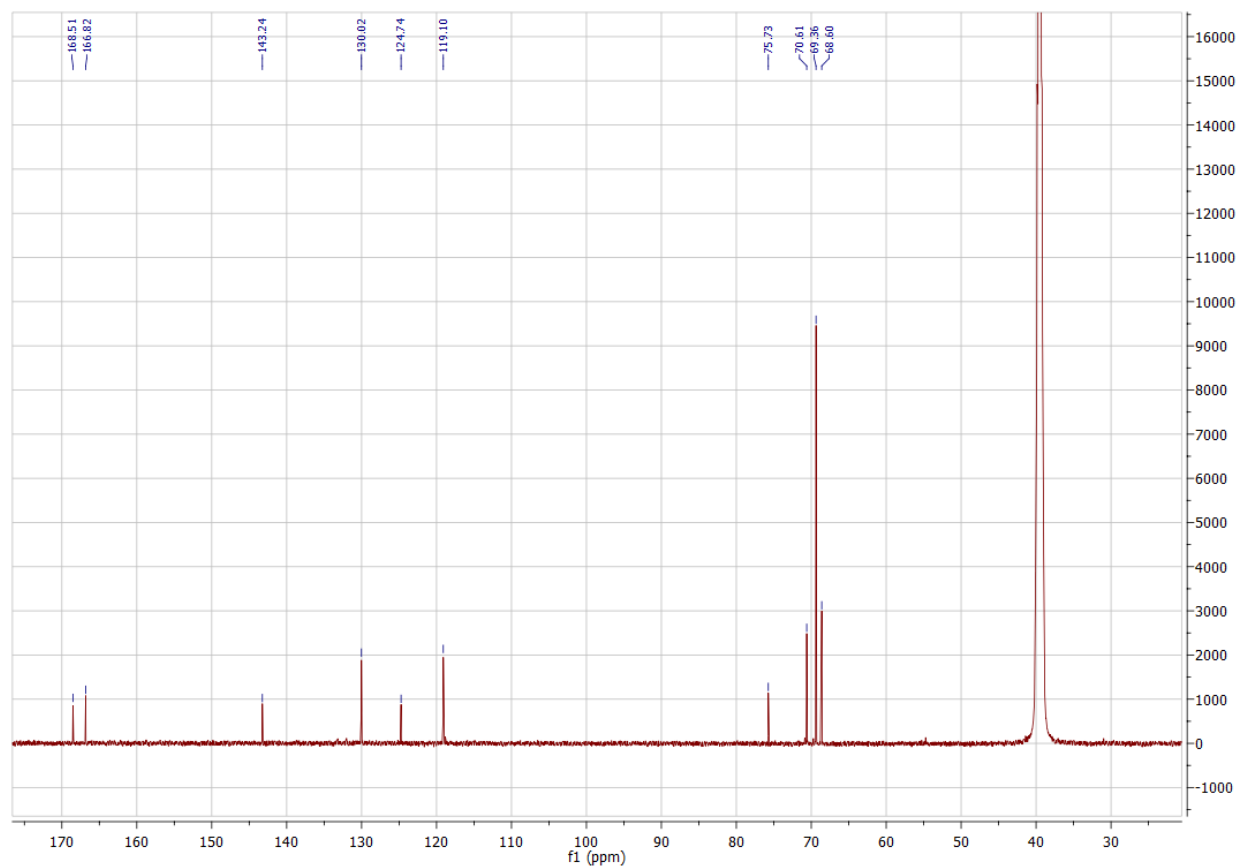
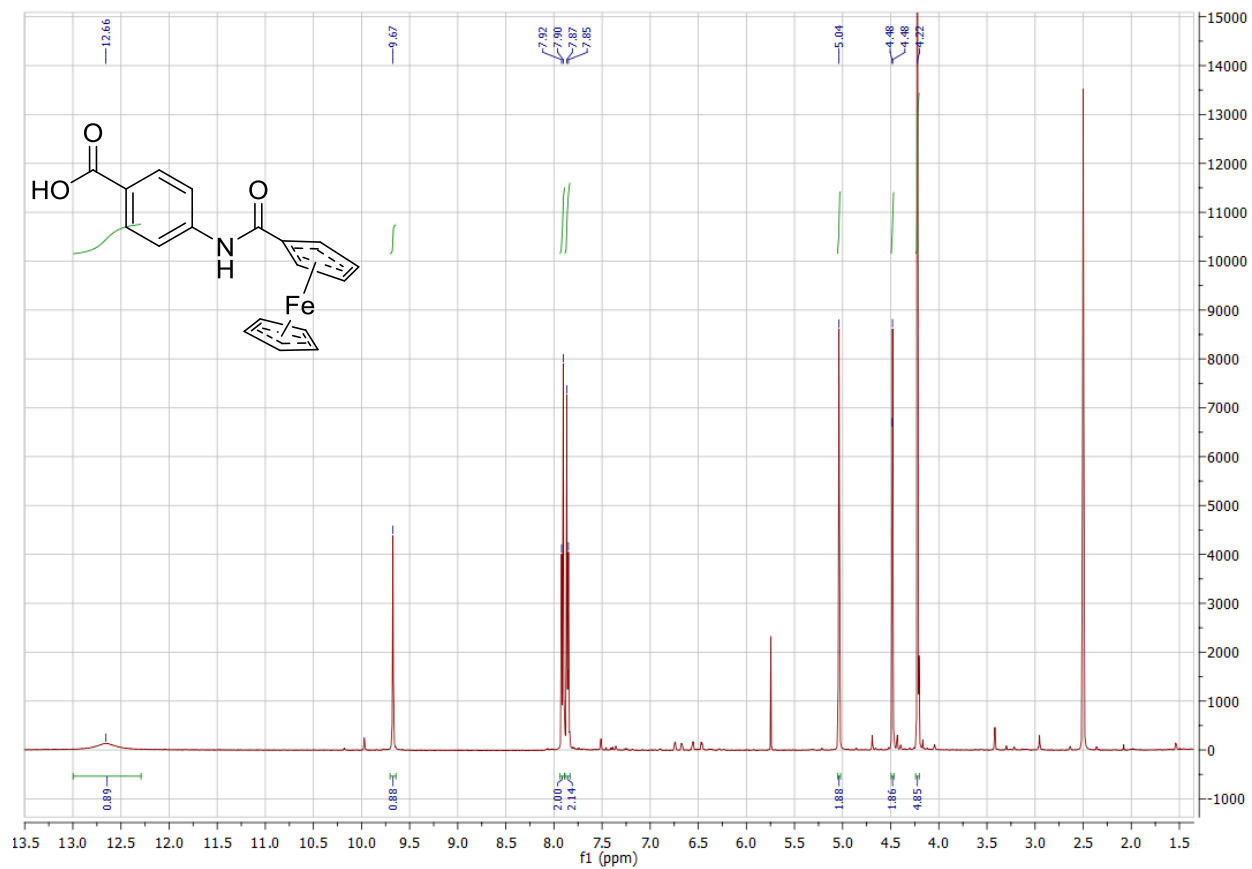
# Methyl (1*s*,2*R*,3*s*,4*r*,5*S*,6*r*,7*R*,8*S*)-4-(4-cyanobenzamido)cubane-1-carboxylate



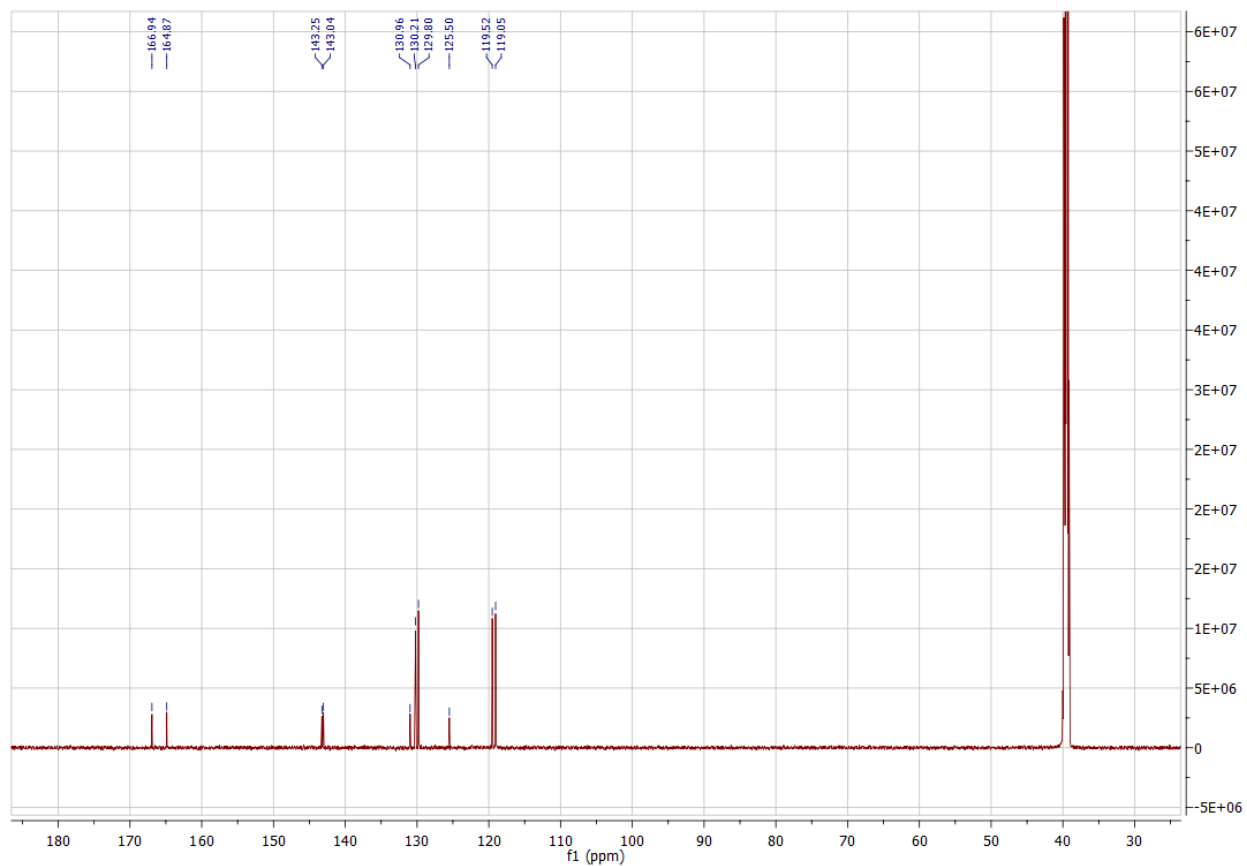
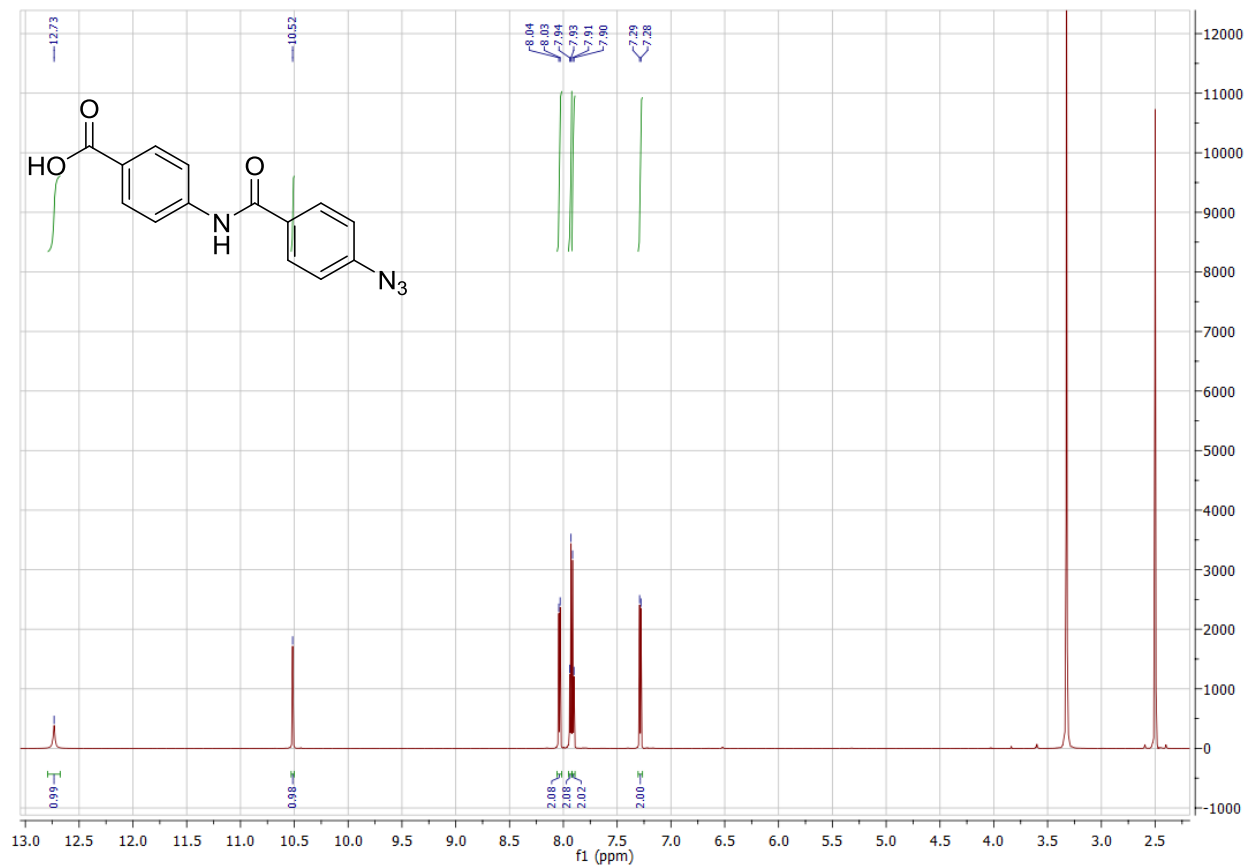
**tert-Butyl 4-(ferrocenecarboxamido)benzoate (110)**



# 4-(ferrocenecarboxamido)benzoic acid (111)

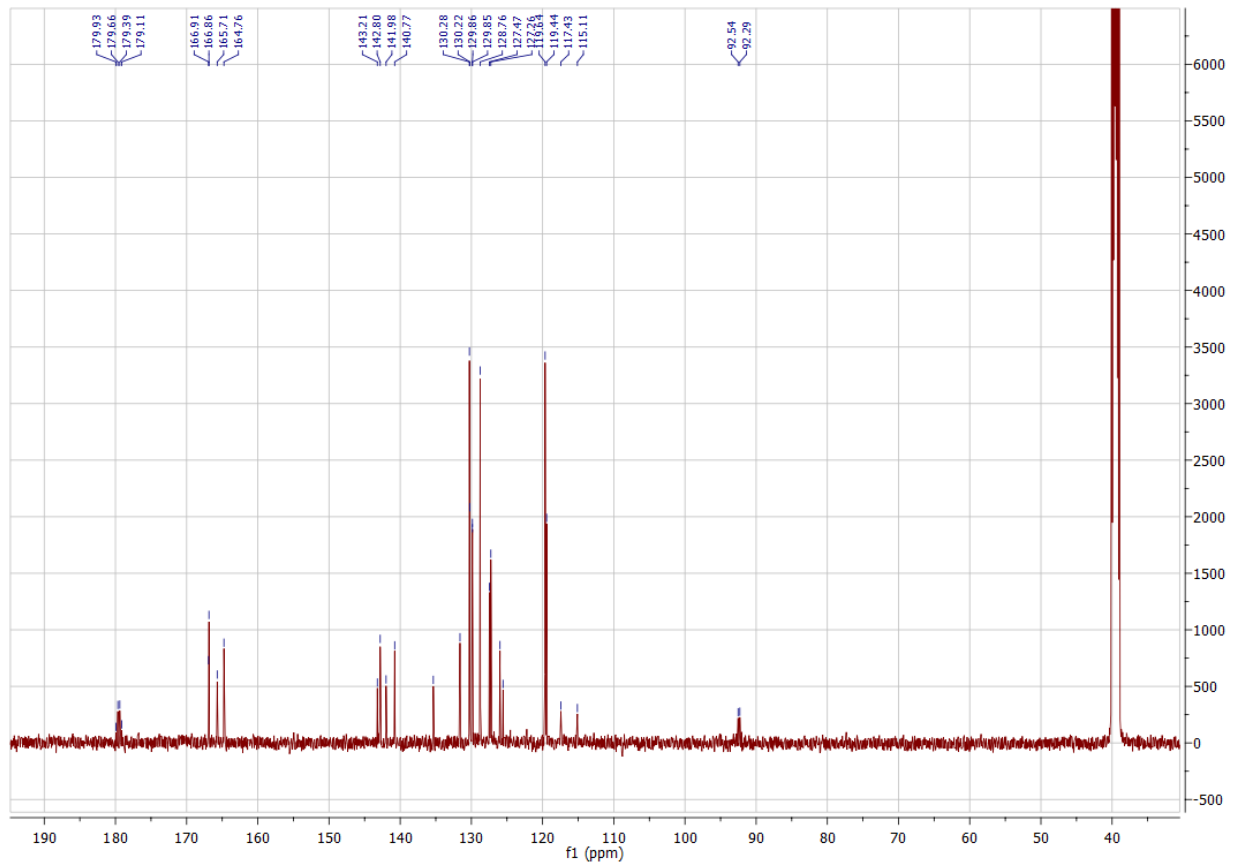
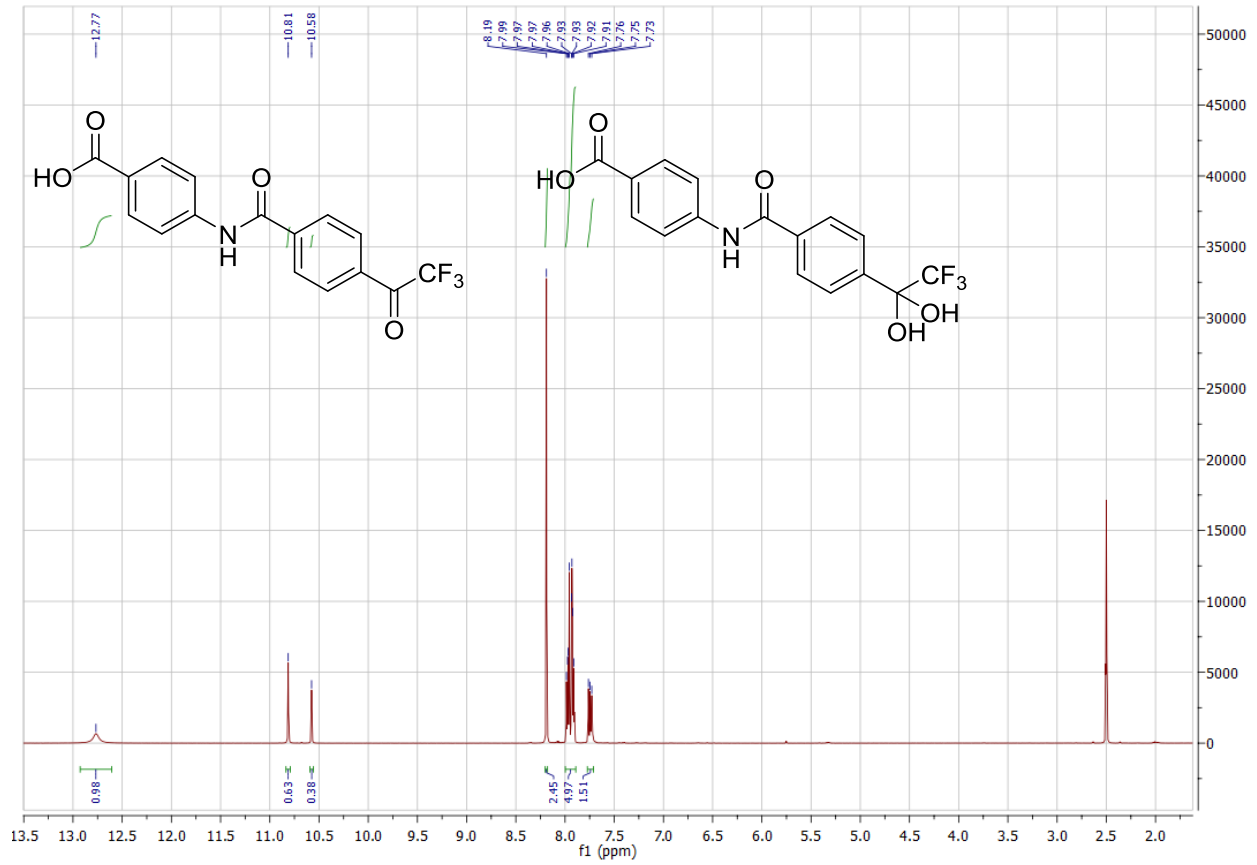


# 4-(4-azidobenzamido)benzoic acid

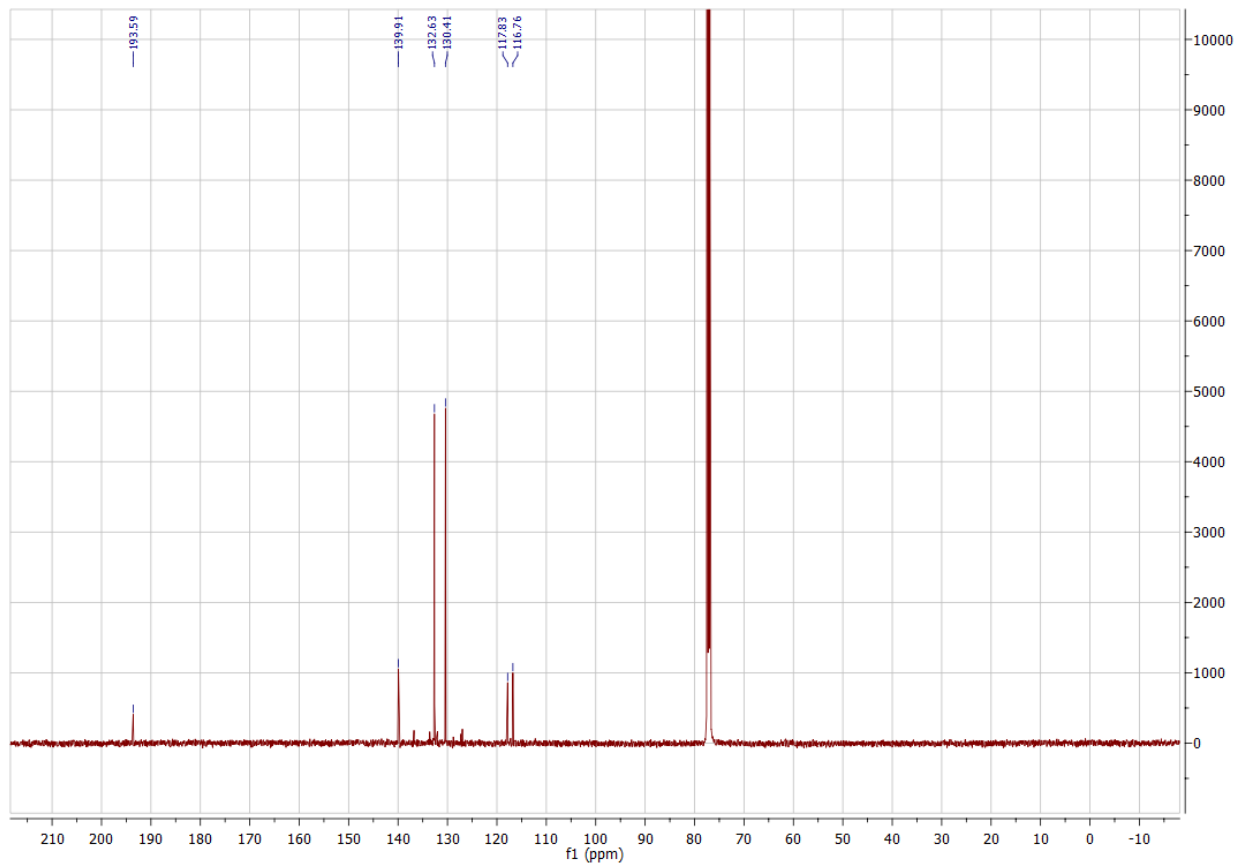
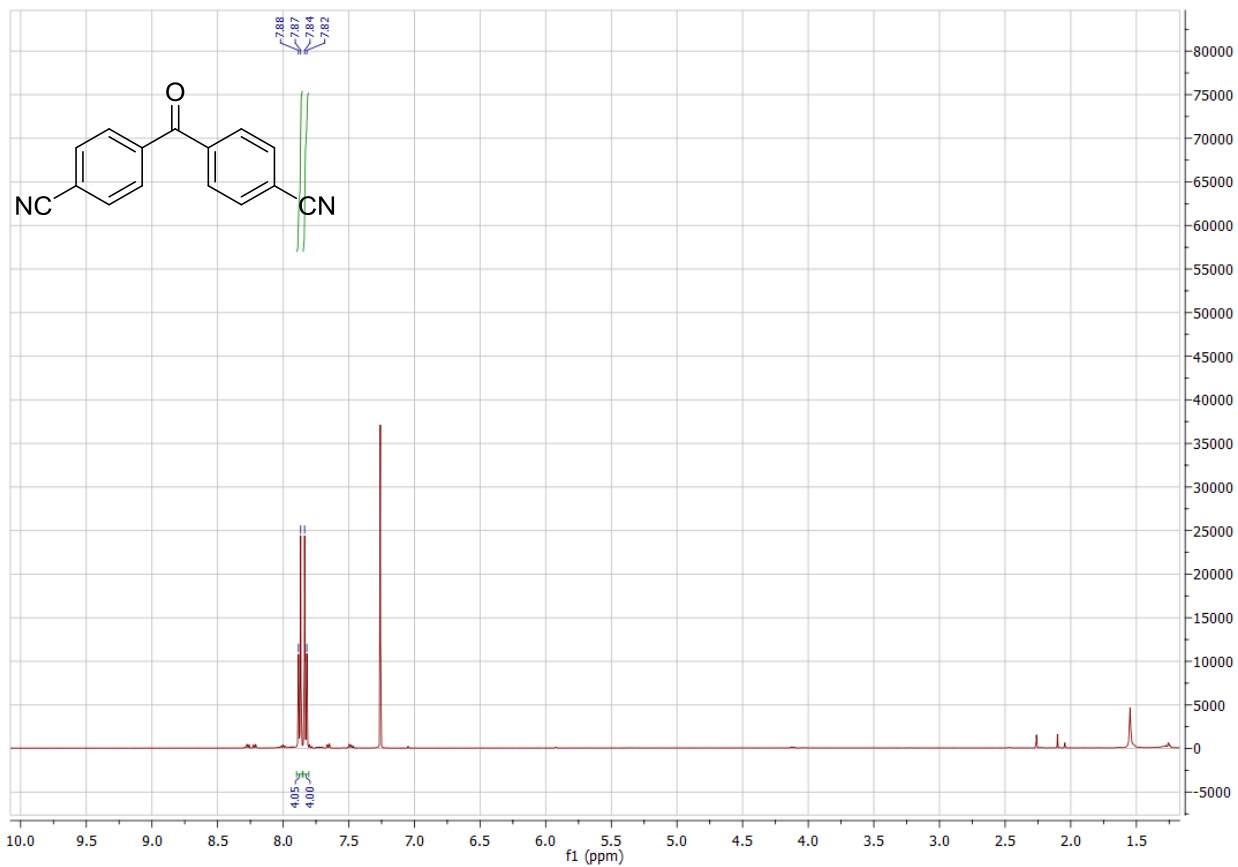




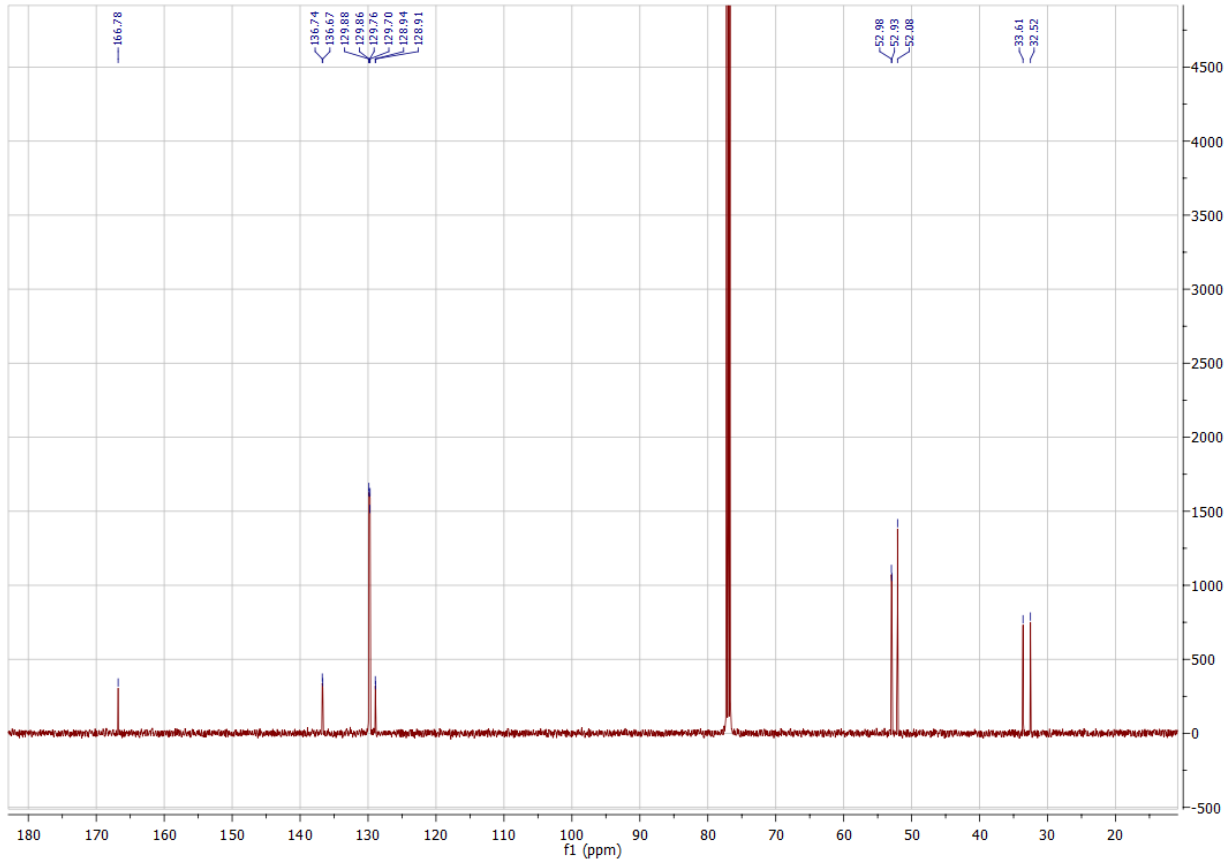
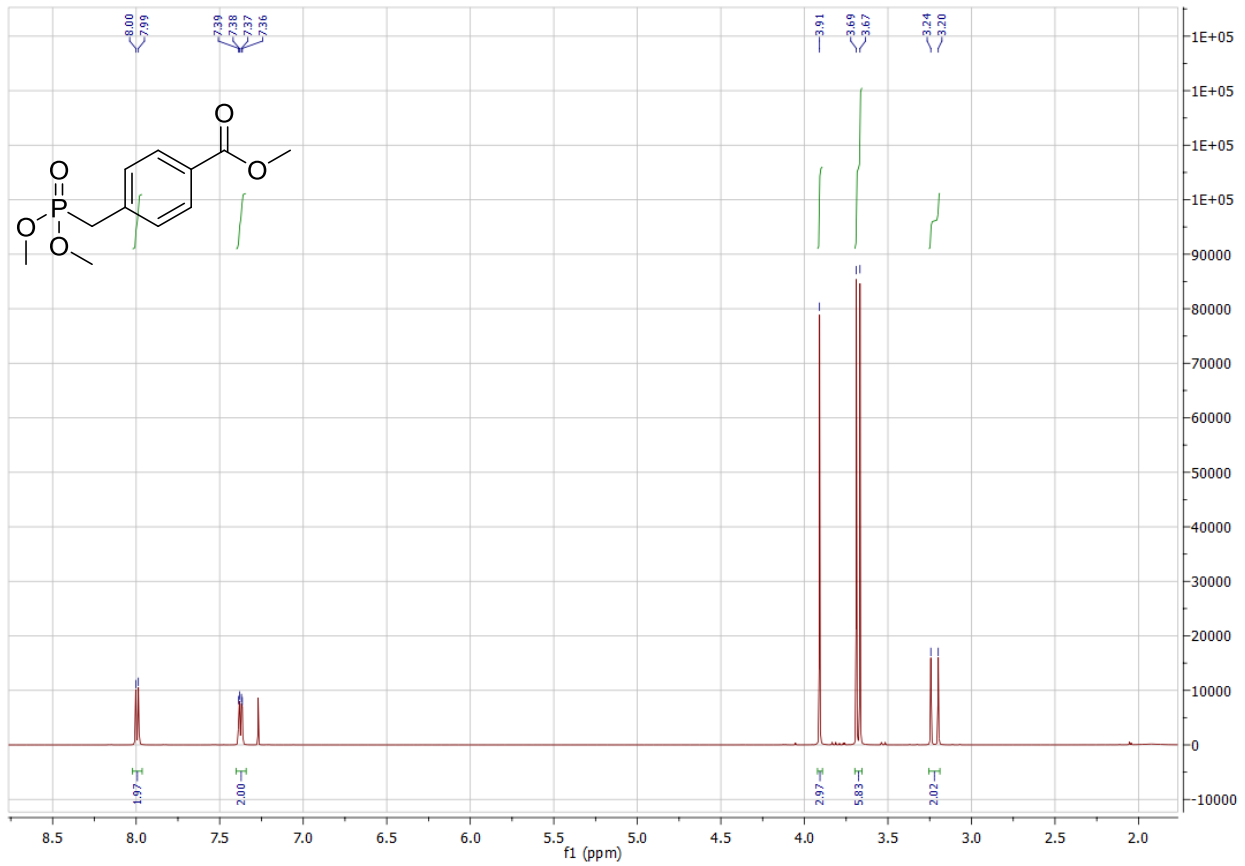
**4-(4-(2,2,2-trifluoroacetyl)benzamido)benzoic acid and 4-(4-(2,2,2-trifluoro-1,1-dihydroxyethyl)benzamido)benzoic acid**



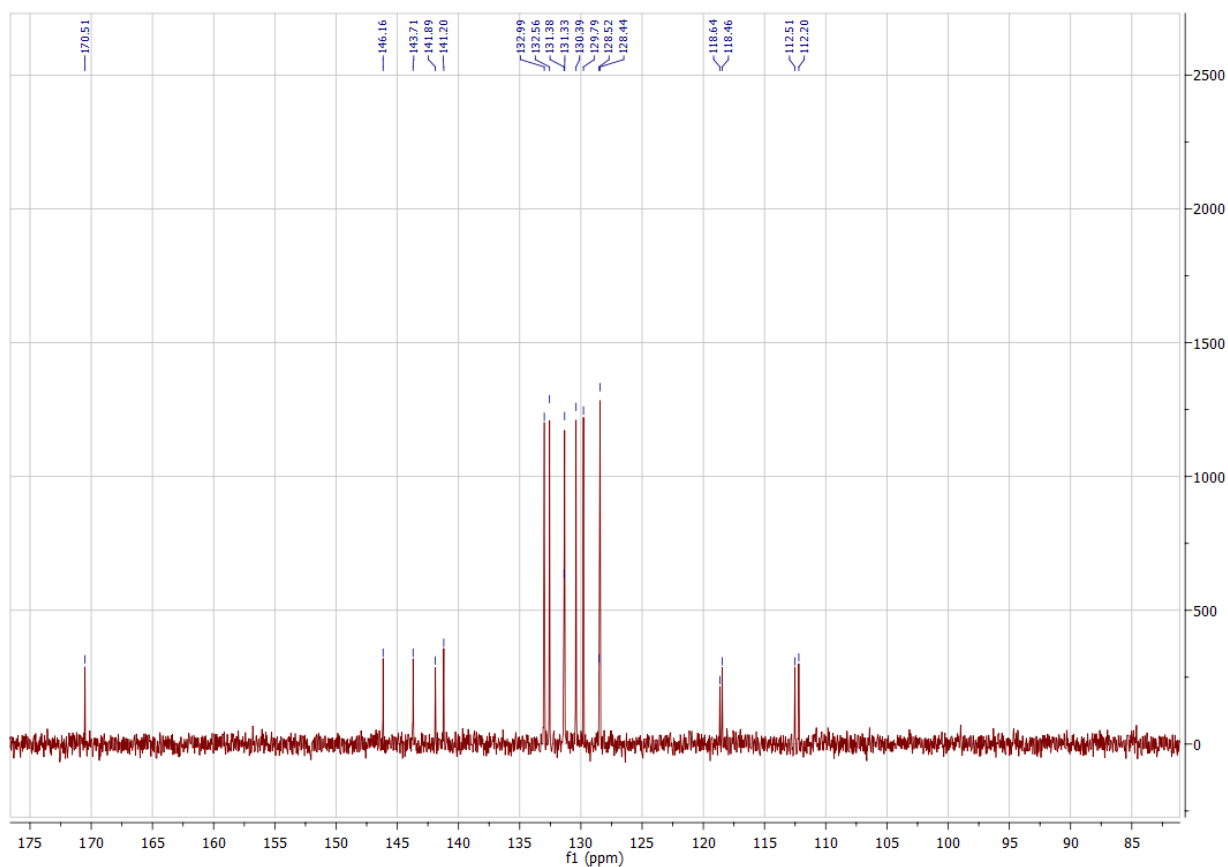
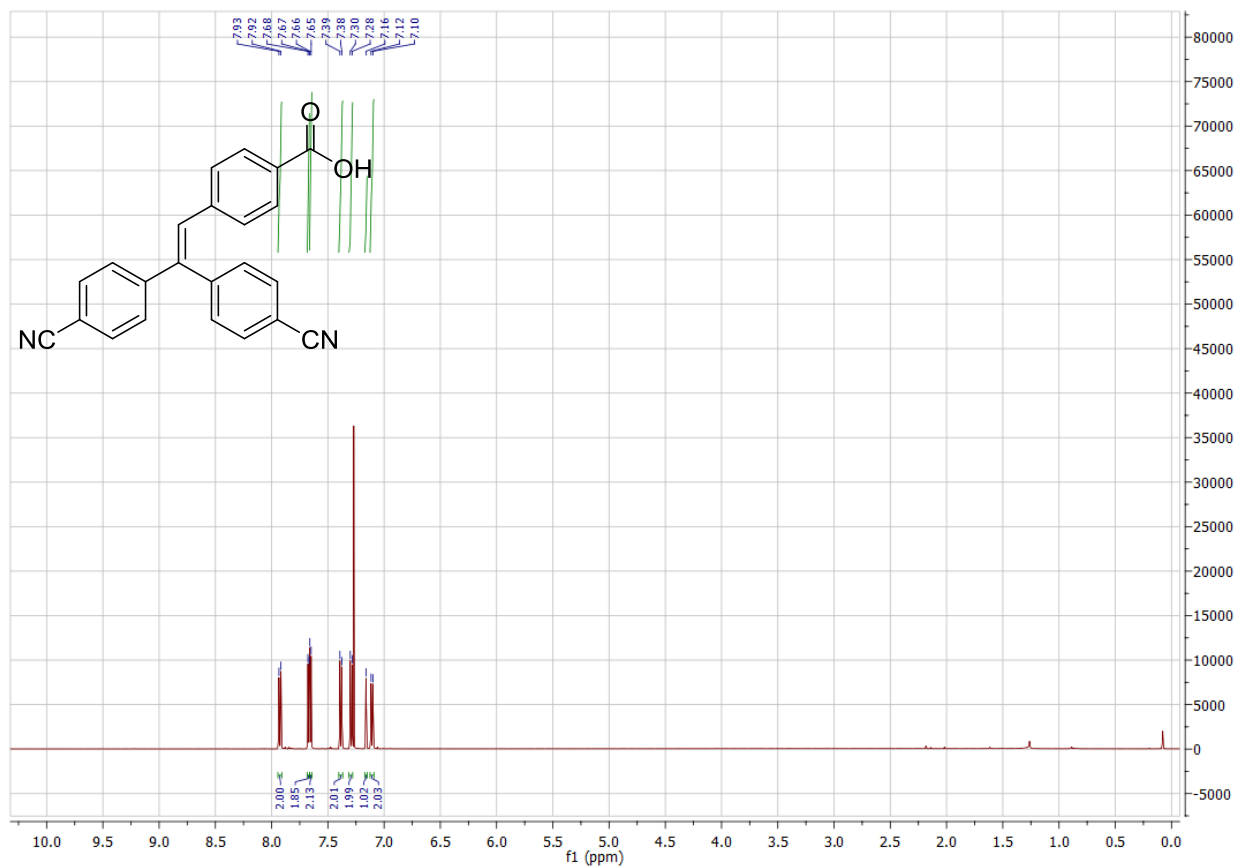
# 4,4'-Carbonyldibenzonitrile (43)



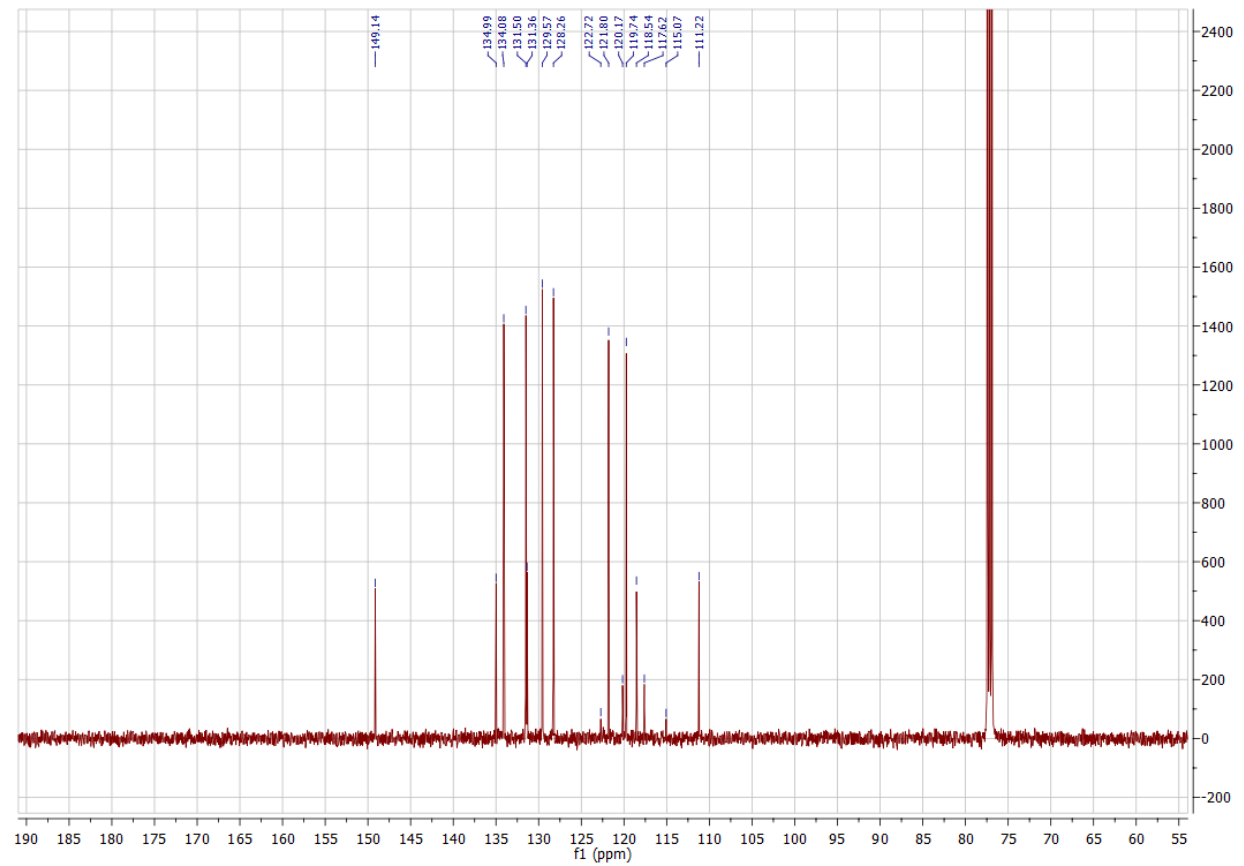
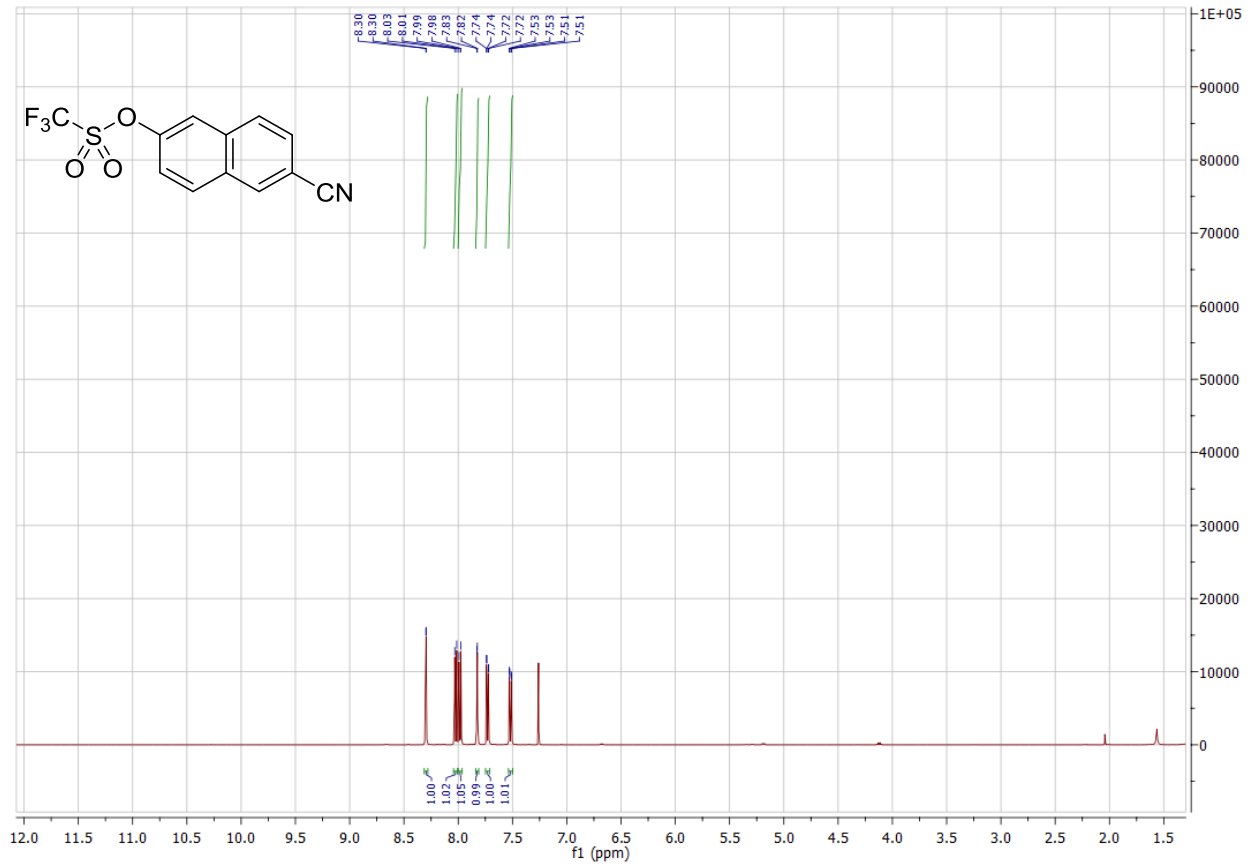
# Methyl 4-((dimethoxyphosphoryl)methyl)benzoate (44)

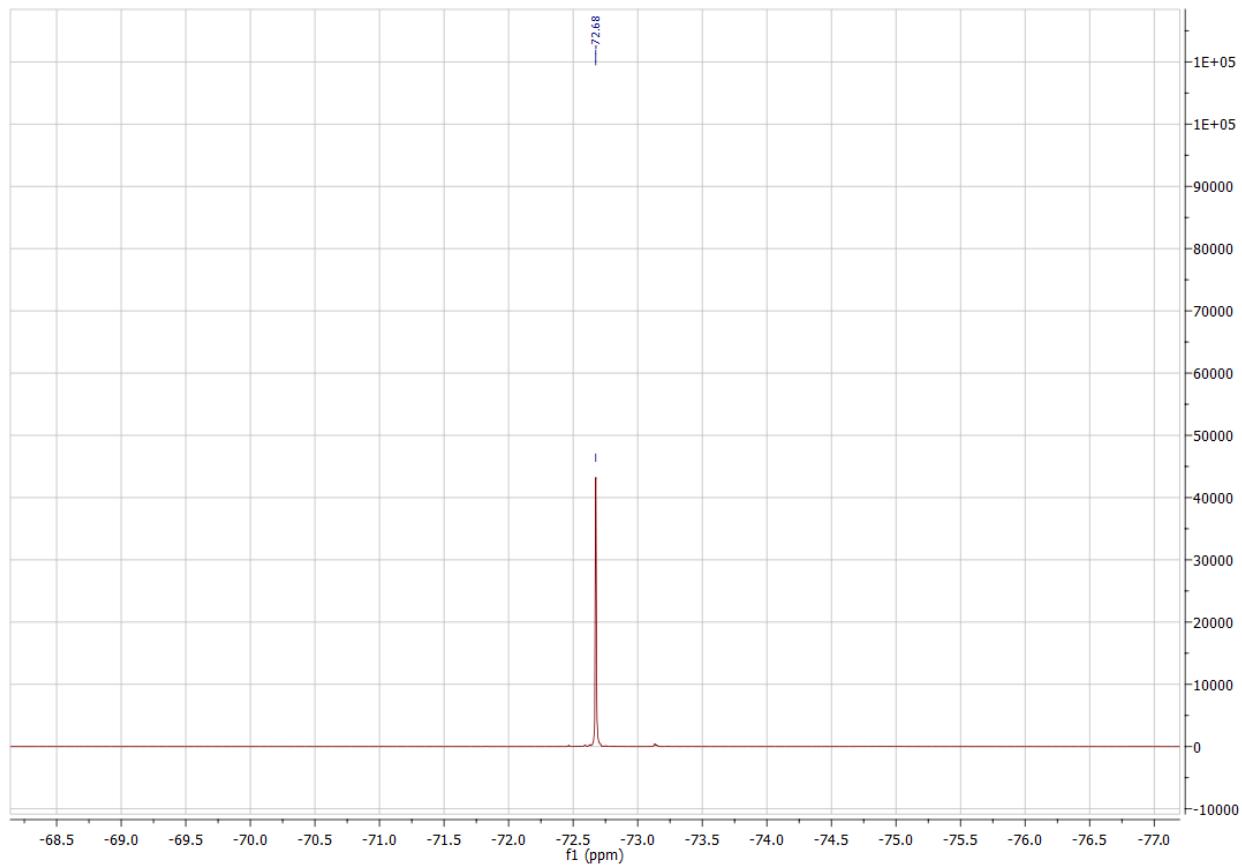


# 4-(2,2-bis(4-cyanophenyl)vinyl)benzoic acid (45)

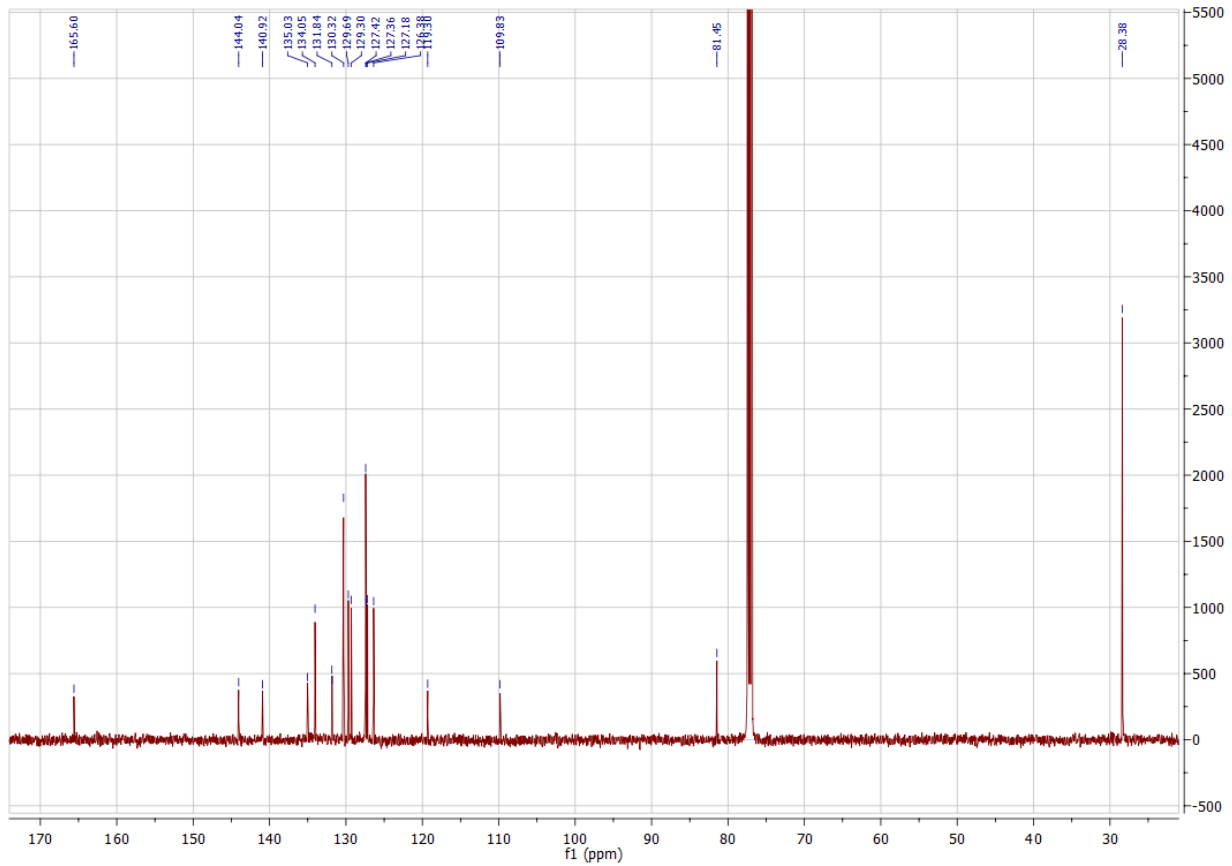
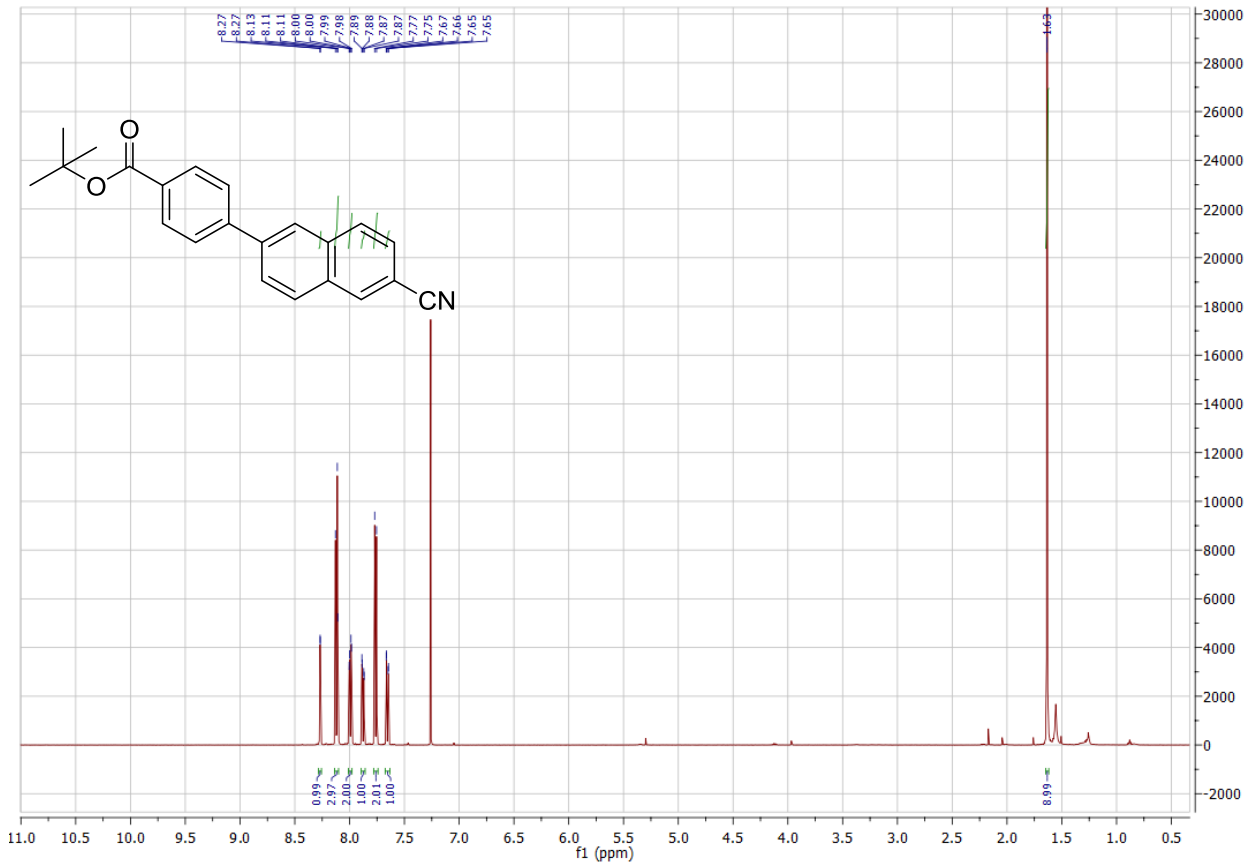


# 6-Cyanonaphthalen-2-yl trifluoromethanesulfonate (106)

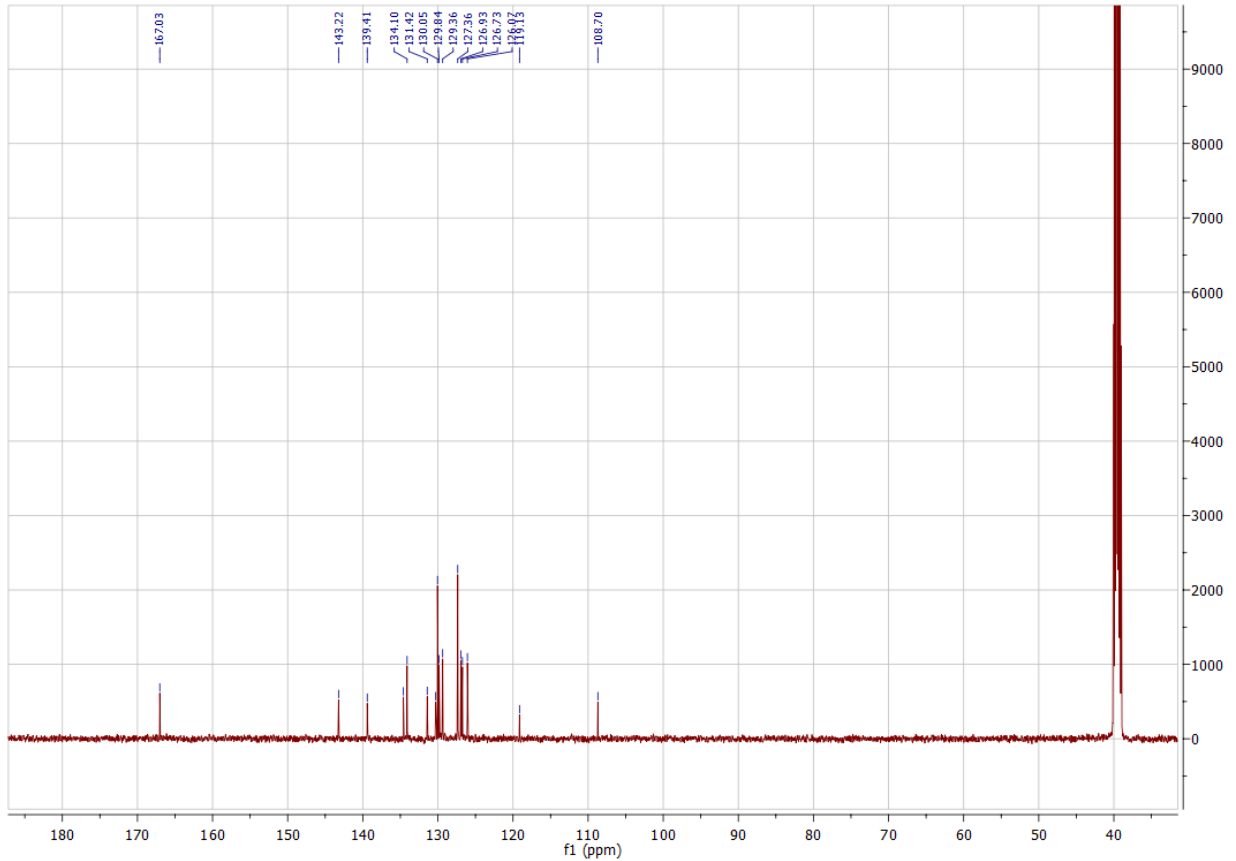
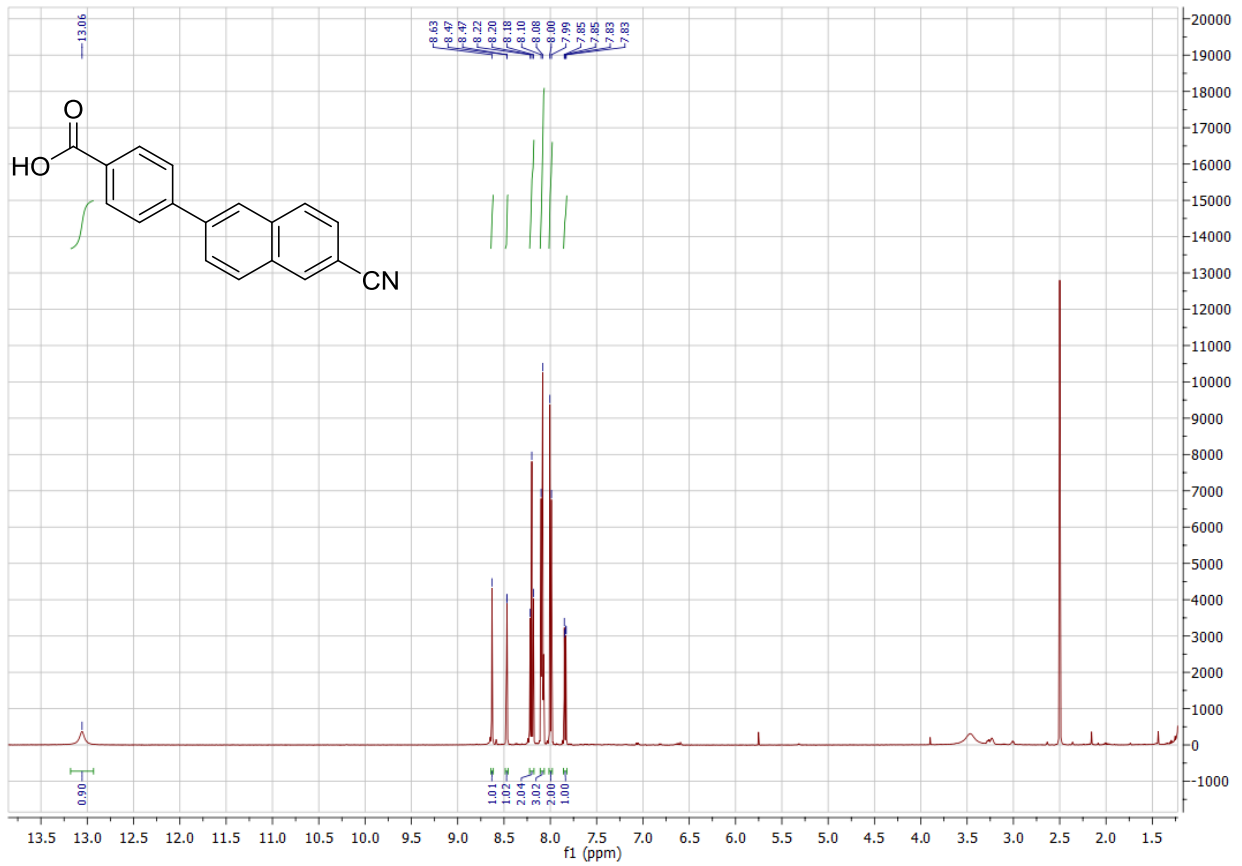




**tert-Butyl 4-(6-cyanonaphthalene-2-yl)benzoate (107)**

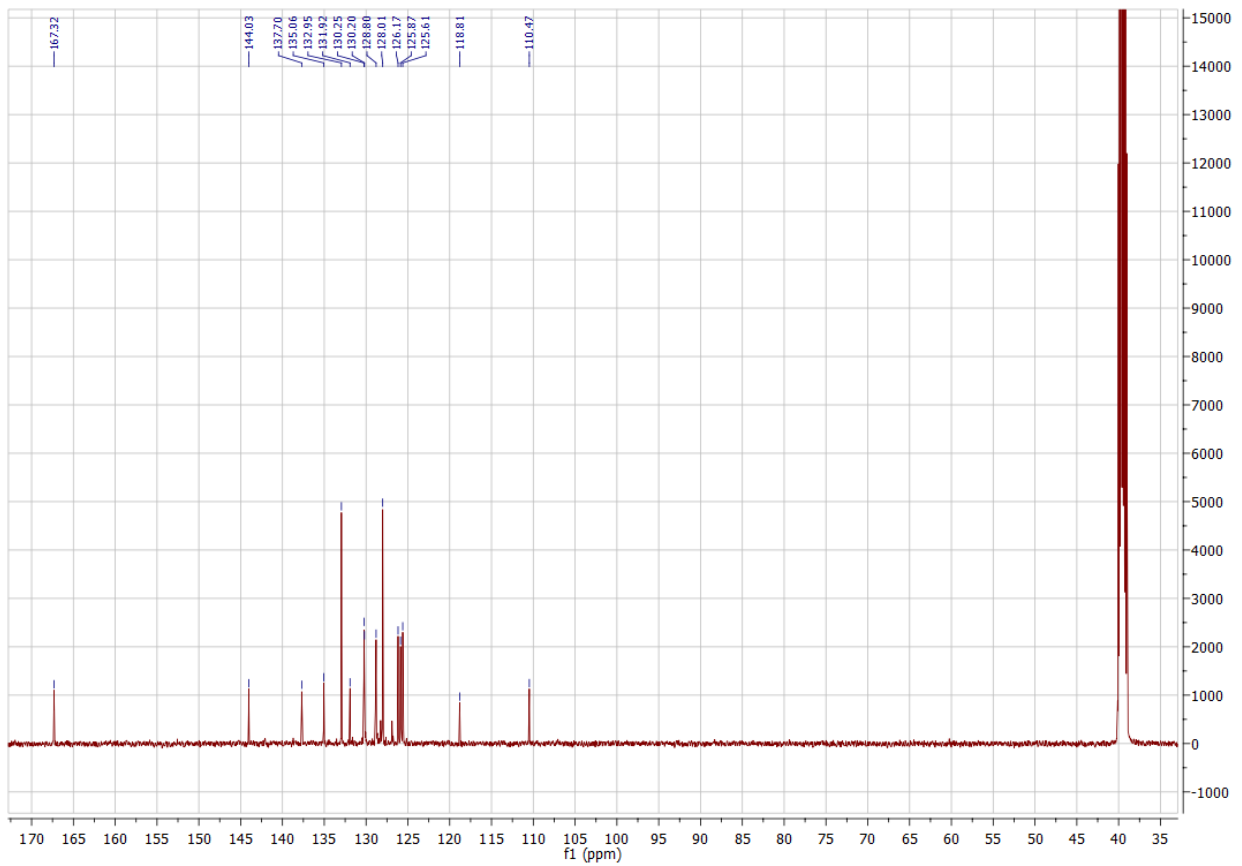
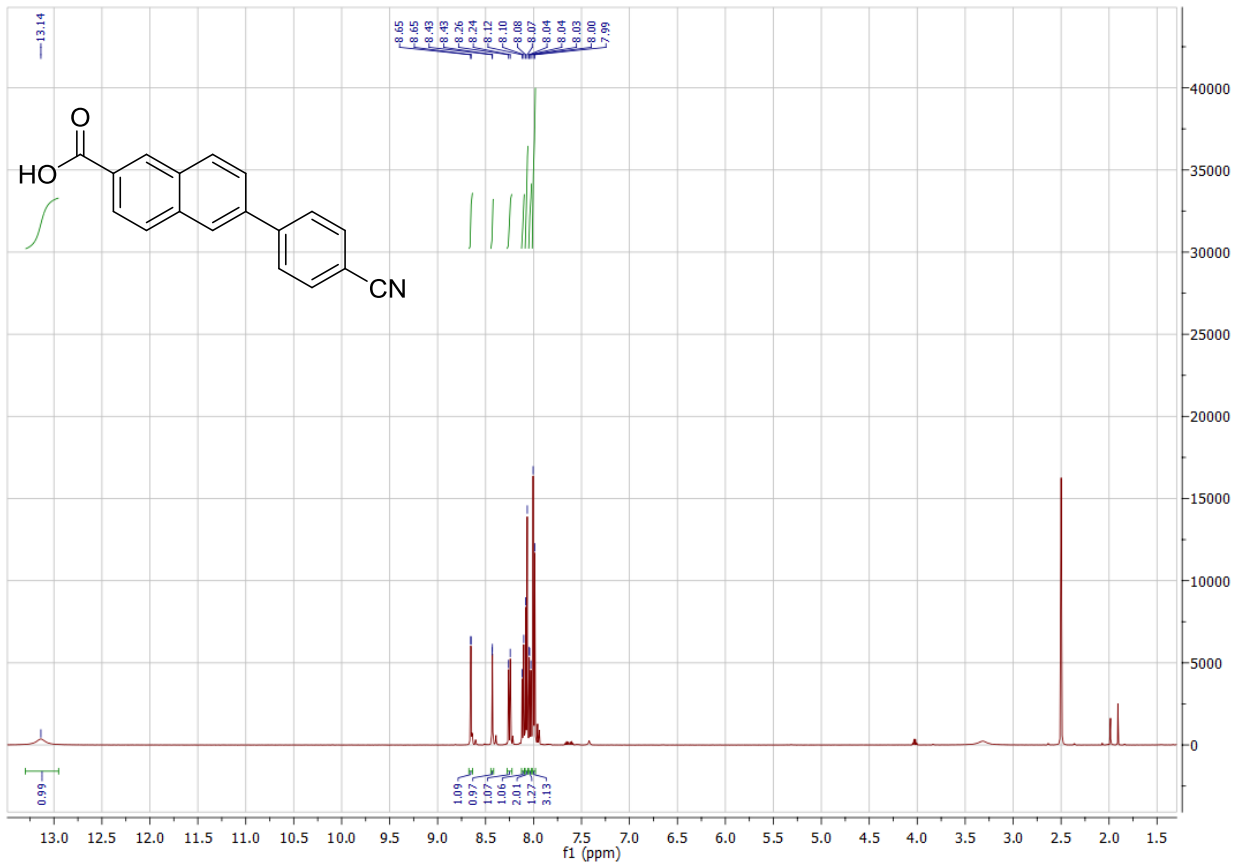


# 4-(6-cyanonaphthalene-2-yl)benzoic acid (108)

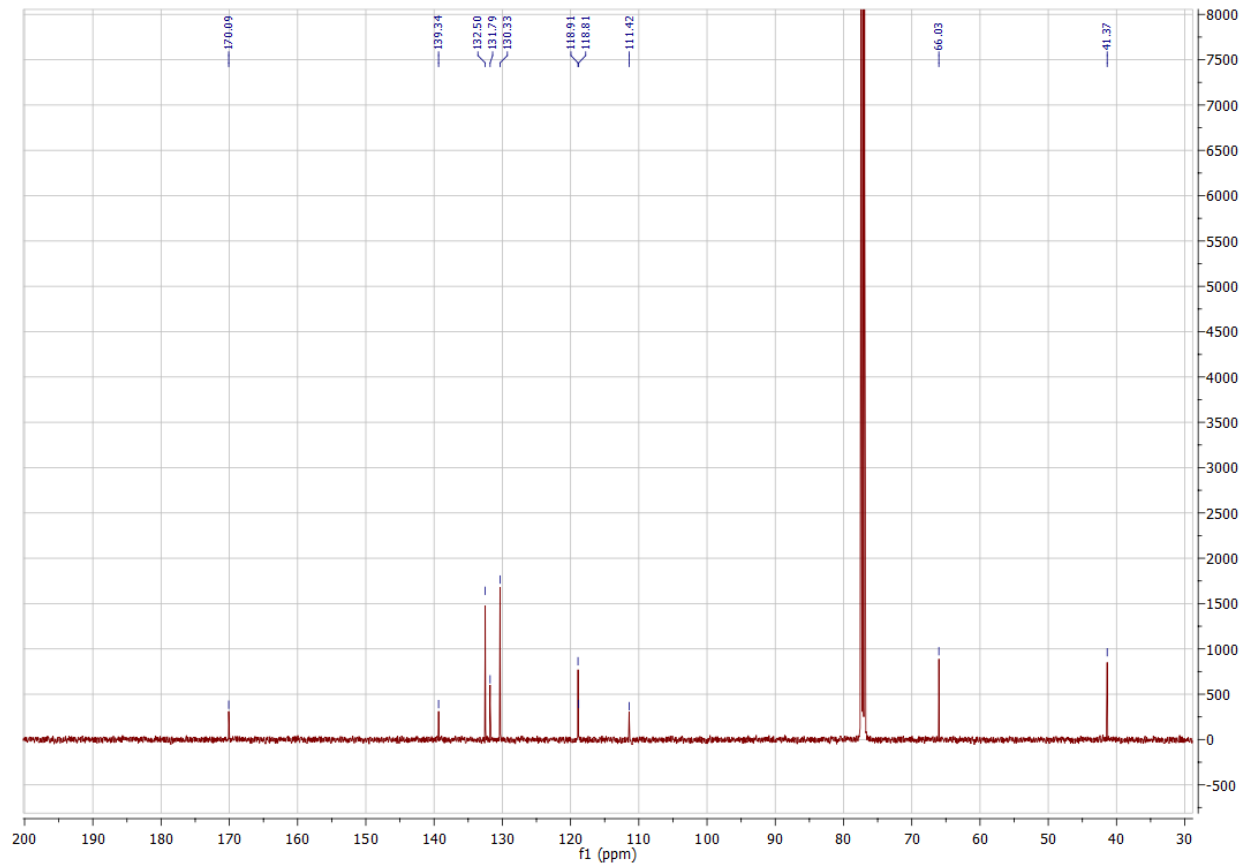
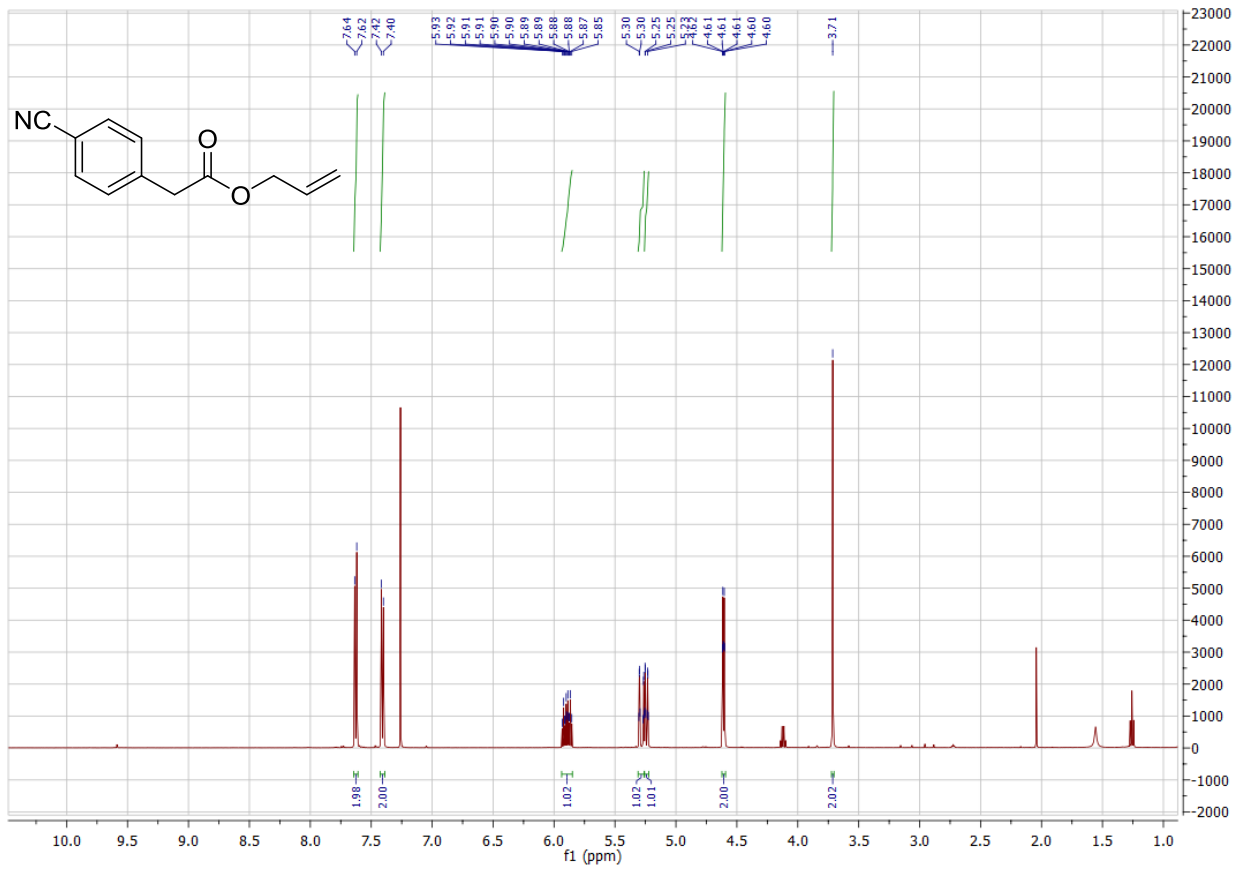




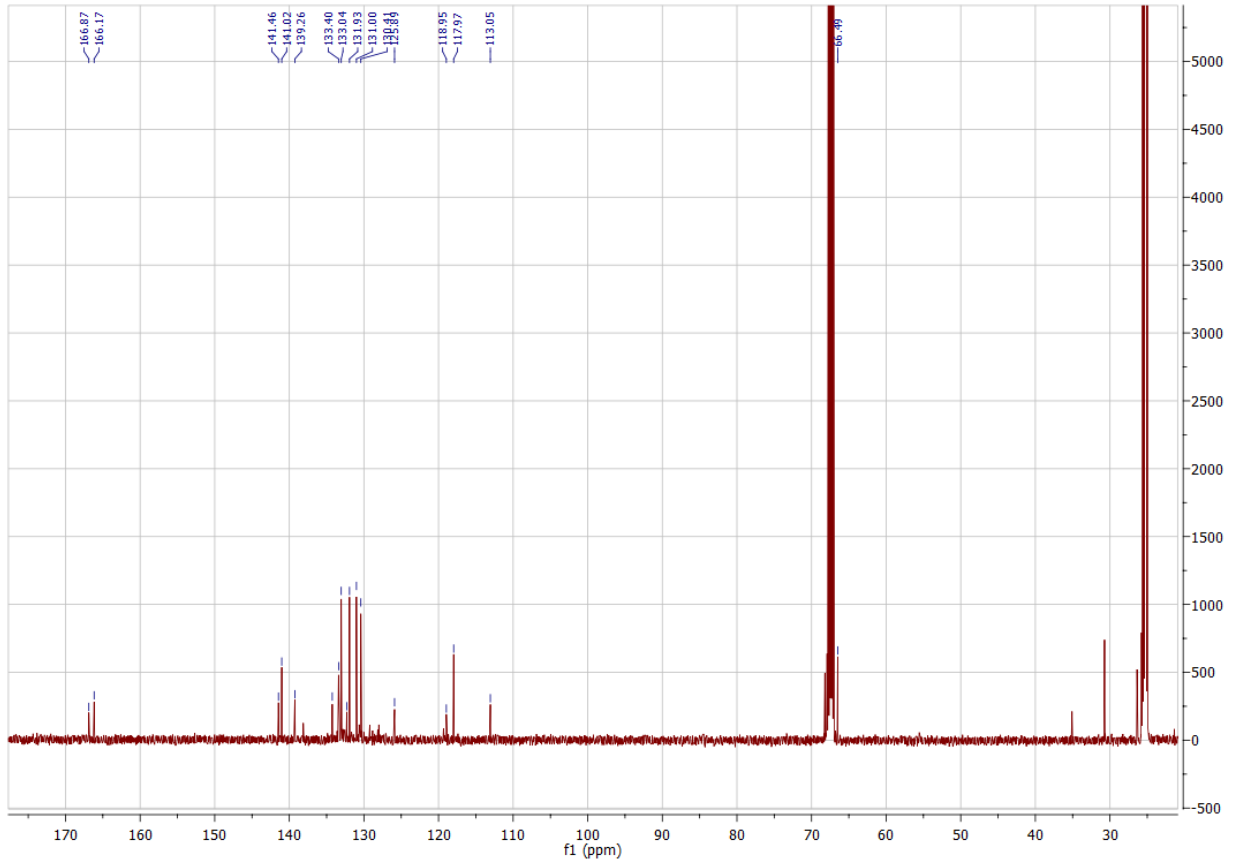
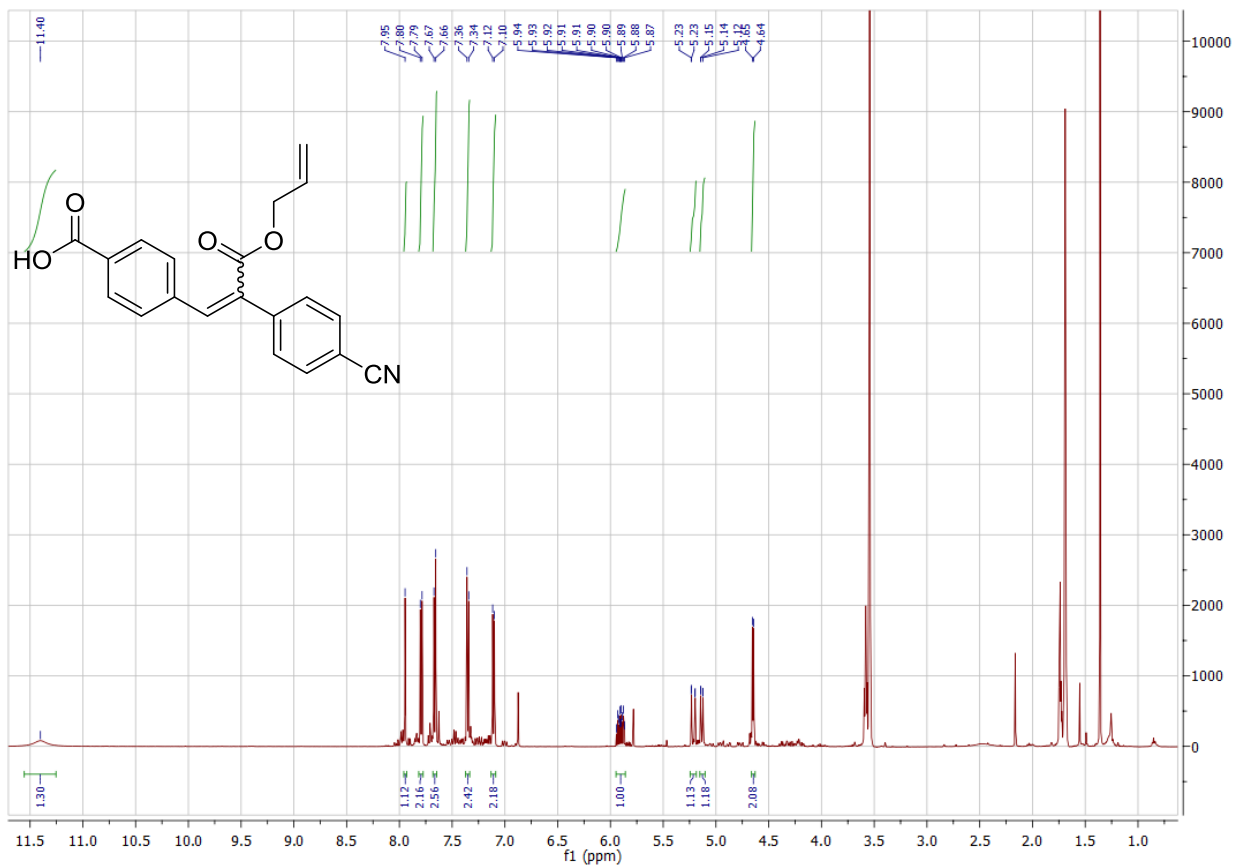
# 6-(4-cyanophenyl)-2-naphthoic acid (109)



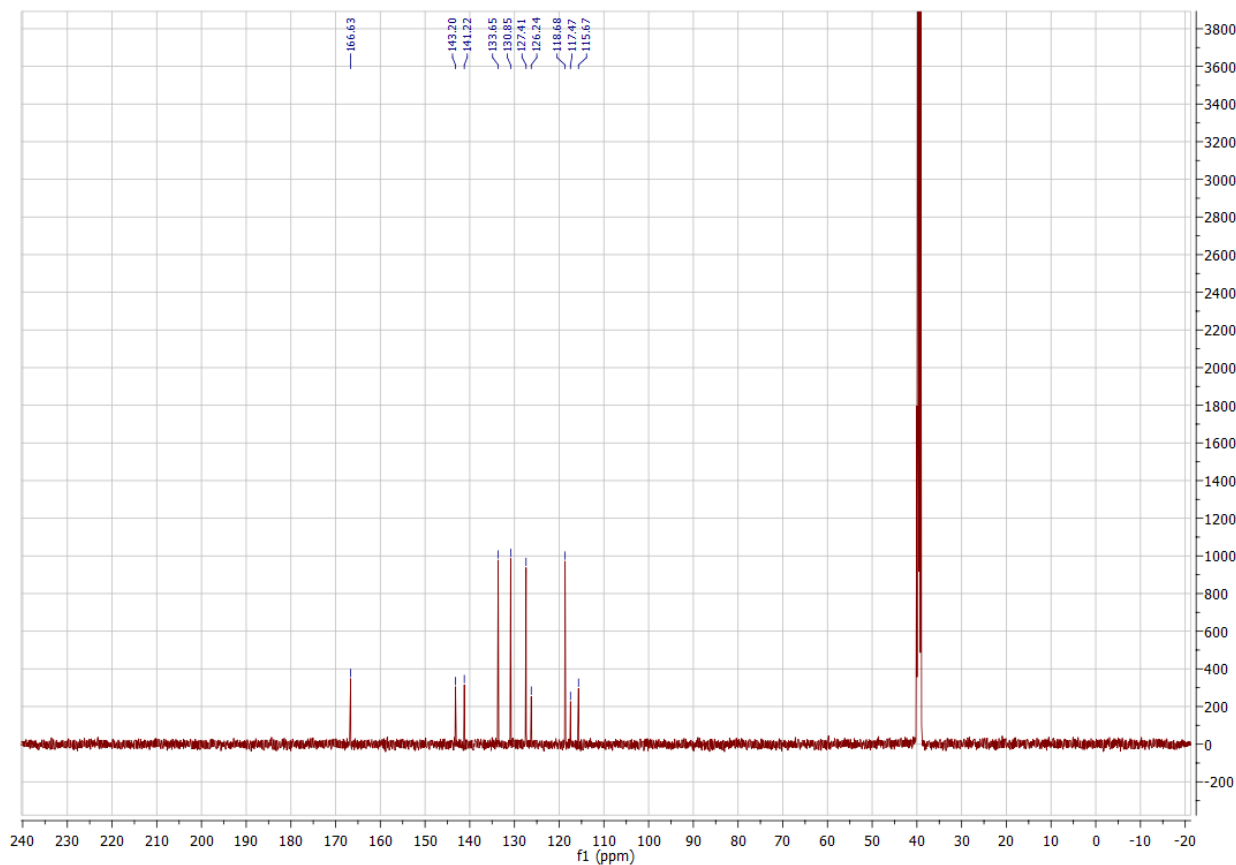
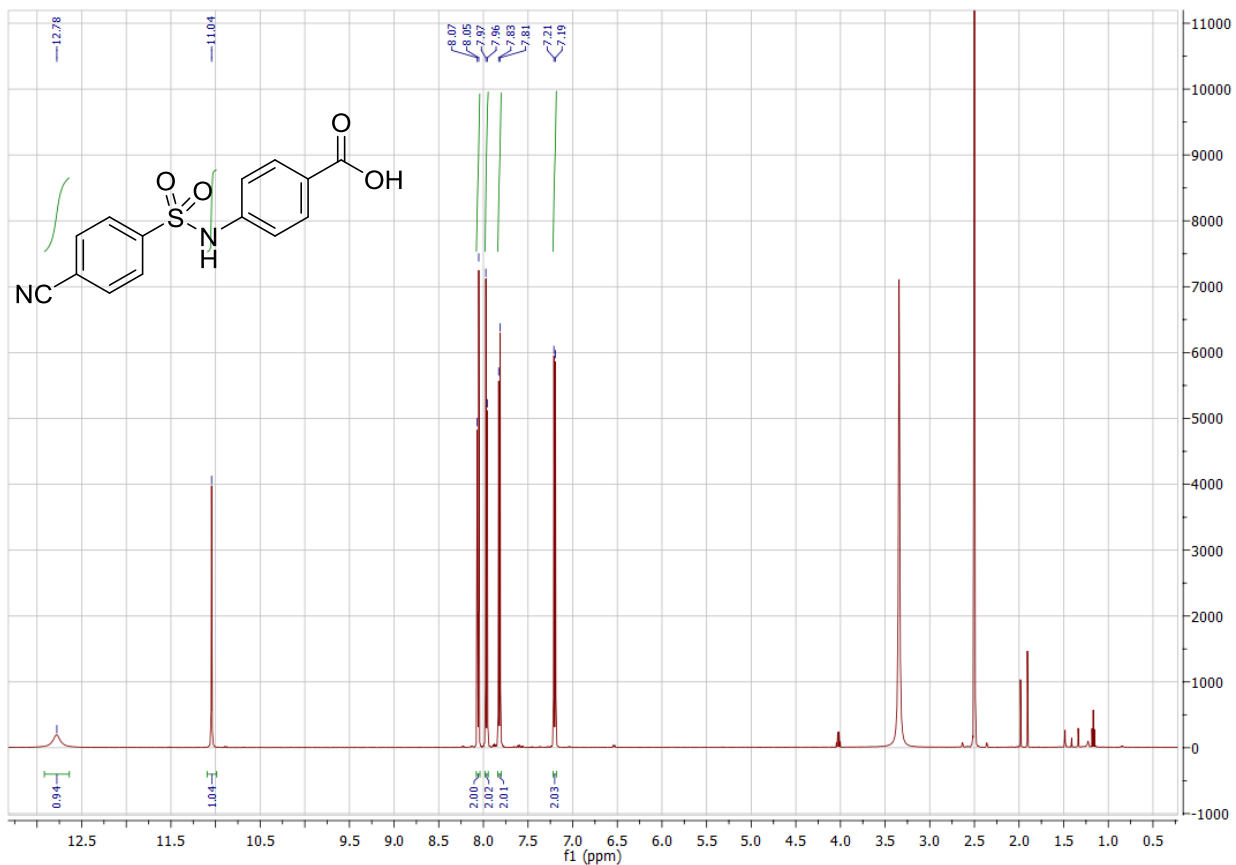
# Allyl 2-(4-cyanophenyl)acetate (94)



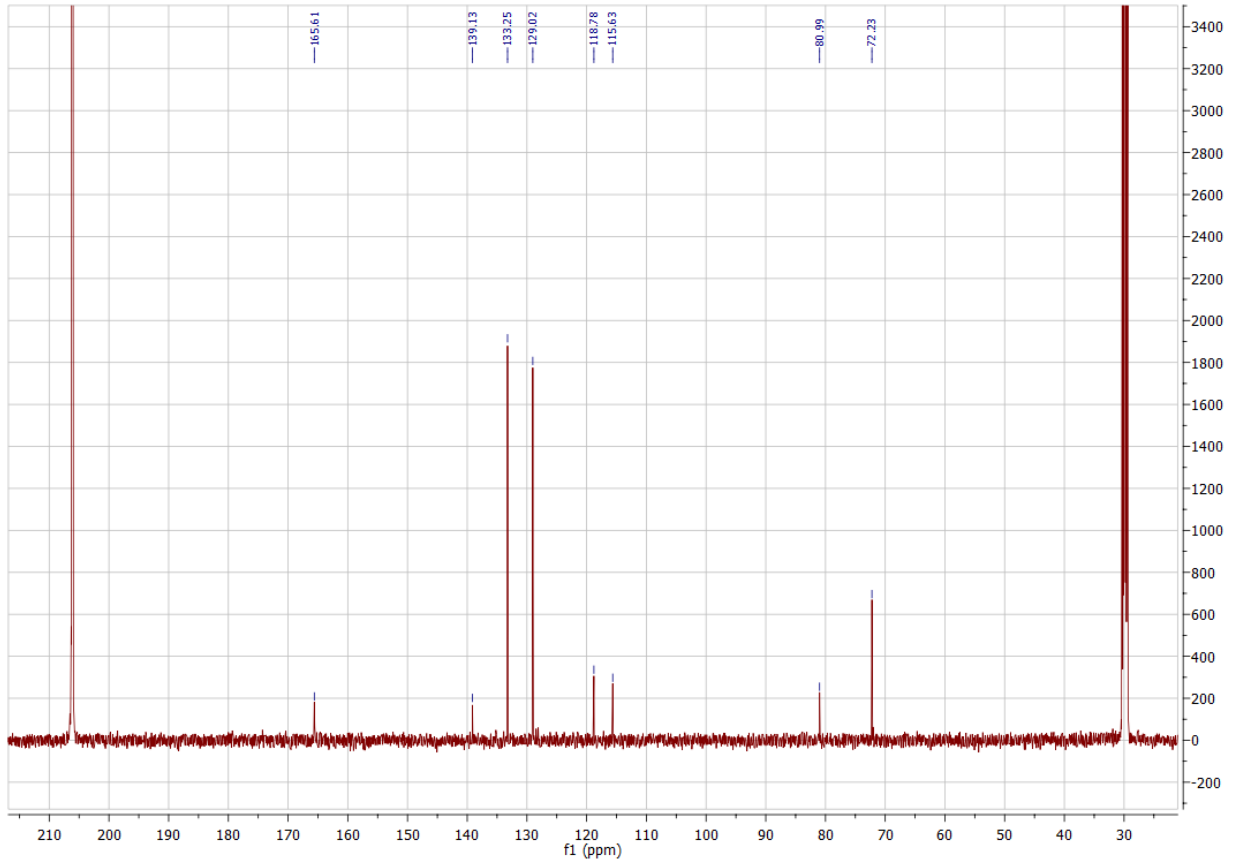
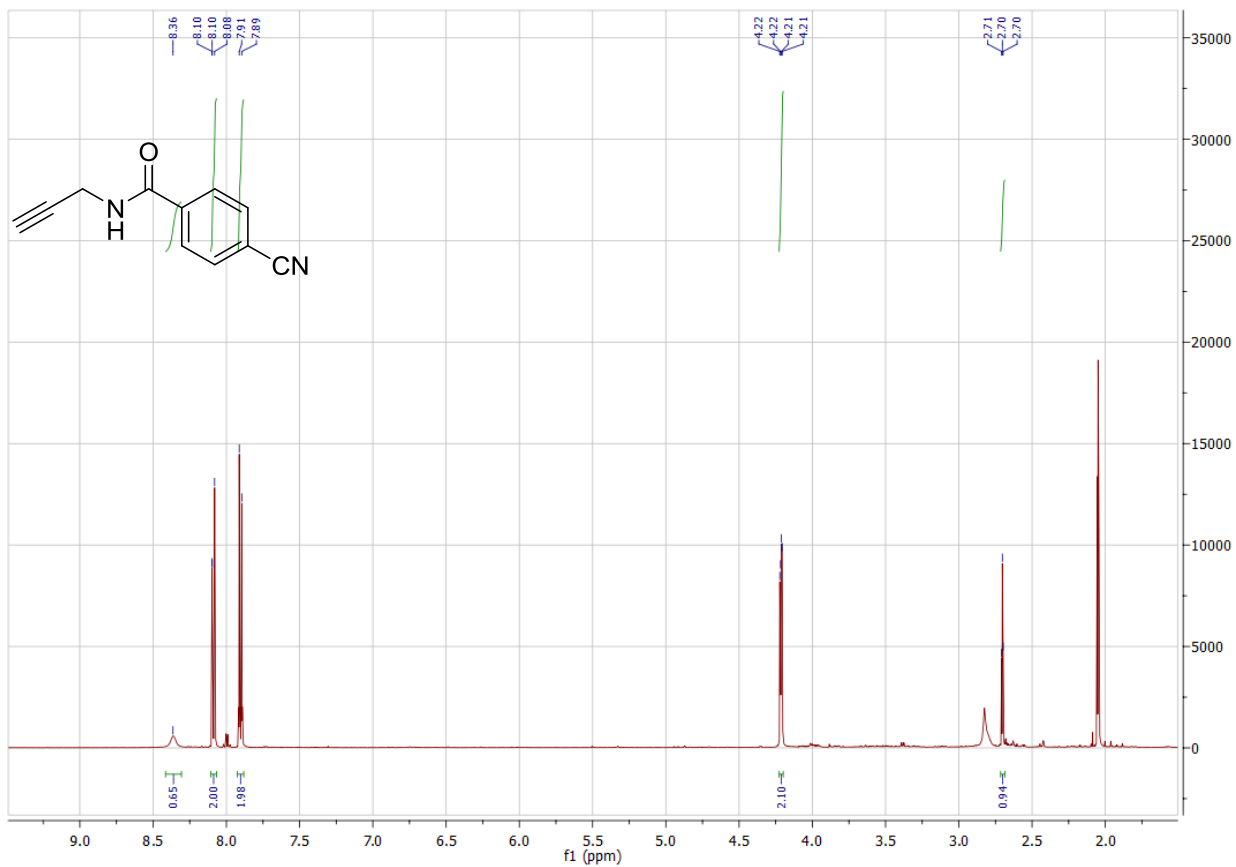
# 4-(3-(allyloxy)-2-(4-cyanophenyl)-3-oxoprop-1-en-1-yl)benzoic acid (95)



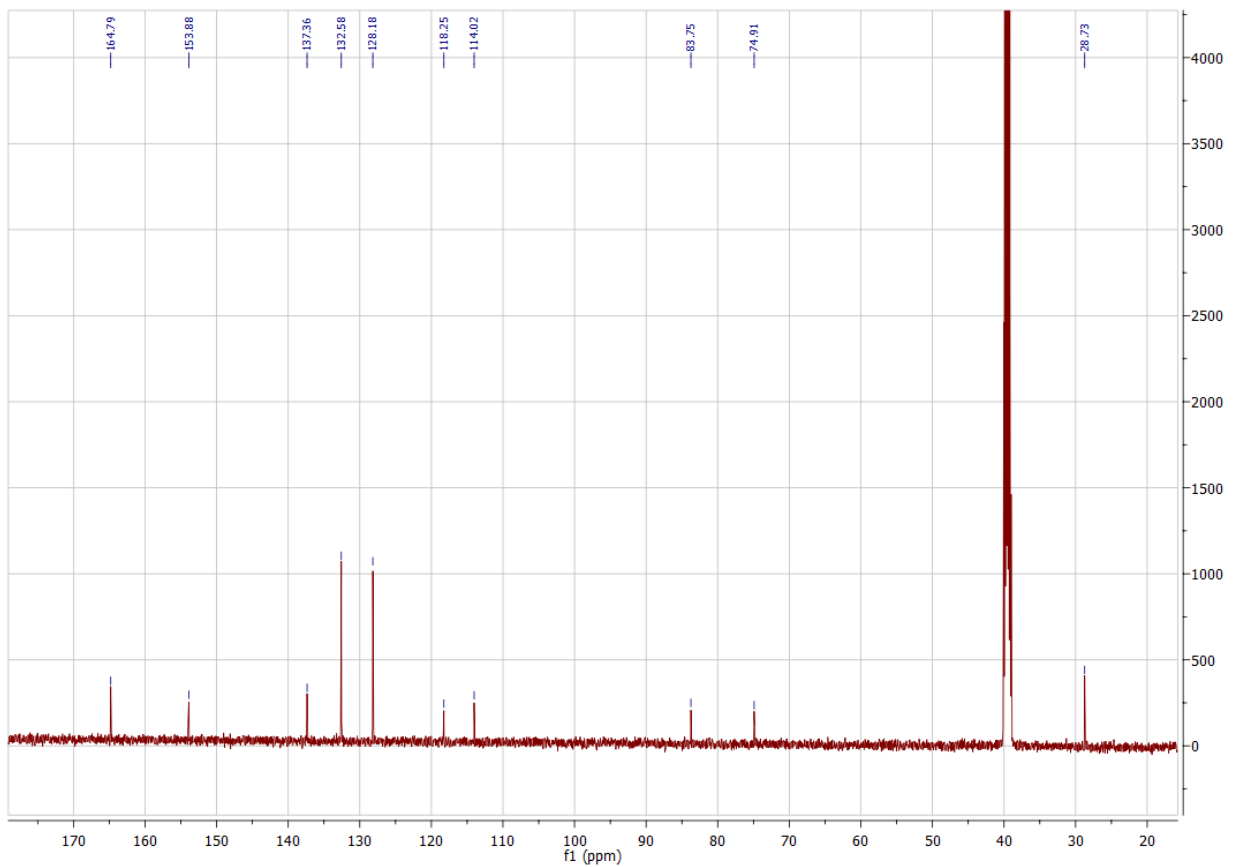
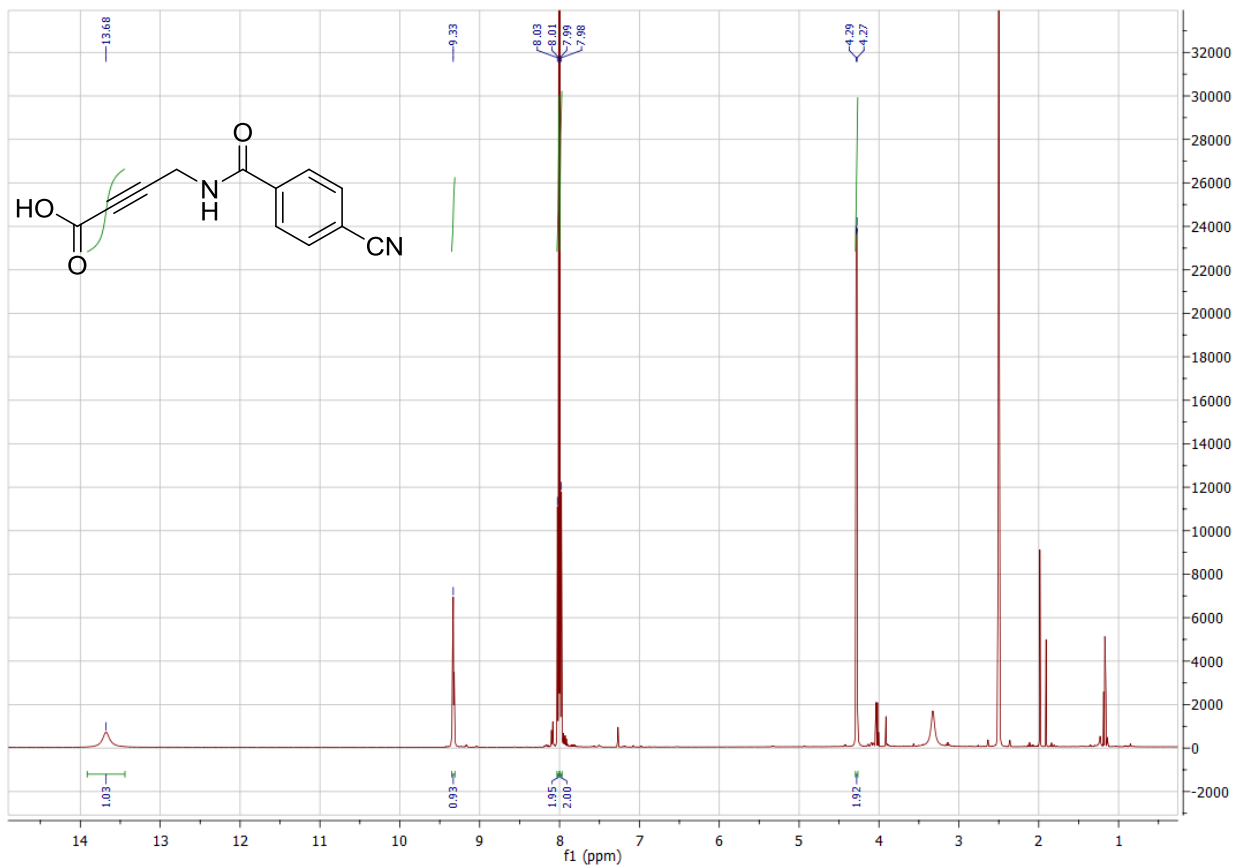
# 4-((4-cyanophenyl)sulfonamido)benzoic acid (46)



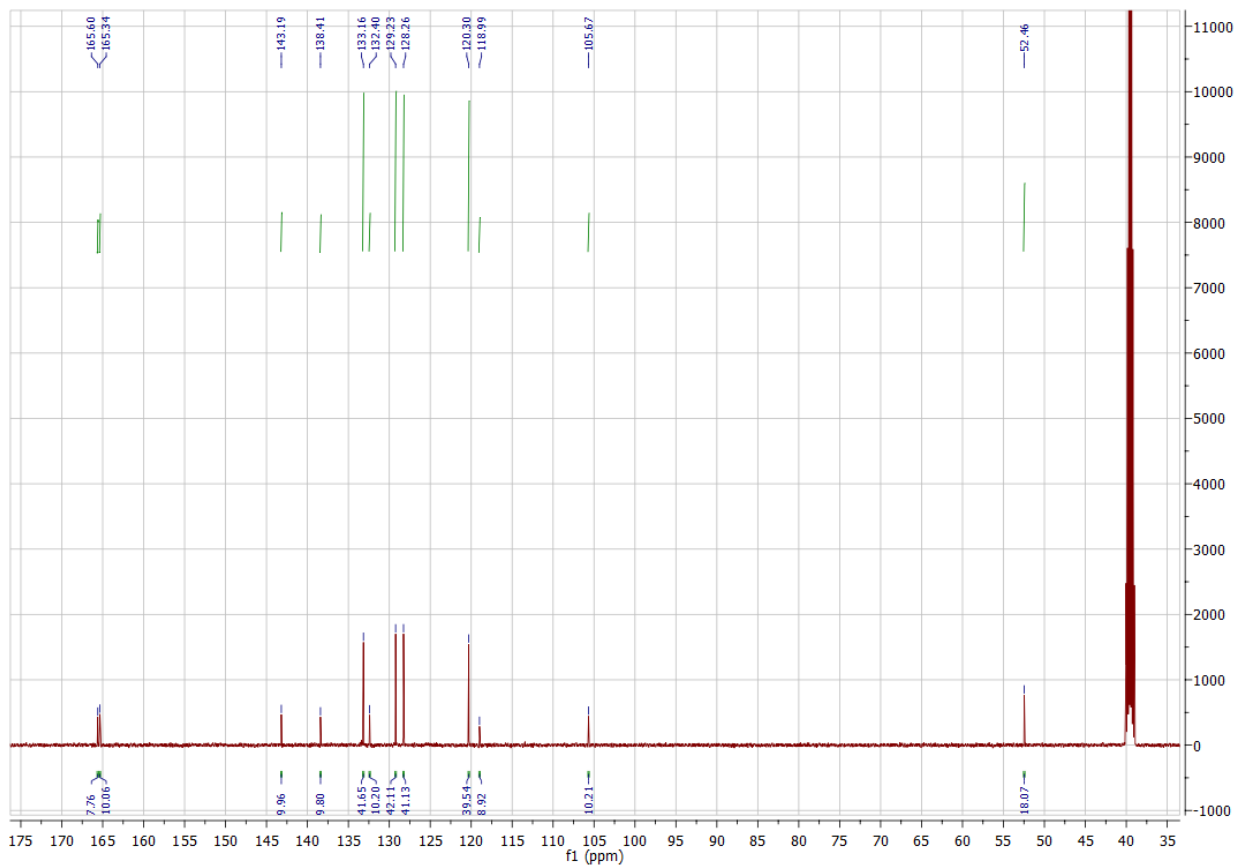
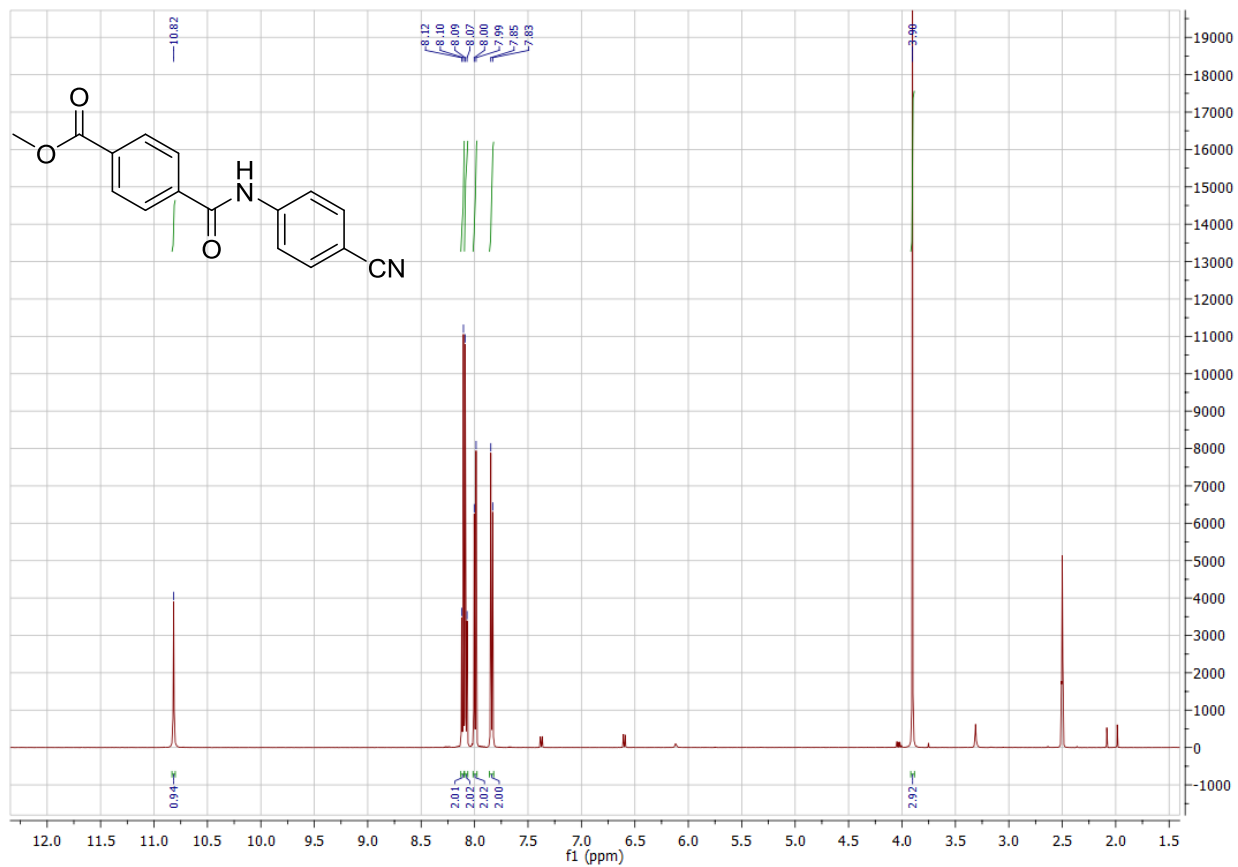
# 4-Cyano-N-(prop-2-yn-1-yl)benzamide (34)



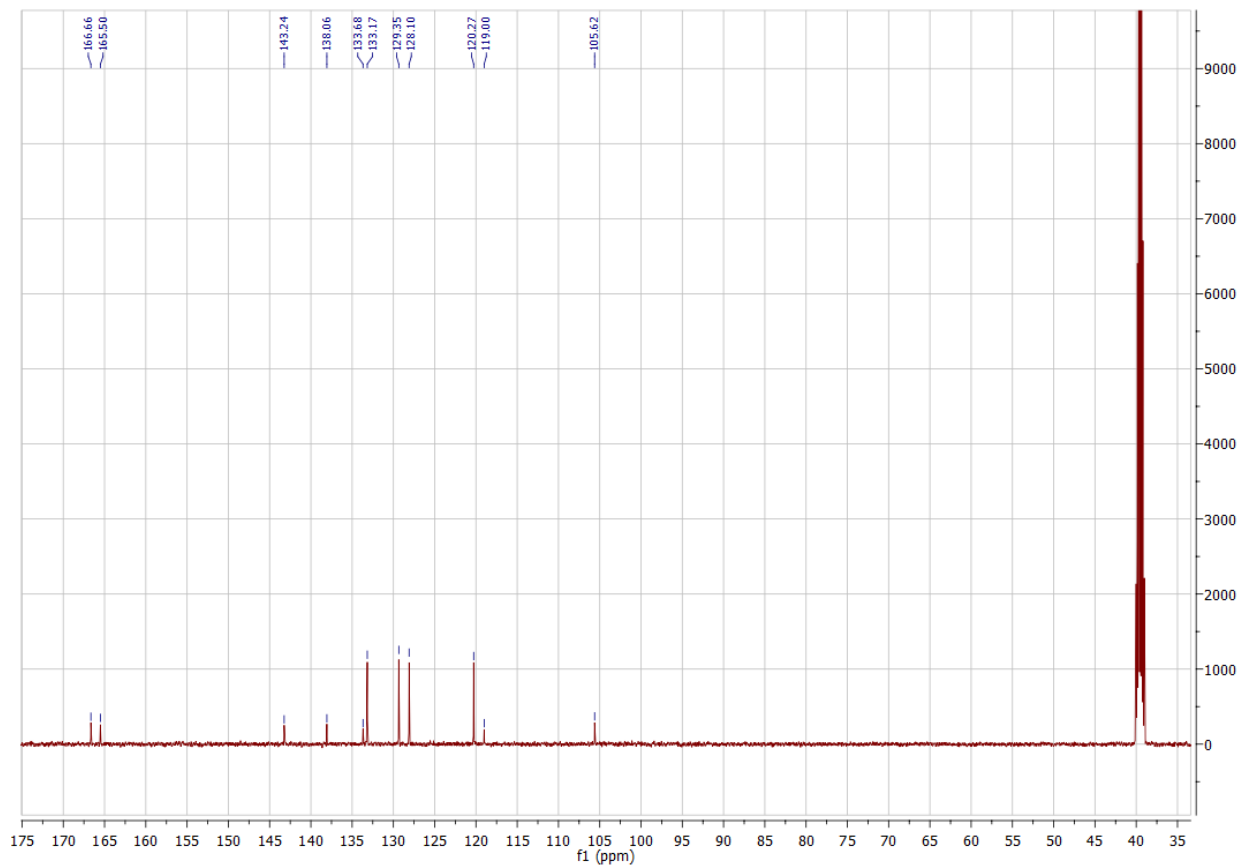
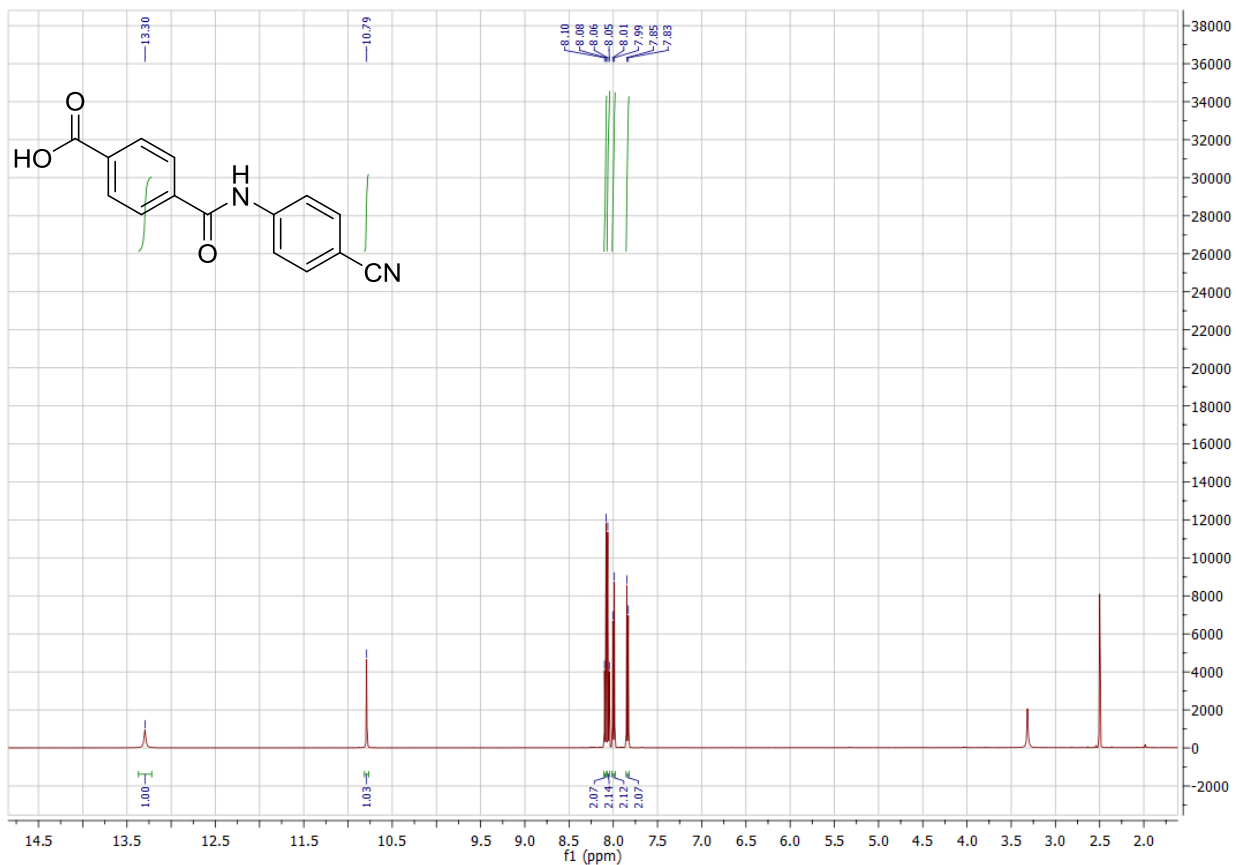
# 4-(4-cyanobenzamido)-but-2-ynoic acid (35)



# Methyl 4-((4-cyanophenyl)carbamoyl)benzoate (96)

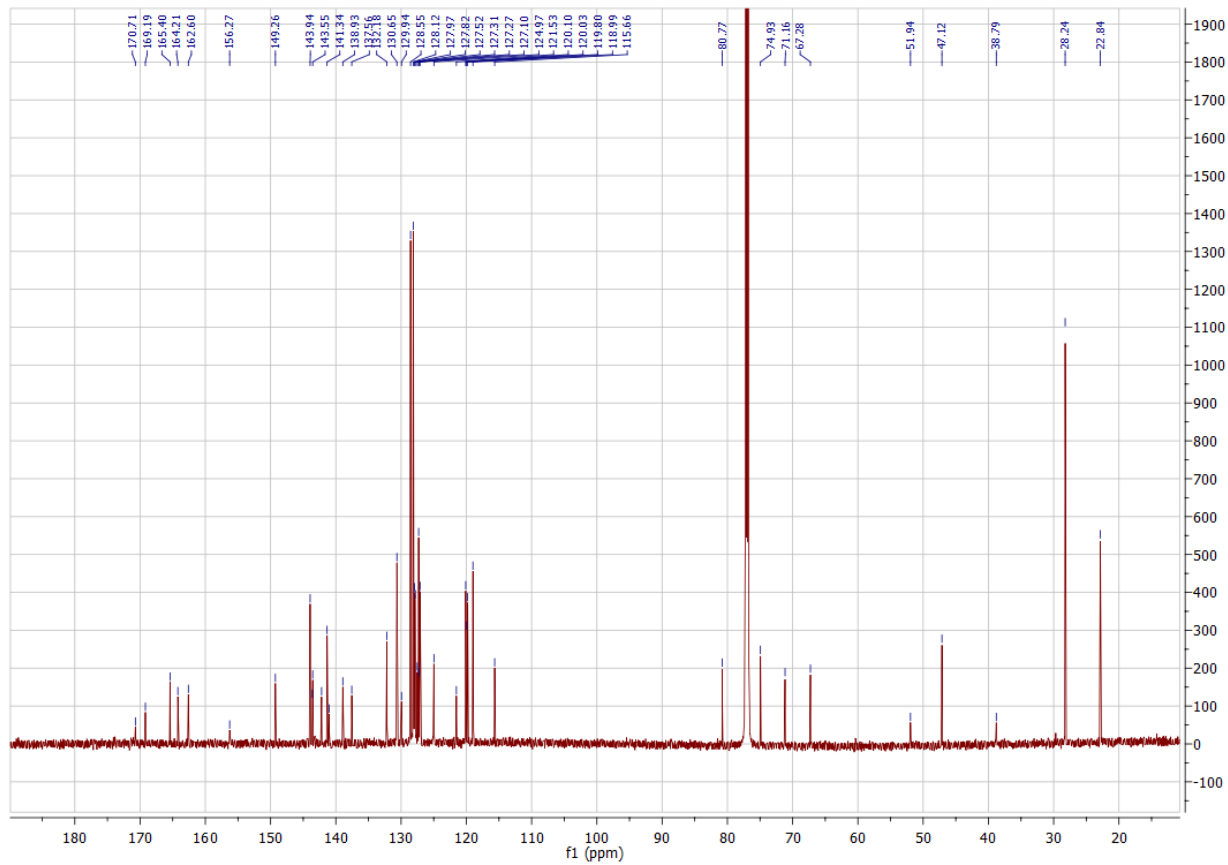
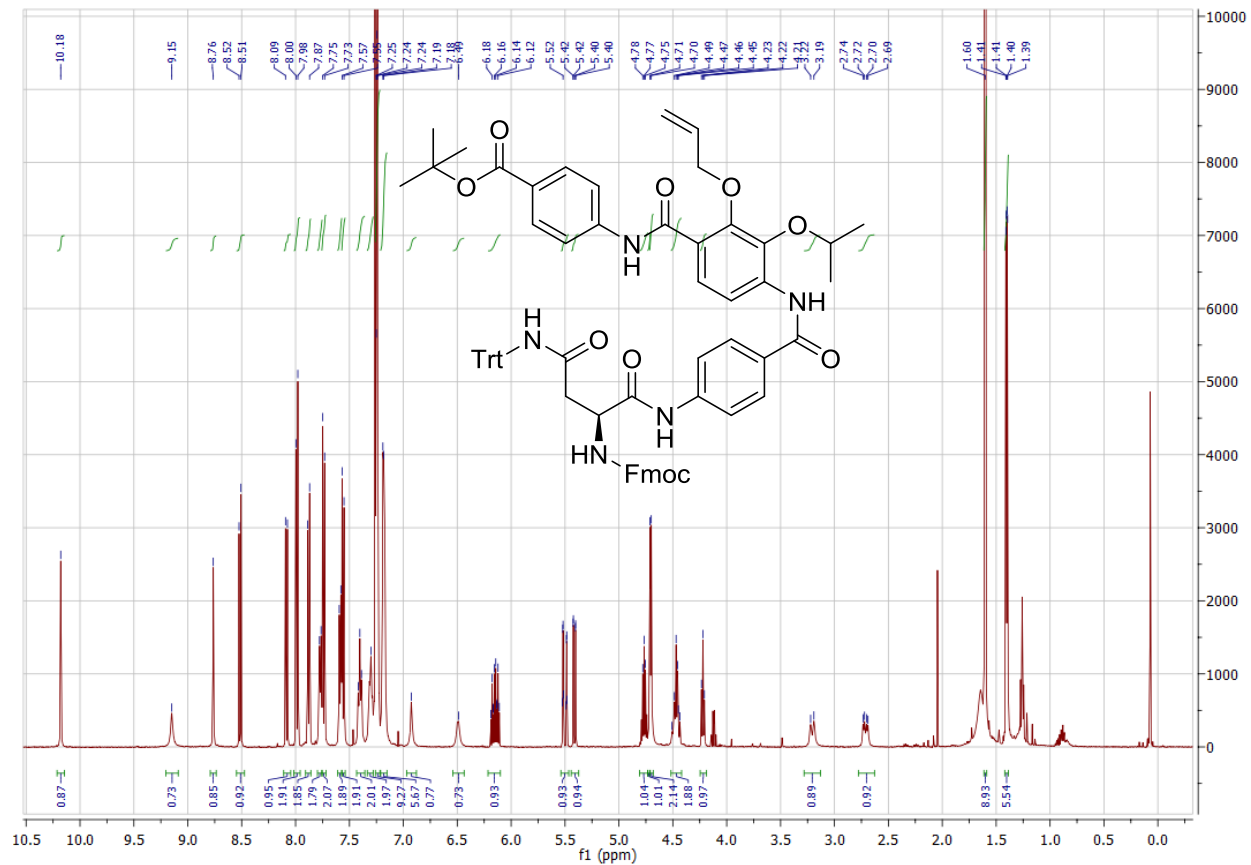


# 4-((4-cyanophenyl)carbamoyl)benzoic acid (97)

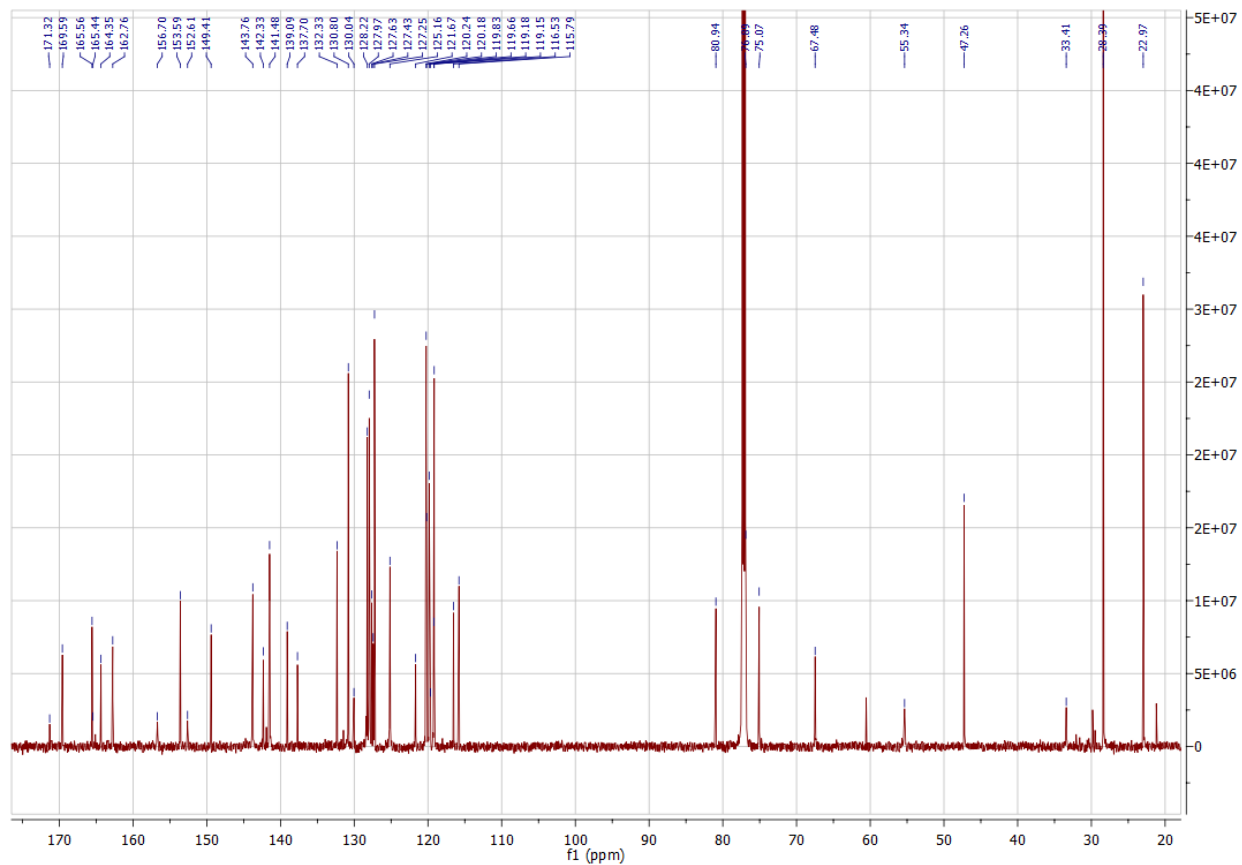
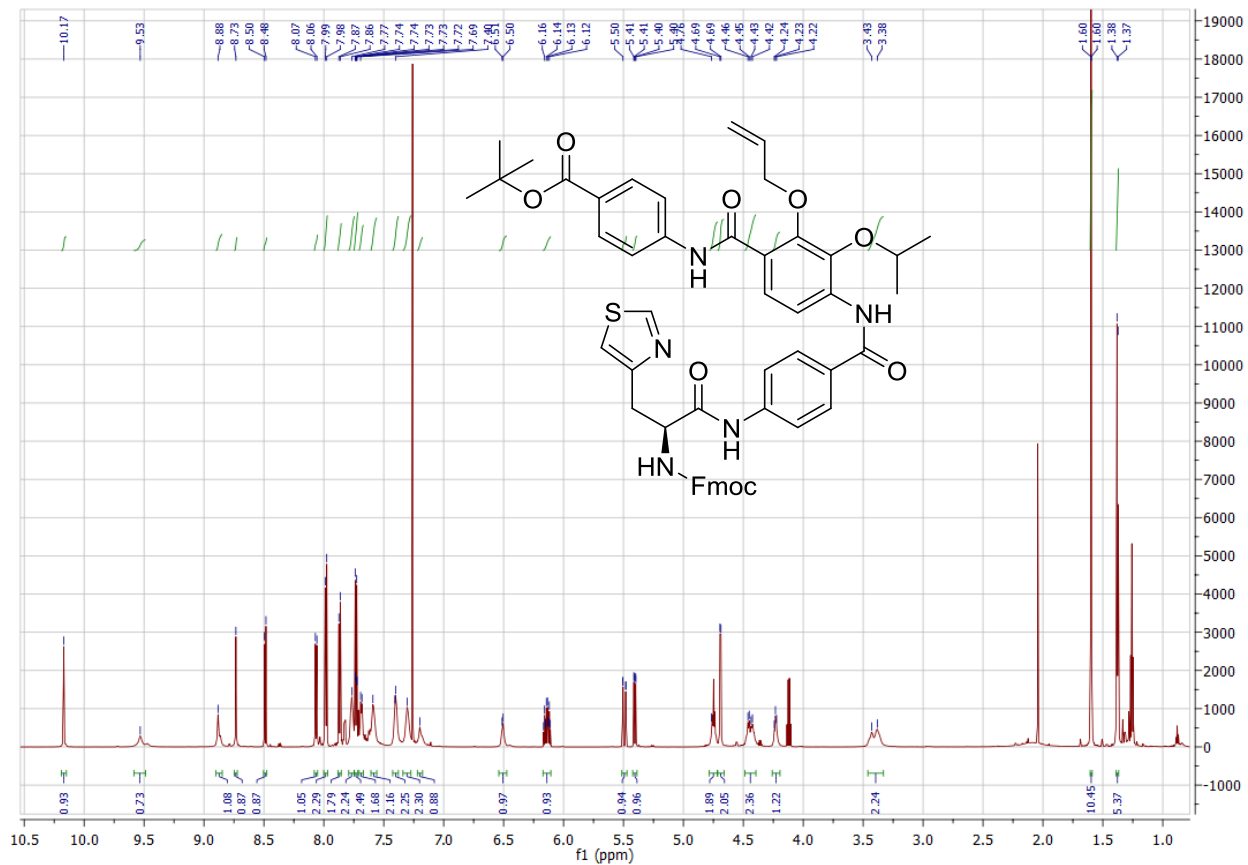




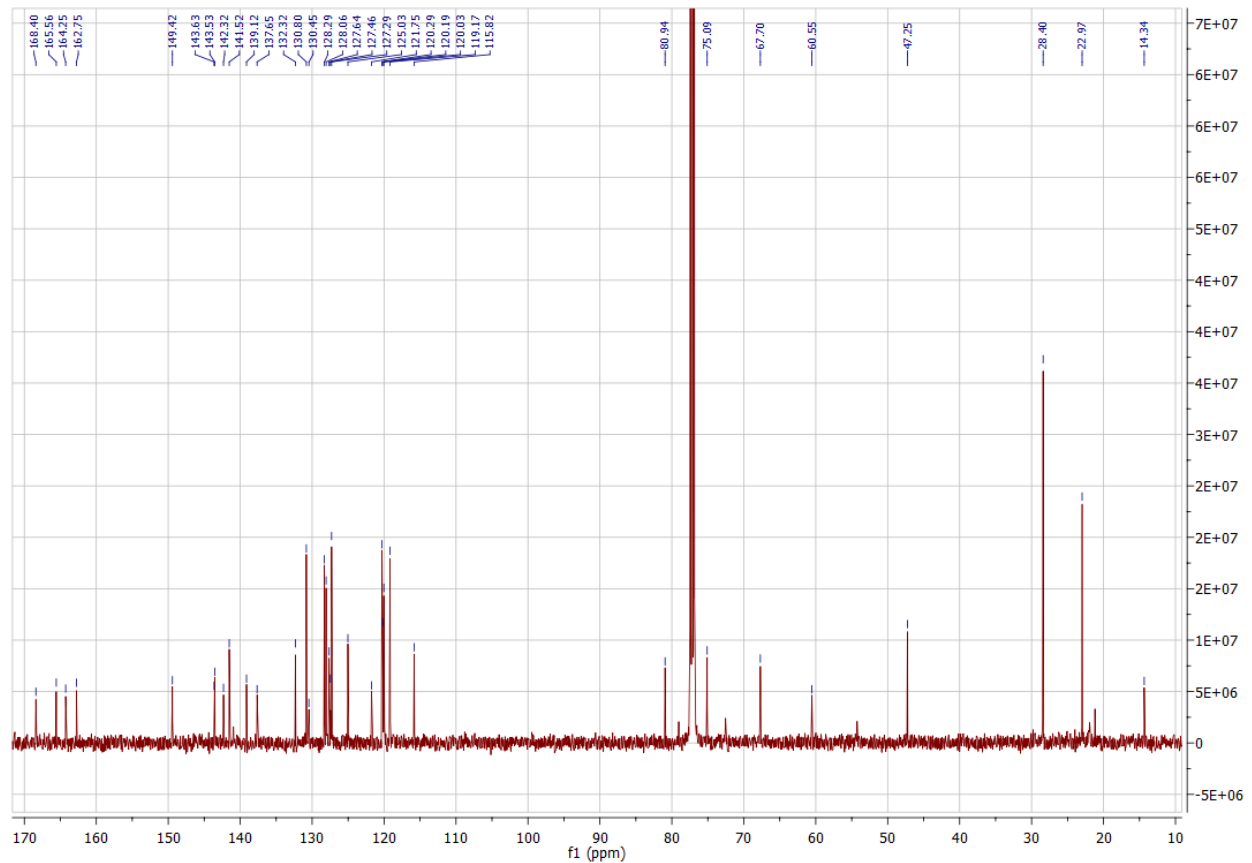
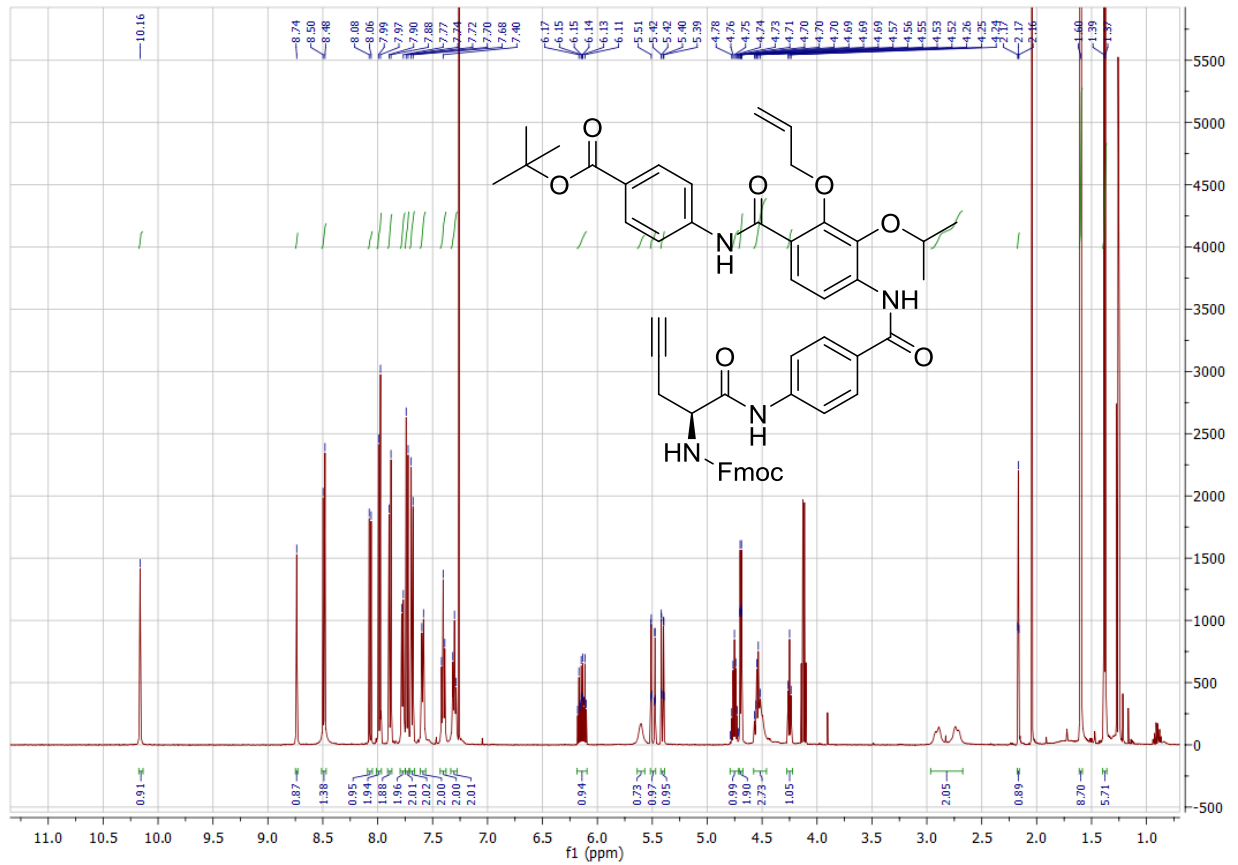
**tert-Butyl (S)-4-(4-(4-(2-(((9H-fluoren-9-yl)methoxy)carbonyl)amino)-4-oxo-4-(tritylamino)butanamido)-benzamido)-2-(allyloxy)-3-isopropoxybenzamido)benzoate (17)**



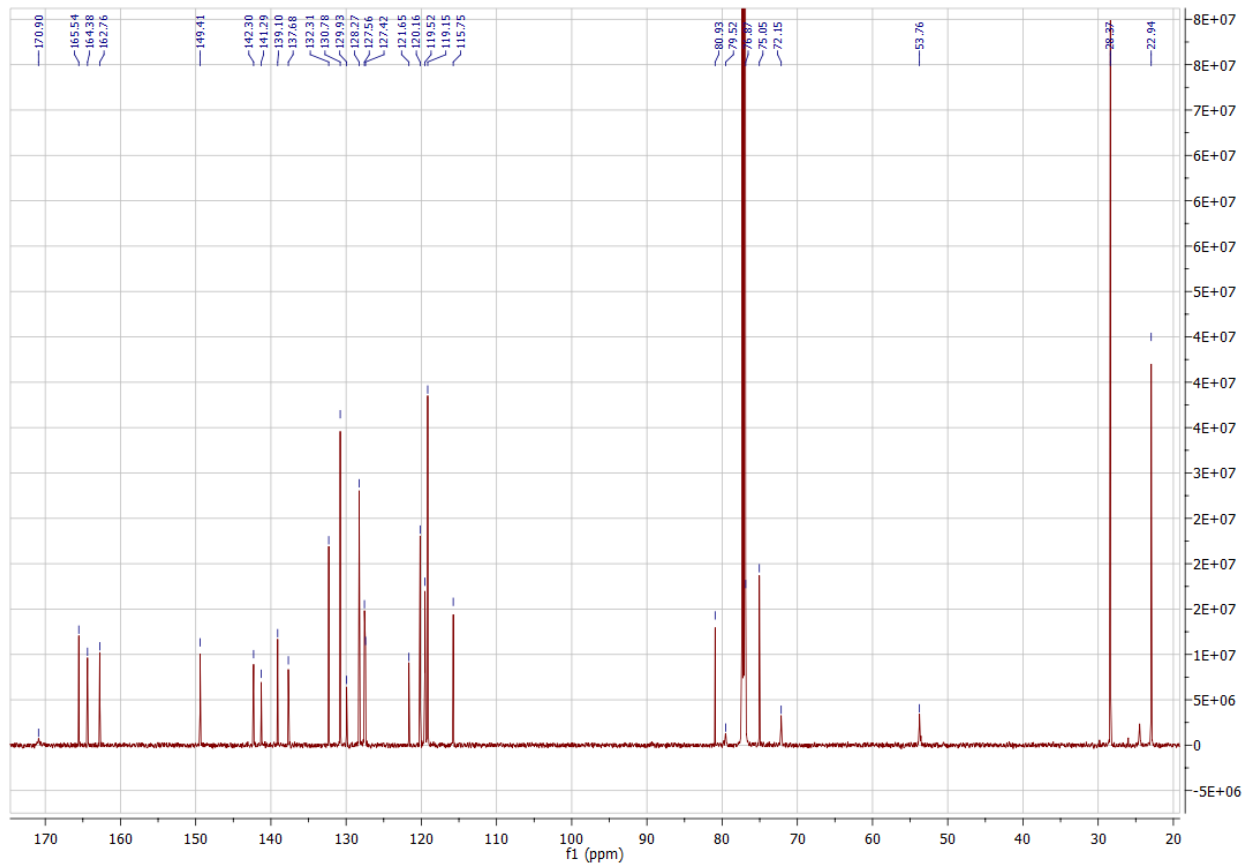
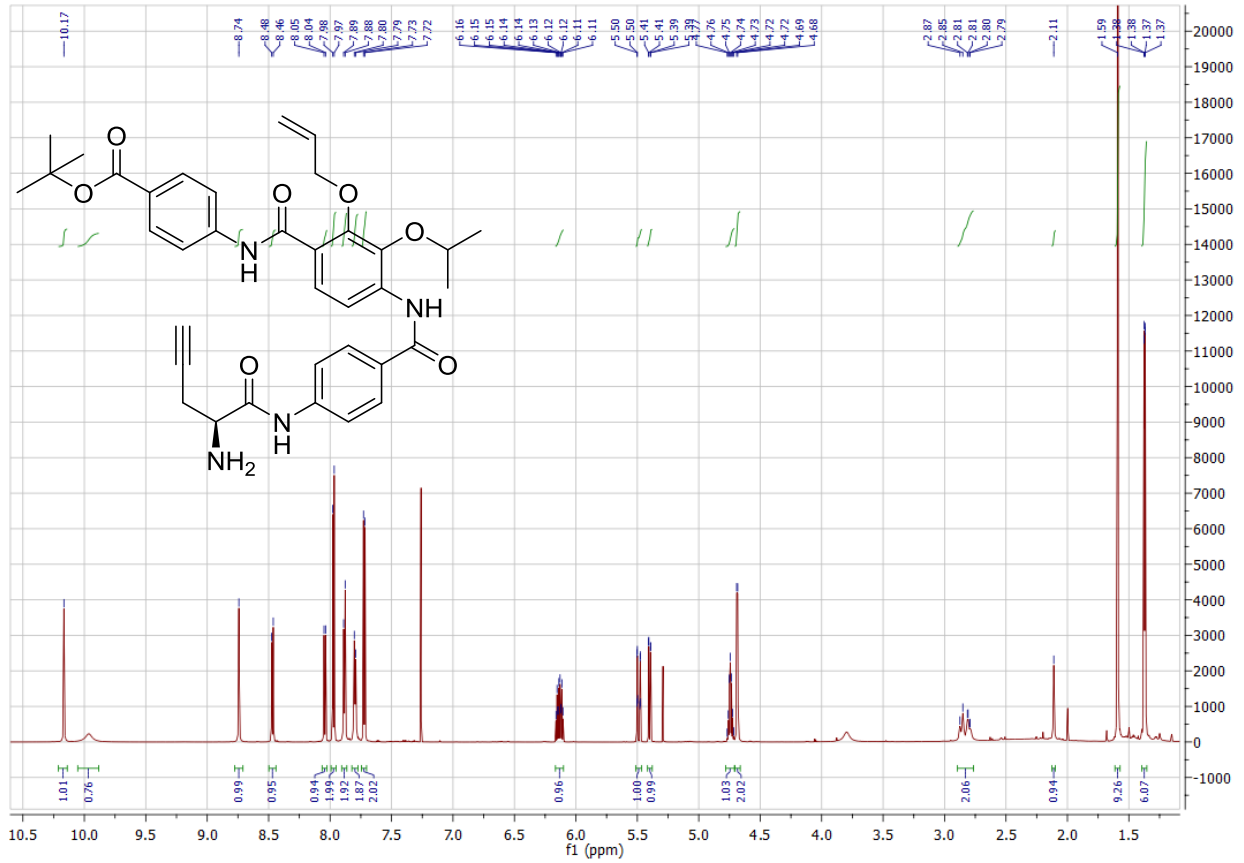
***tert*-Butyl (S)-4-(4-(4-(2-(((9H-fluoren-9-yl)methoxy)carbonyl)amino)-3-(thiazol-4-yl)propanamido)-benzamido)-2-(allyloxy)-3-isopropoxybenzamido)benzoate (54)**



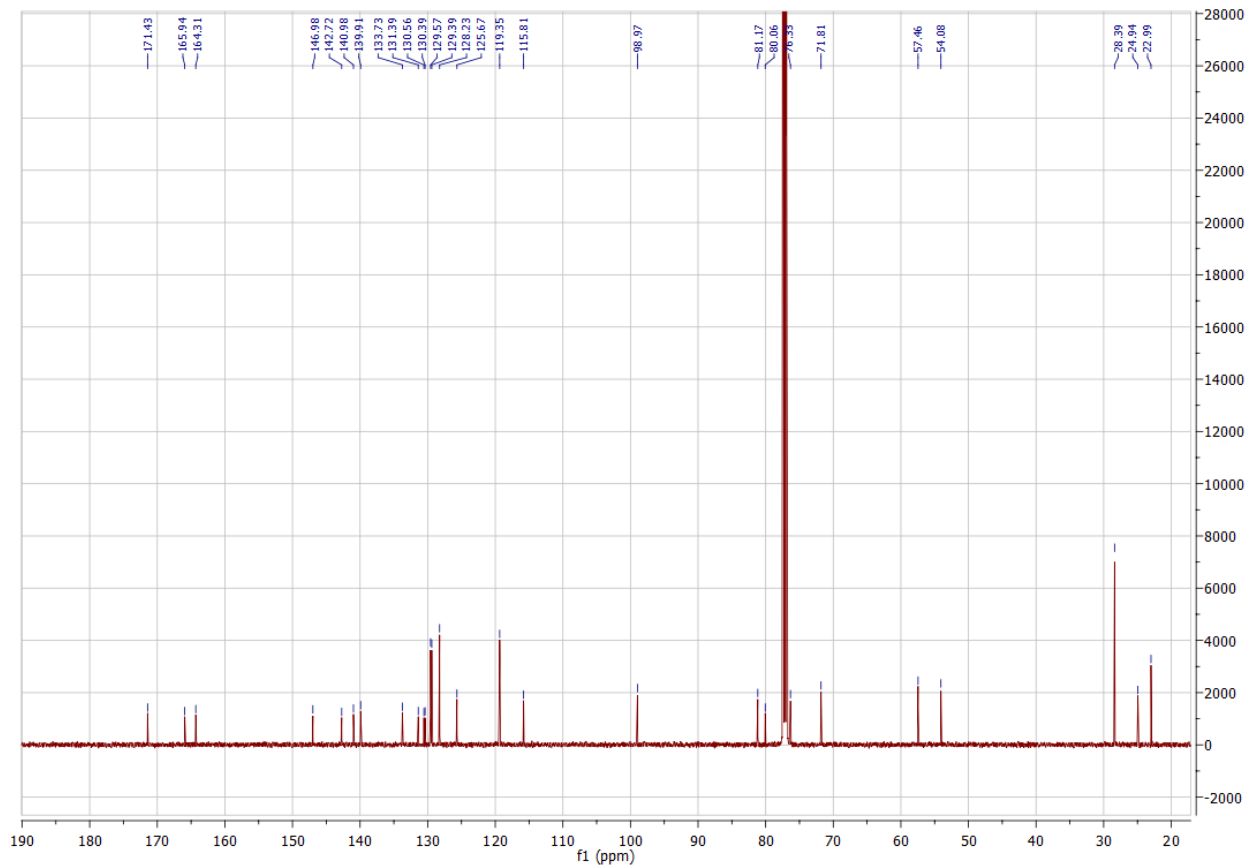
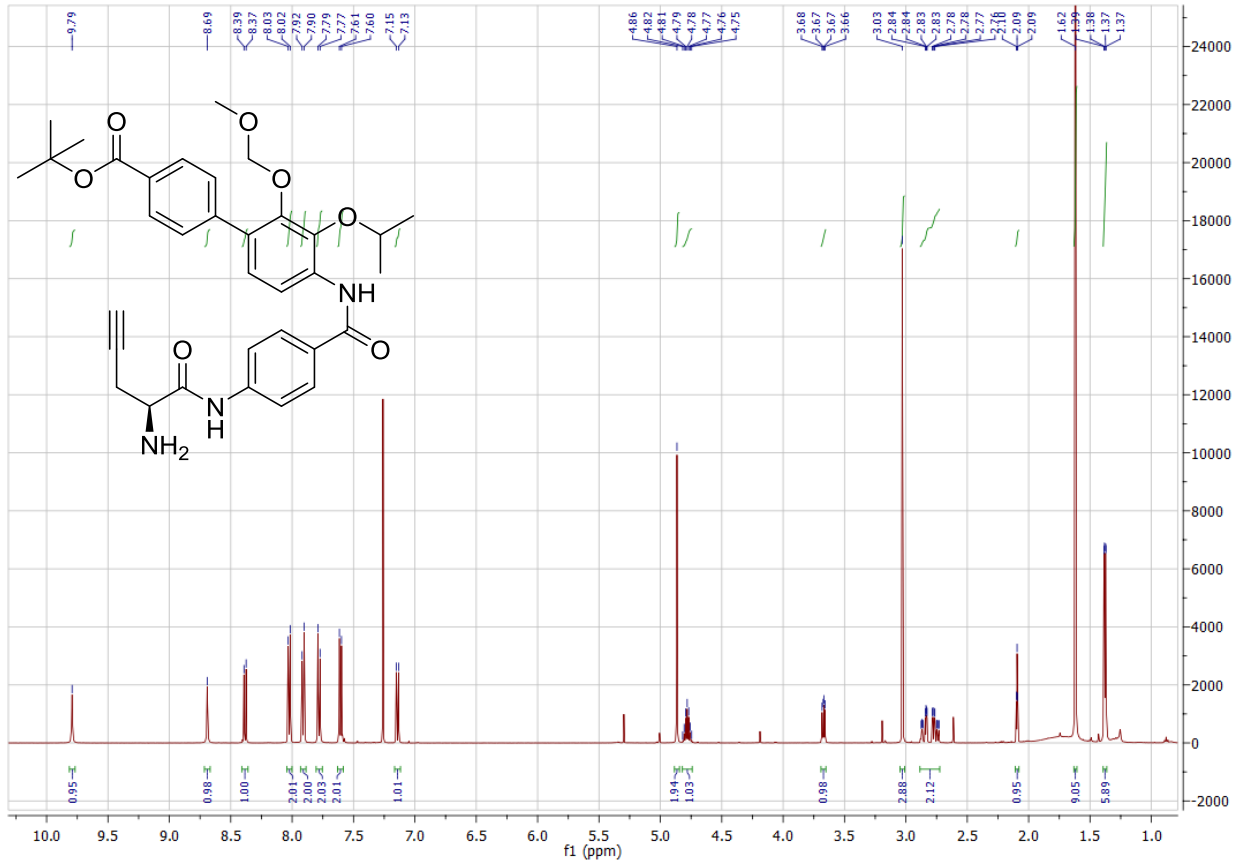
***tert*-Butyl (S)-4-(4-(4-(2-(((9H-fluoren-9-yl)methoxy)carbonyl)amino)pent-4-ynamido)benzamido)-2-(allyloxy)-3-isopropoxybenzamido)benzoate**



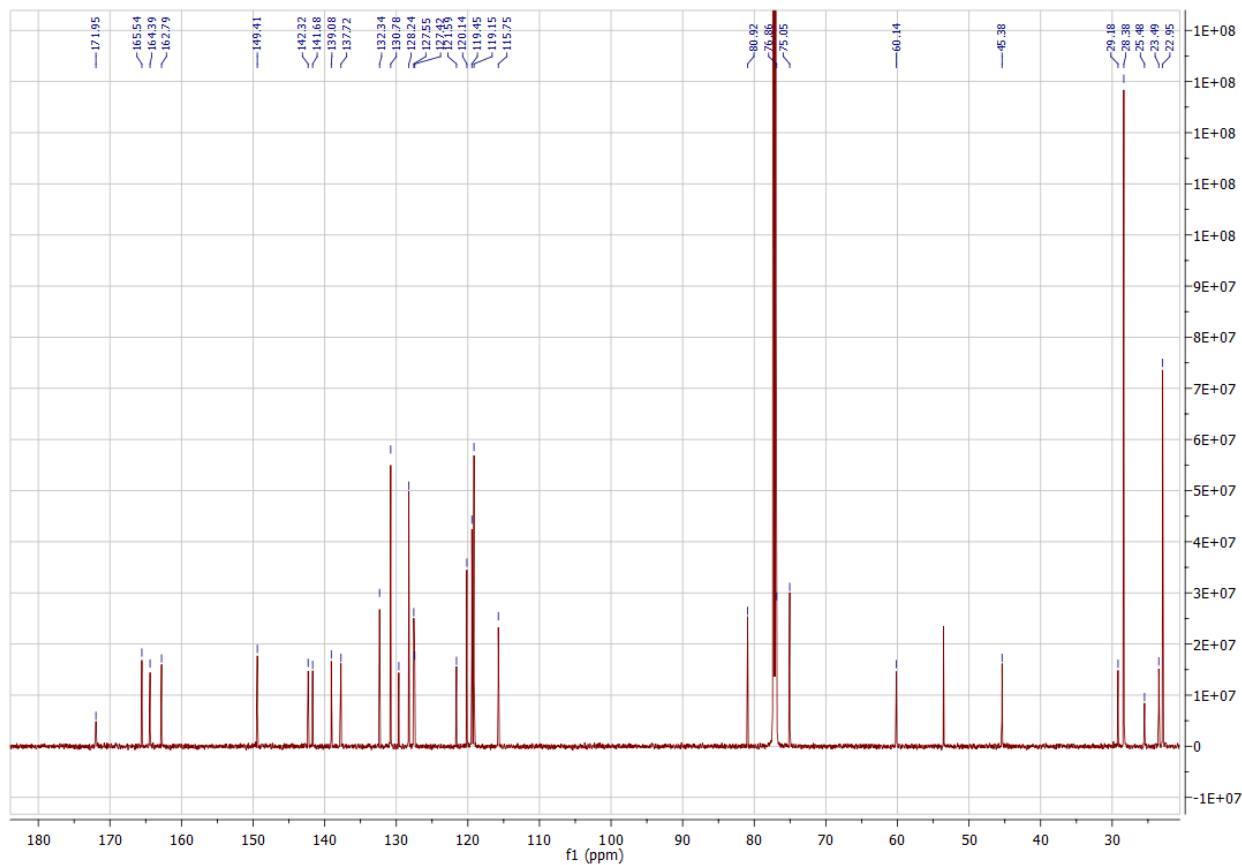
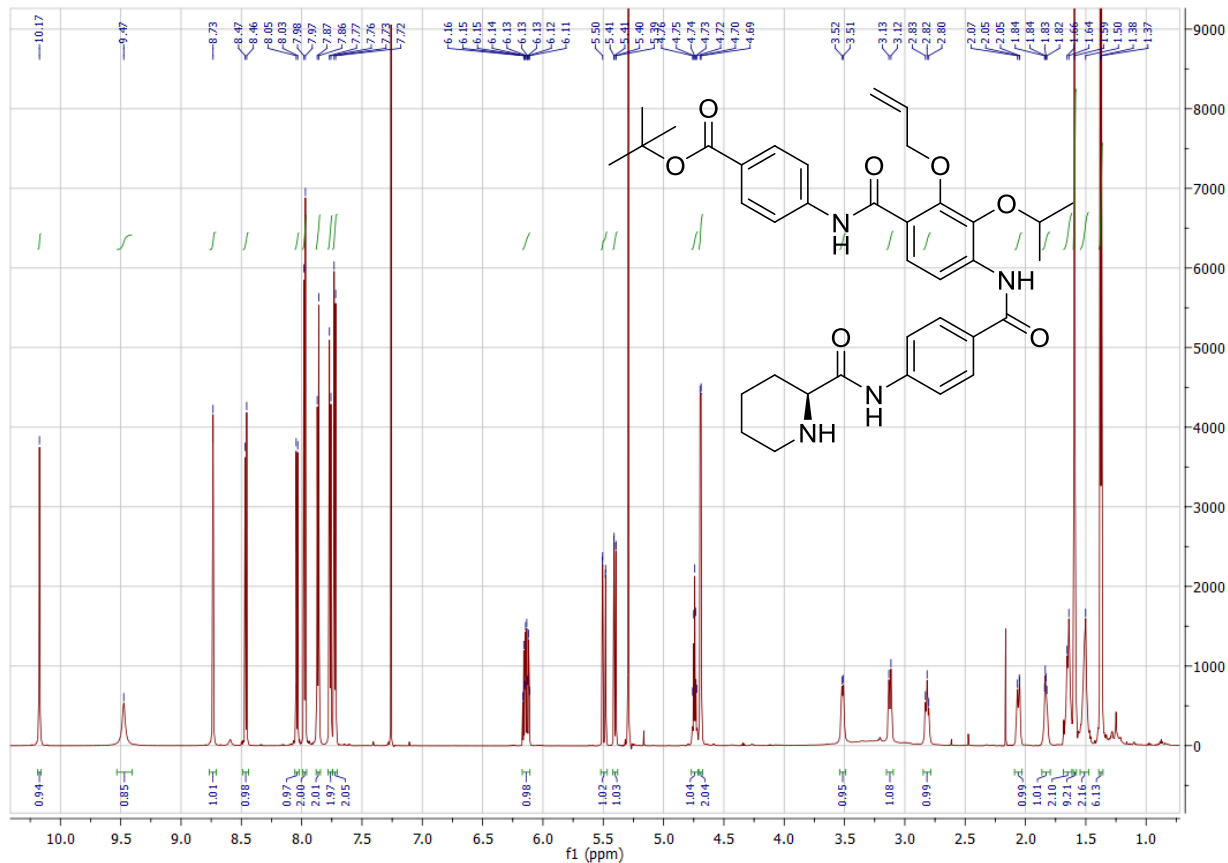
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminopent-4-ynamido)benzamido)-3-isopropoxybenzamido)-benzoate**



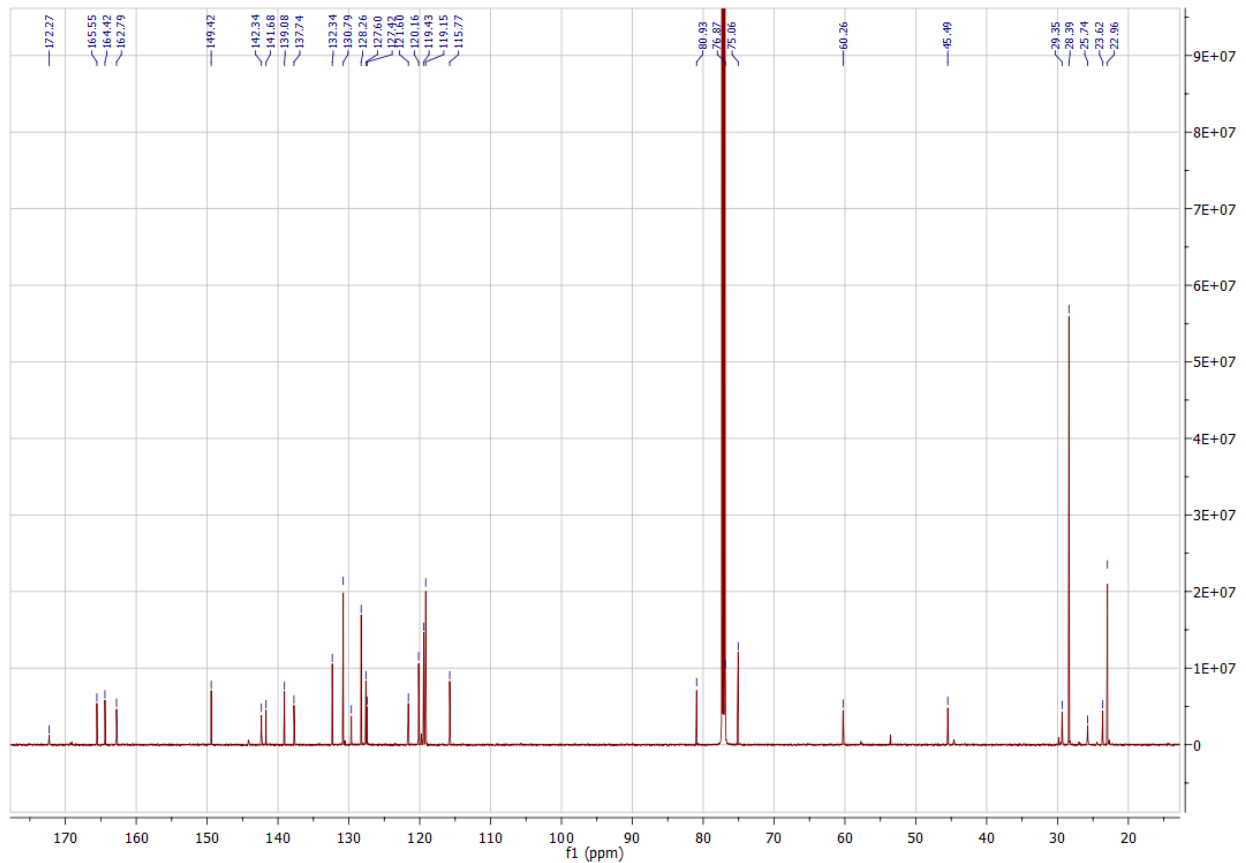
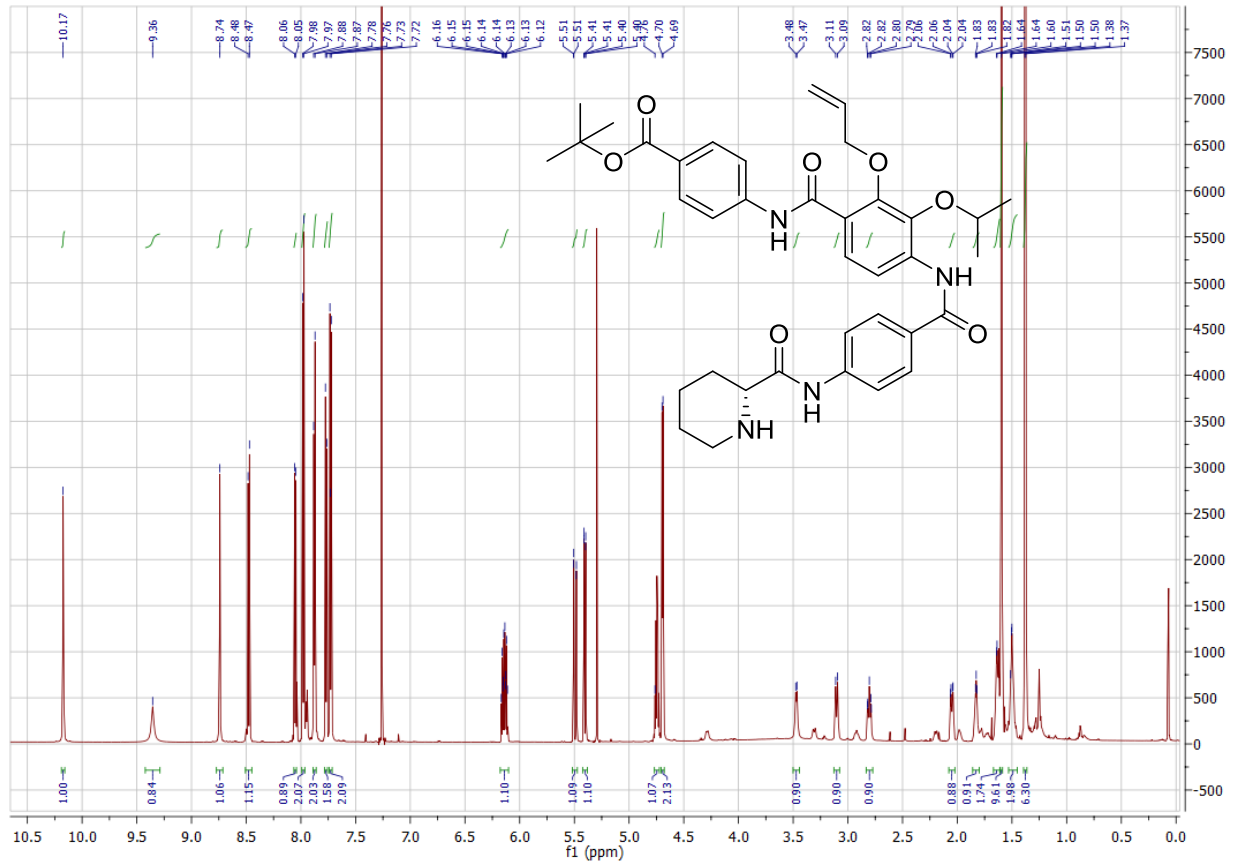
***tert*-Butyl (S)-4'-(4-(2-aminopent-4-ynamido)benzamido)-3'-isopropoxy-2'-(methoxymethoxy)-[1,1'-biphenyl]-4-carboxylate**



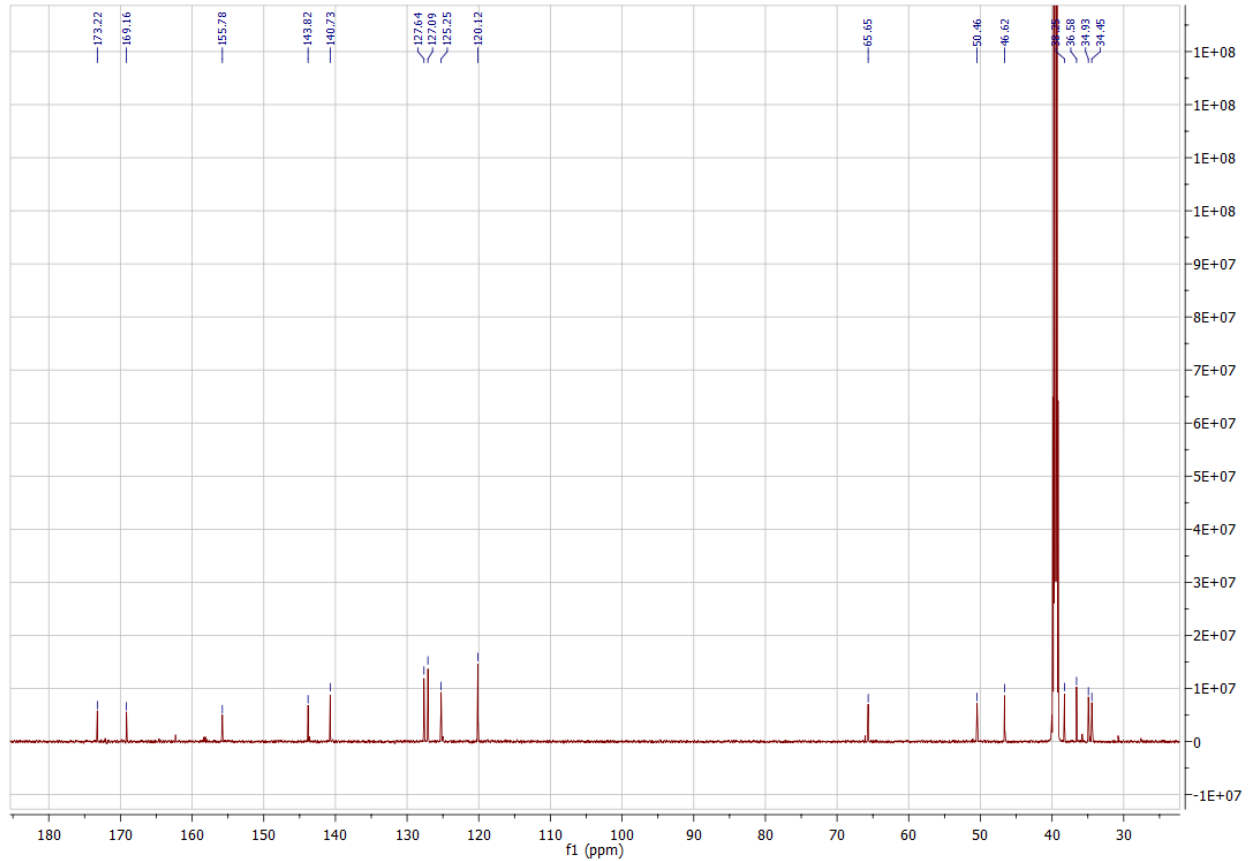
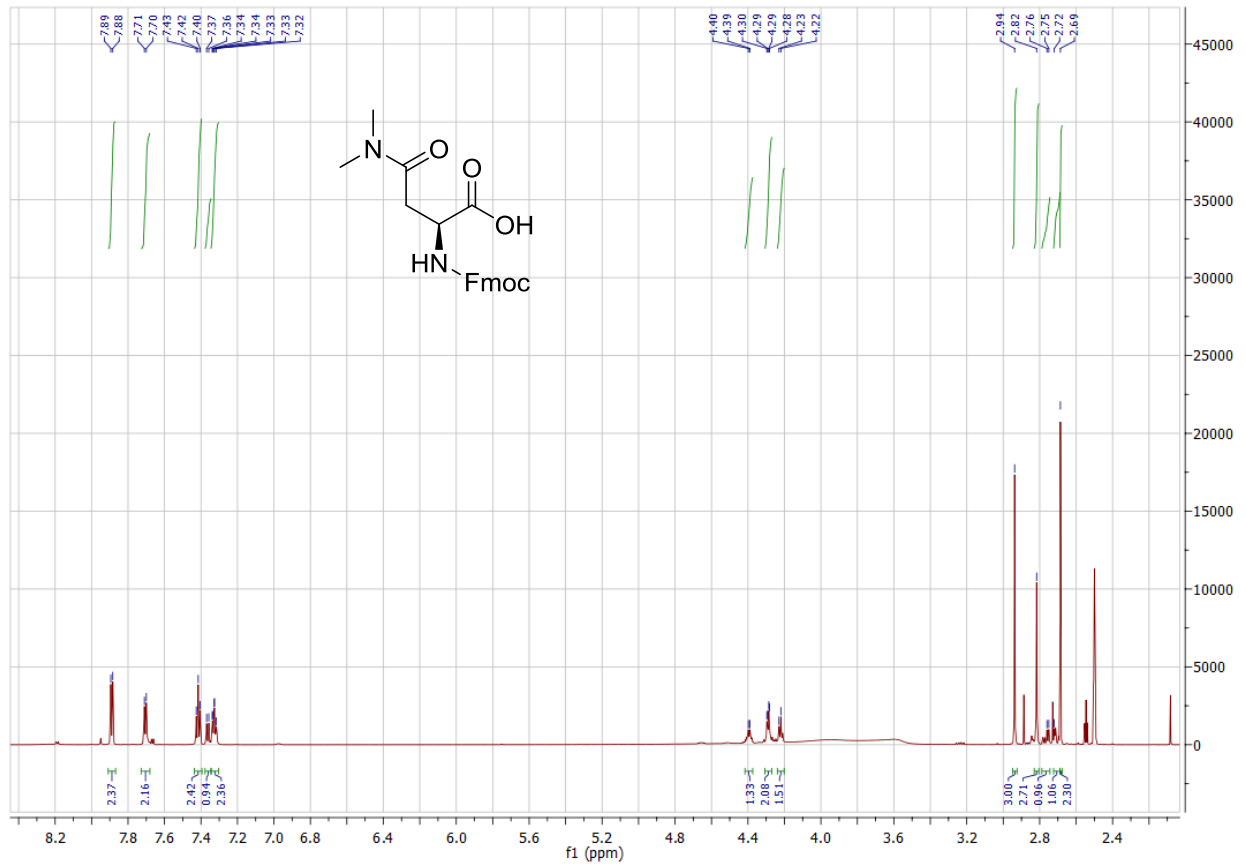
***tert*-Butyl (S)-4-(2-(allyloxy)-3-isopropoxy-4-(4-(piperidine-2-carboxamido)benzamido)benzamido)benzoate**



***tert*-Butyl (*R*)-4-(2-(allyloxy)-3-isopropoxy-4-(4-(piperidine-2-carboxamido)benzamido)benzamido)benzoate**

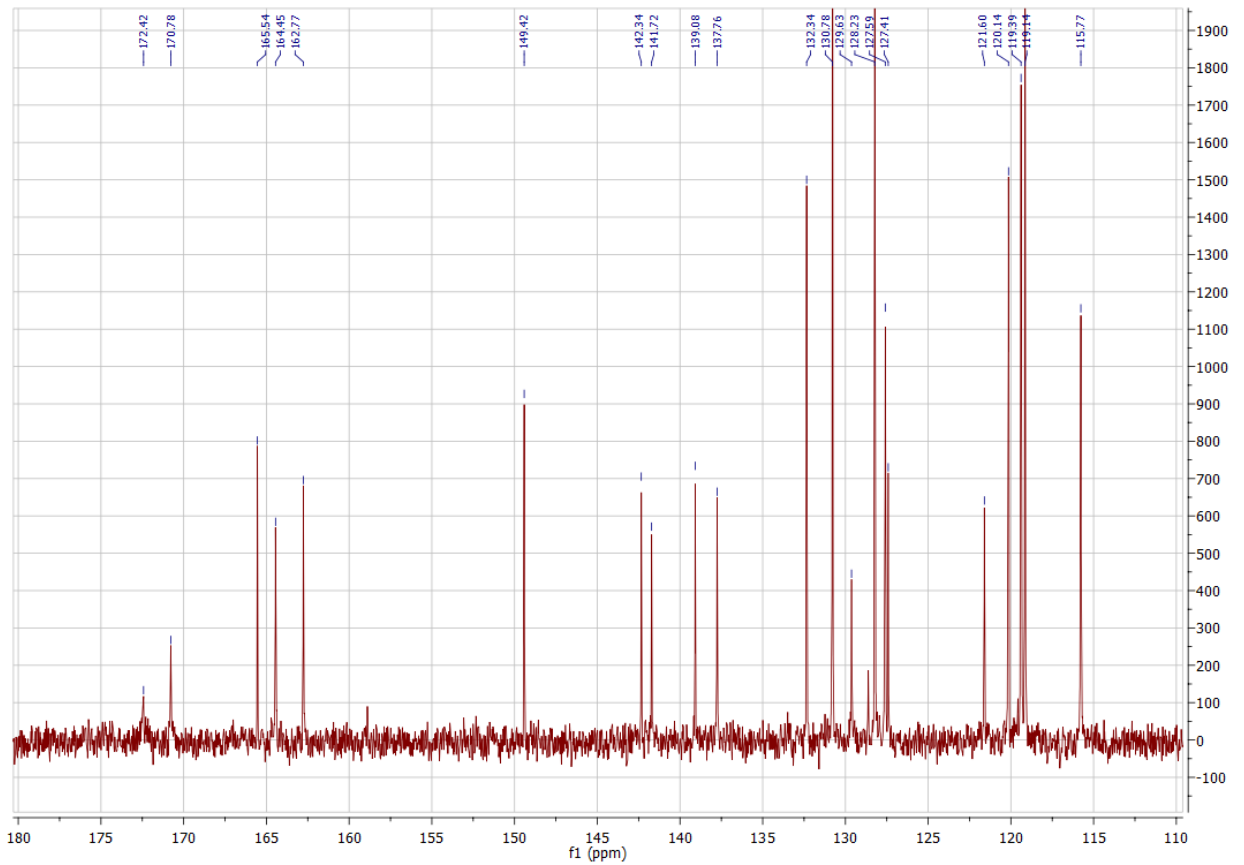
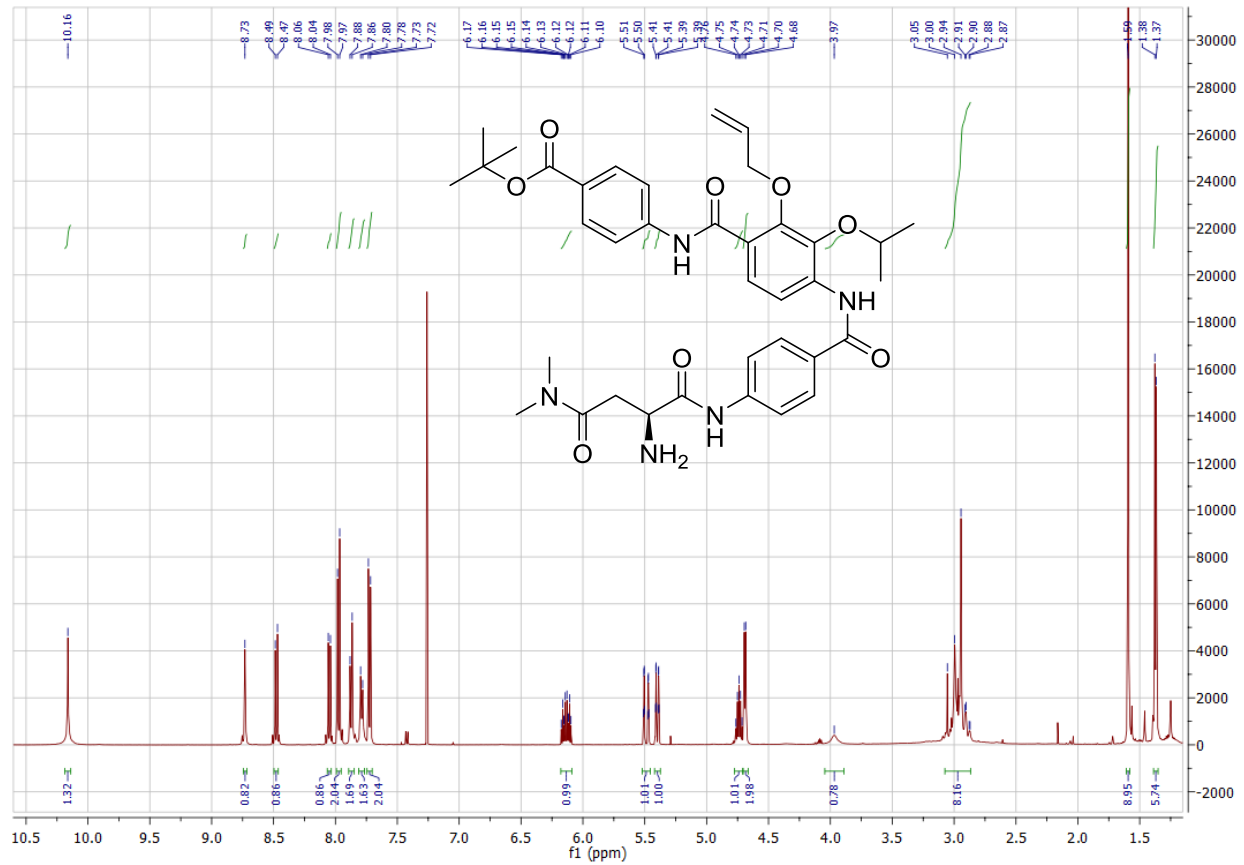


***N*<sup>2</sup>-(((9*H*-fluoren-9-yl)methoxy)carbonyl)-*N*<sup>4</sup>,*N*<sup>4</sup>-dimethyl-L-asparagine (53)**

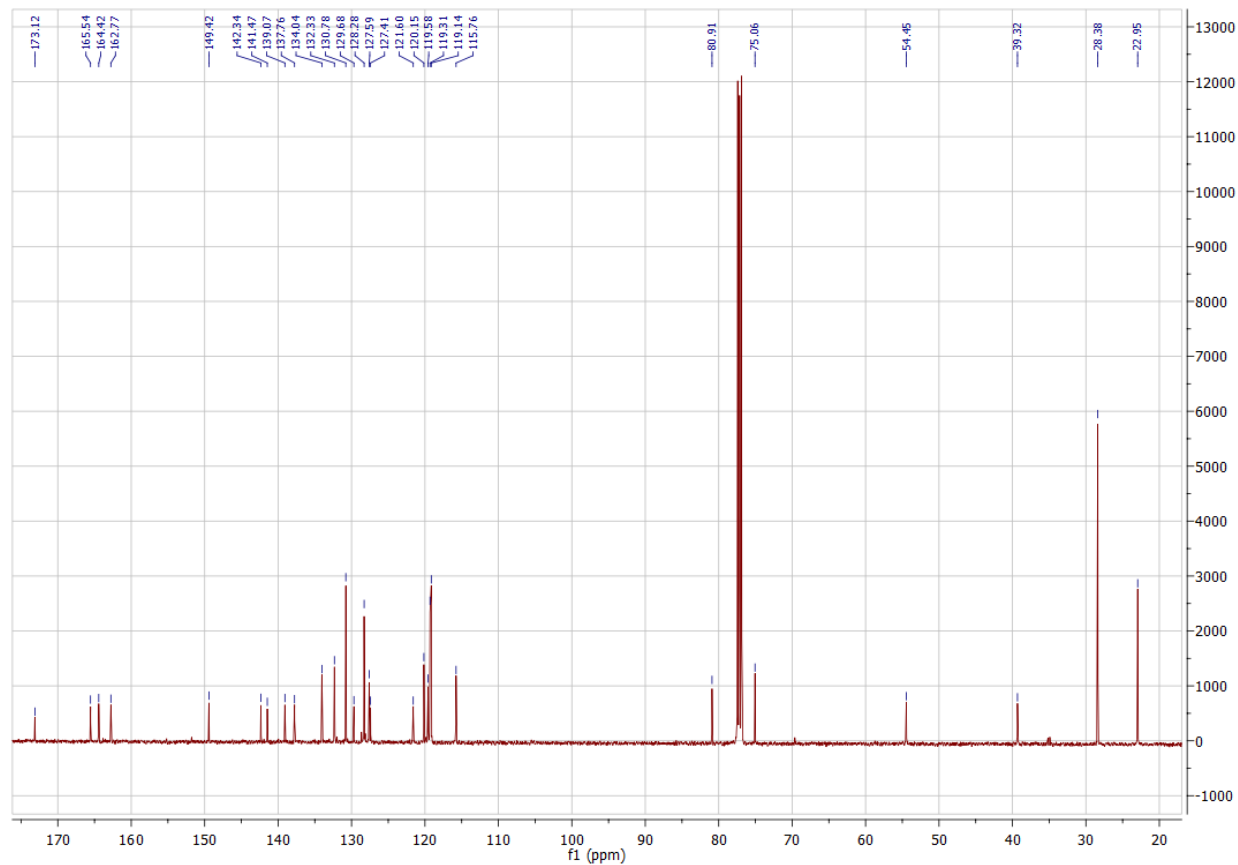
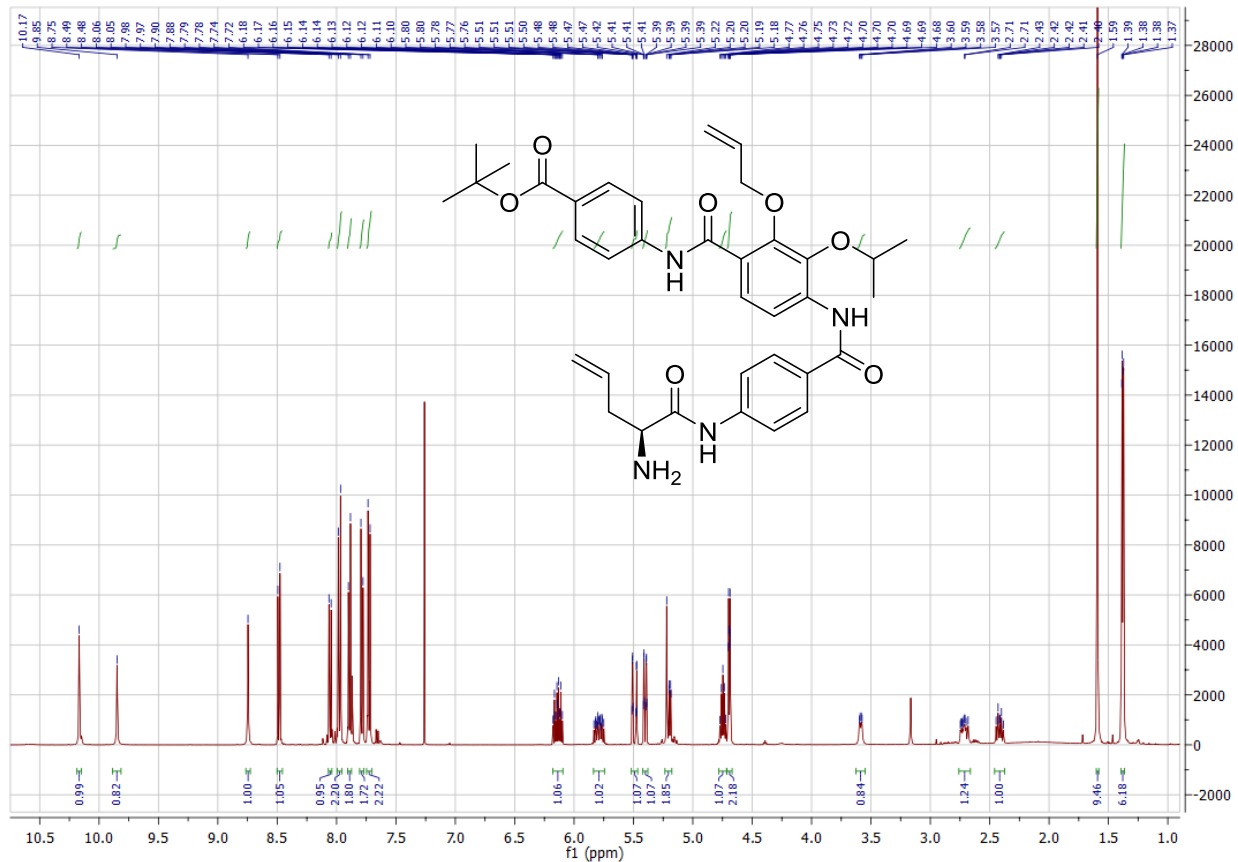




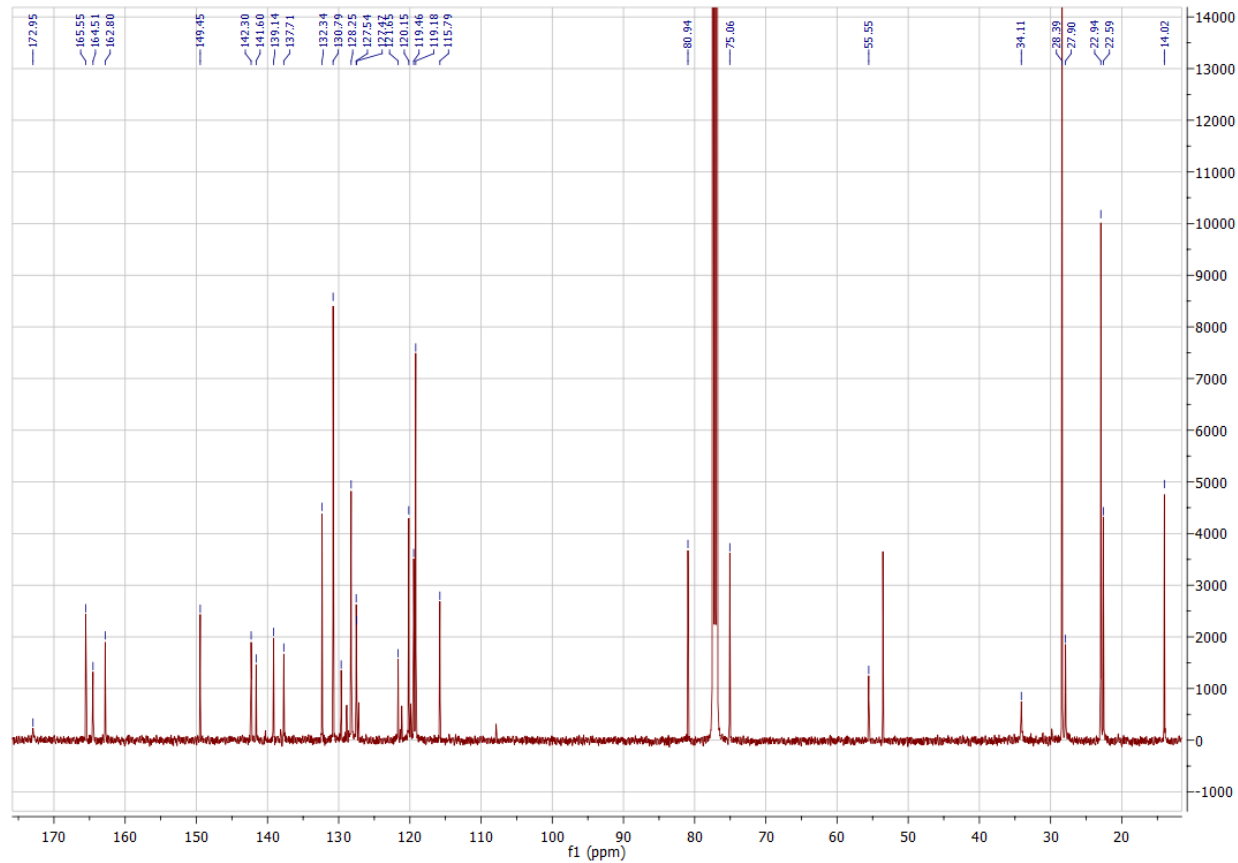
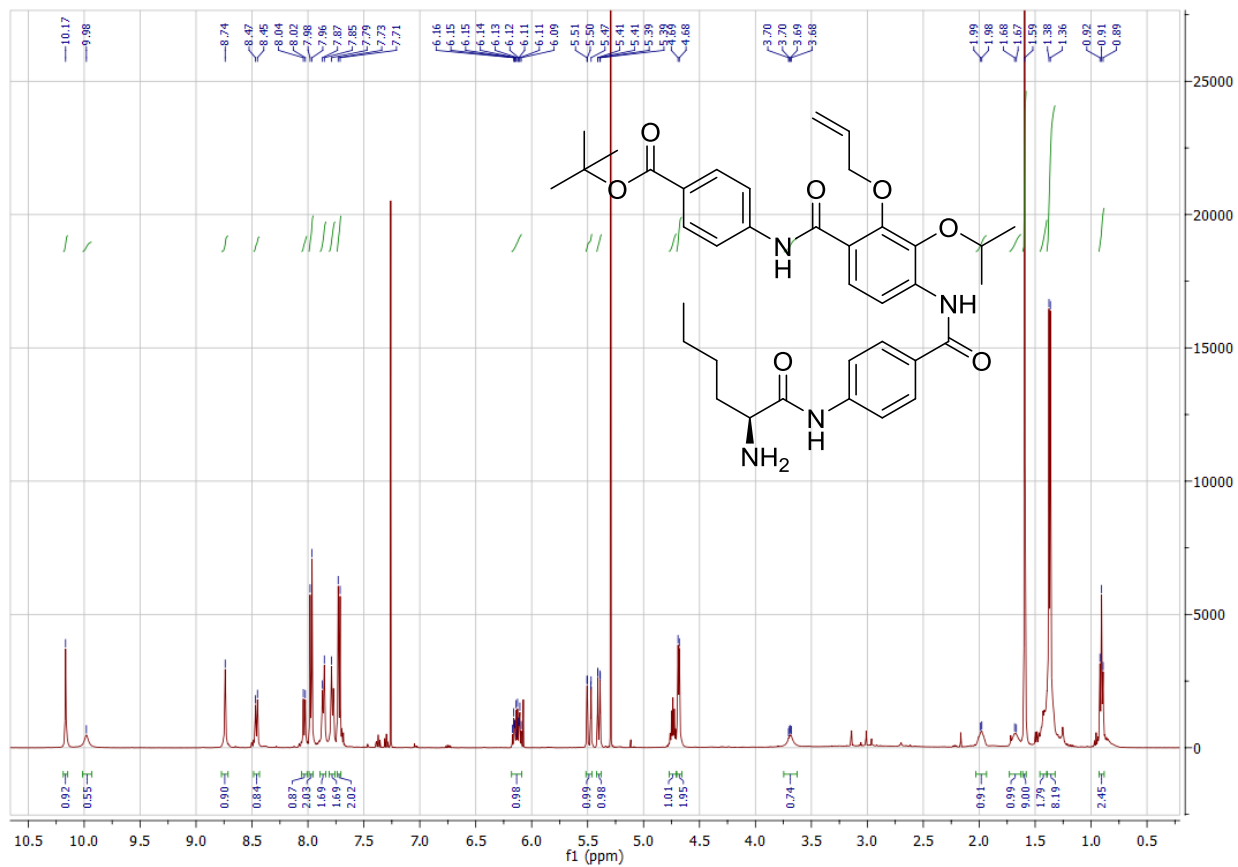
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-amino-4-(dimethylamino)-4-oxobutanamido)benzamido)-3-isopropoxybenzamido)benzoate**



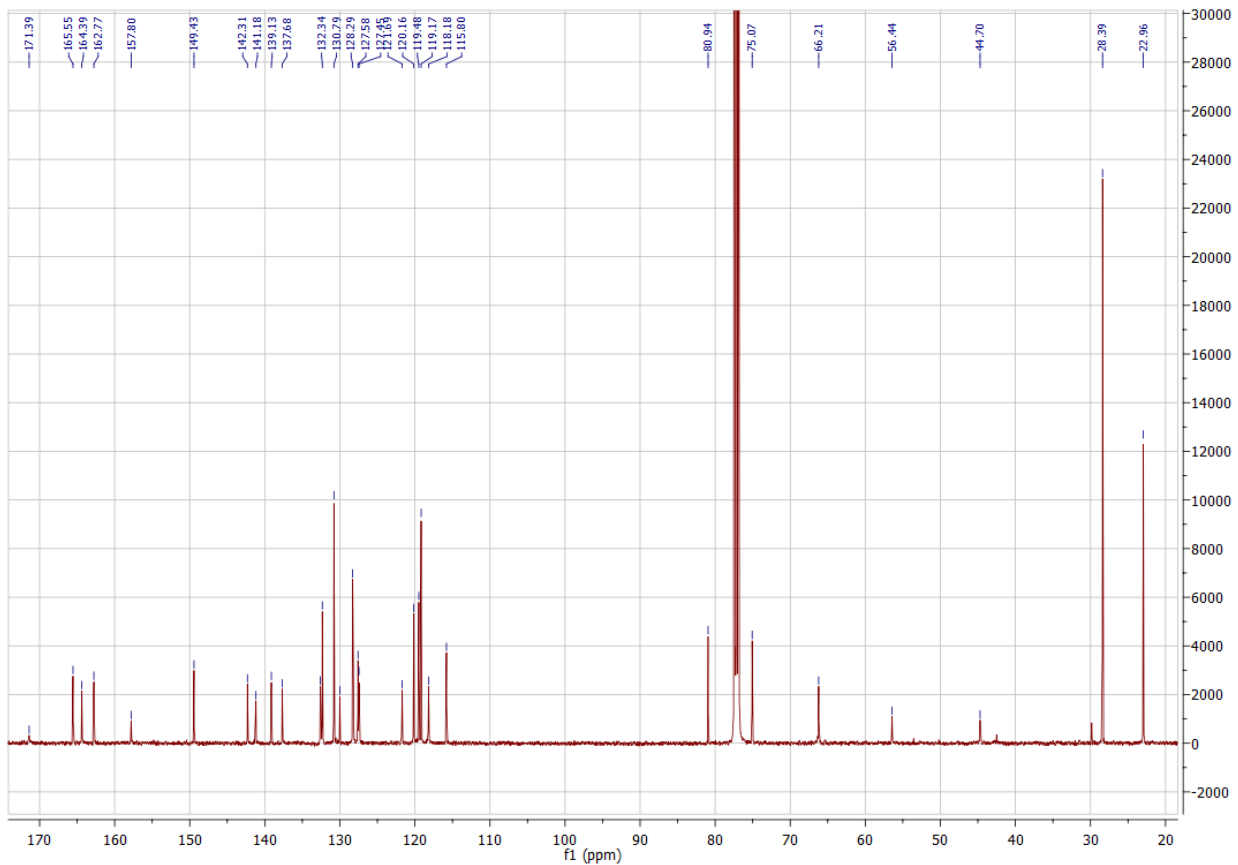
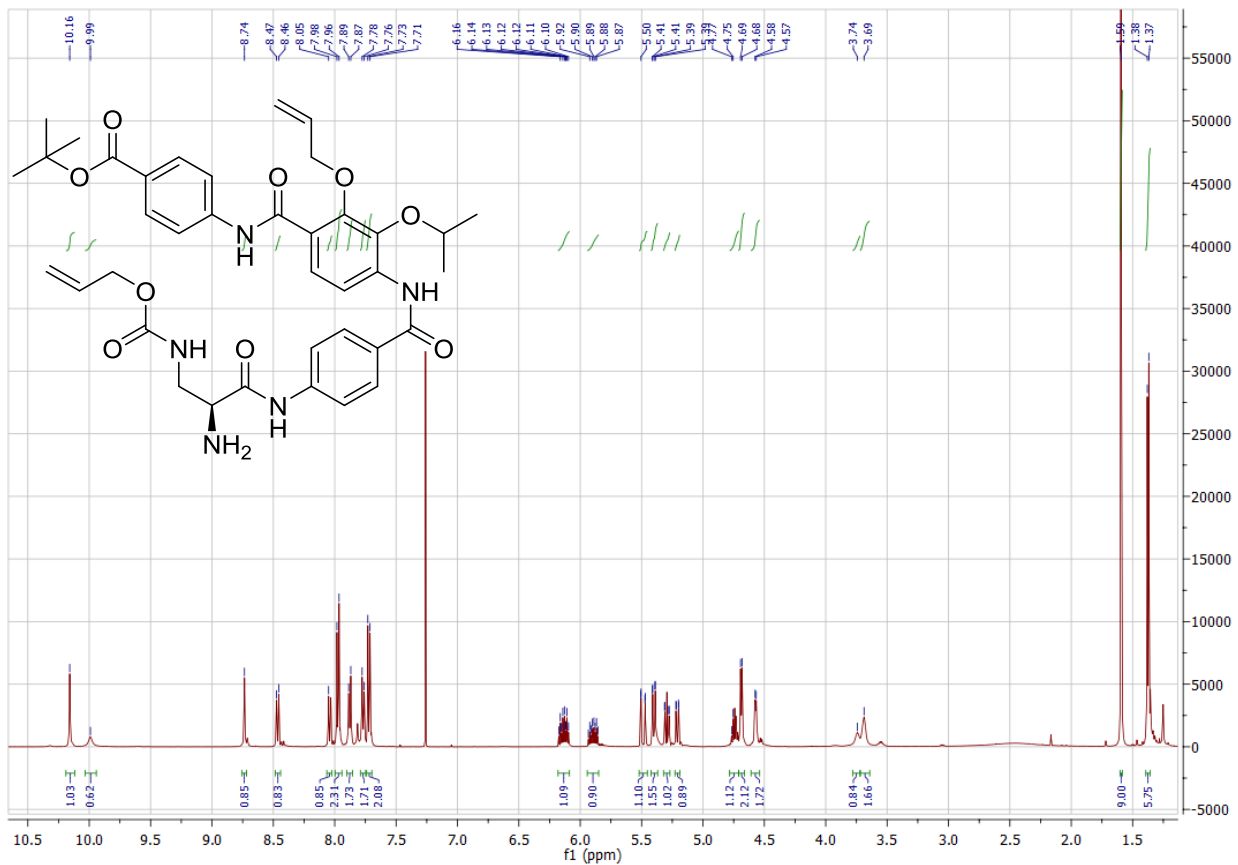
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminopent-4-enamido)benzamido)-3-isopropoxybenzamido)benzoate**



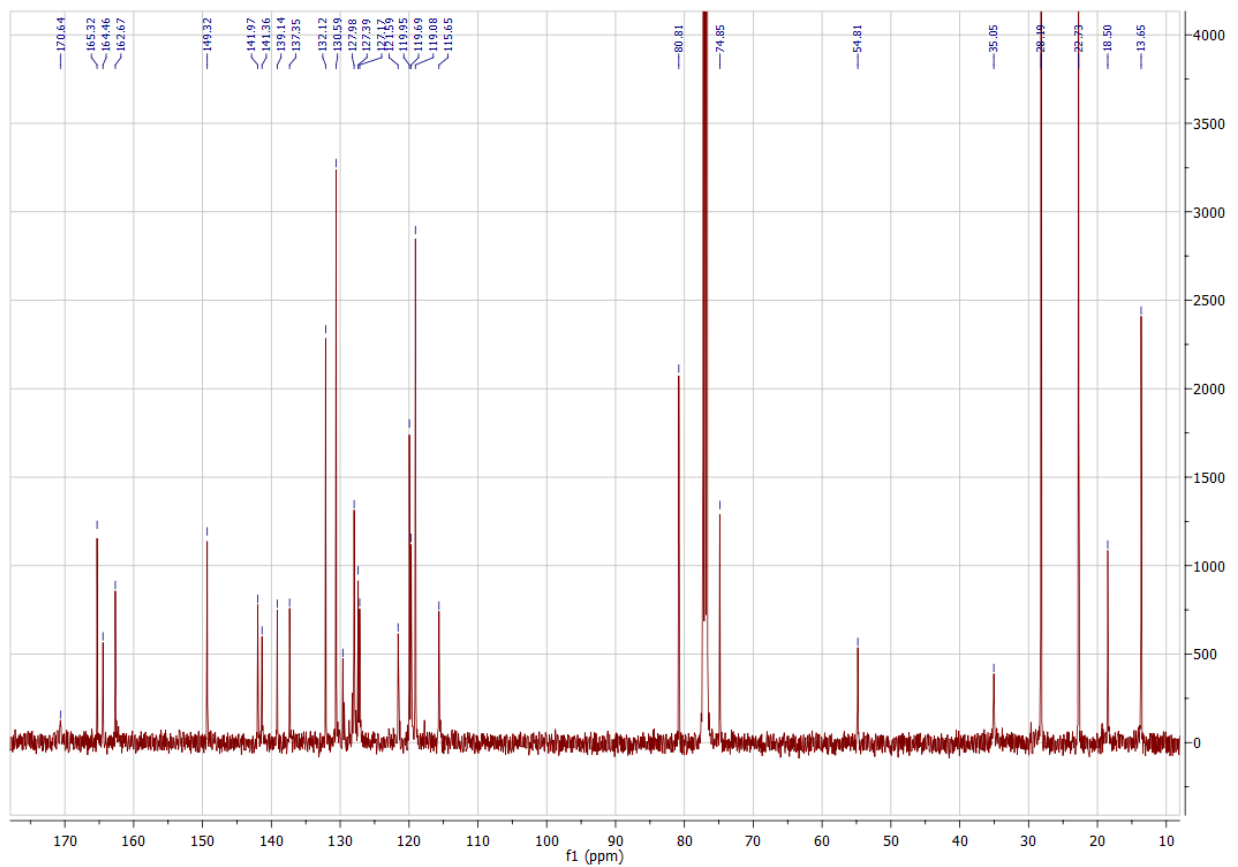
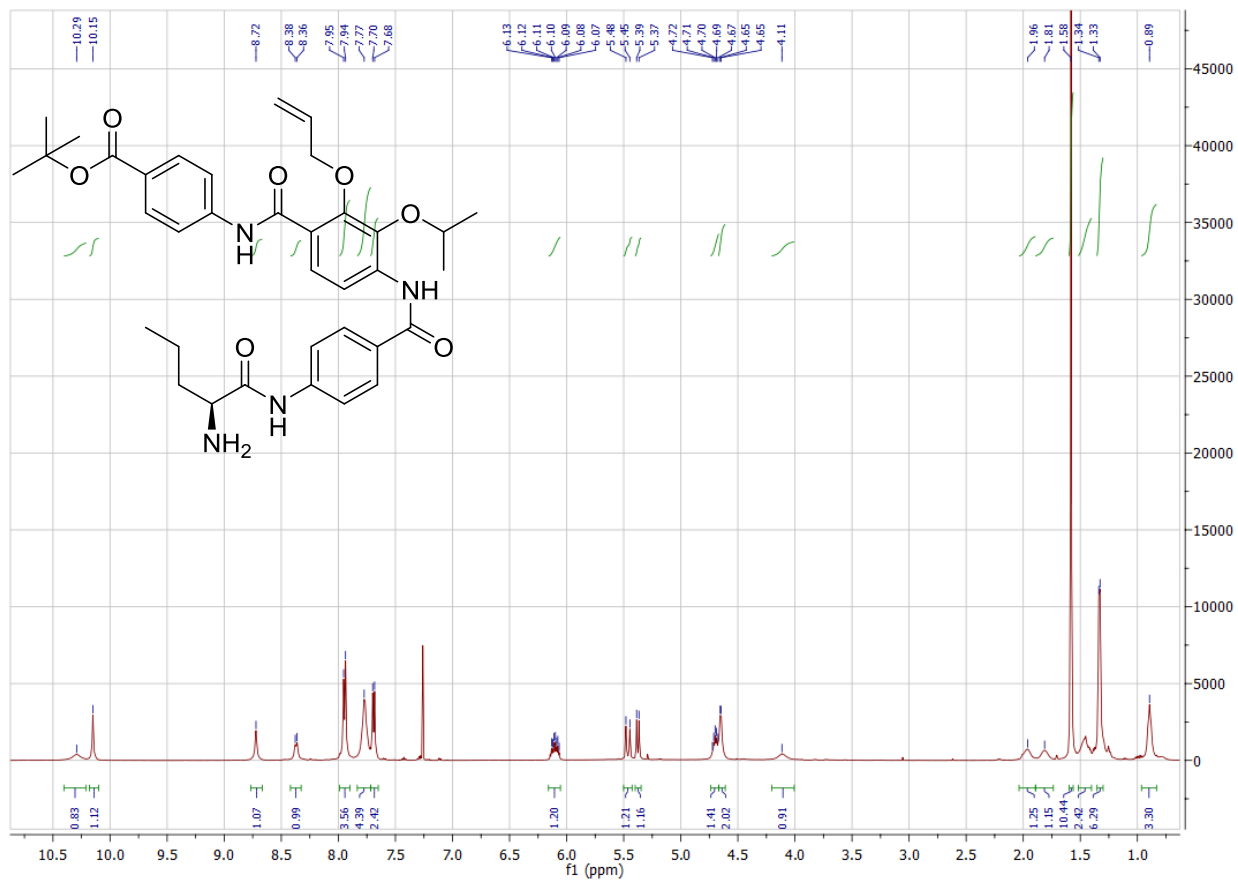
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminohexanamido)benzamido)-3-isopropoxybenzamido)benzoate**



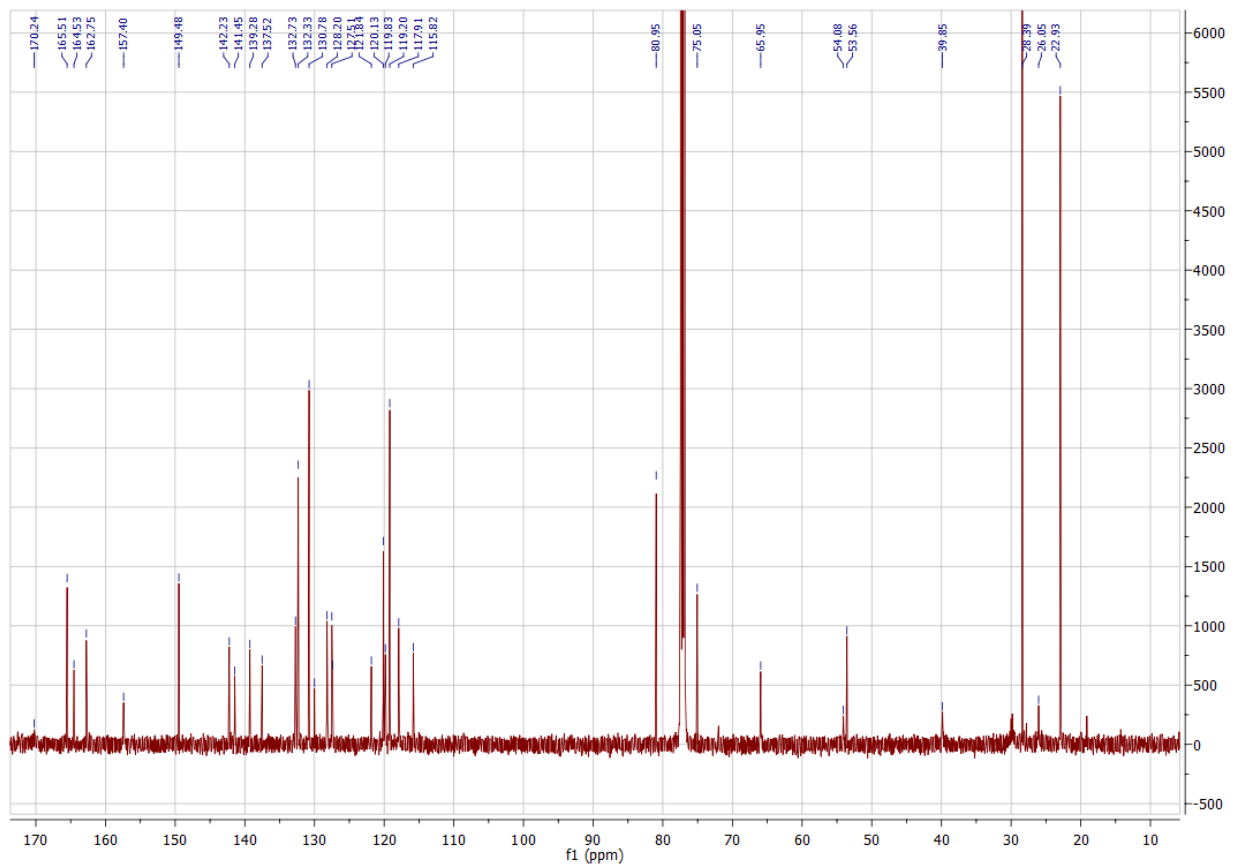
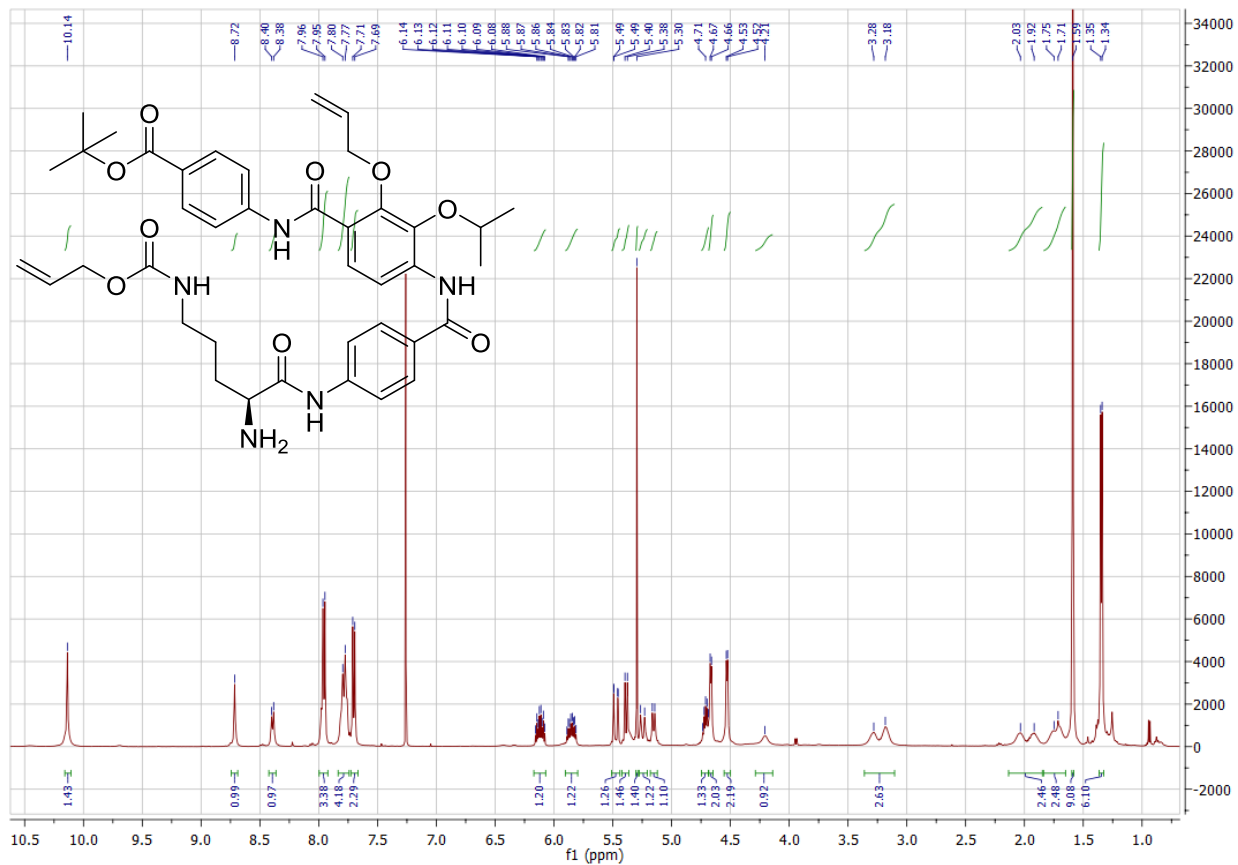
**tert-Butyl (S)-4-(2-(allyloxy)-4-(4-(3-(((allyloxy)carbonyl)amino)-2-aminopropanamido)benzamido)-3-isopropoxybenzamido)benzoate**



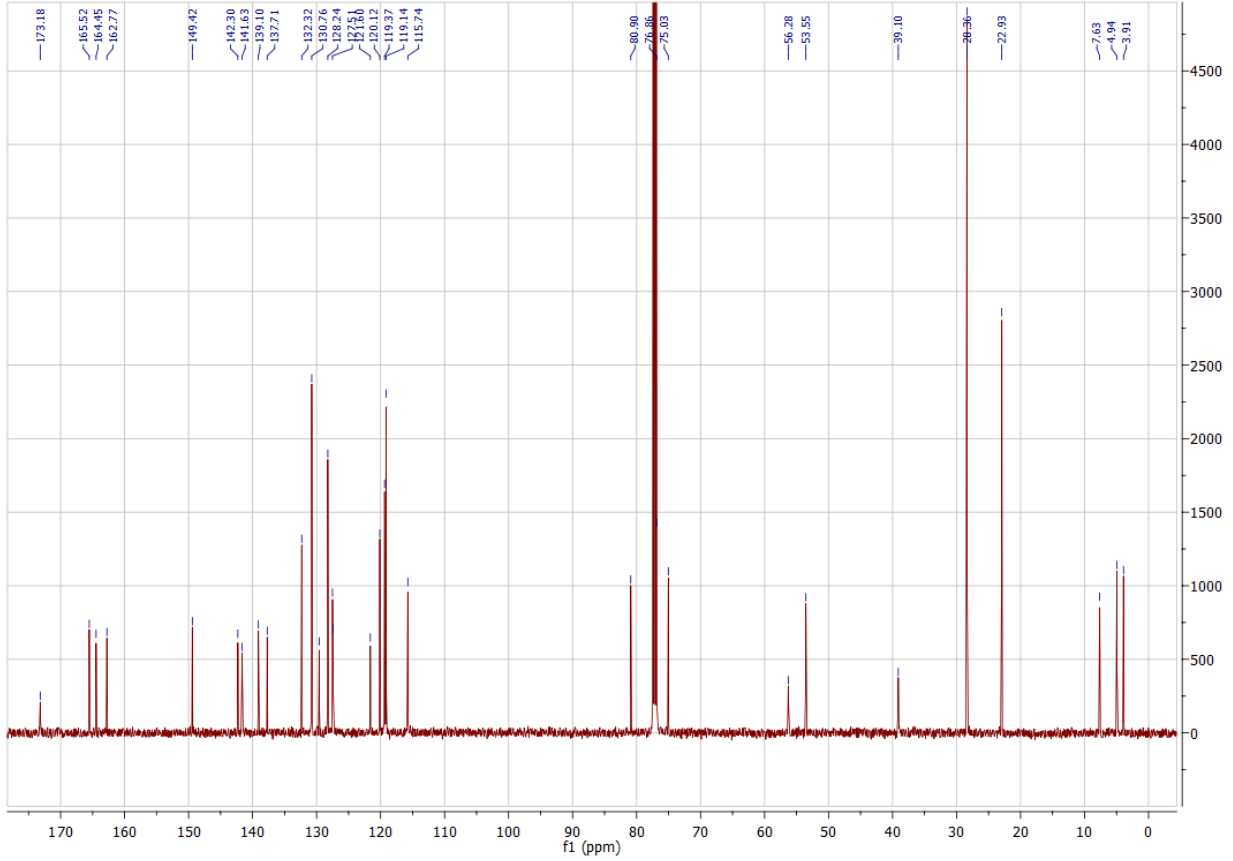
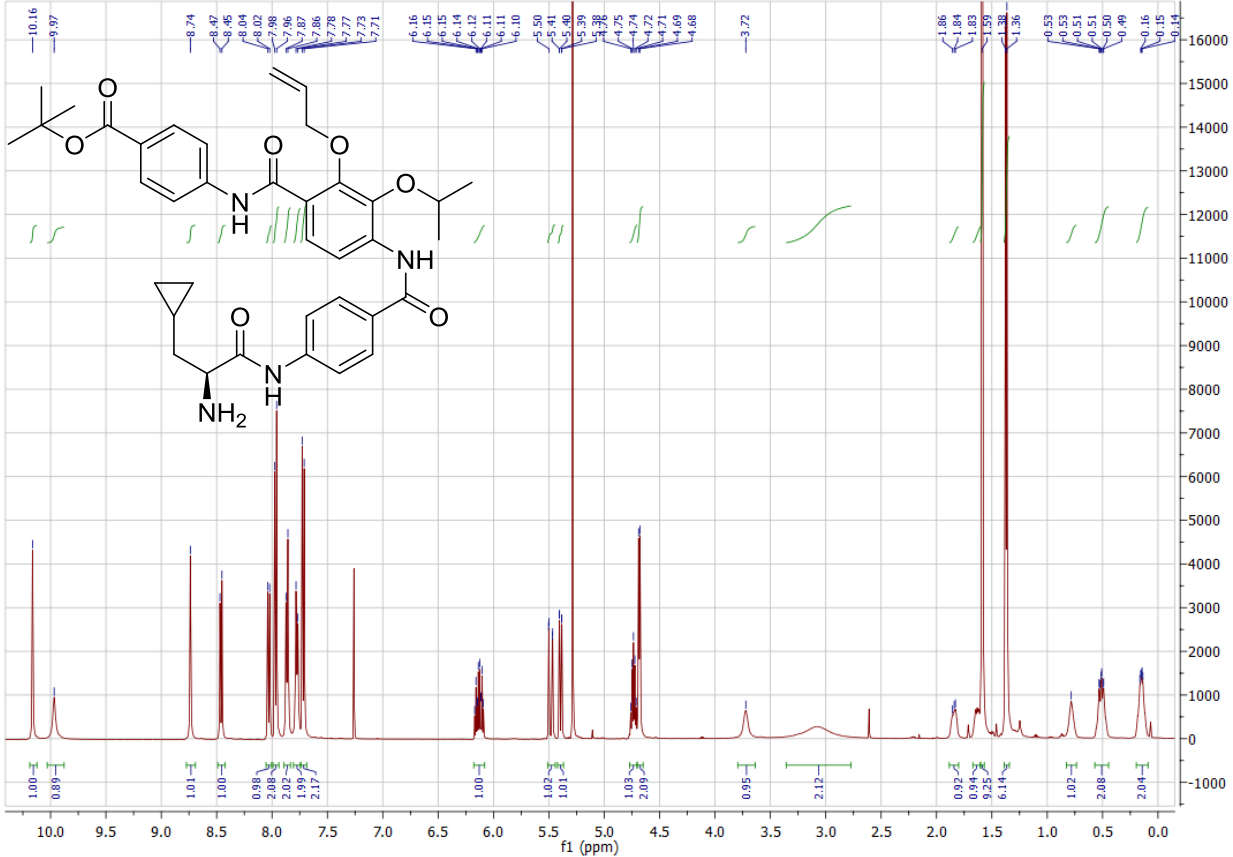
**tert-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminopentanamido)benzamido)-3-isopropoxybenzamido)benzoate**



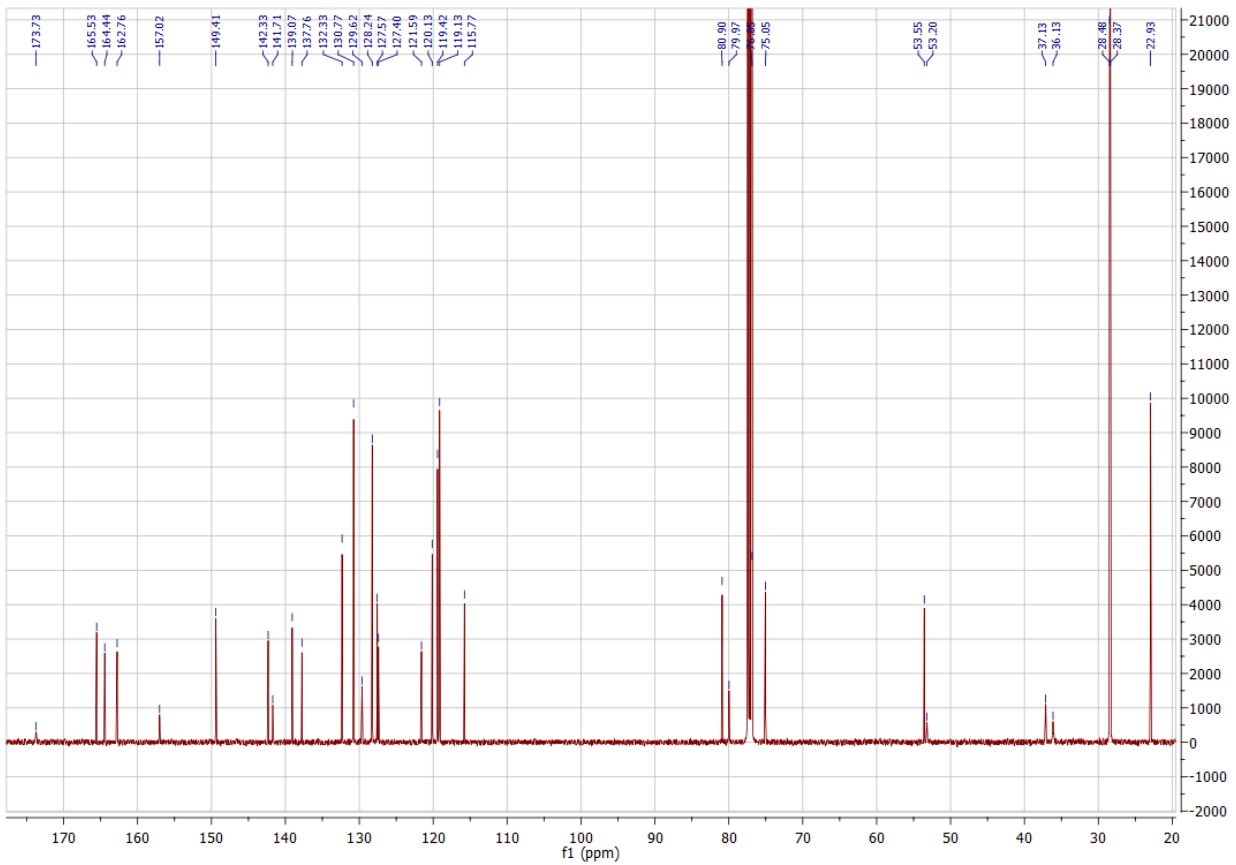
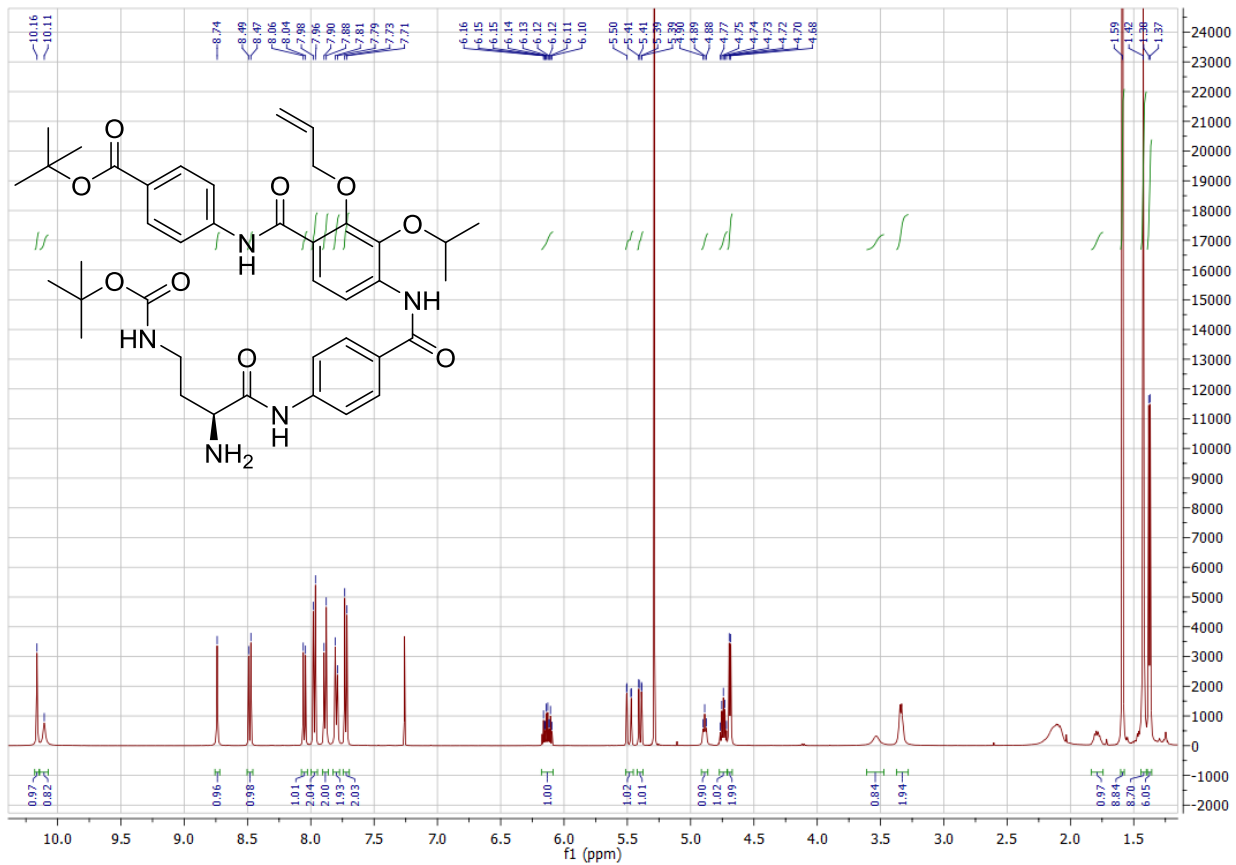
**tert-Butyl (S)-4-(2-(allyloxy)-4-(4-(5-(((allyloxy)carbonyl)amino)-2-aminopentanamido)benzamido)-3-isopropoxybenzamido)benzoate**



**tert-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-amino-3-cyclopropylpropanamido)benzamido)-3-isopropoxybenzamido)benzoate (55)**

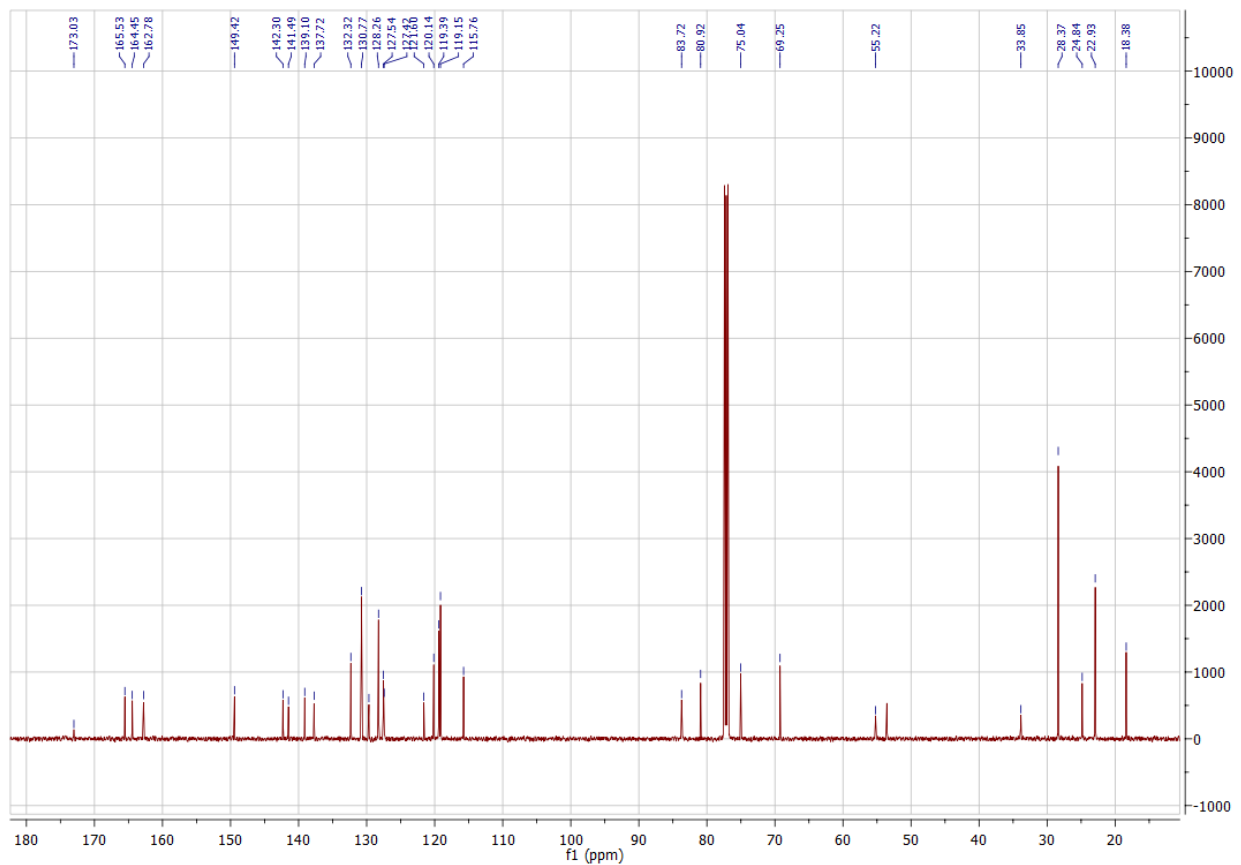
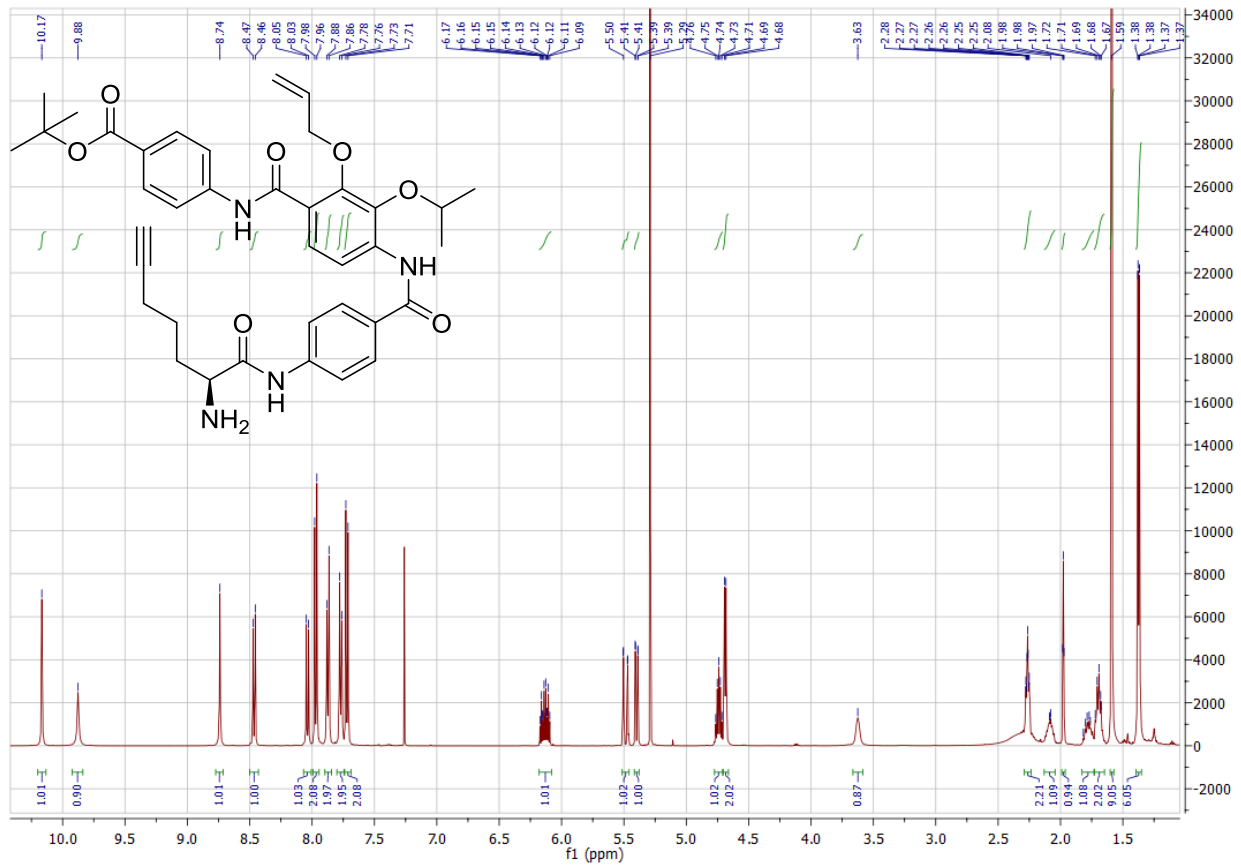


***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-amino-4-((*tert*-butoxycarbonyl)amino)butanamido)benzamido)-3-isopropoxybenzamido)benzoate**

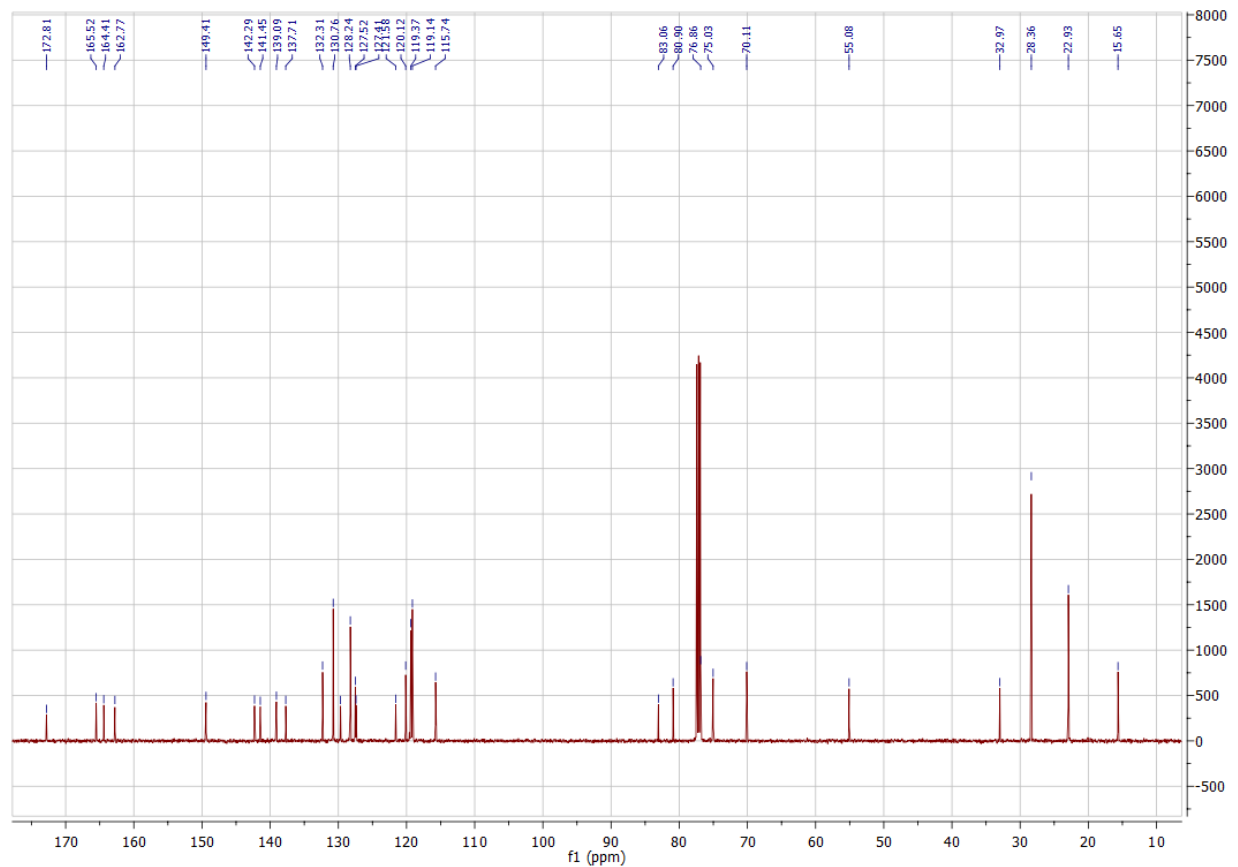
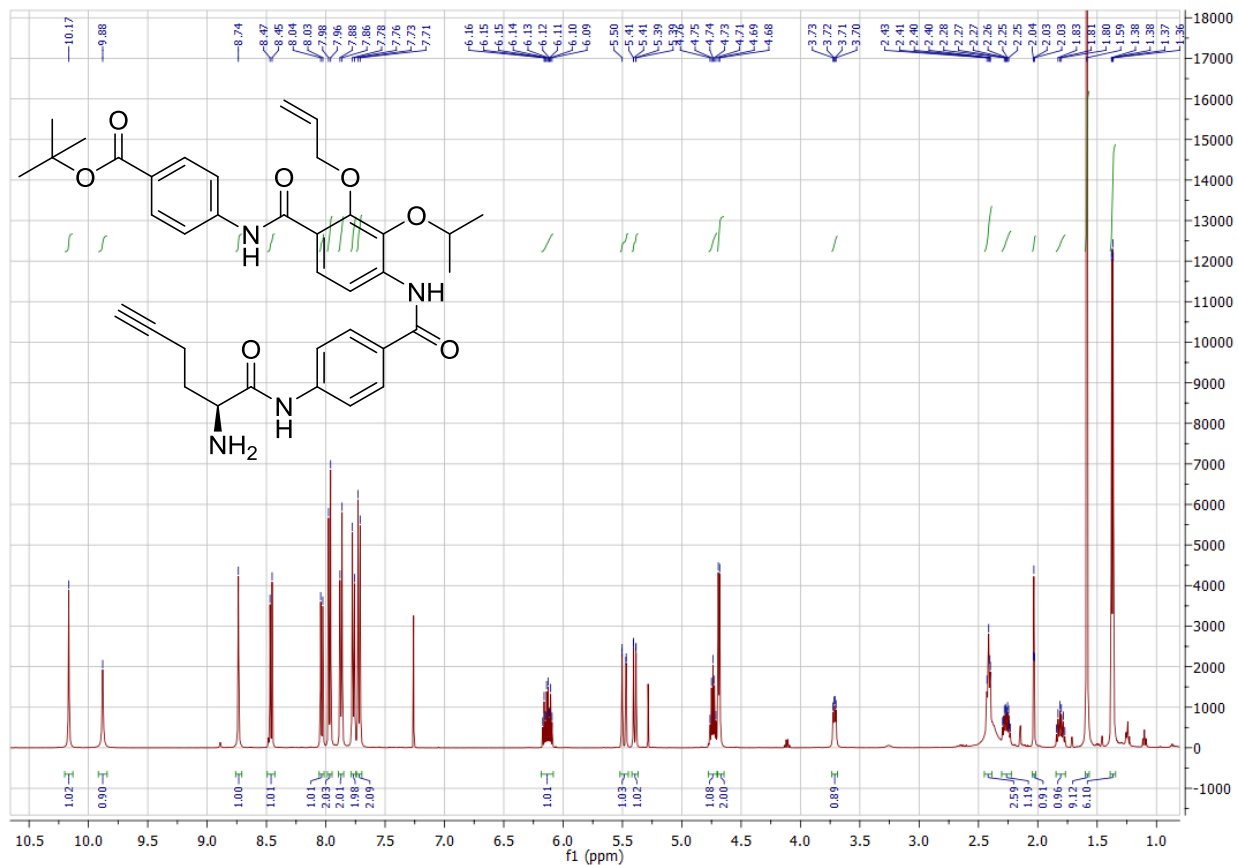




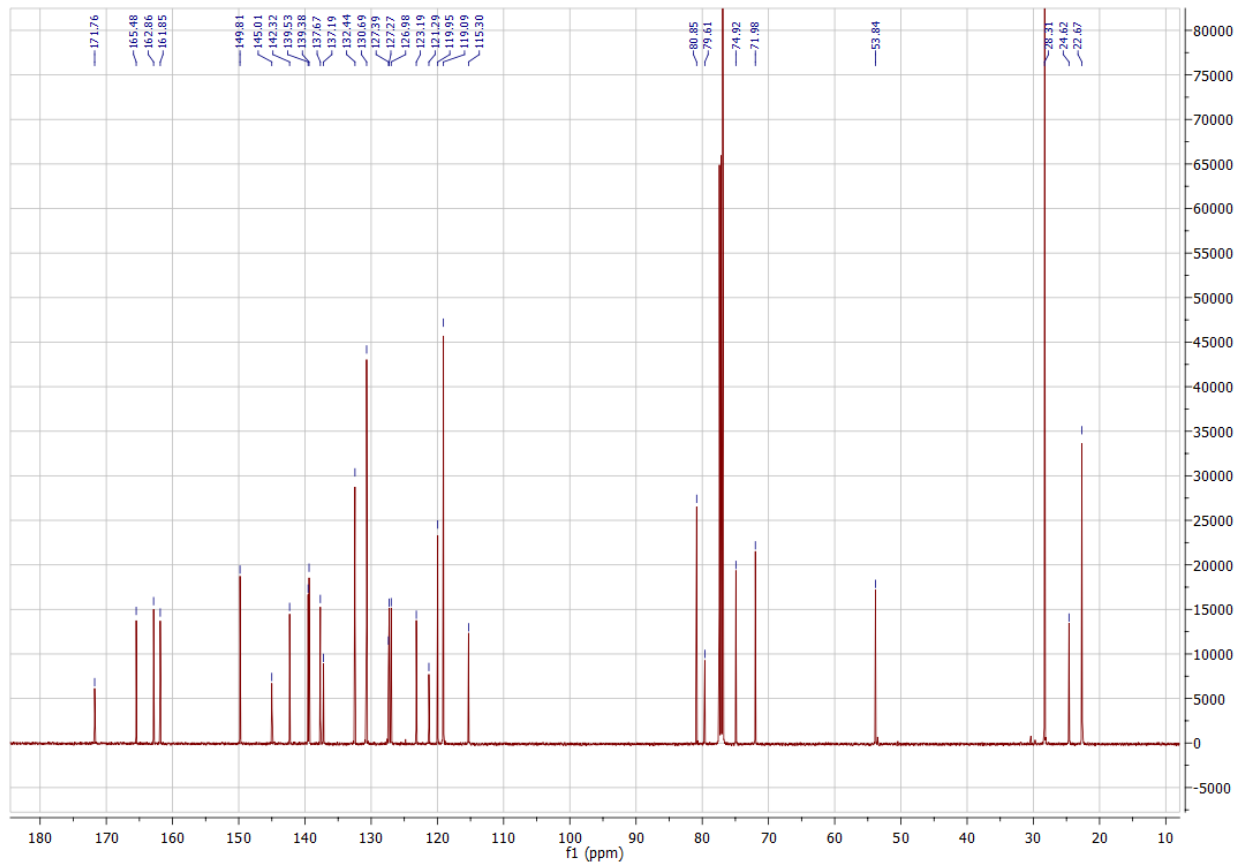
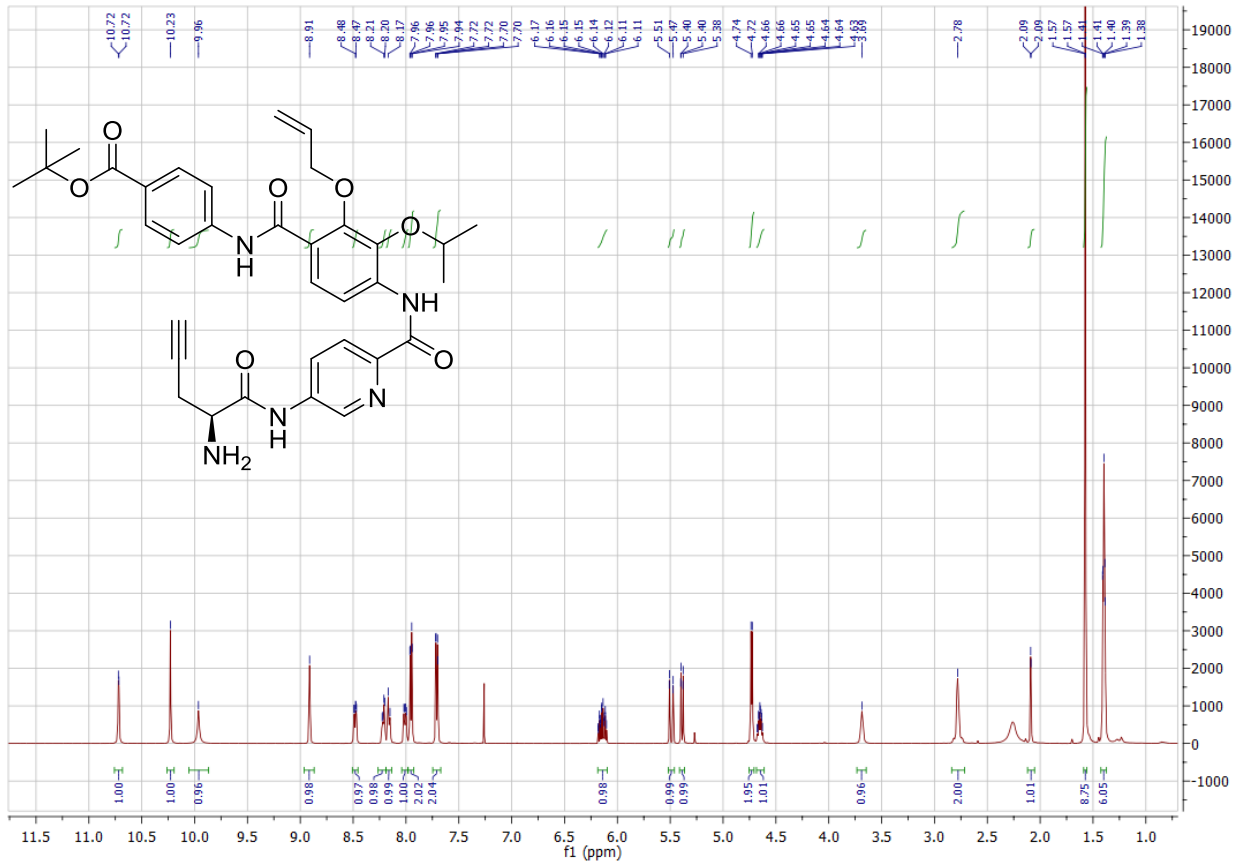
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminohept-6-ynamido)benzamido)-3-isopropoxybenzamido)-benzoate**



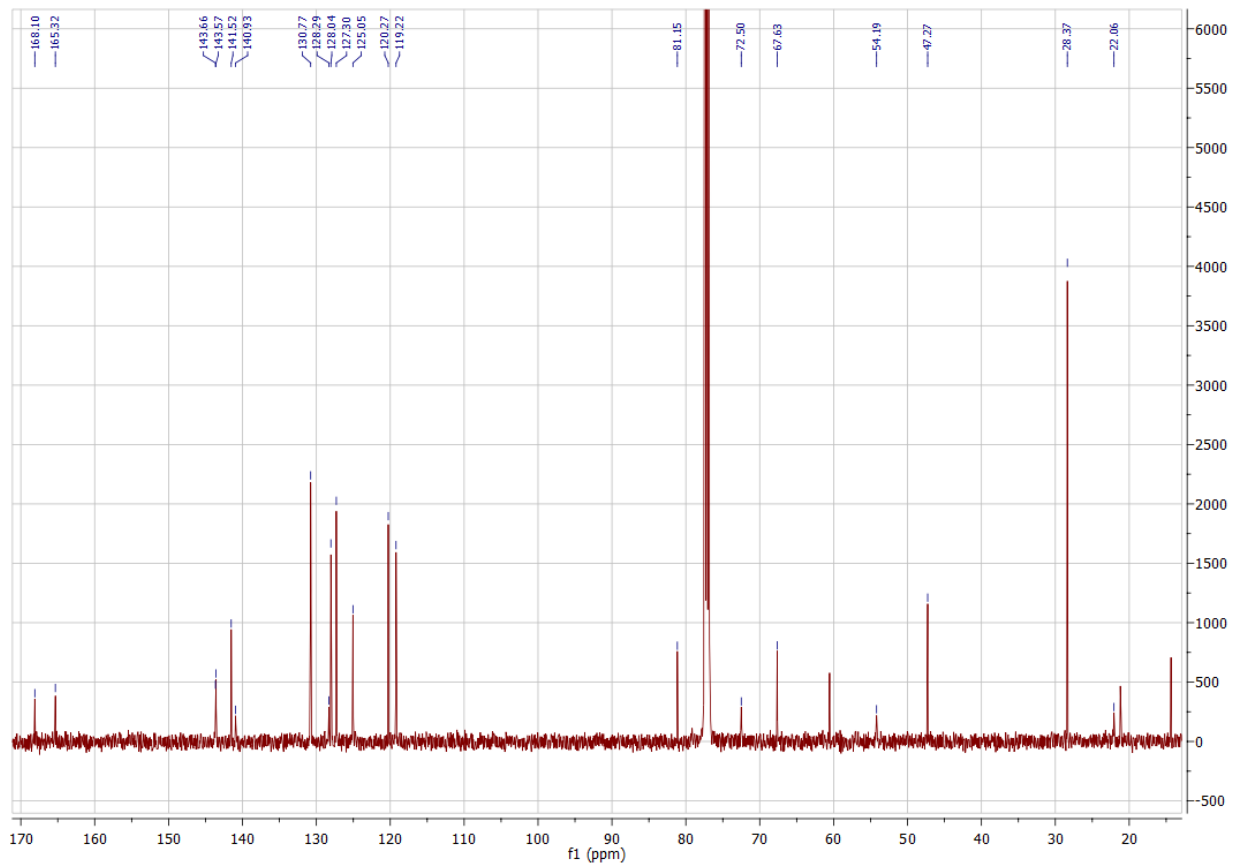
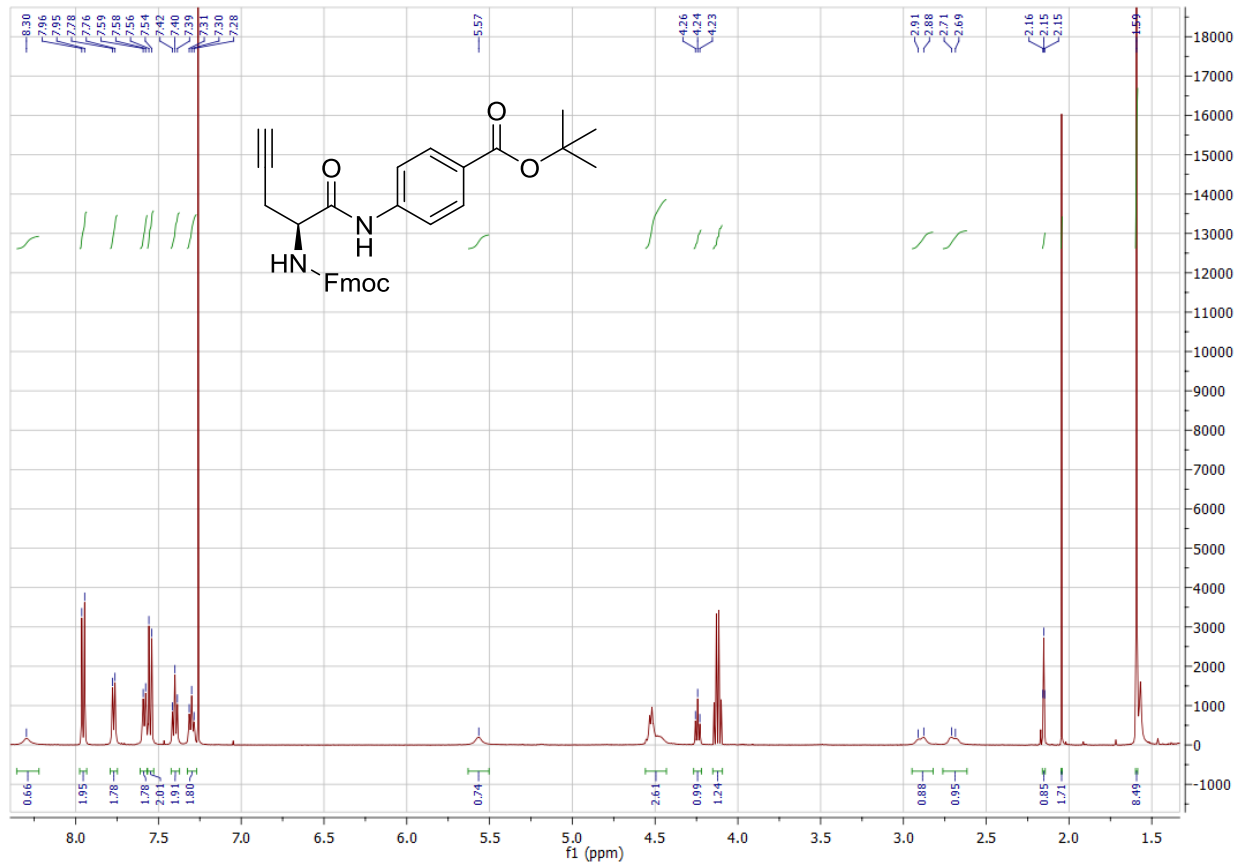
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(4-(2-aminohex-5-ynamido)benzamido)-3-isopropoxybenzamido)-benzoate**



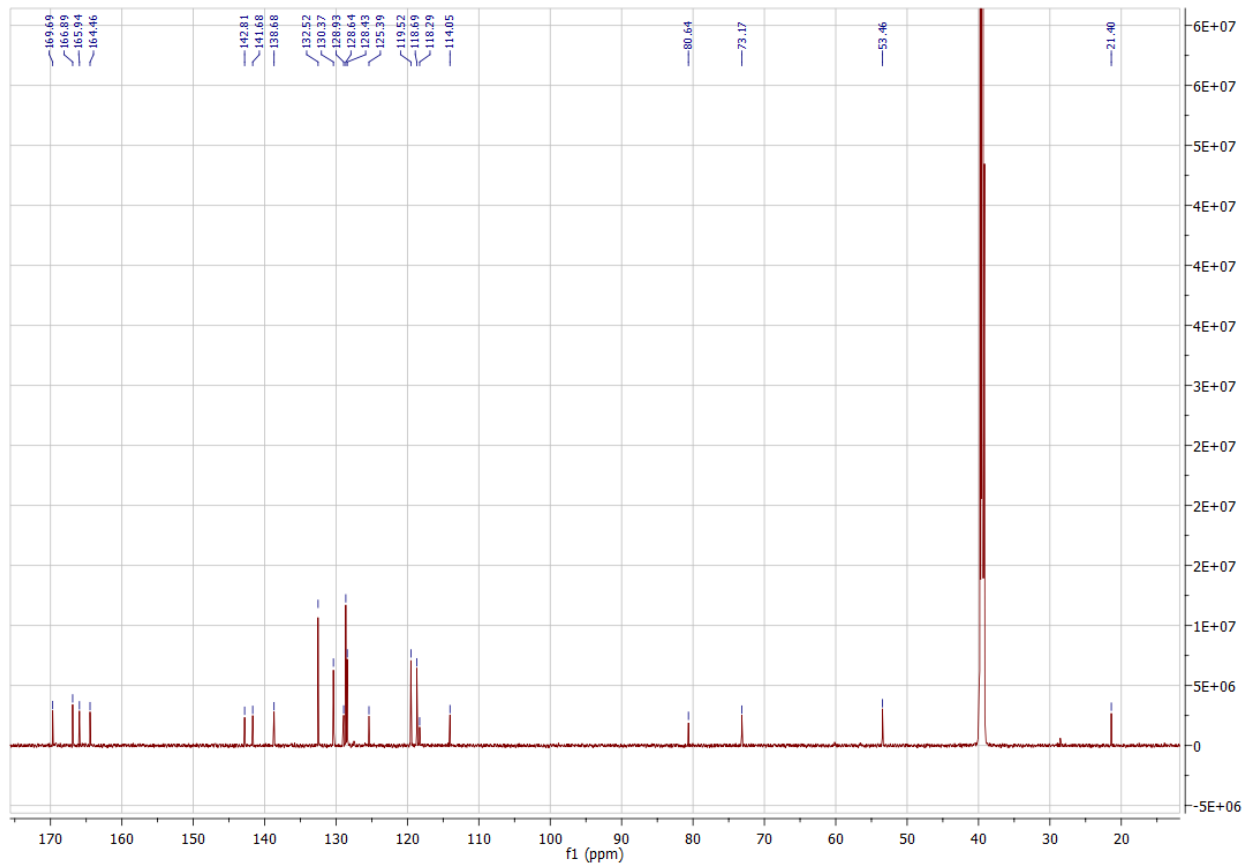
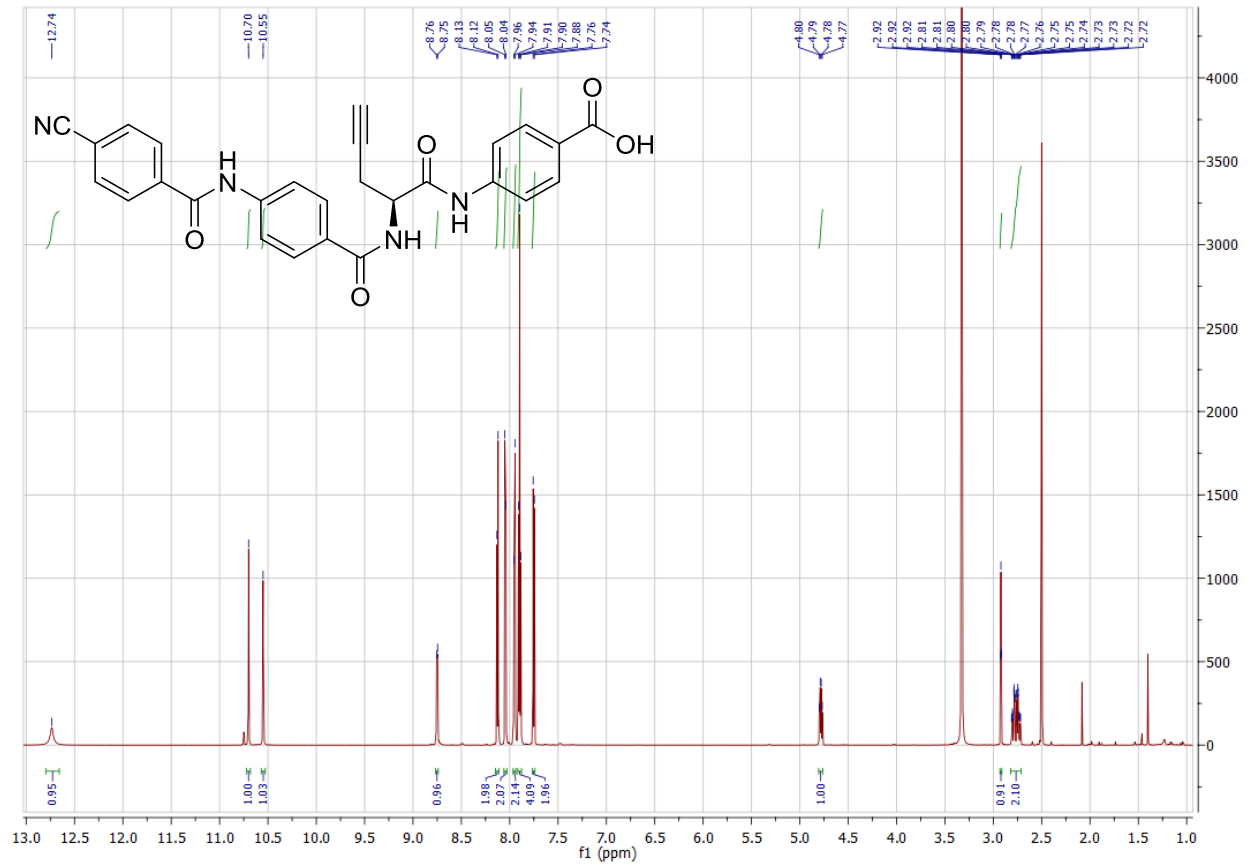
***tert*-Butyl (S)-4-(2-(allyloxy)-4-(5-(2-aminopent-4-ynamido)picolinamido)-3-isopropoxybenzamido)-benzoate (56)**



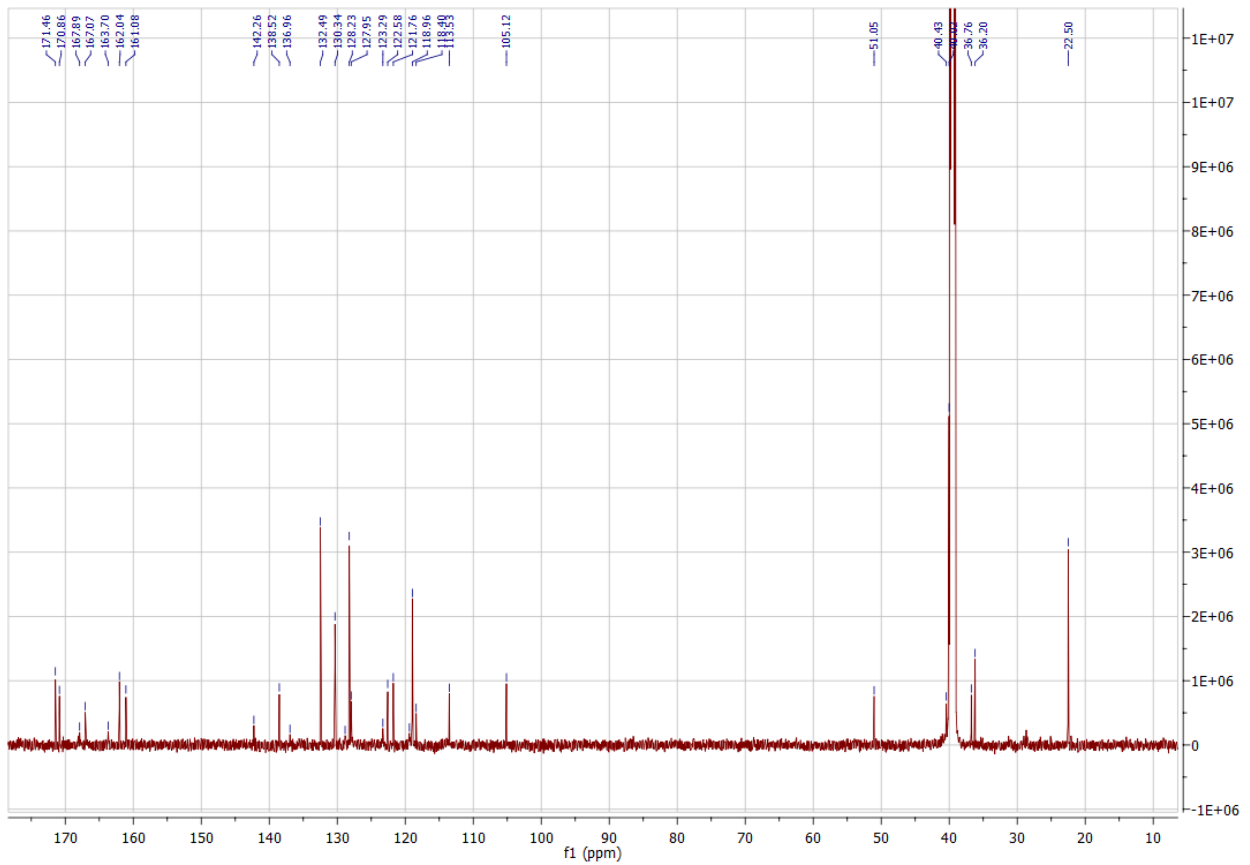
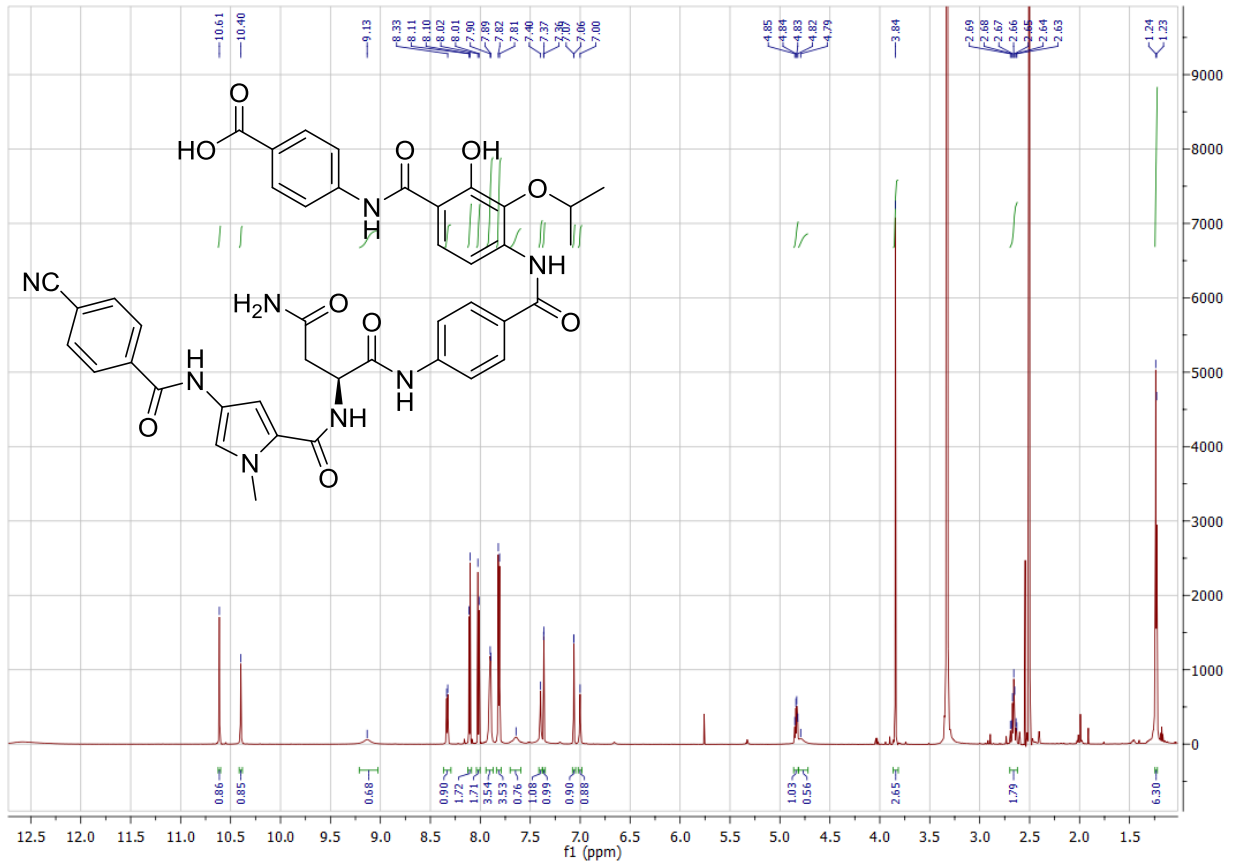
**tert-Butyl (S)-4-(2-(((9H-fluoren-9-yl)methoxy)carbonyl)amino)pent-4-ynamido)benzoate (79)**



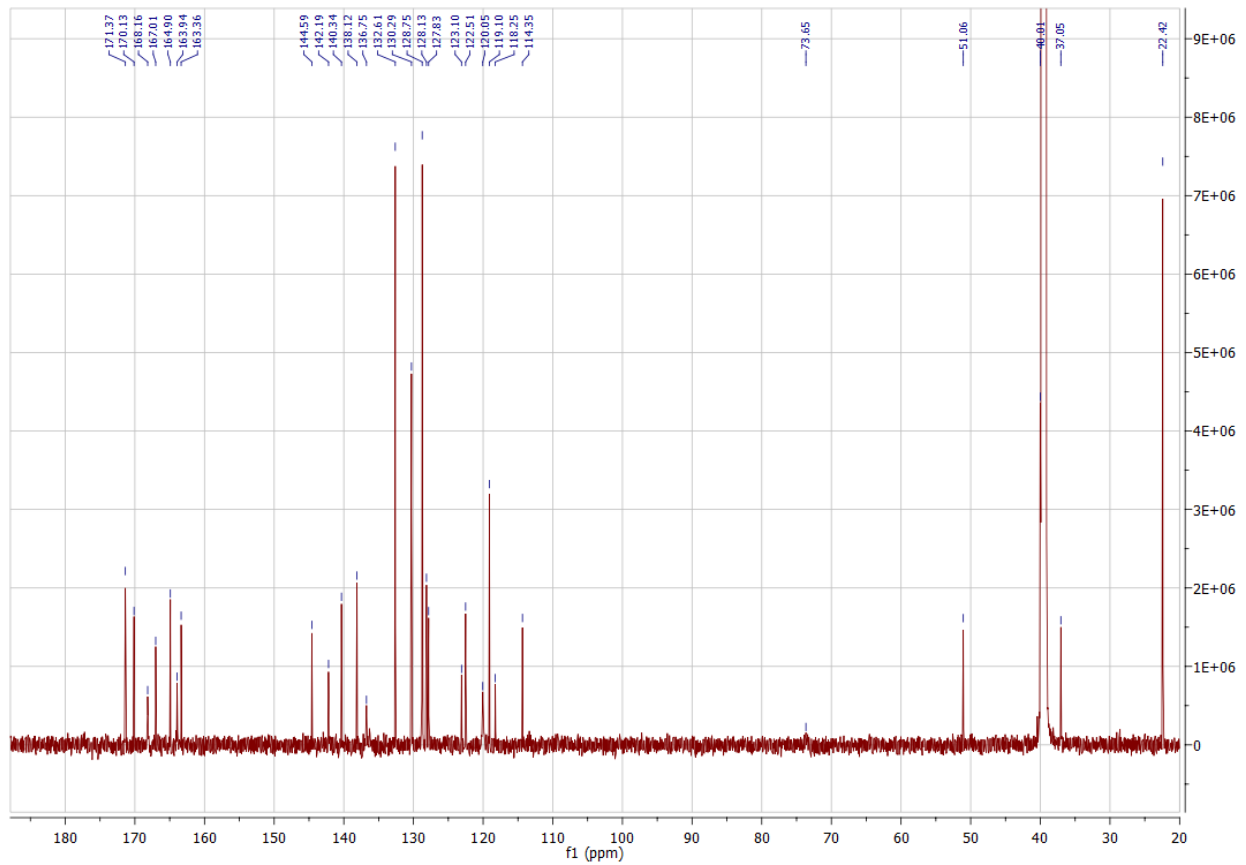
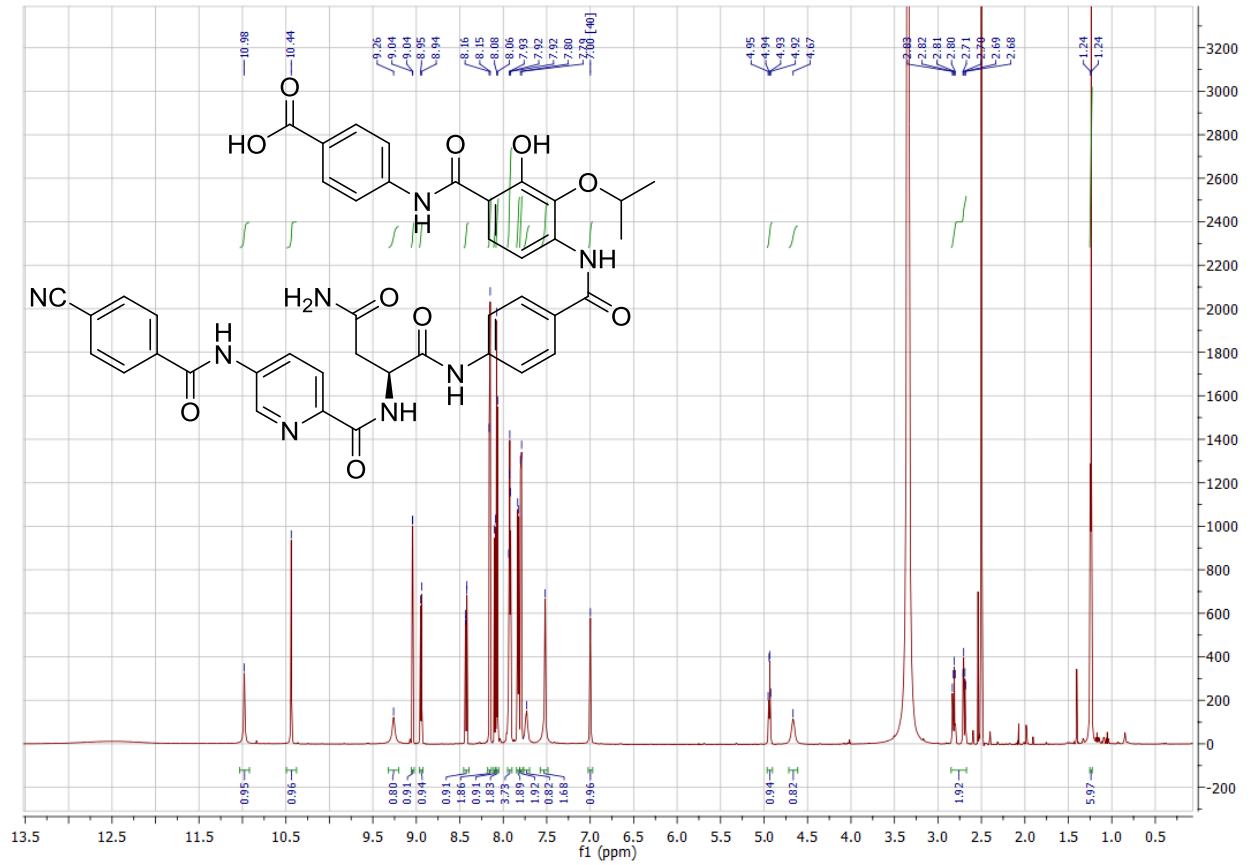
(S)-4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)benzoic acid (80)



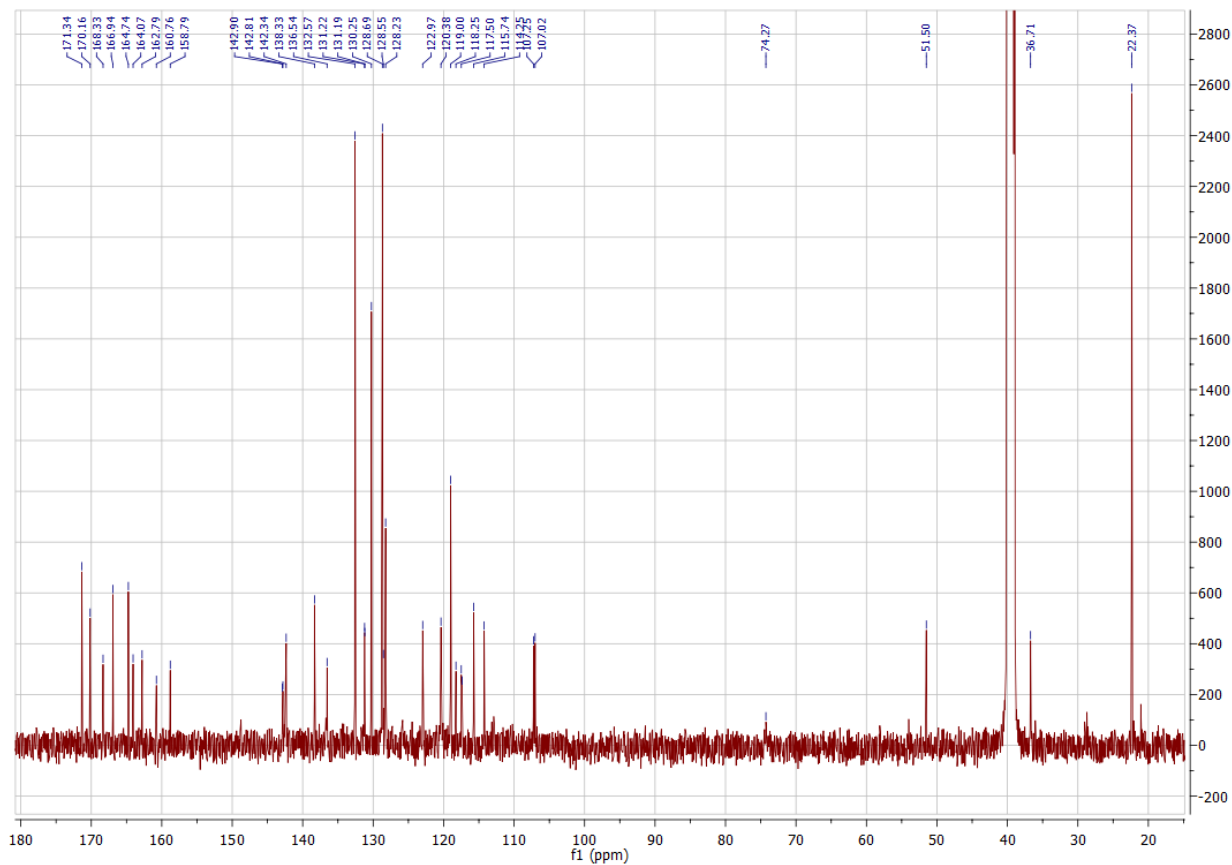
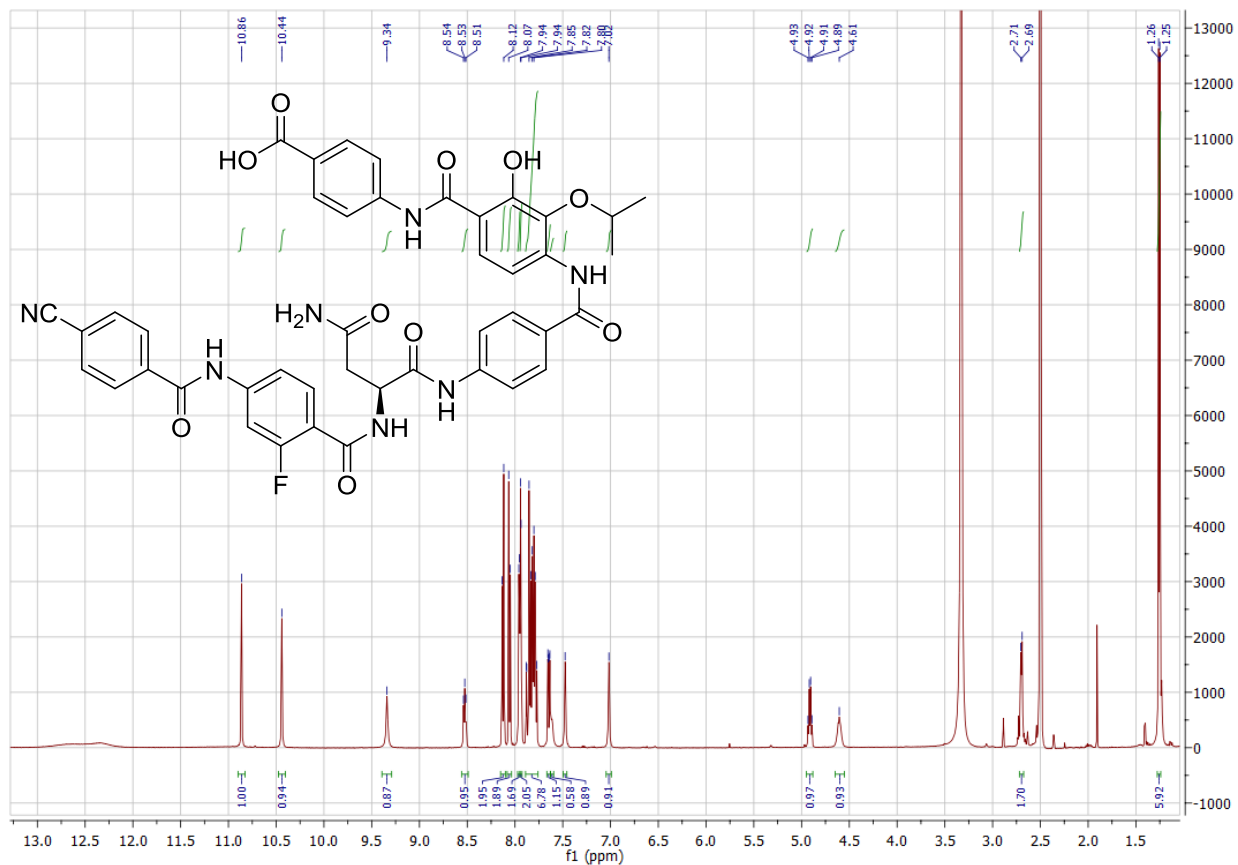
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-1-methyl-1H-pyrrol-2-carboxamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (20)**



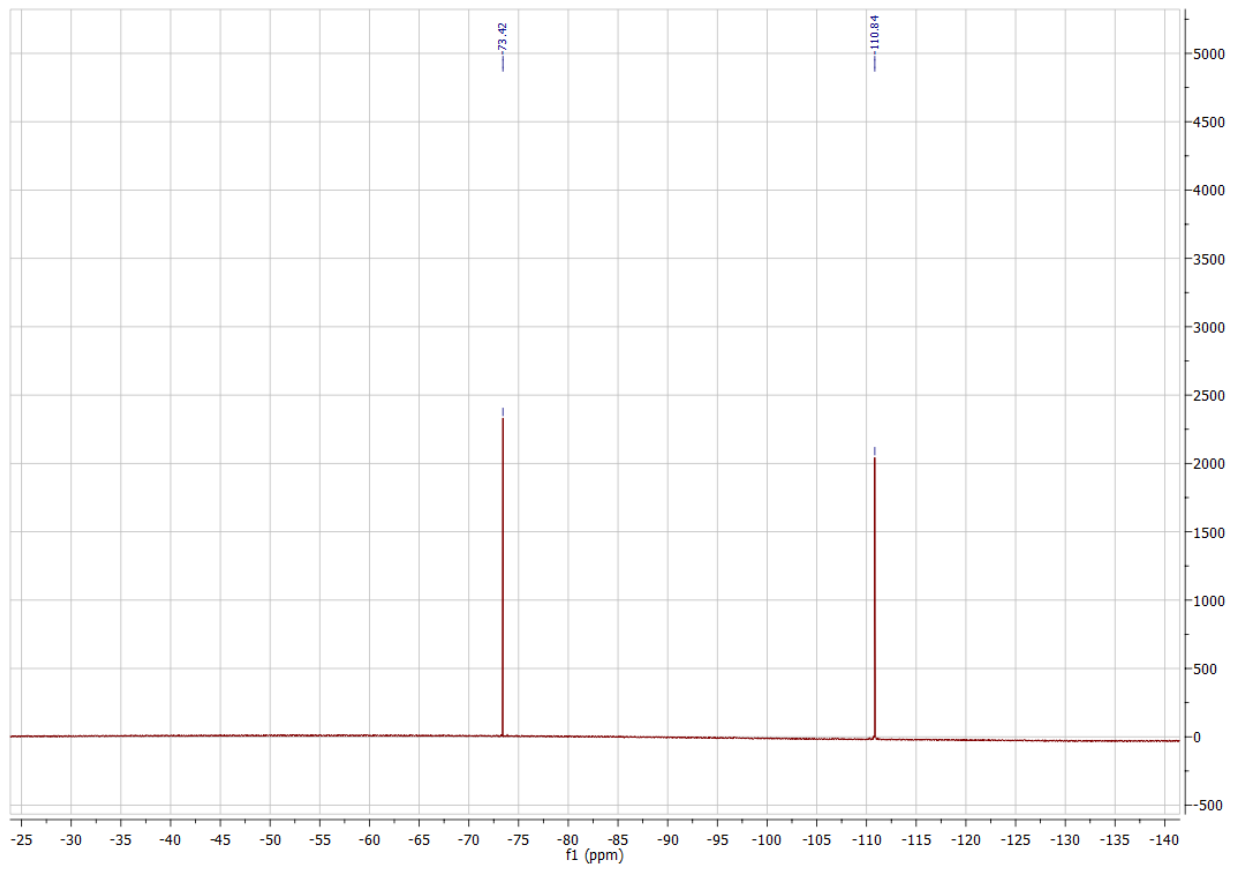
(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-picolinamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (21)



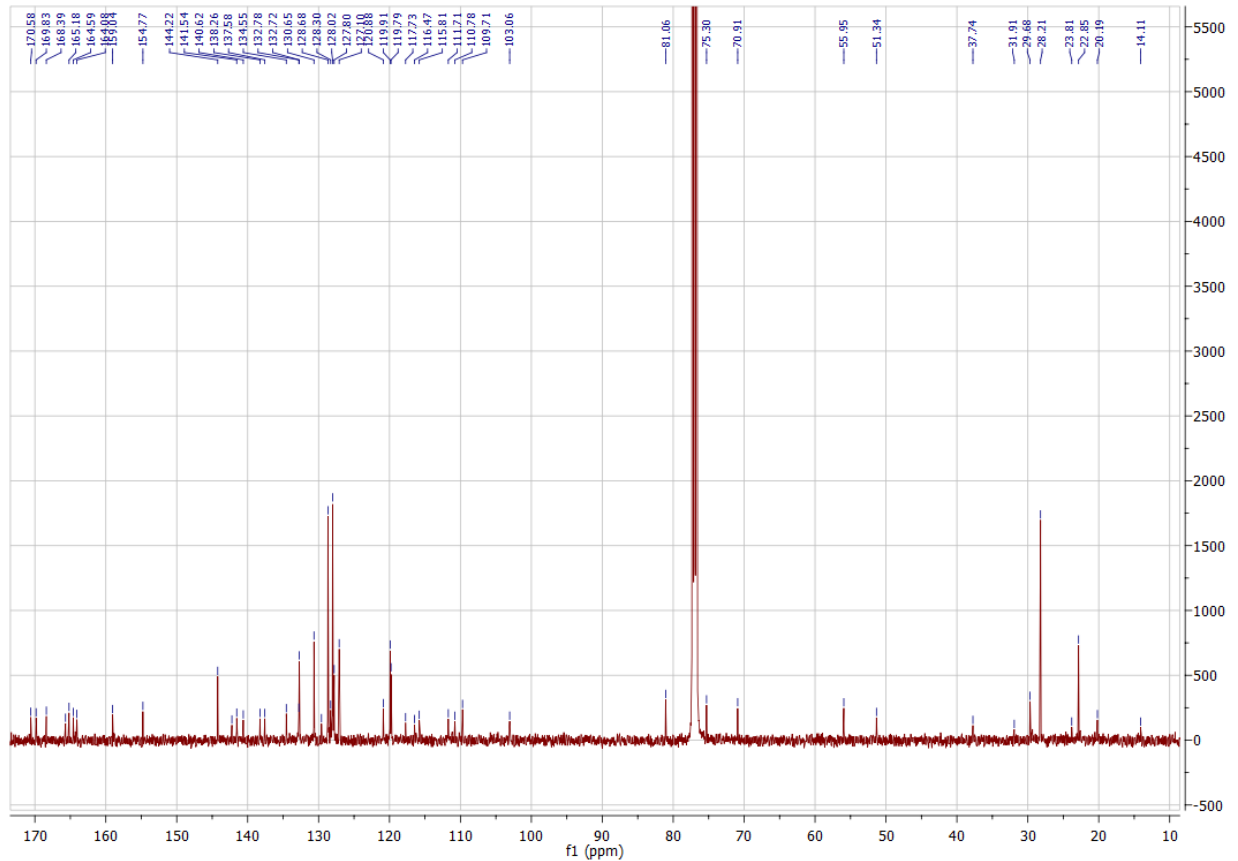
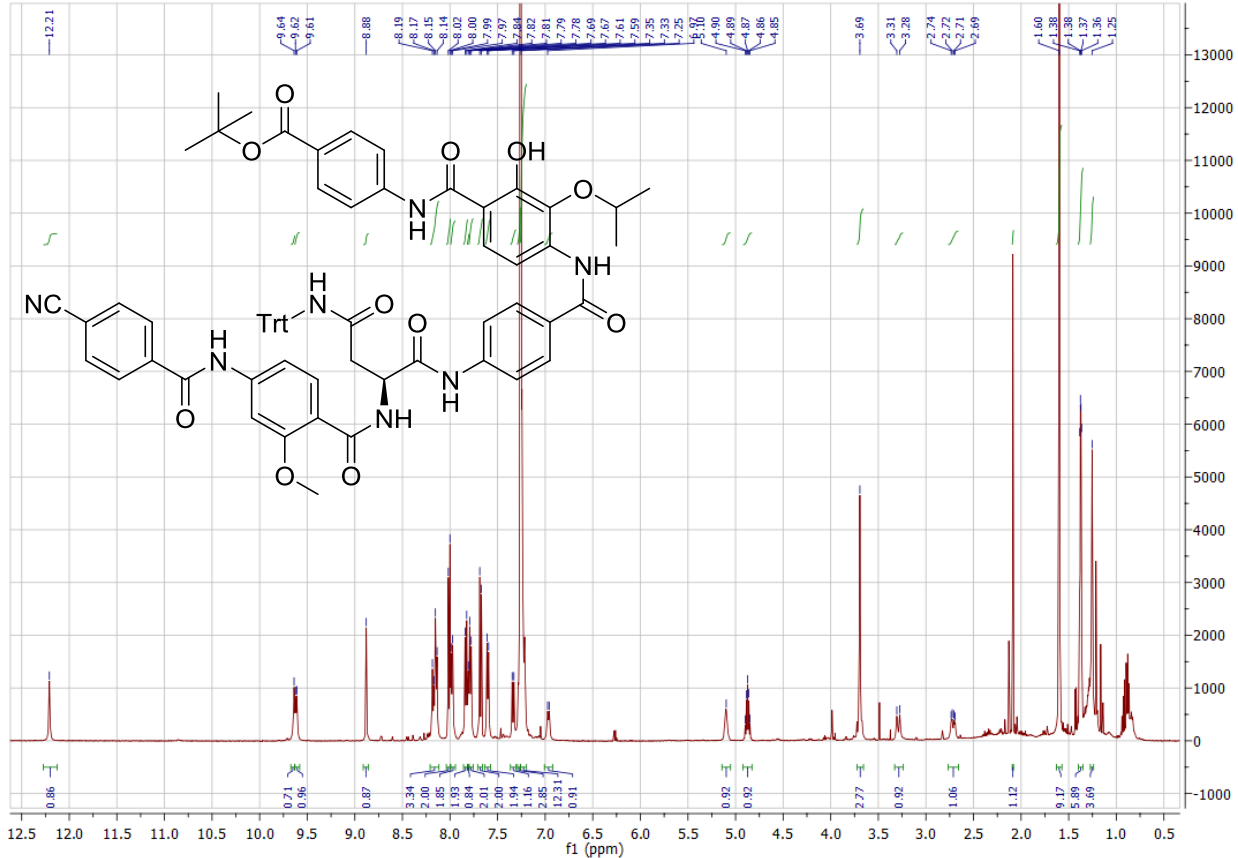
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-2-fluorobenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (22)**



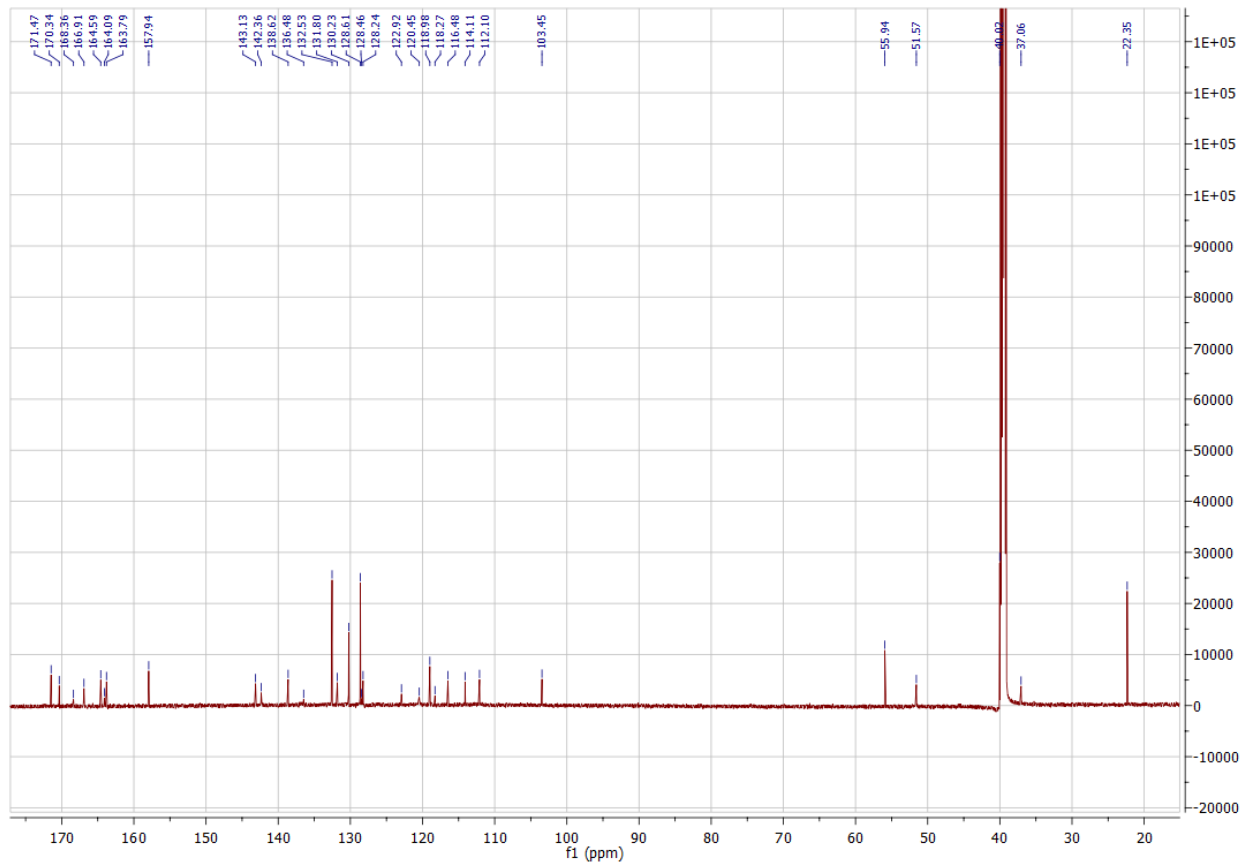
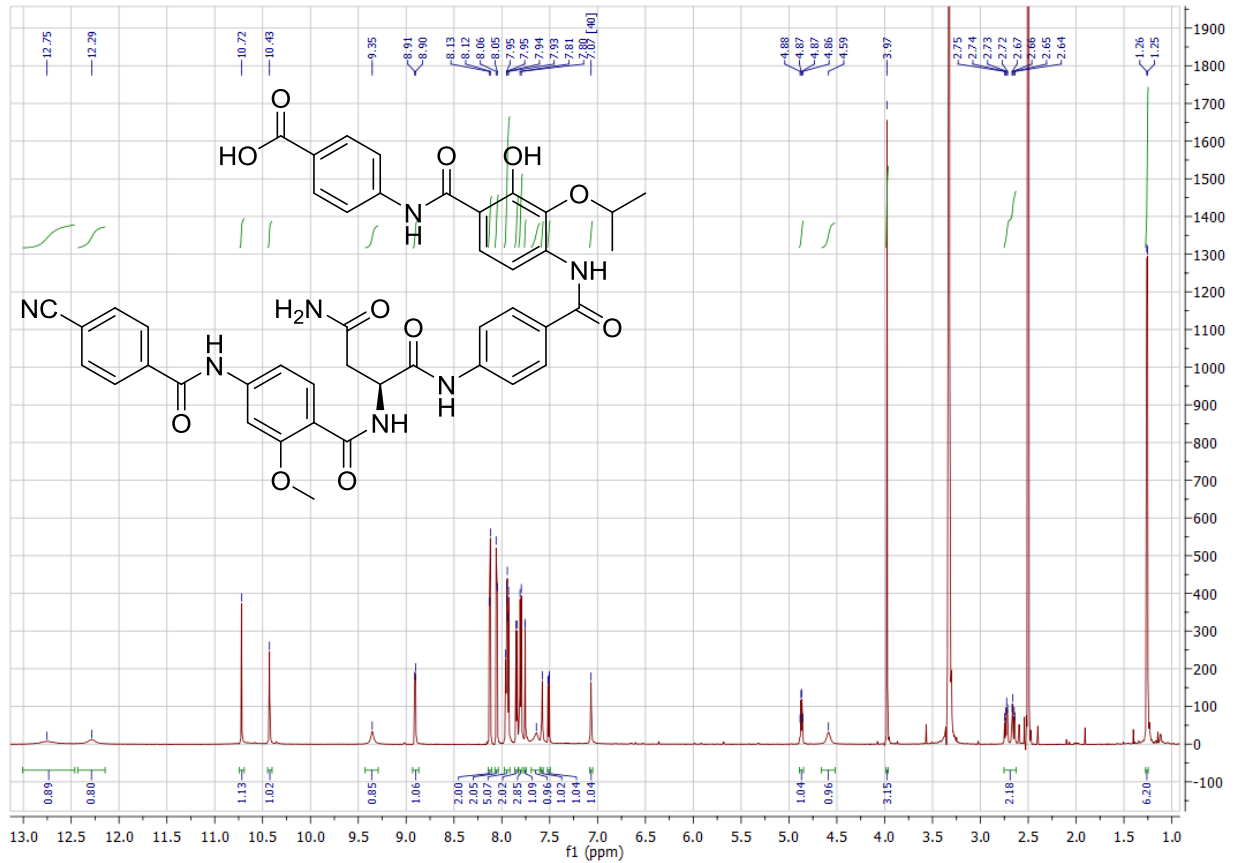




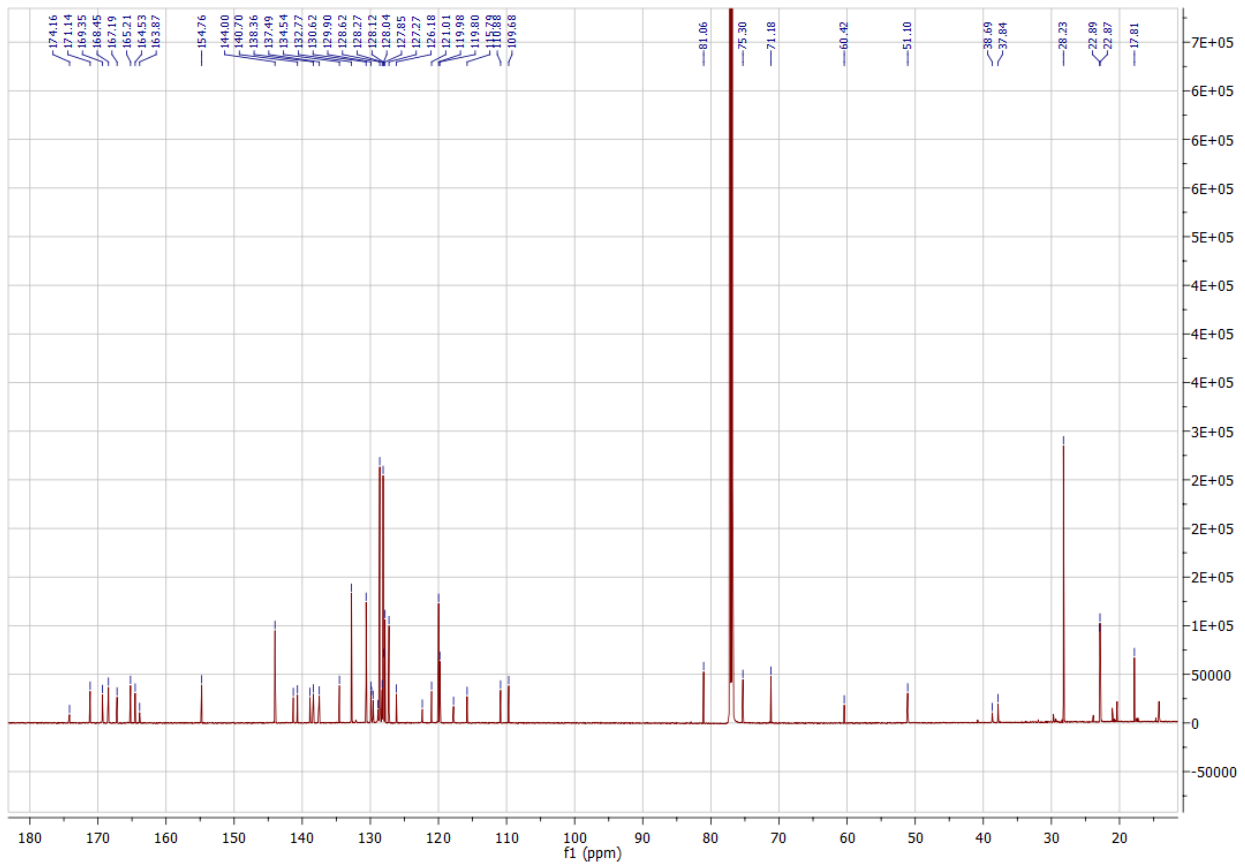
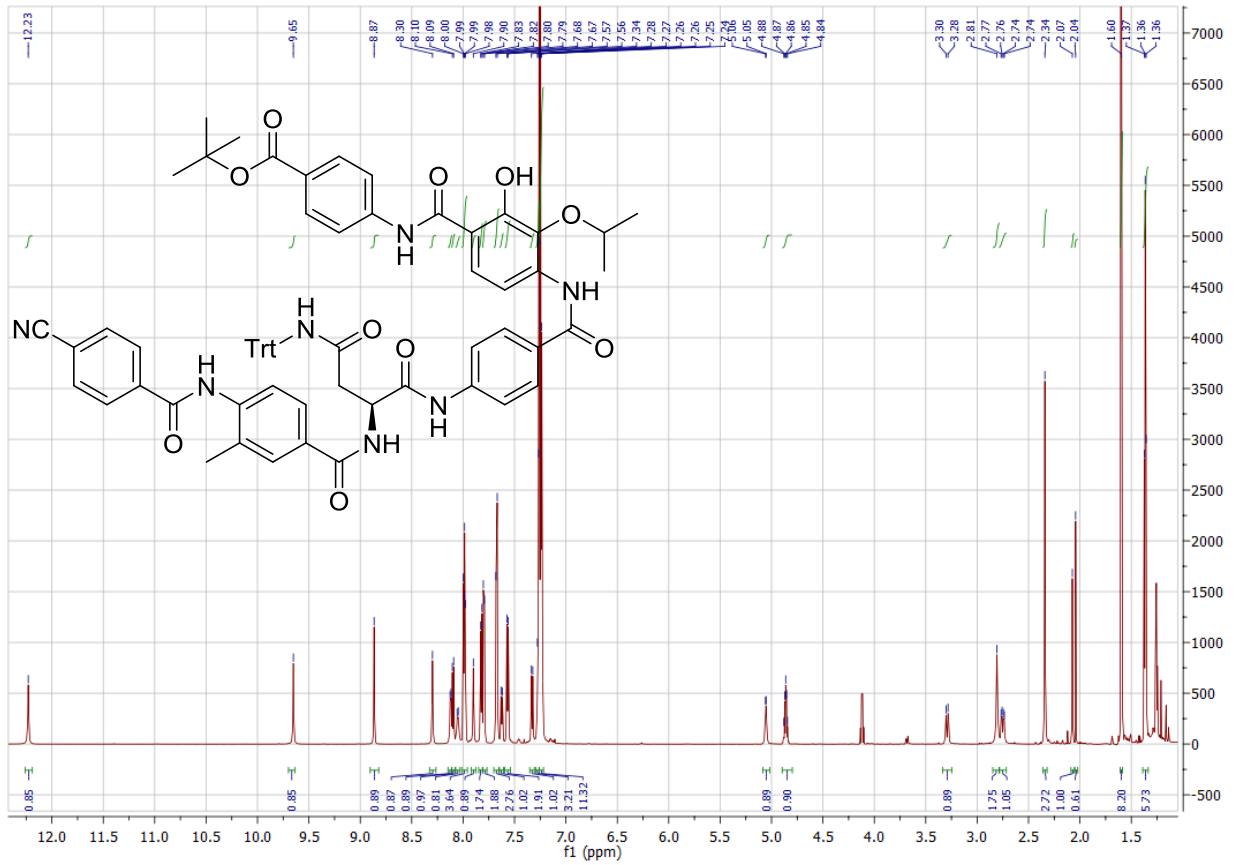
*tert*-Butyl (S)-4-(4-(4-(2-(4-(4-cyanobenzamido)-2-methoxybenzamido)-4-oxo-4-(tritylamino)-butanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoate



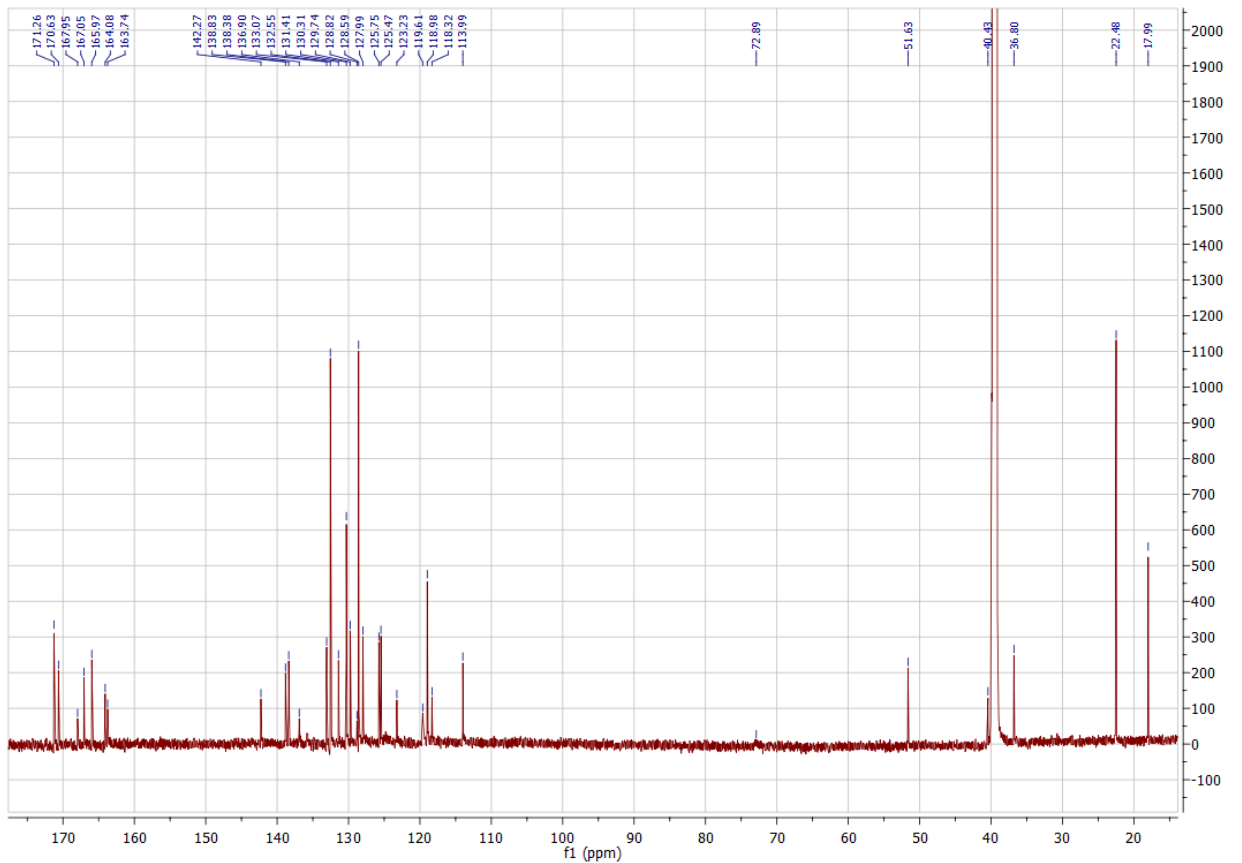
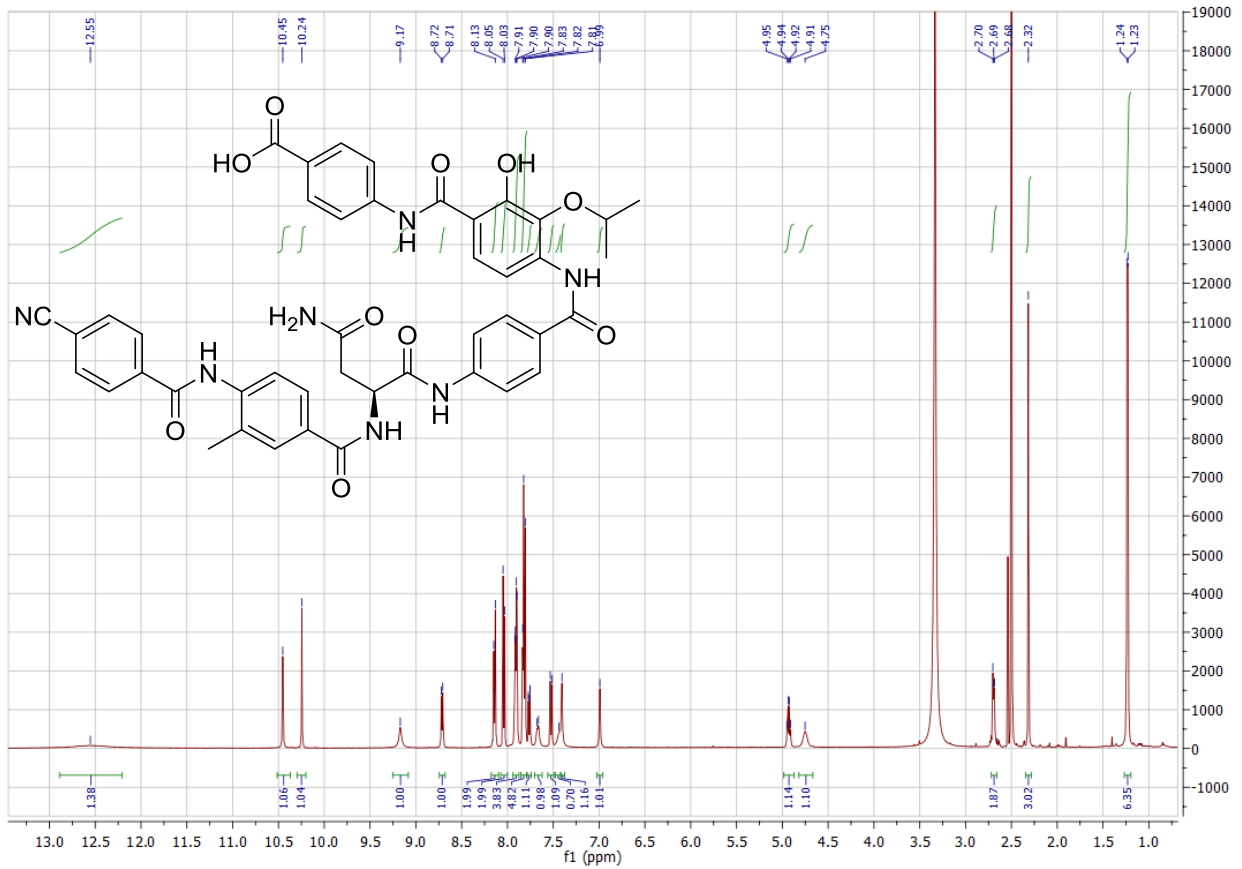
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-2-methoxybenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (23)**



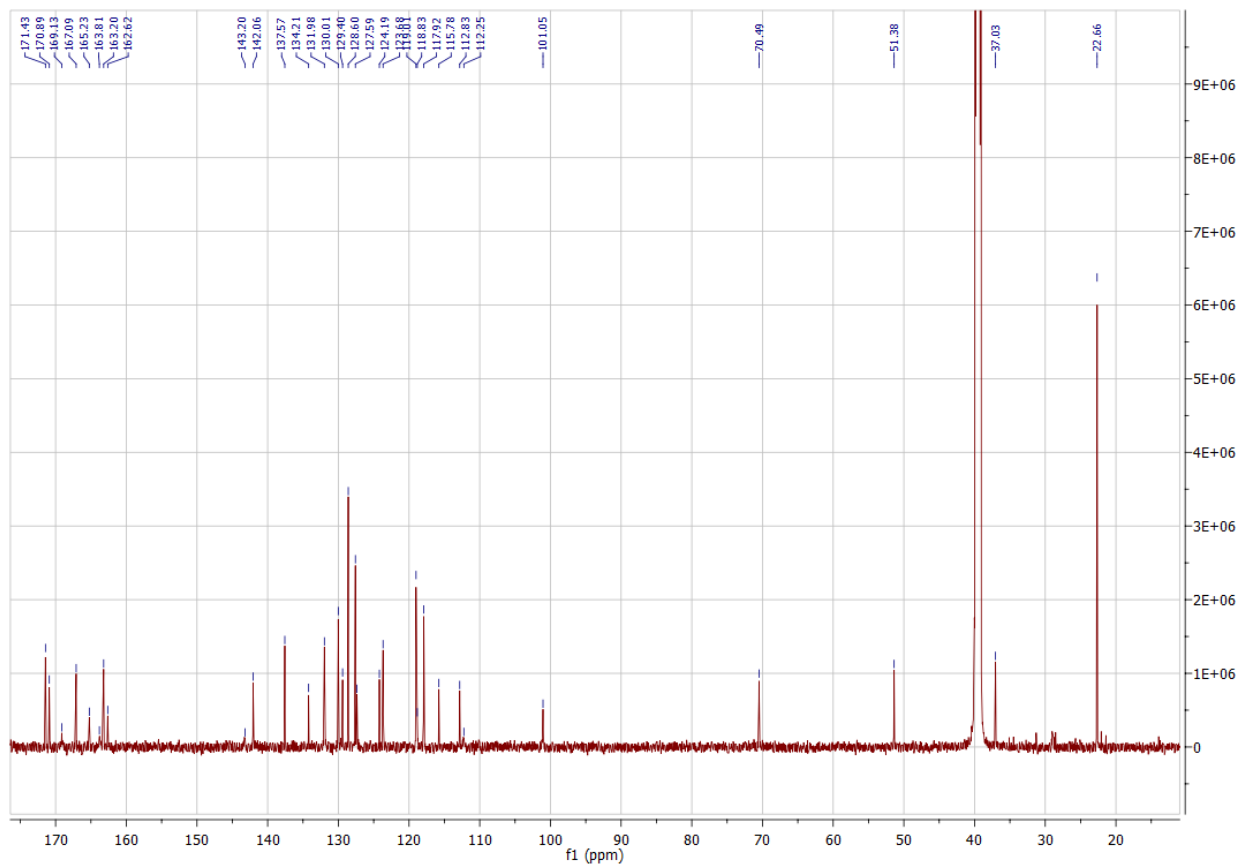
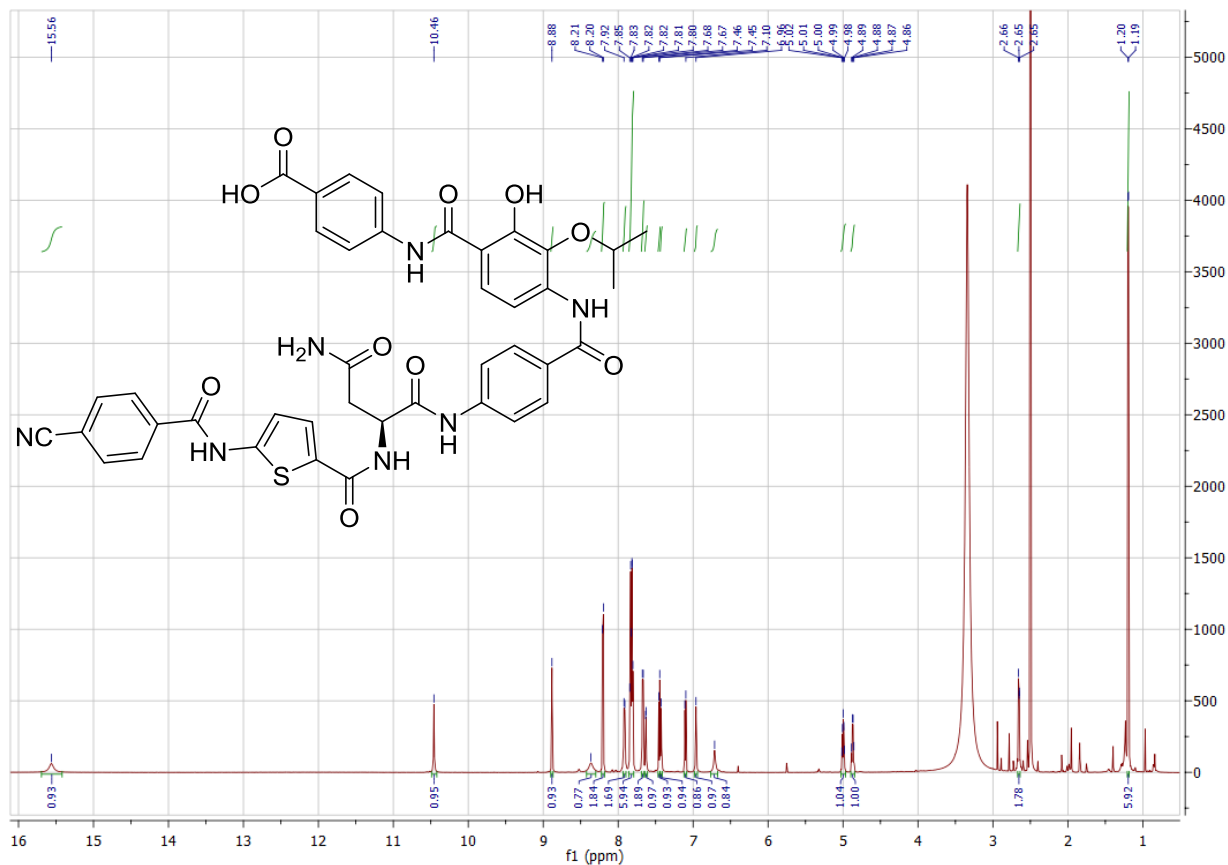
**tert-Butyl (S)-4-(4-(4-(2-(4-(4-cyanobenzamido)-3-methylbenzamido)-4-oxo-4-(tritylamino)butanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoate (19)**



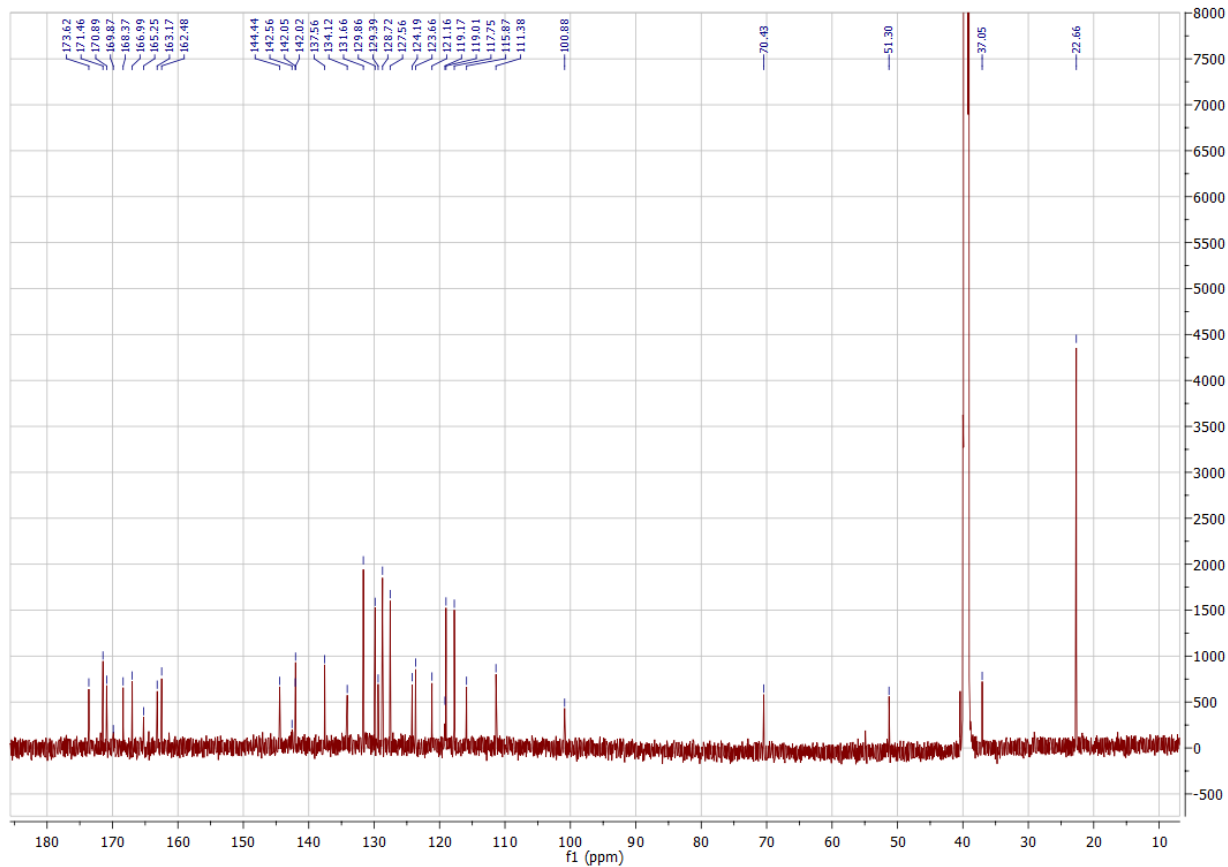
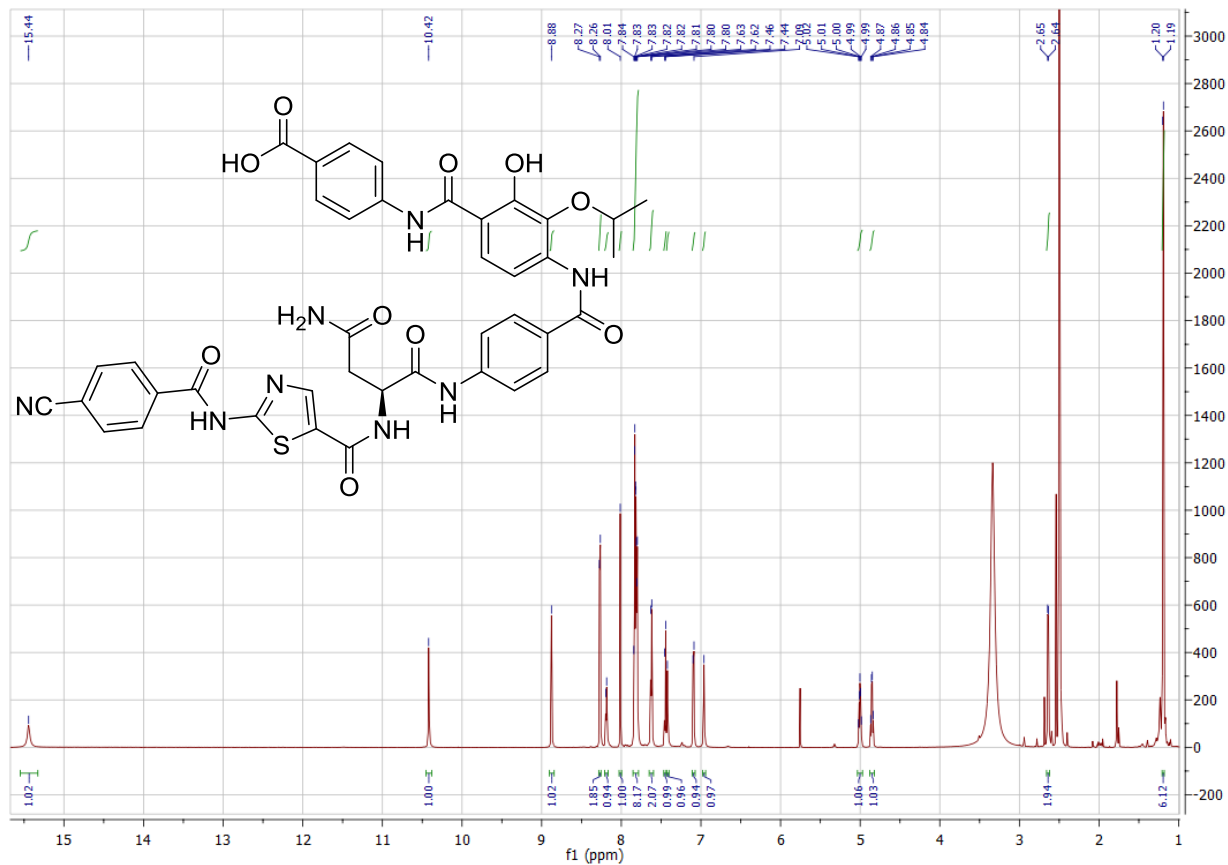
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-3-methylbenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (24)**



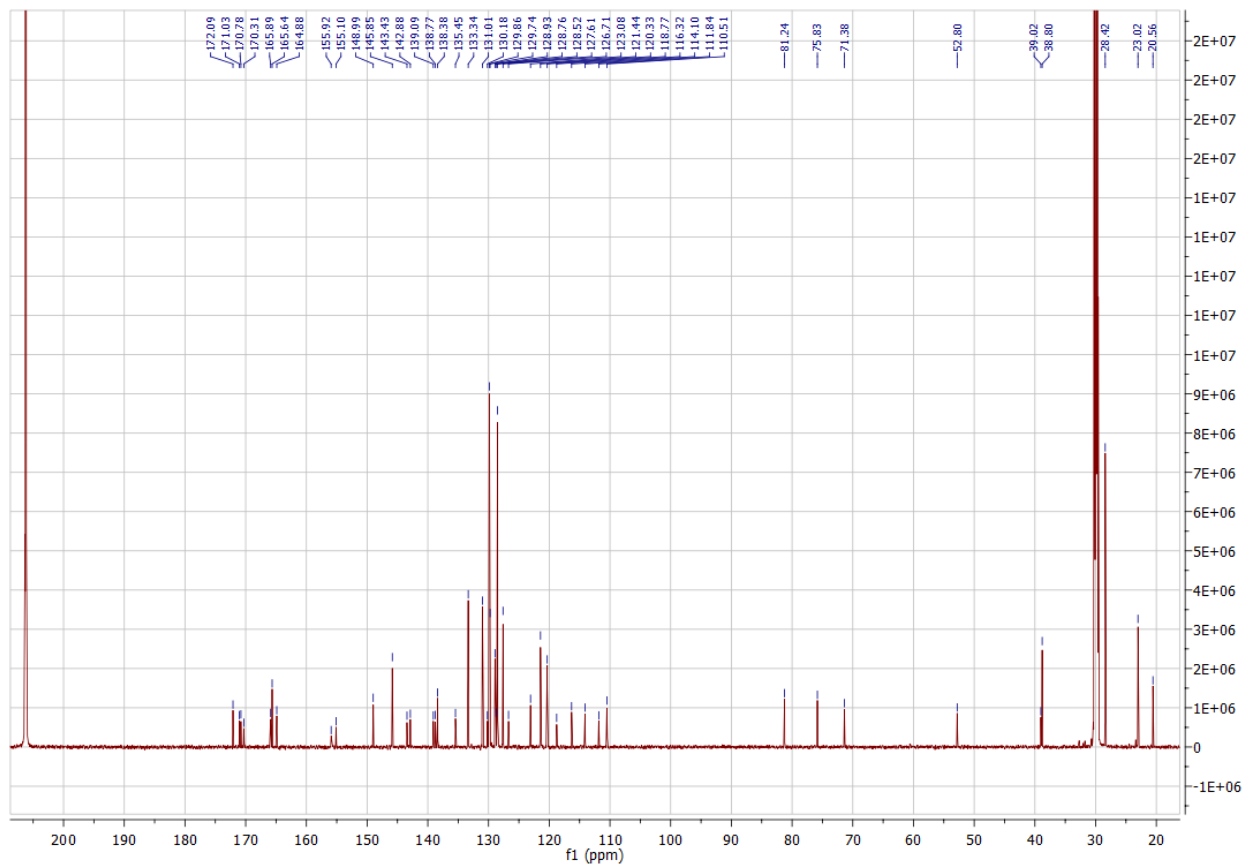
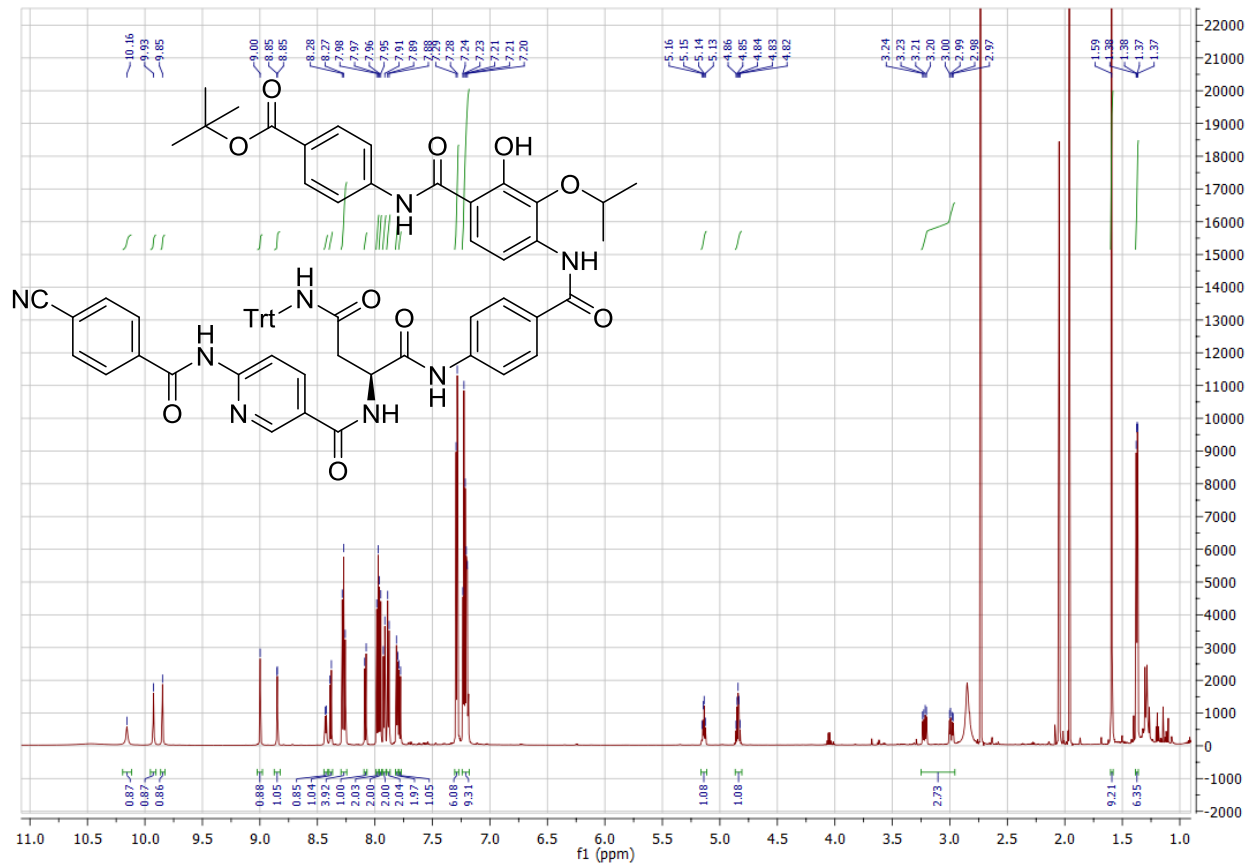
**(S)-4-(4-(4-(4-amino-2-(5-(4-cyanobenzamido)thiophene-2-carboxamido)-4-oxobutanamido)-benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (25)**



**(S)-4-(4-(4-(4-amino-2-(2-(4-cyanobenzamido)thiazole-5-carboxamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (26)**

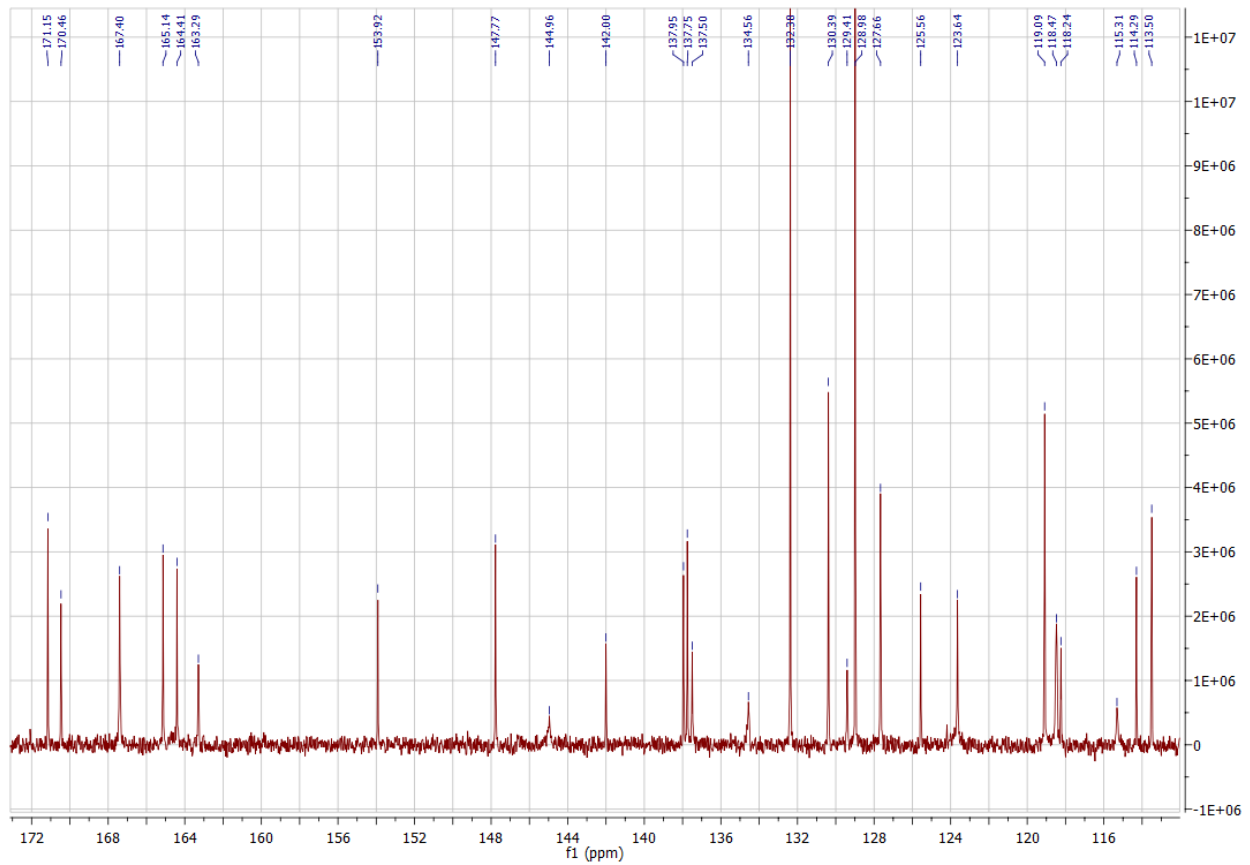
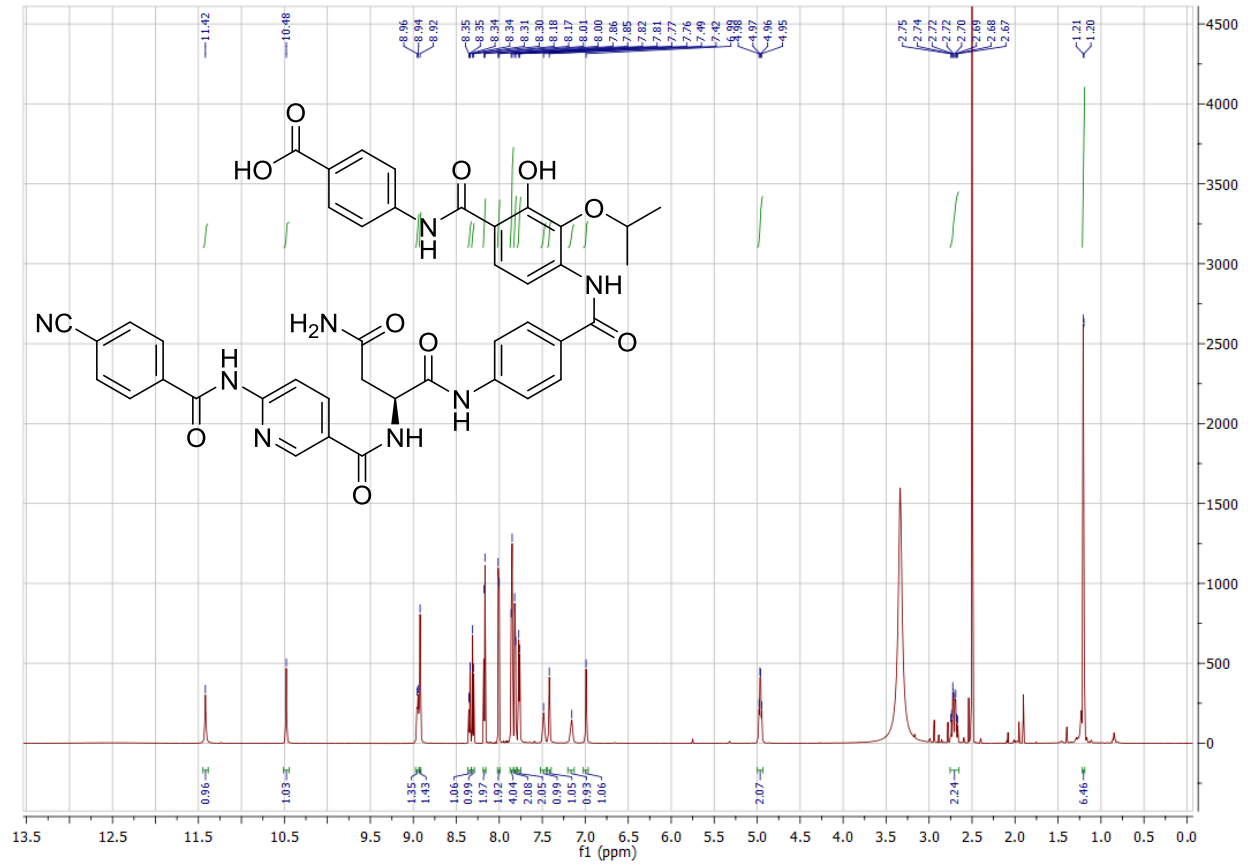


***tert*-Butyl (S)-4-(4-(4-(2-(6-(4-cyanobenzamido)-nicotinamido)-4-oxo-4-(tritylamino)butanamido)-benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoate**

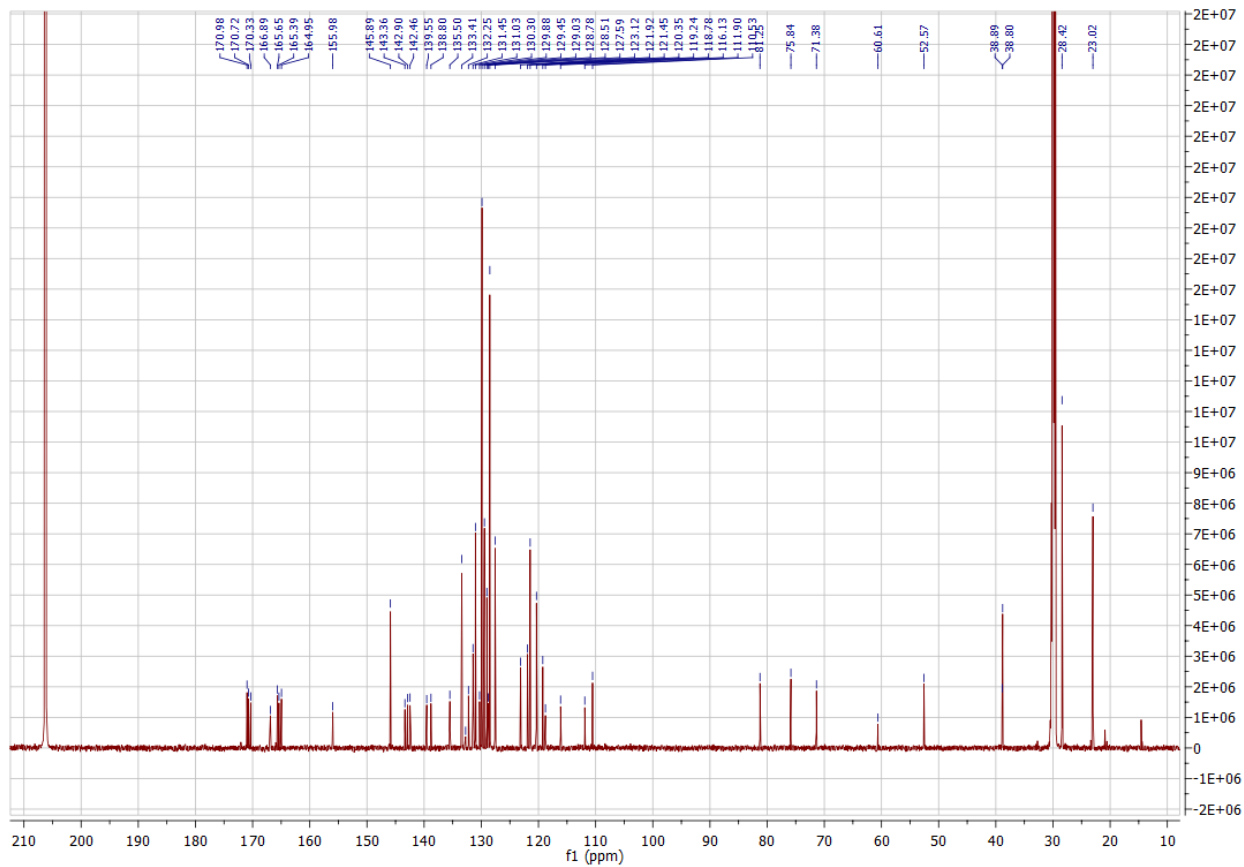
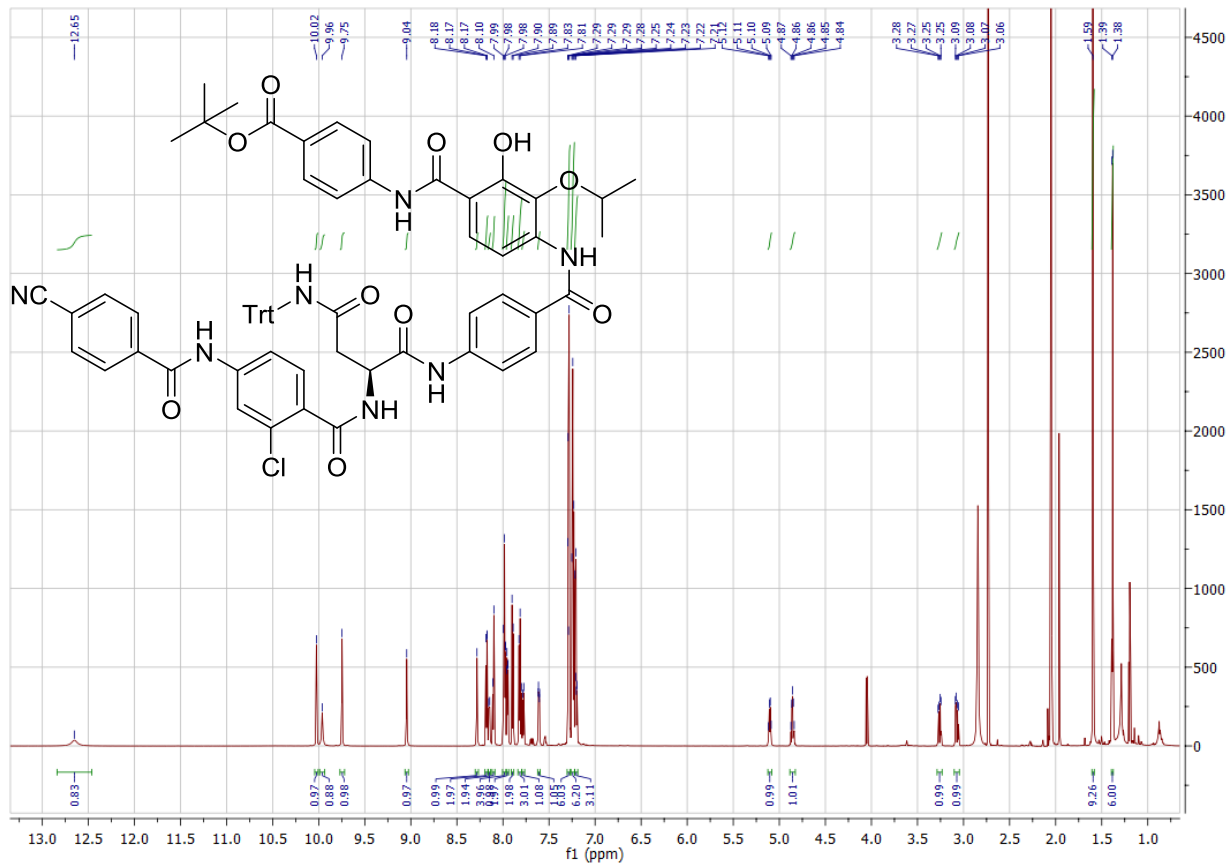




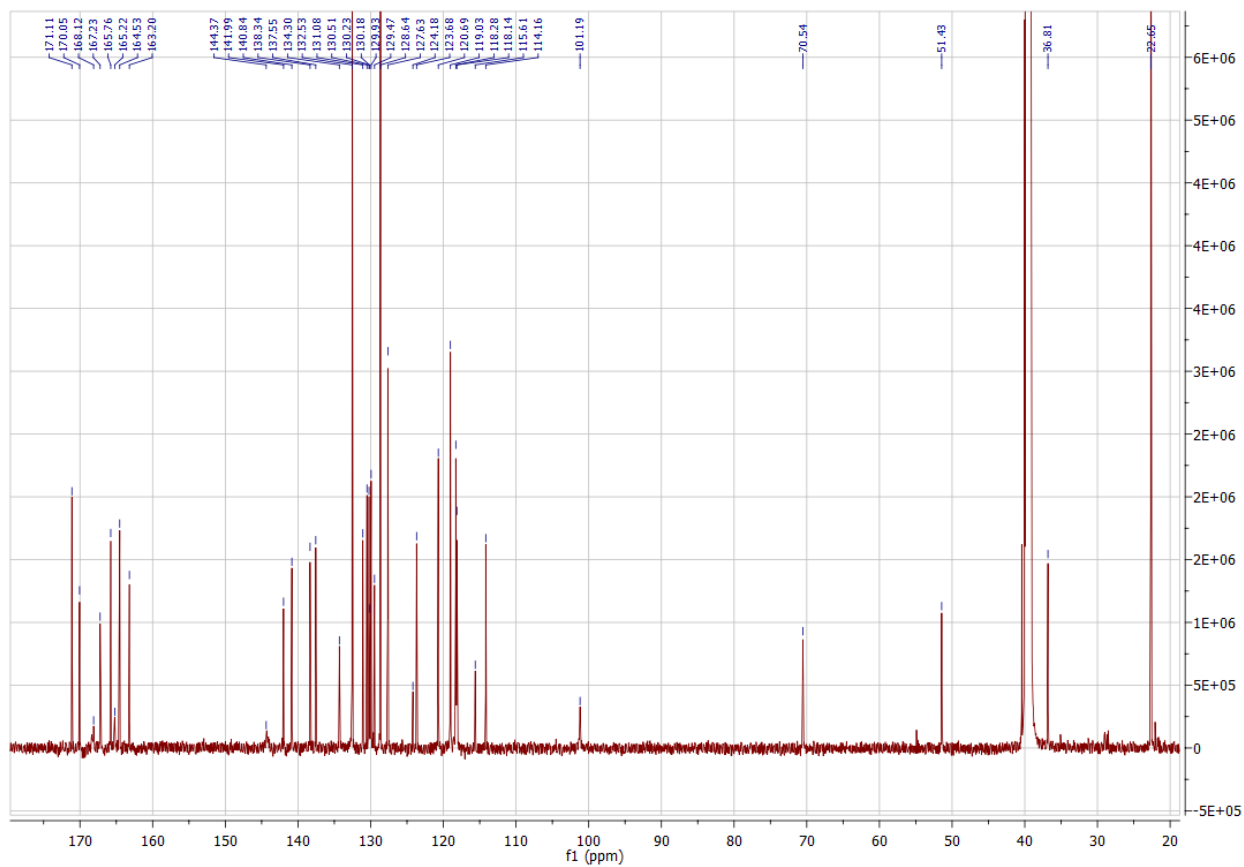
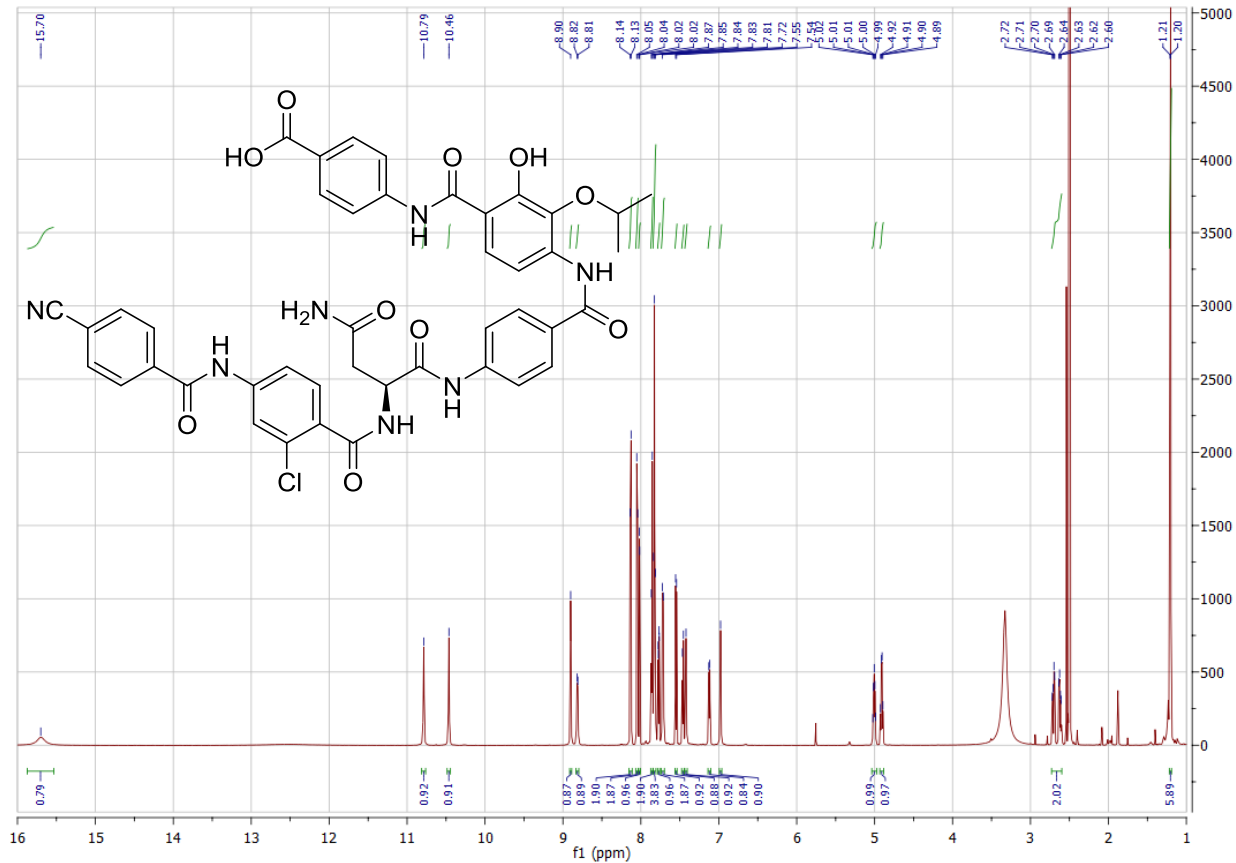
**(S)-4-(4-(4-(4-amino-2-(6-(4-cyanobenzamido)nicotinamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (27)**



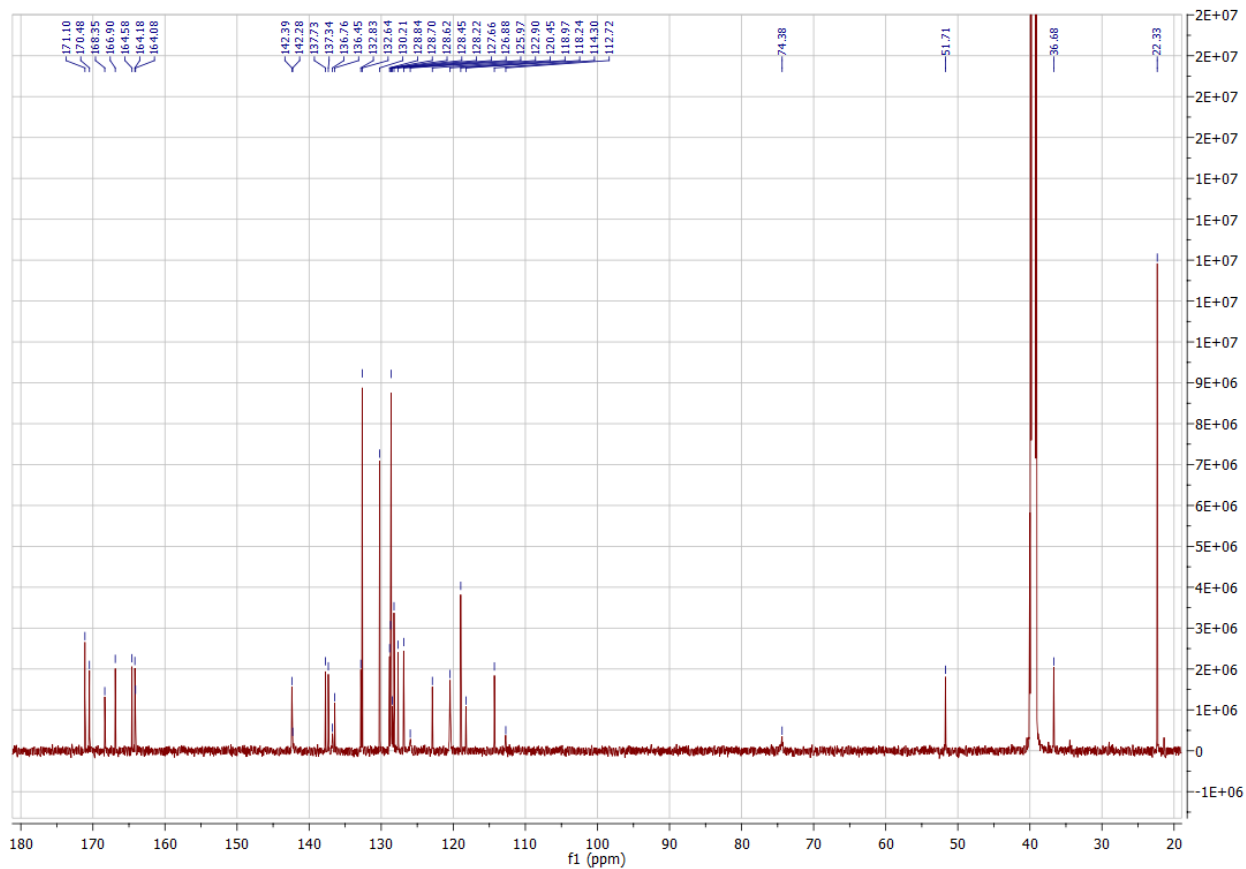
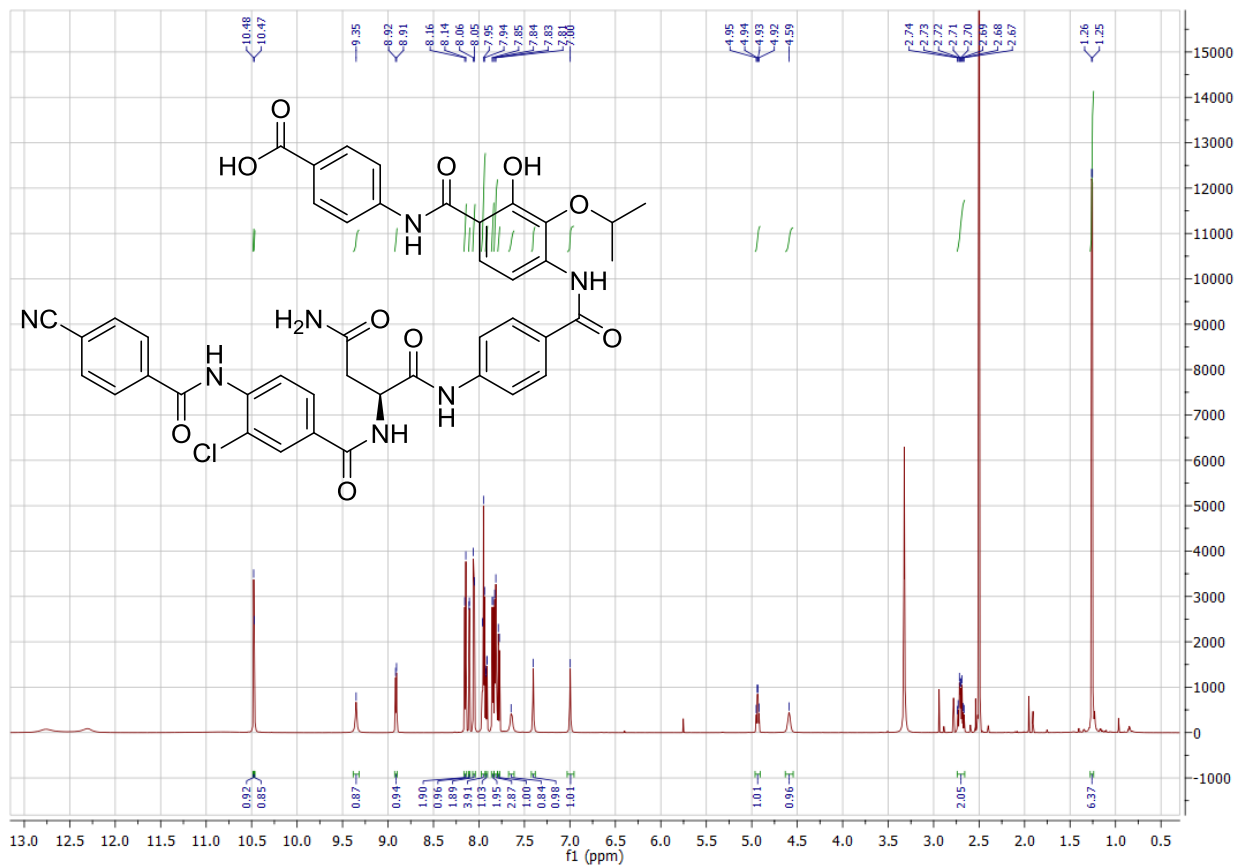
***tert*-Butyl (S)-4-(4-(4-(2-(2-chloro-4-(4-cyanobenzamido)benzamido)-4-oxo-4-(tritylamino)butanamido)-benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoate**



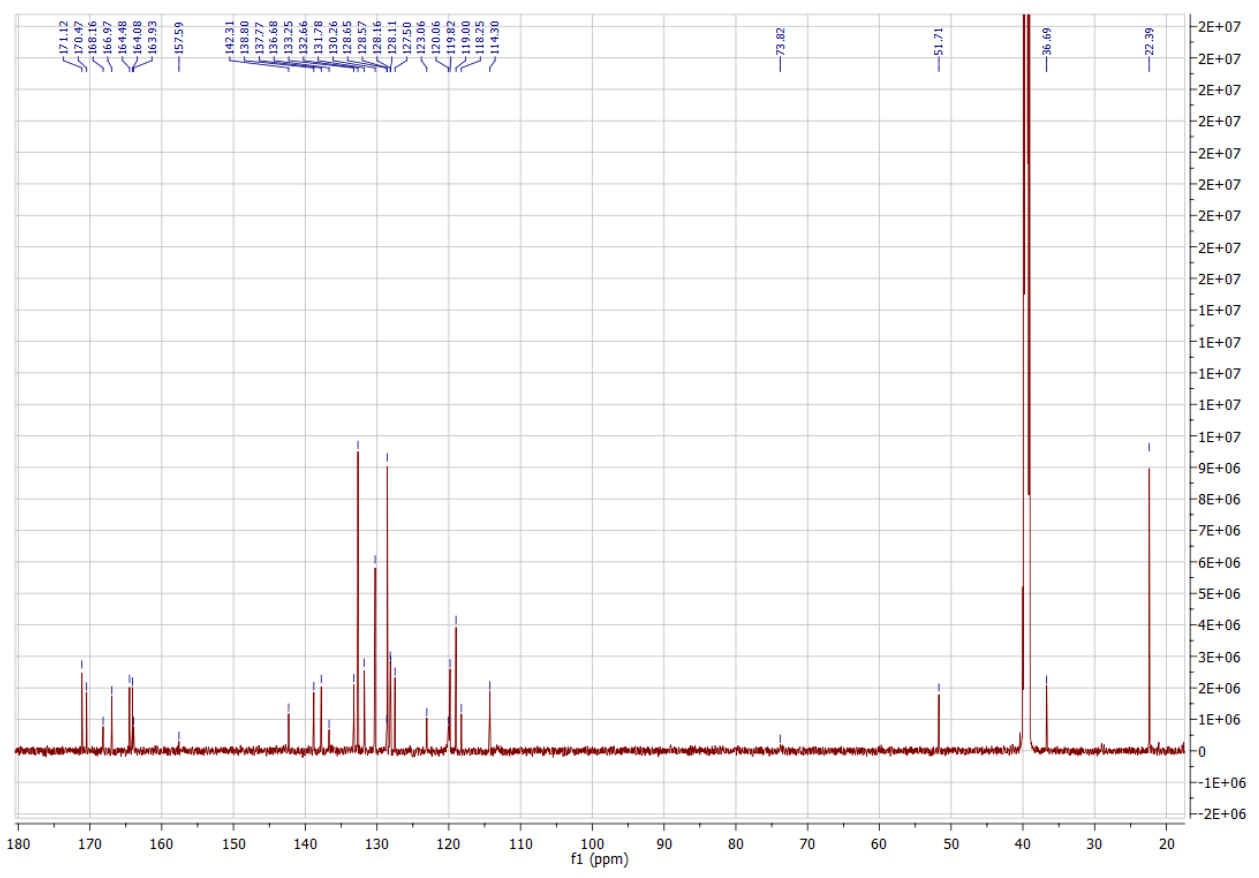
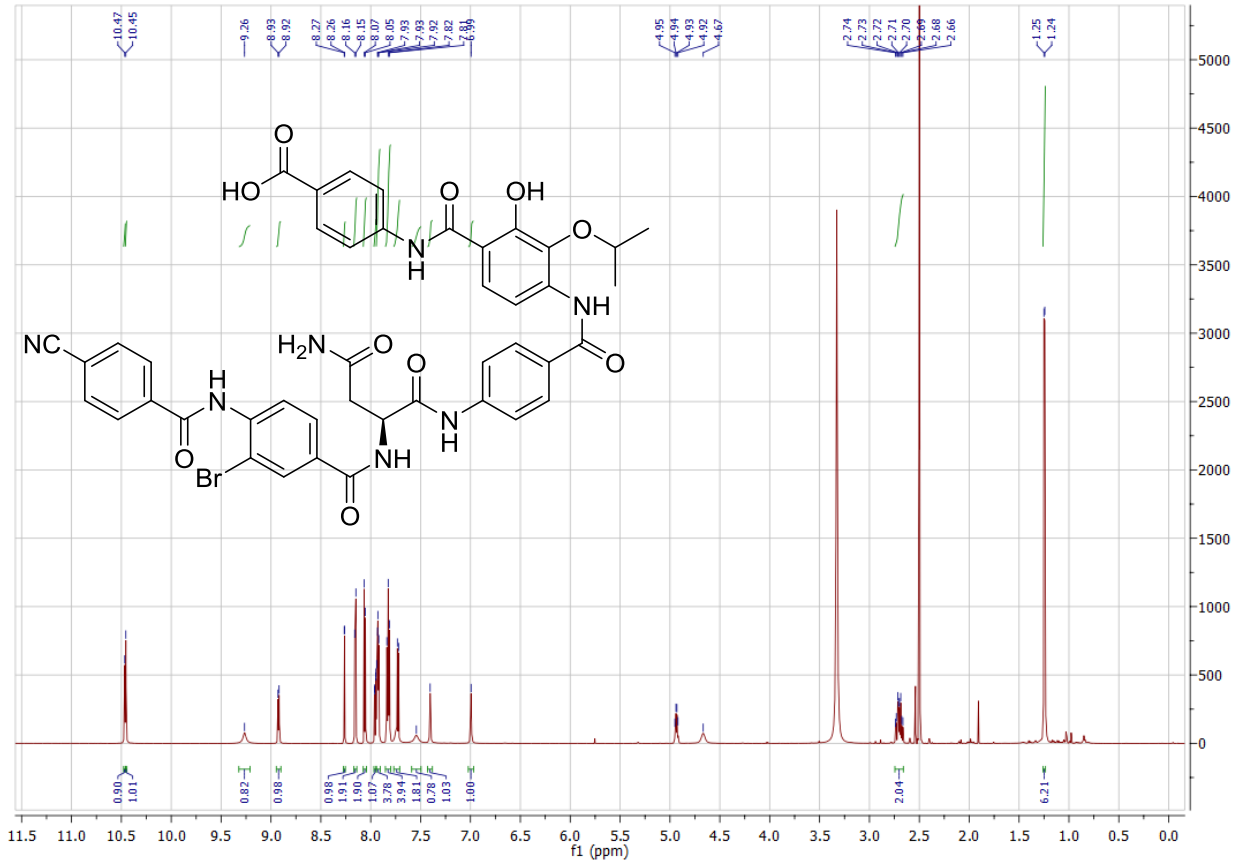
**(S)-4-(4-(4-(4-amino-2-(2-chloro-4-(4-cyanobenzamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (28)**



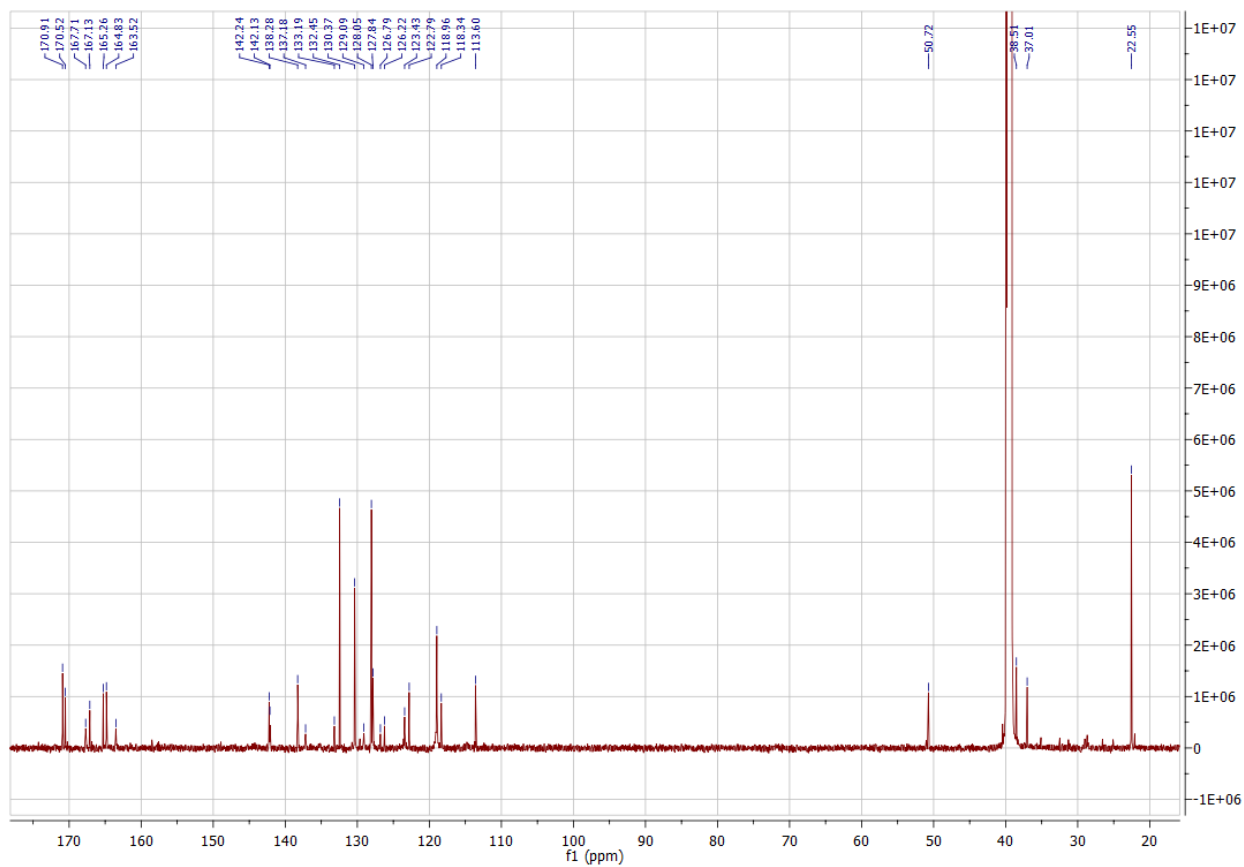
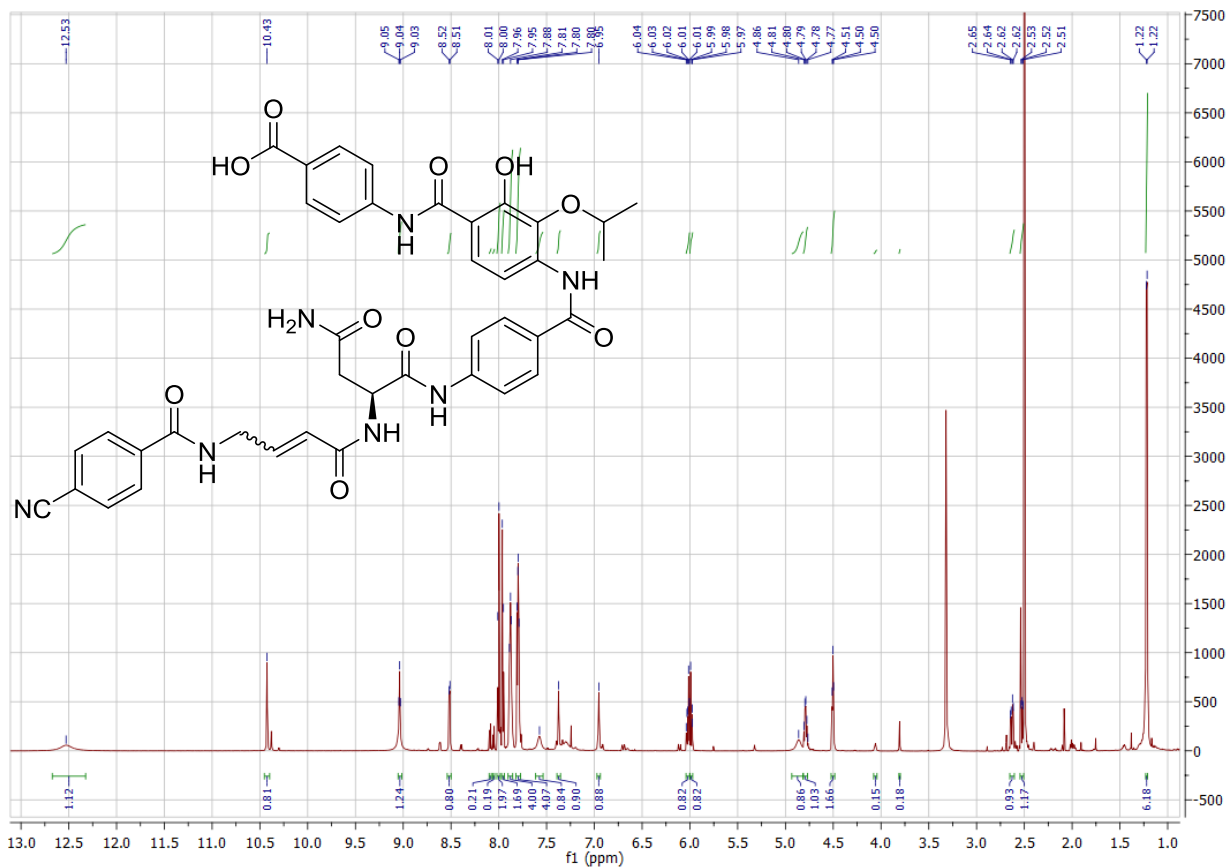
**(S)-4-(4-(4-(4-amino-2-(3-chloro-4-(4-cyanobenzamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (29)**



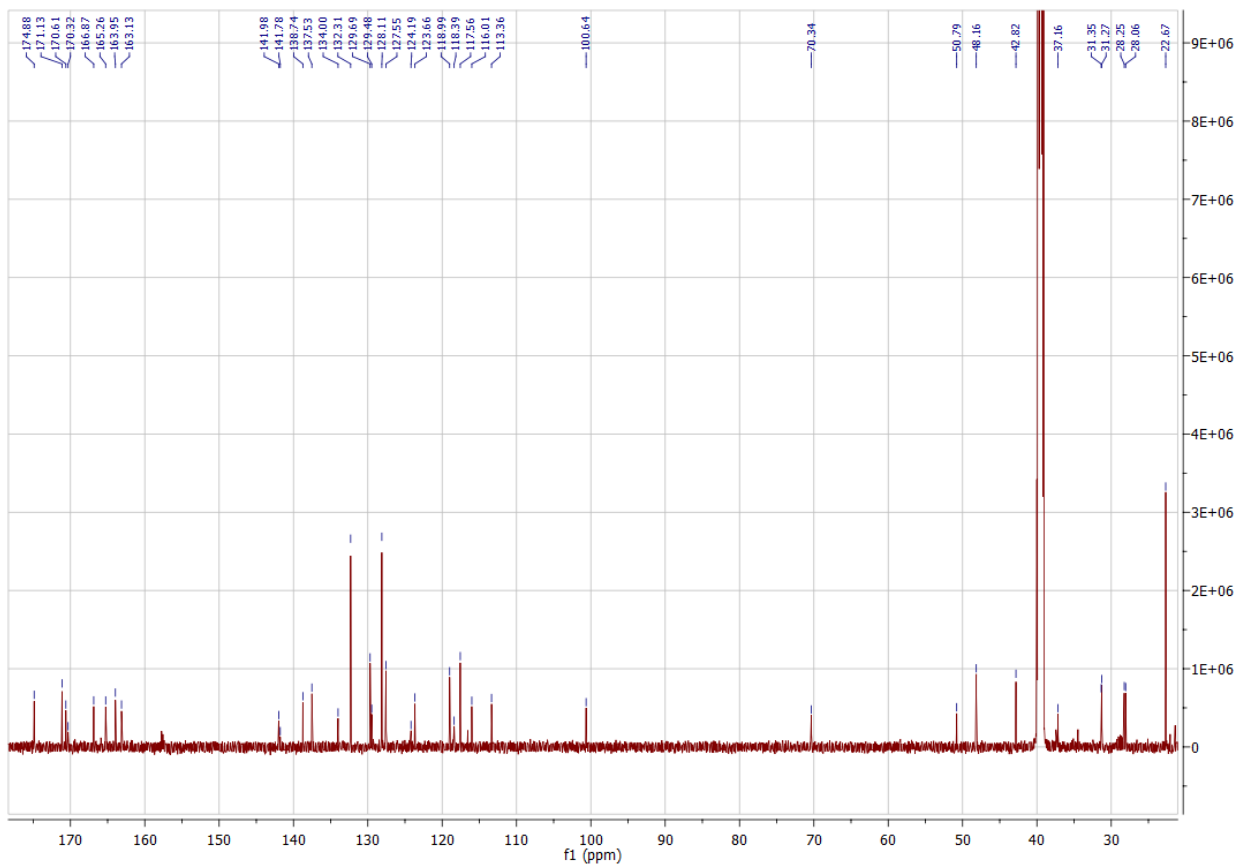
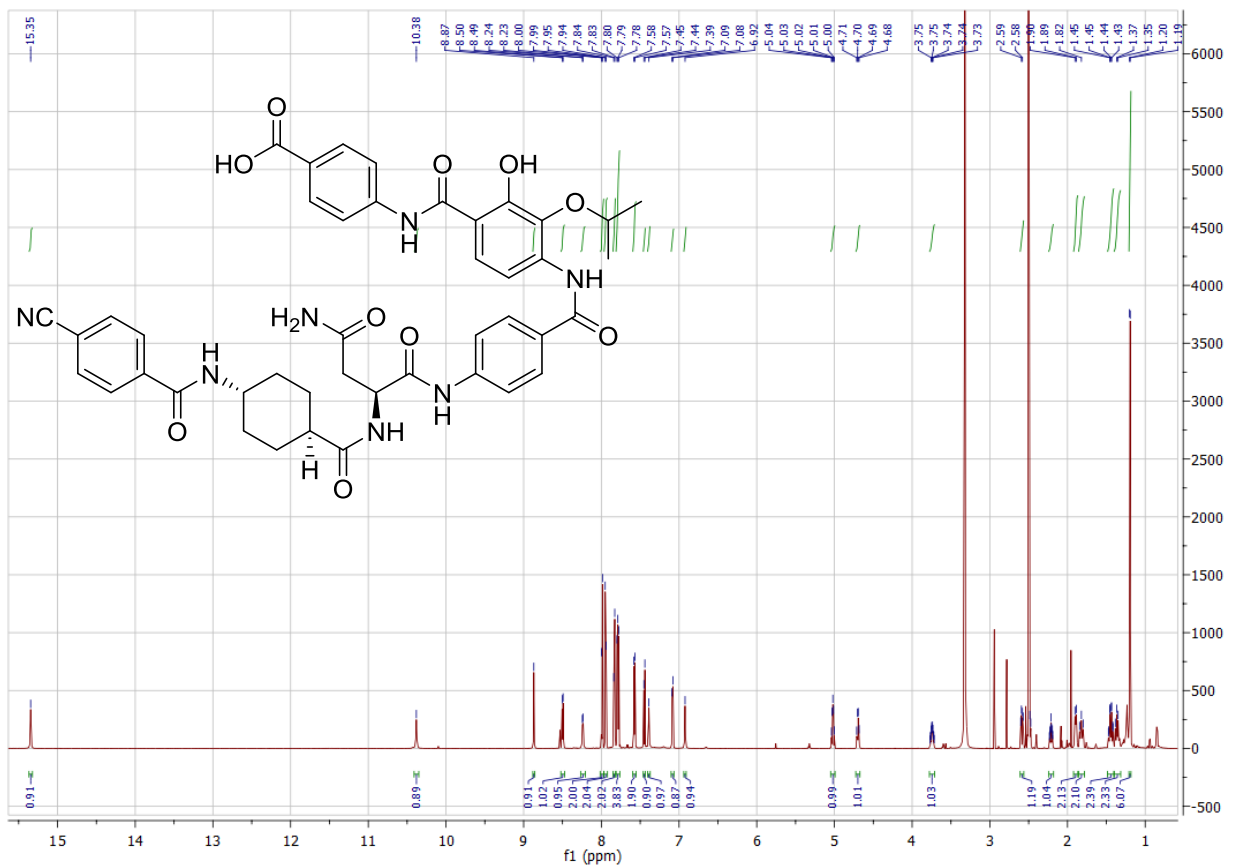
**(S)-4-(4-(4-(4-amino-2-(3-bromo-4-(4-cyanobenzamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (30)**



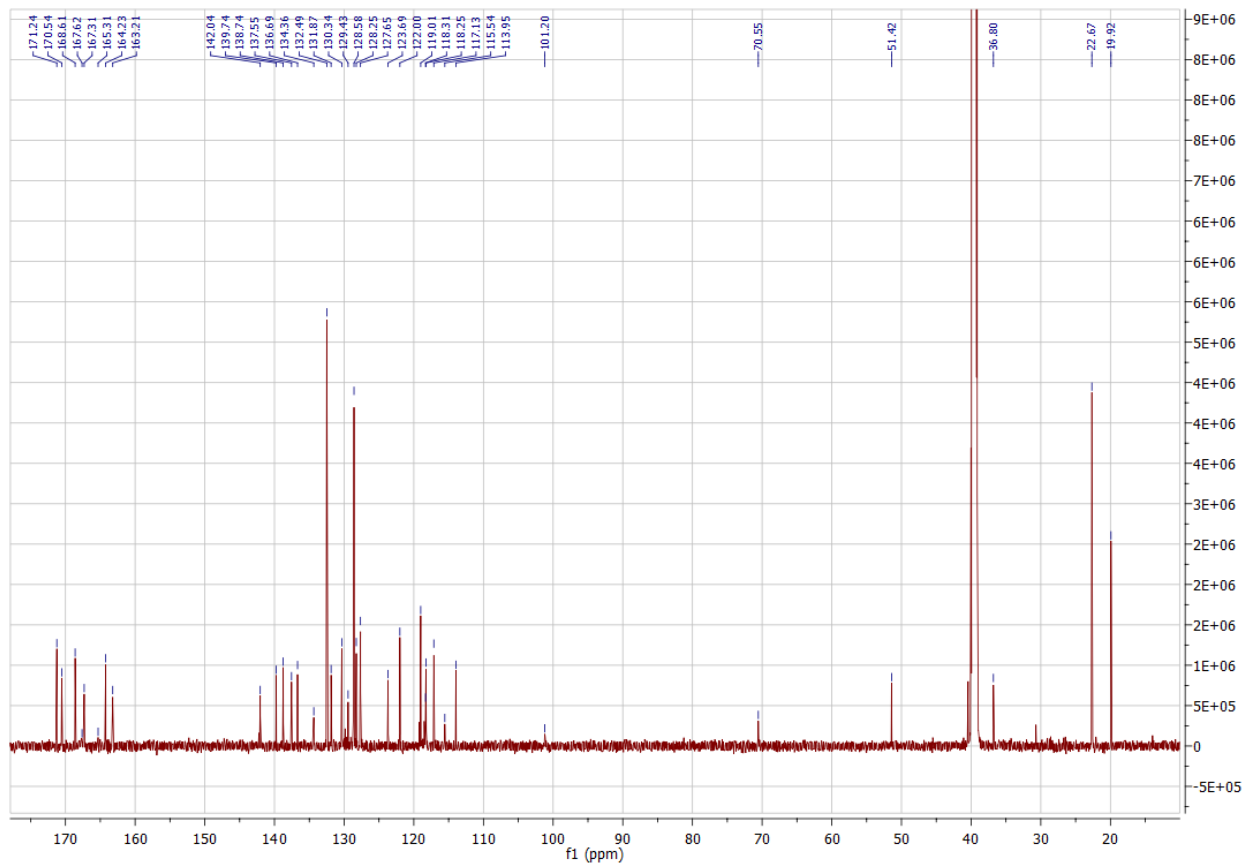
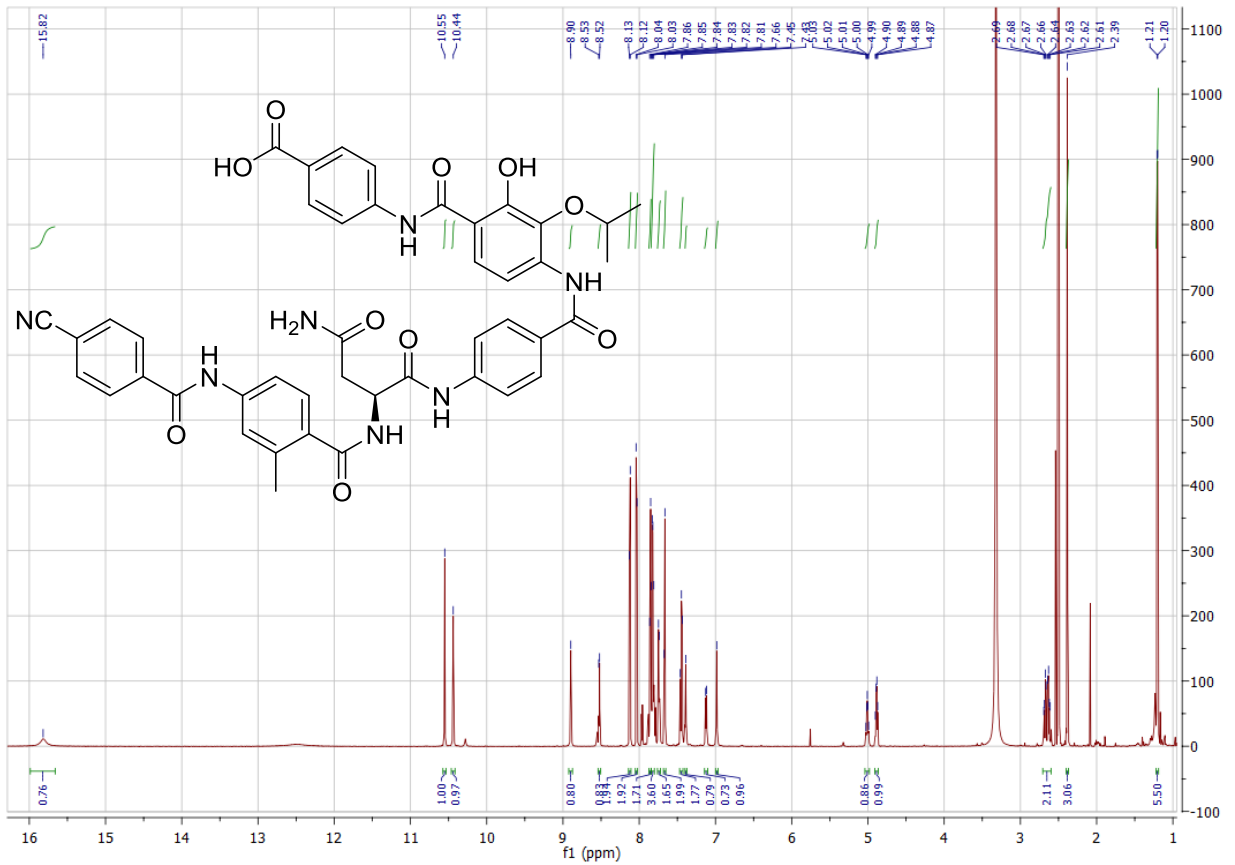
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)but-2-enamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (36)**



**4-(4-(4-((S)-4-amino-2-((1*r*,4*S*)-4-(4-cyanobenzamido)cyclohexan-1-carboxamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (37)**

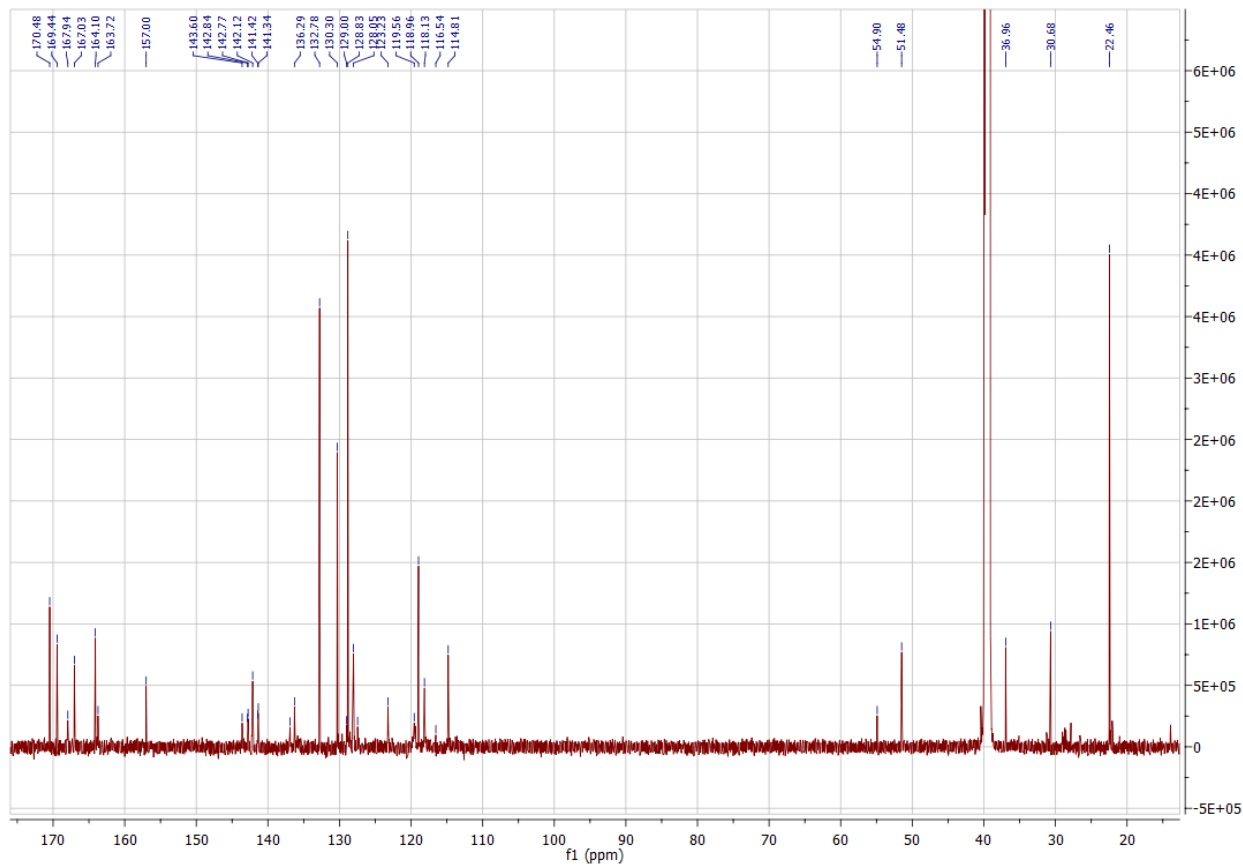
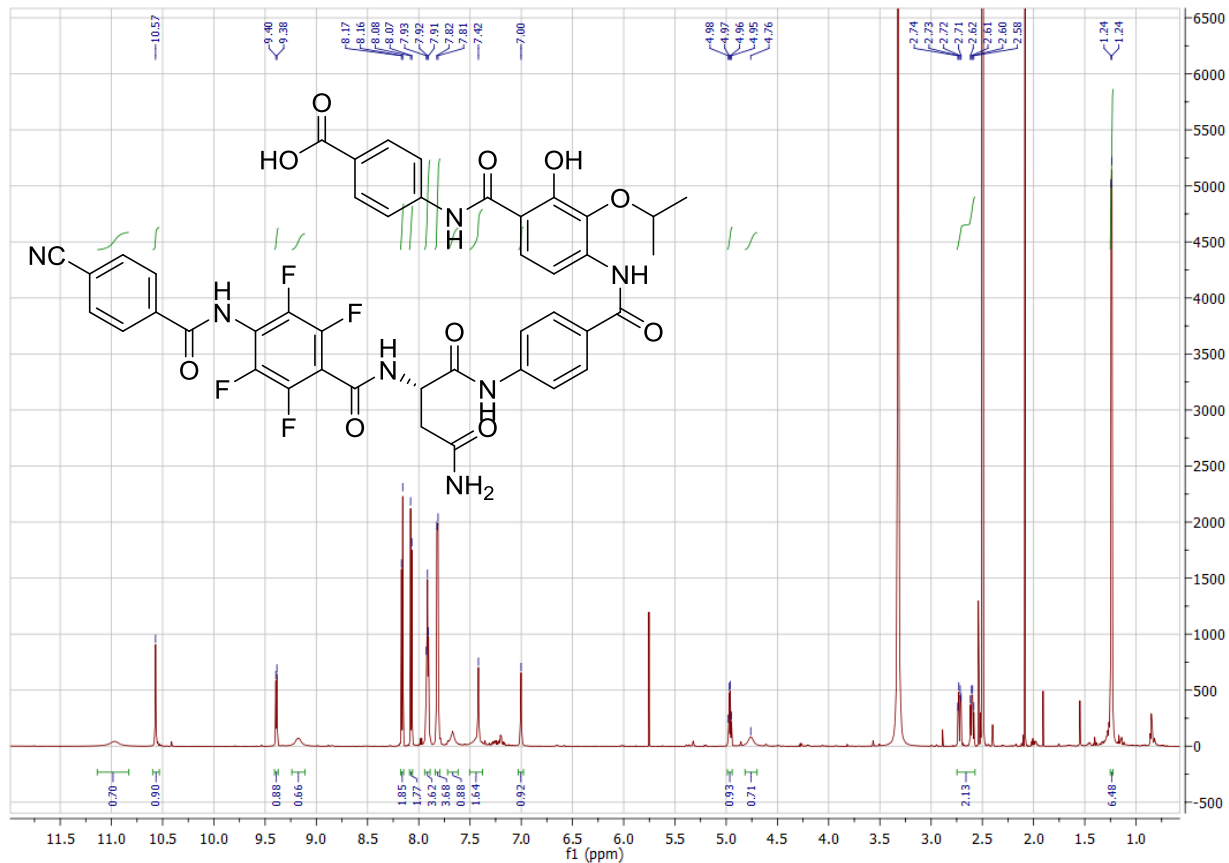


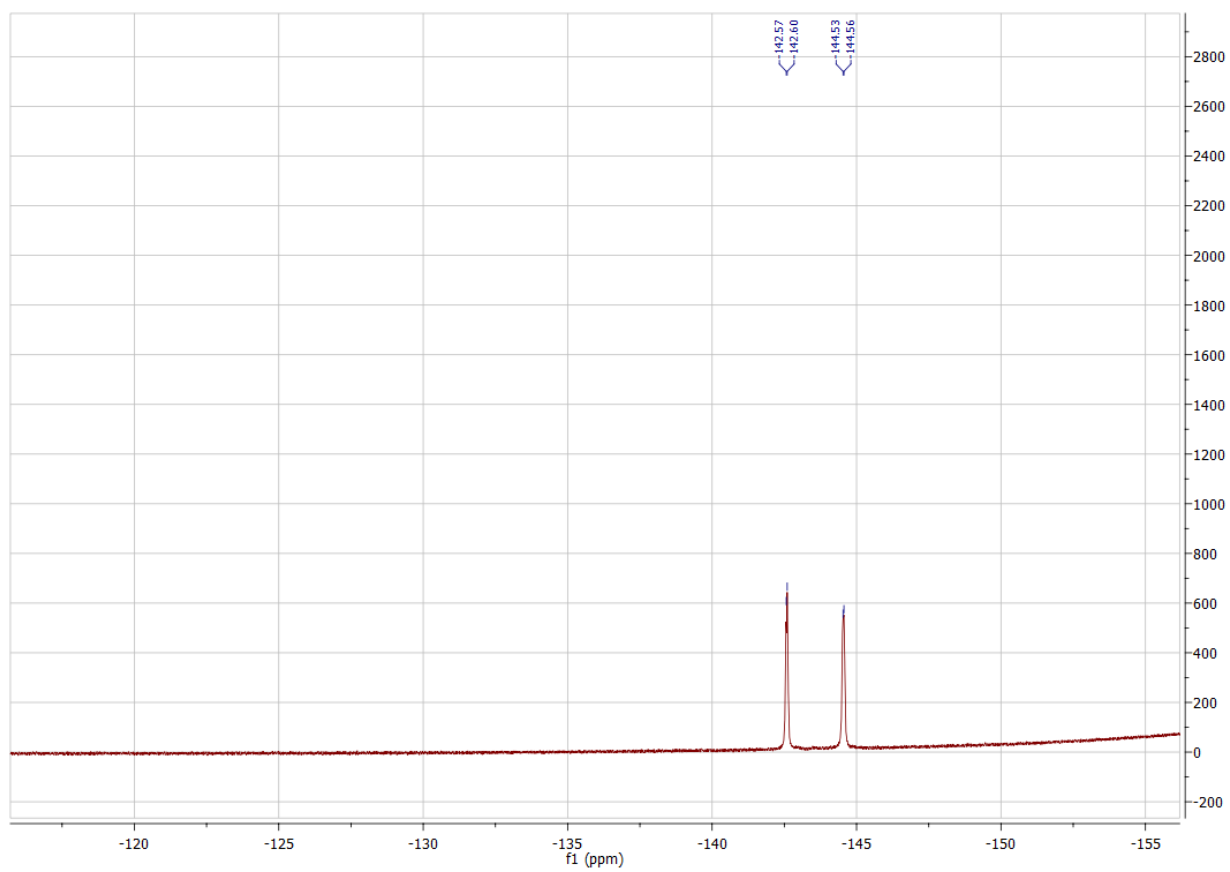
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-2-methylbenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (38)**



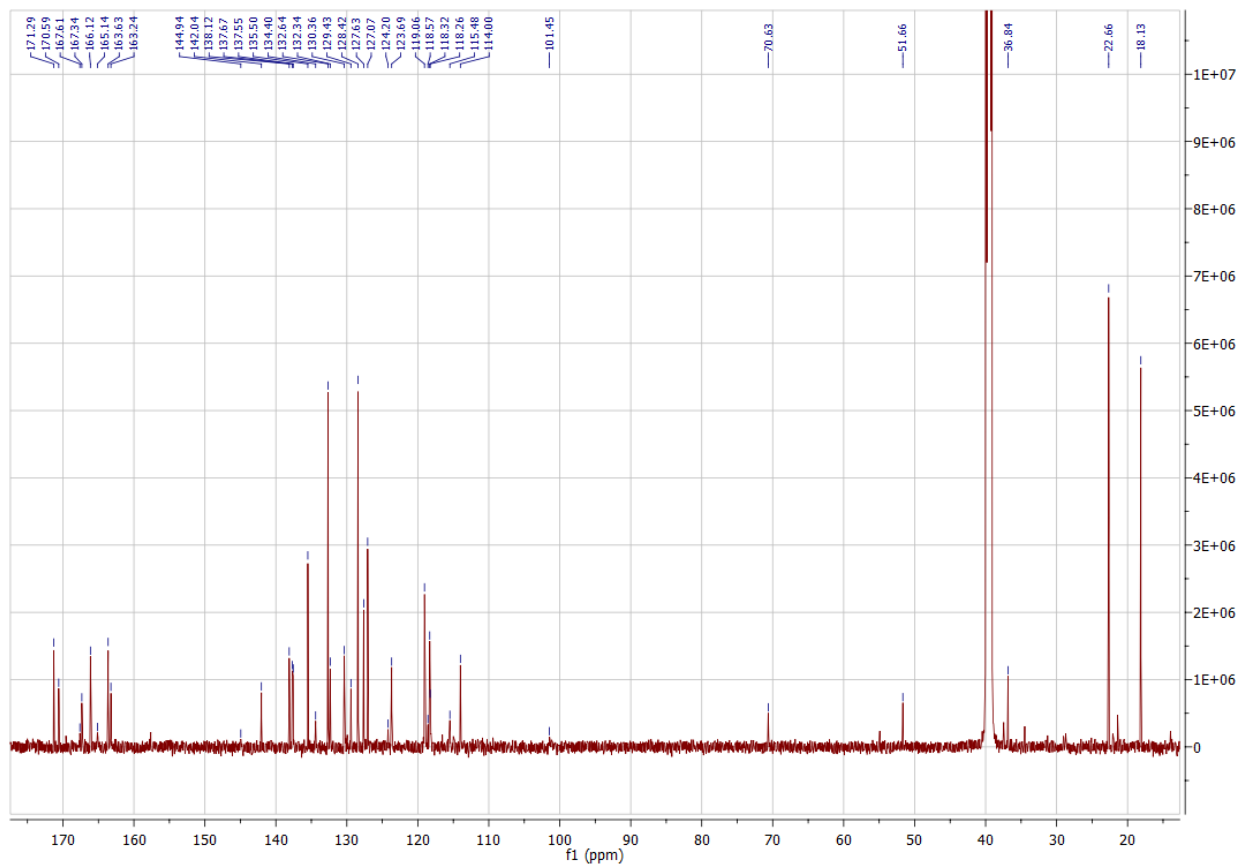
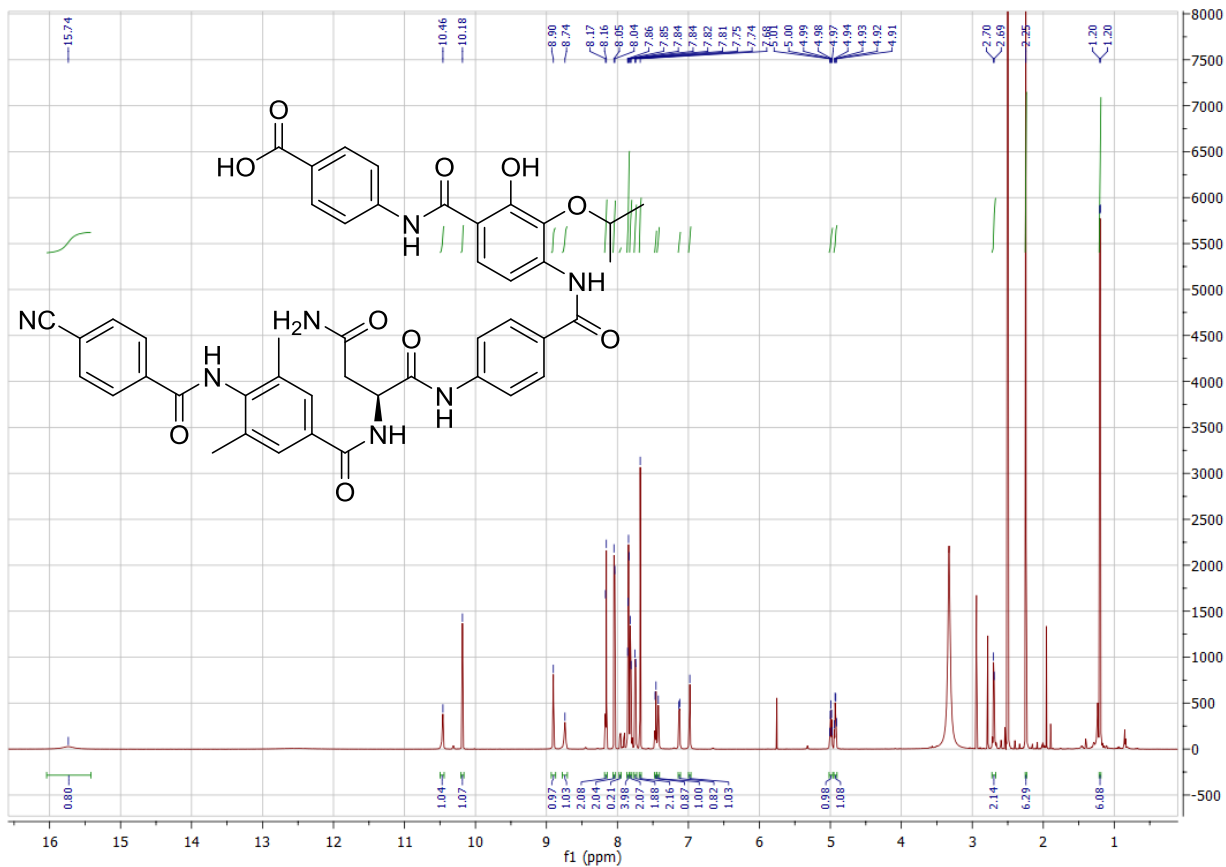


**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-2,3,5,6-tetrafluorobenzamido)-4-oxobutanamido)-benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (39)**

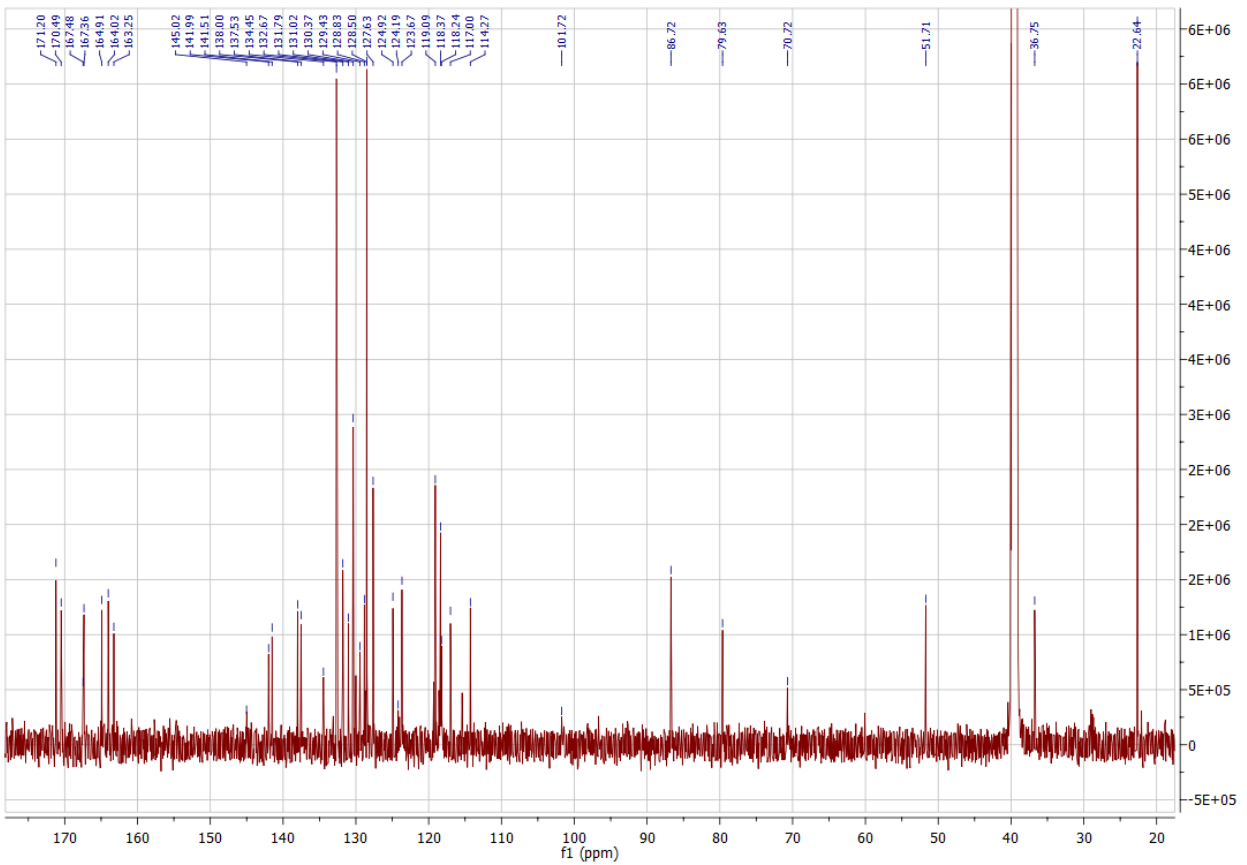
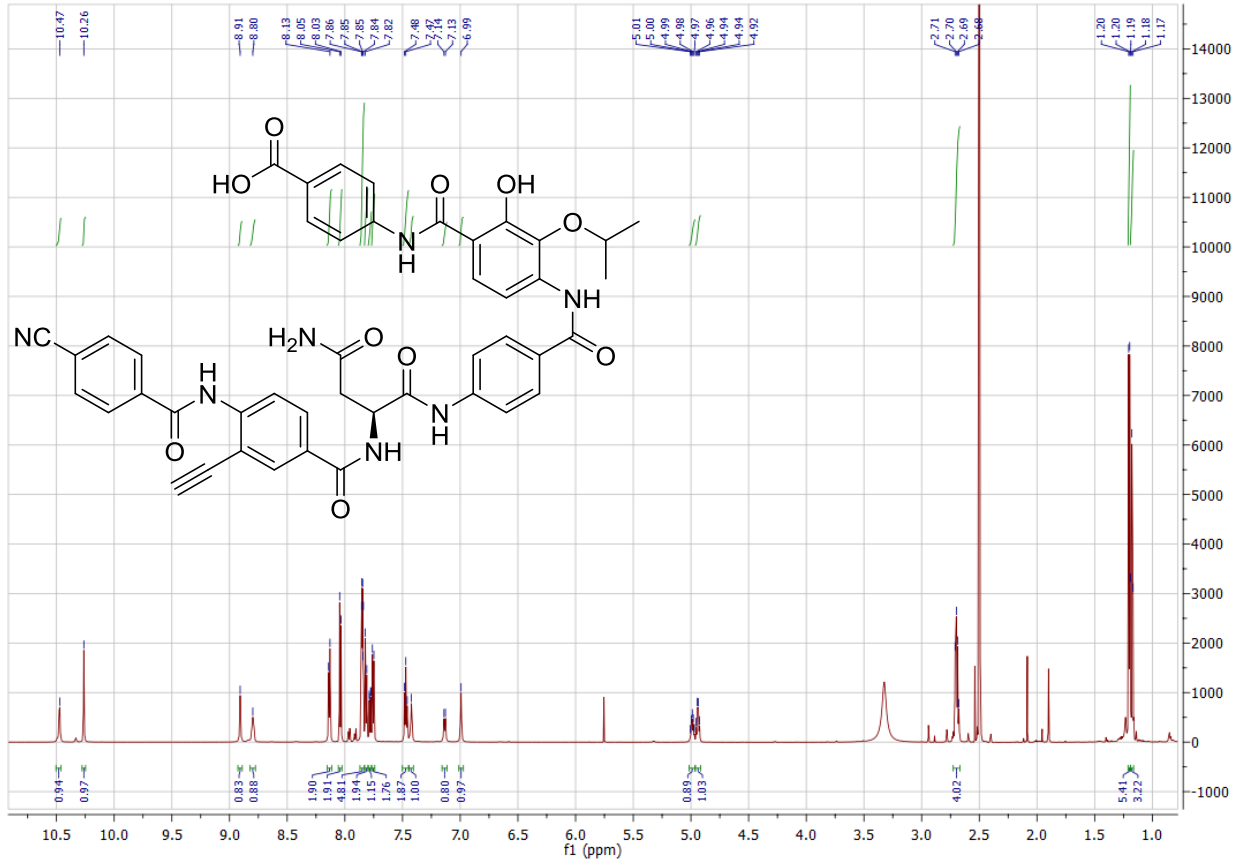




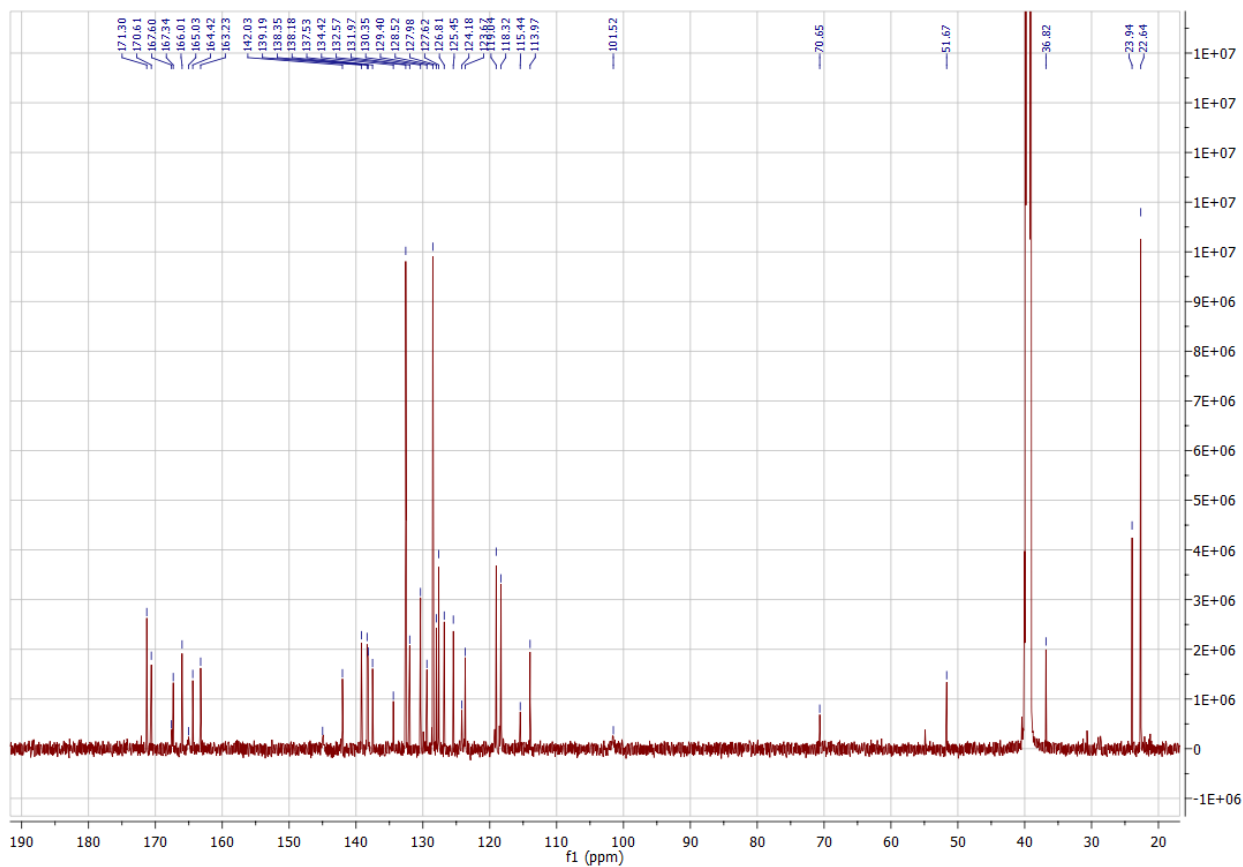
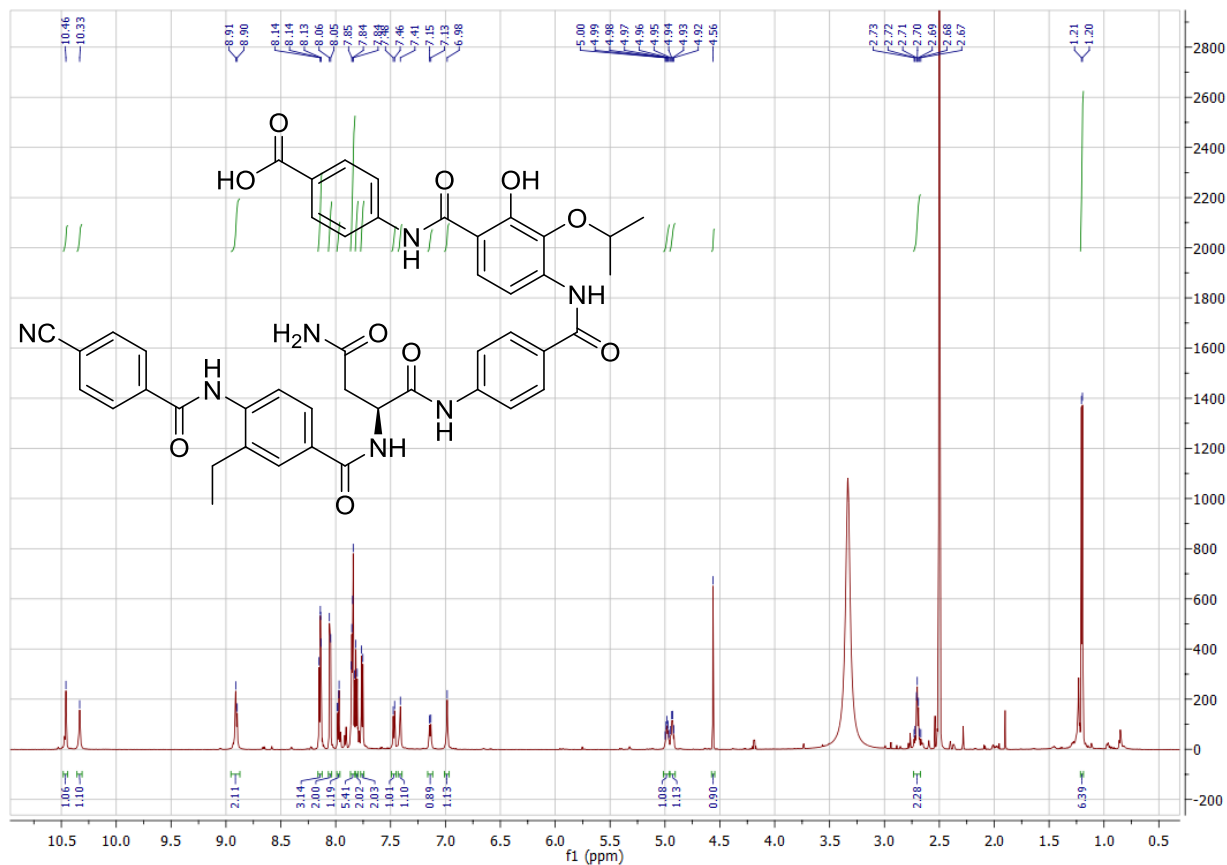
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-3,5-dimethylbenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (40)**



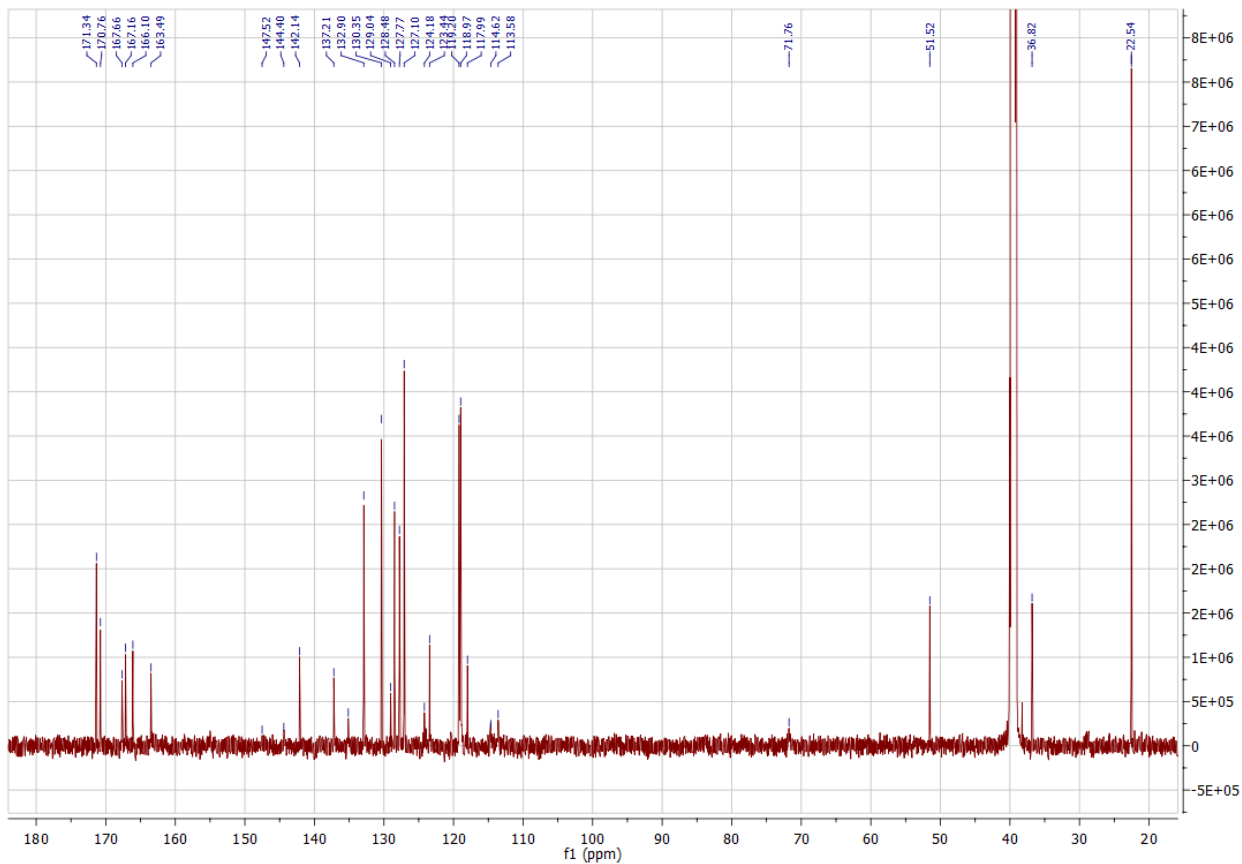
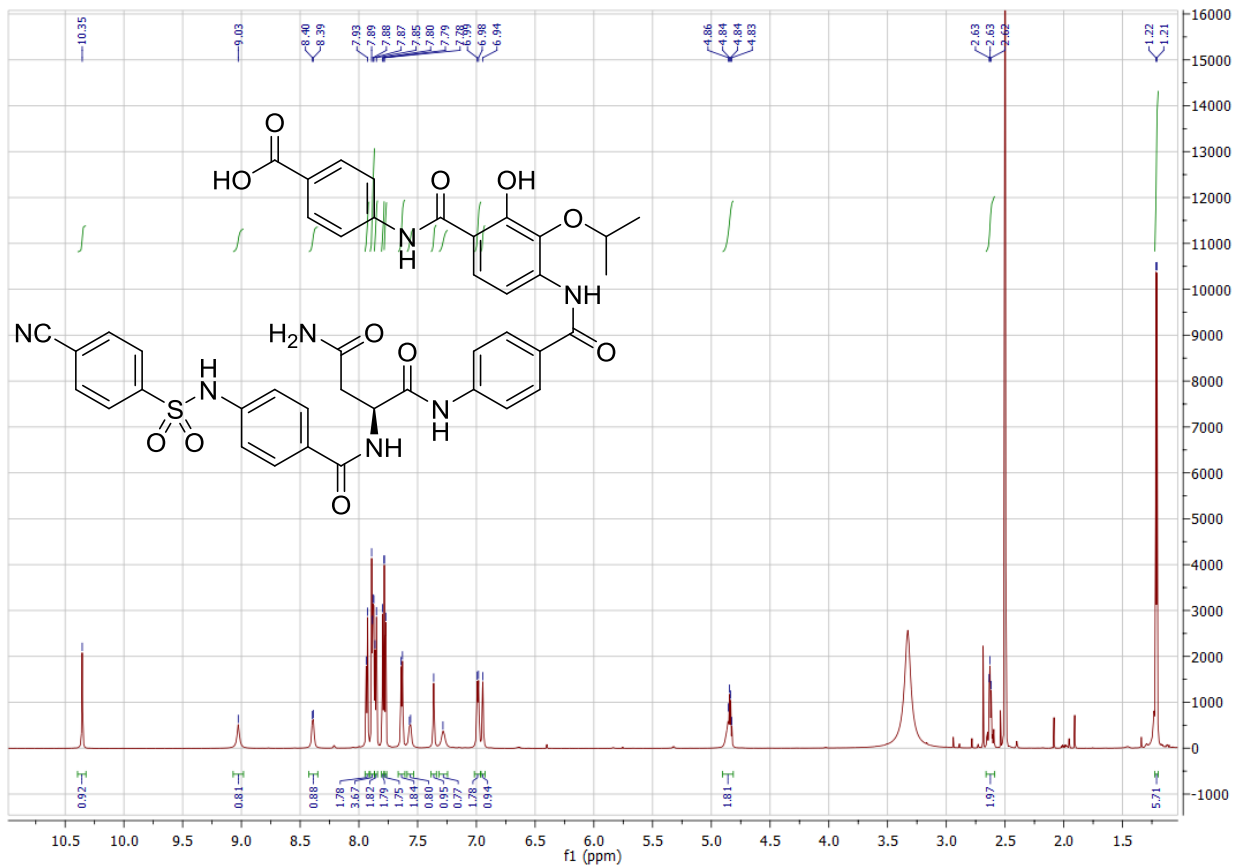
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-3-ethynylbenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (41)**



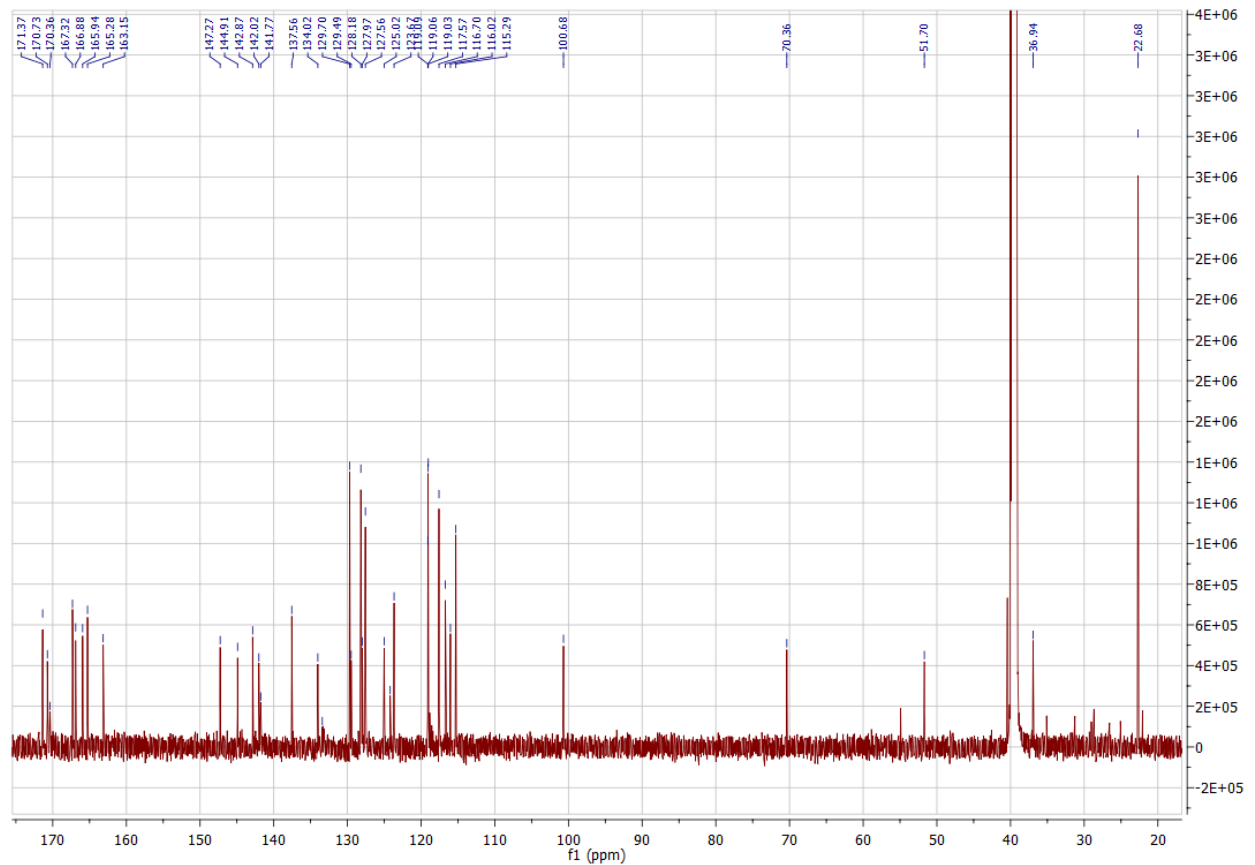
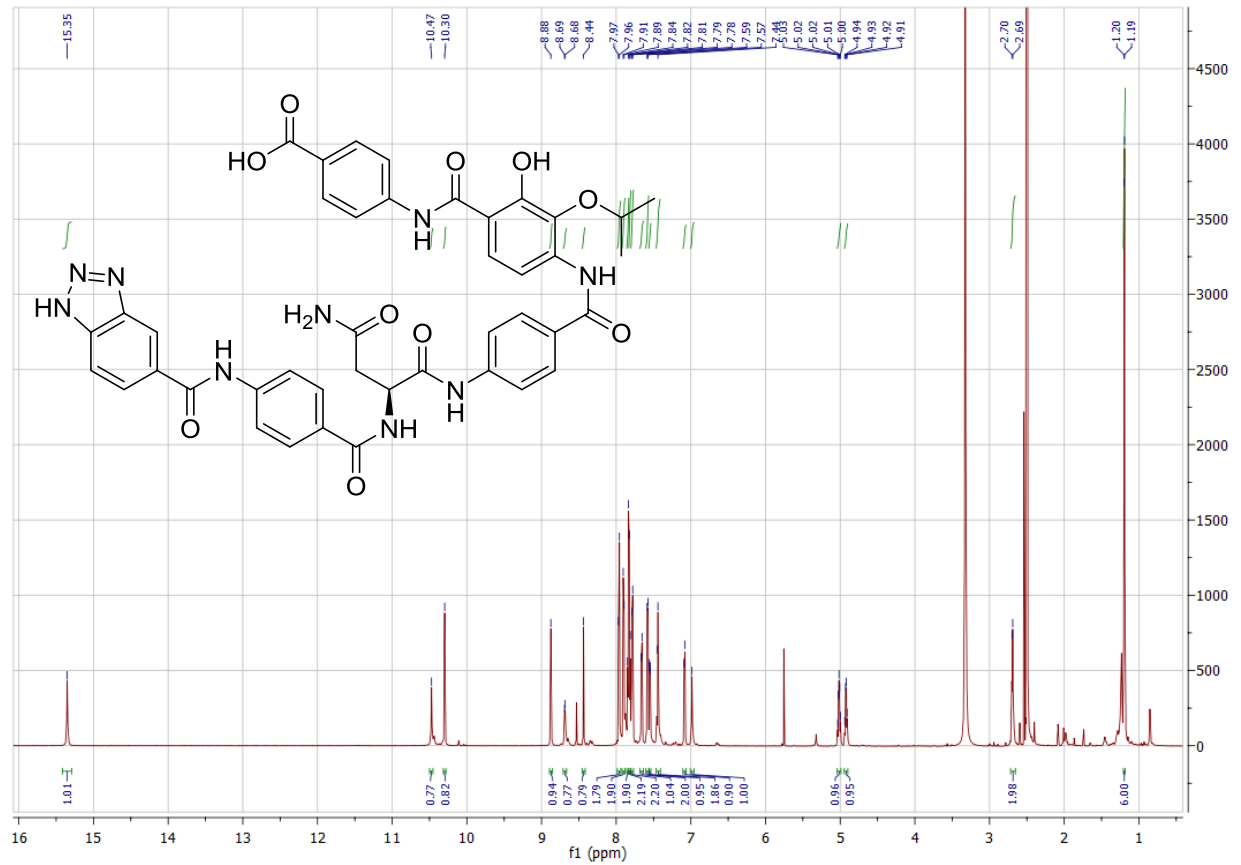
**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)-3-ethylbenzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (42)**



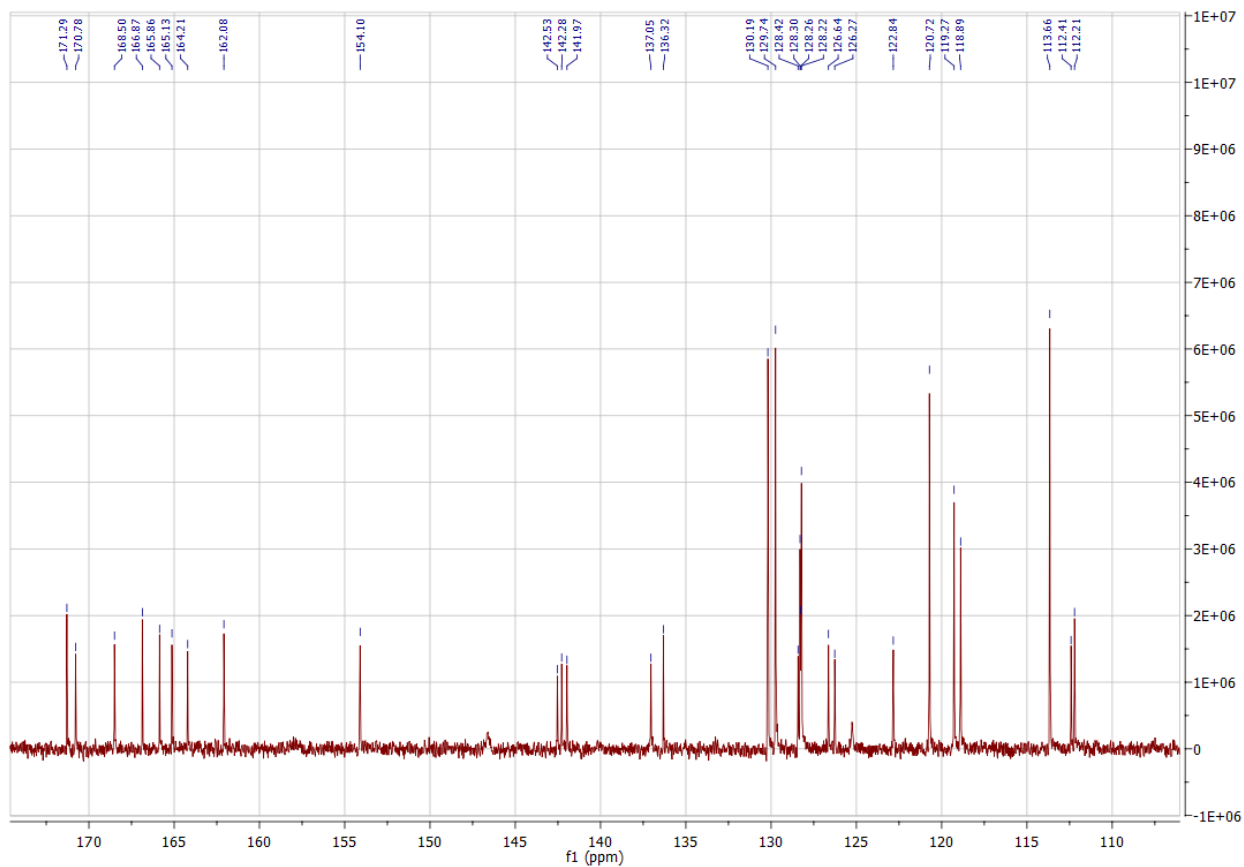
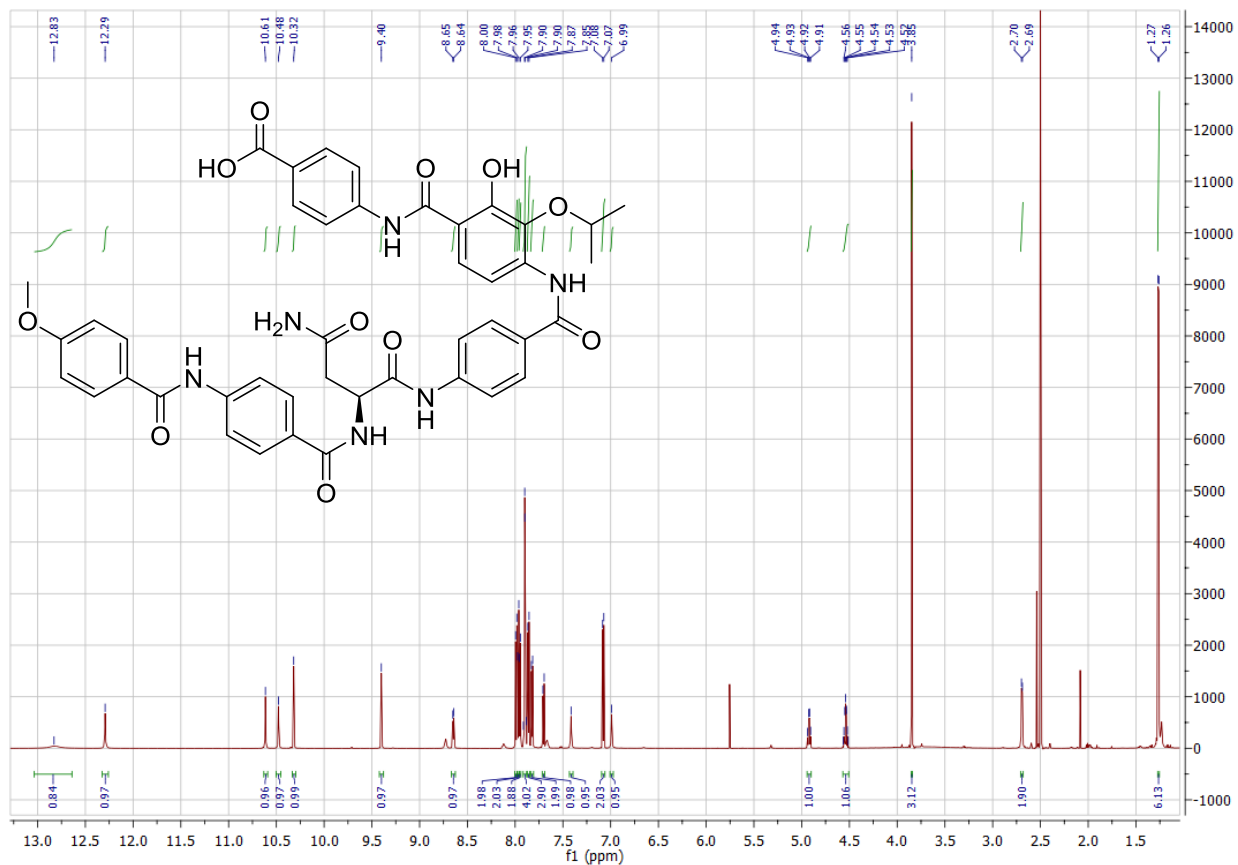
**(S)-4-(4-(4-(4-amino-2-(4-((4-cyanophenyl)sulfonamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (47)**



**(S)-4-(4-(4-(2-(4-(benzo[d][1,2,3]triazole-5-carboxamido)benzamido)-4-amino-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (48)**

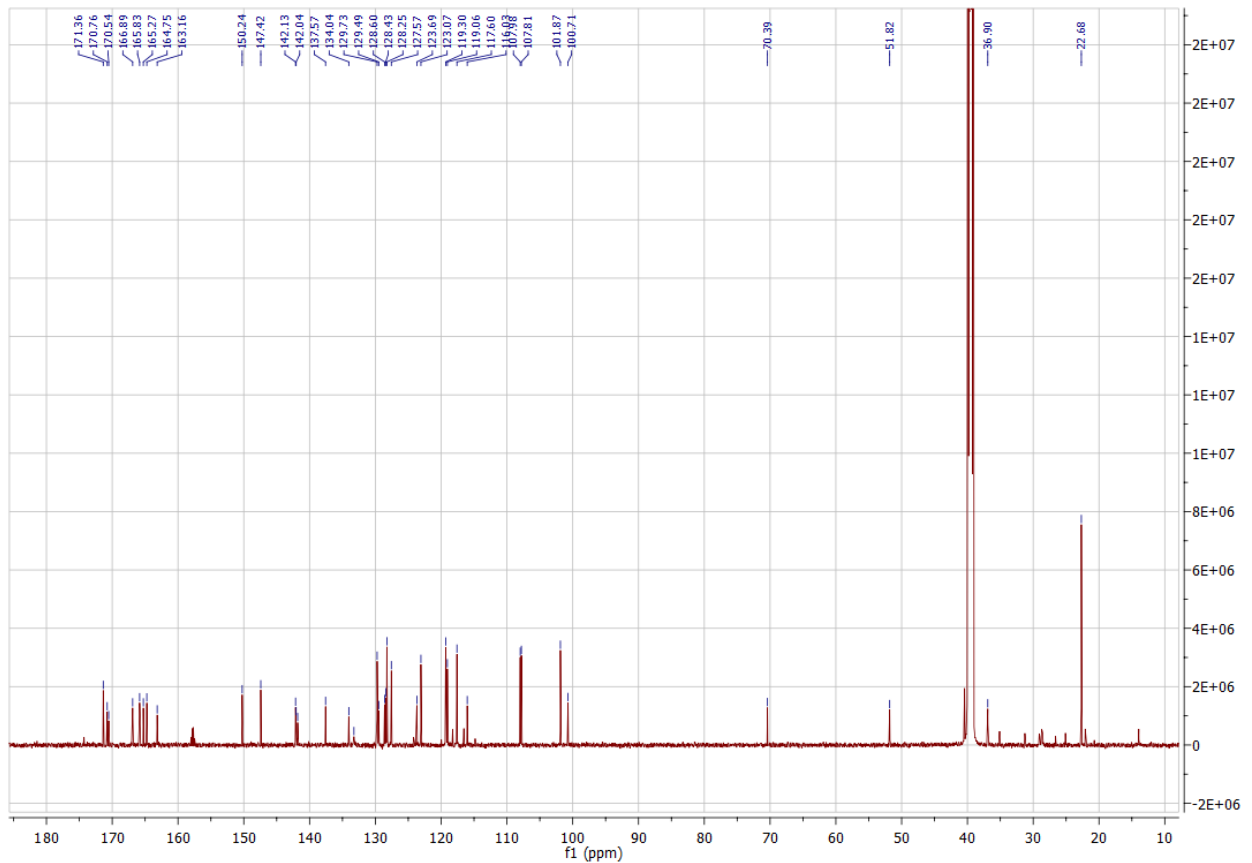
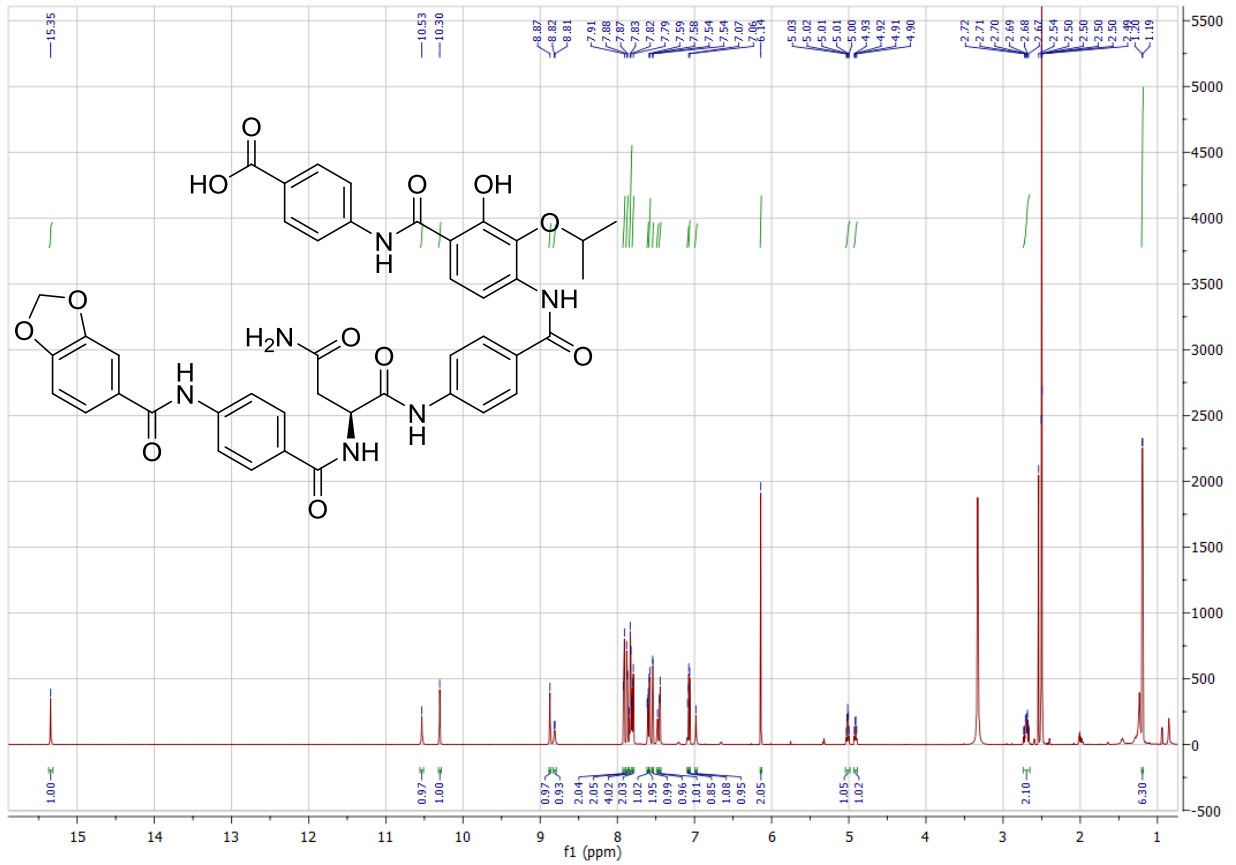


**(S)-4-(4-(4-(4-amino-2-(4-(4-methoxybenzamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (49)**

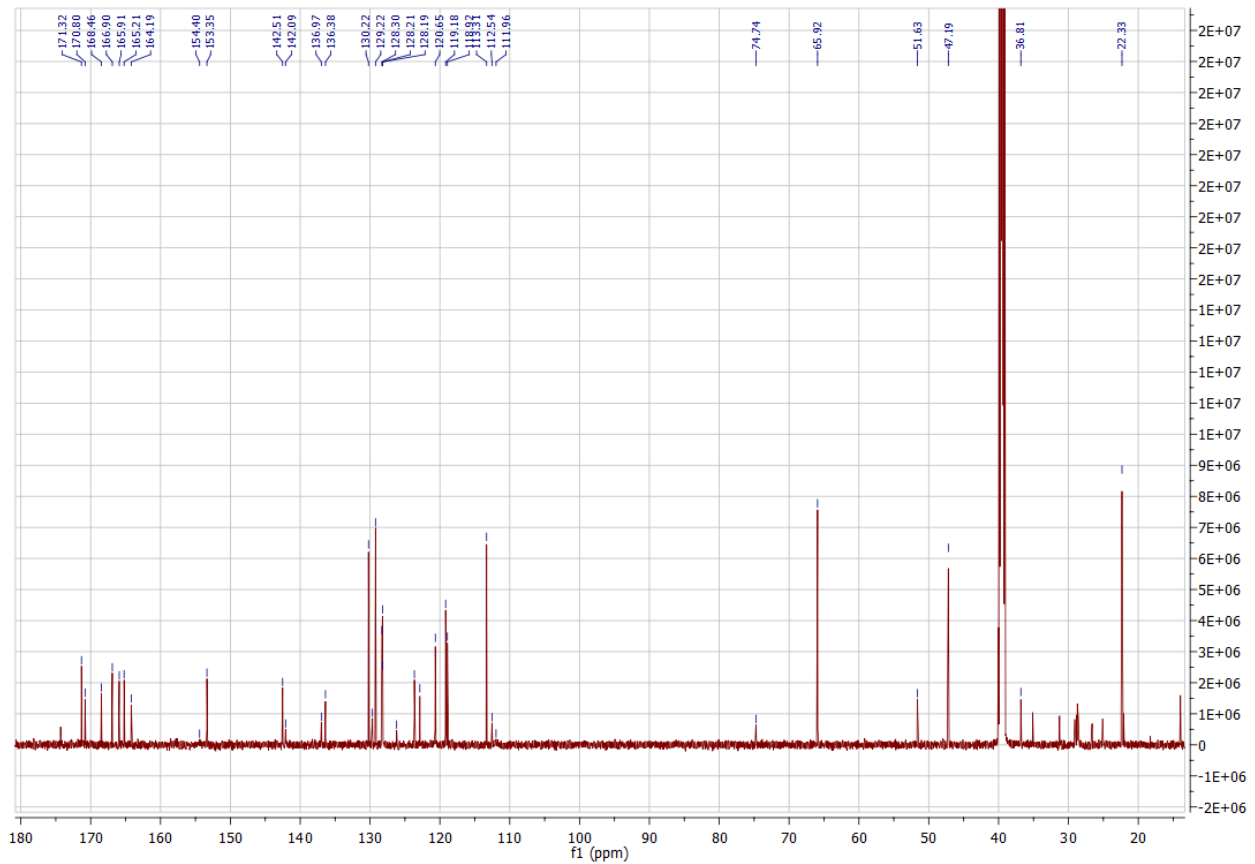
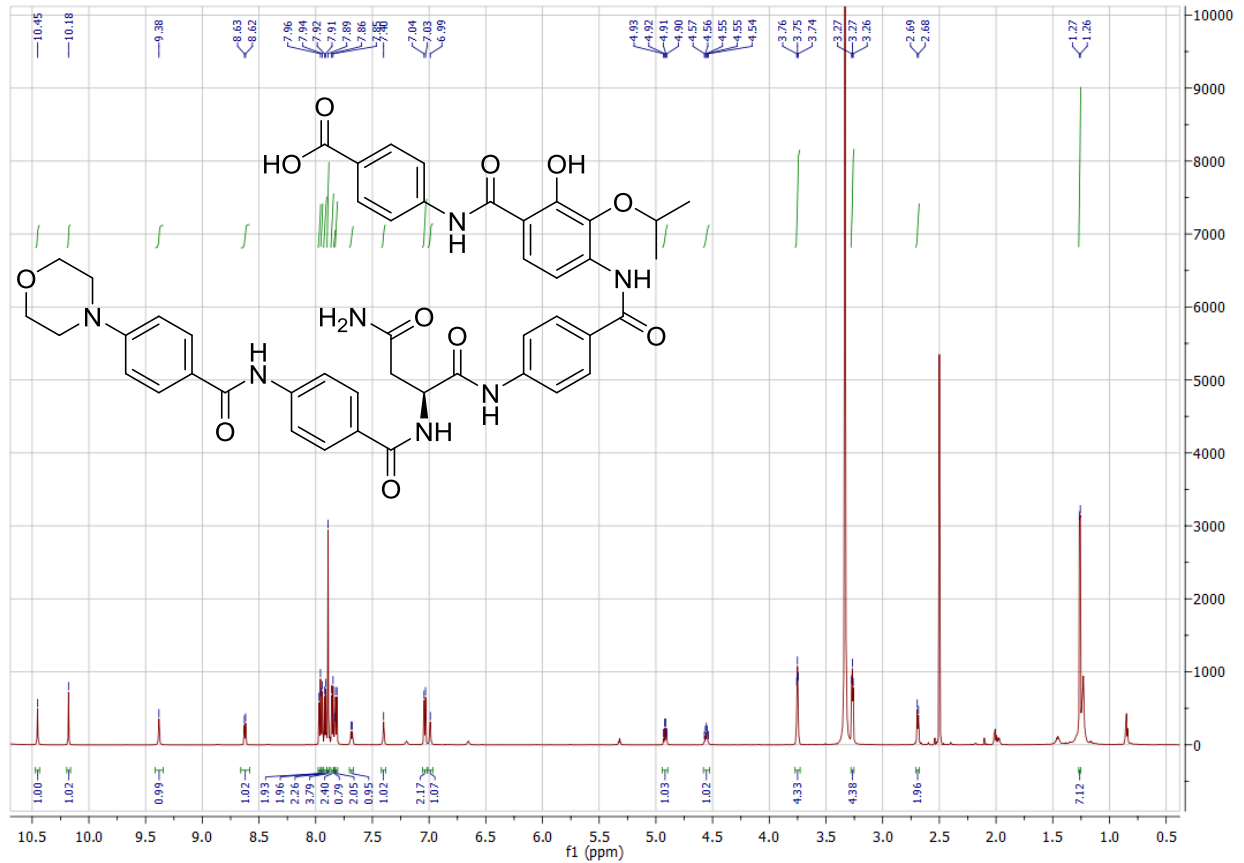




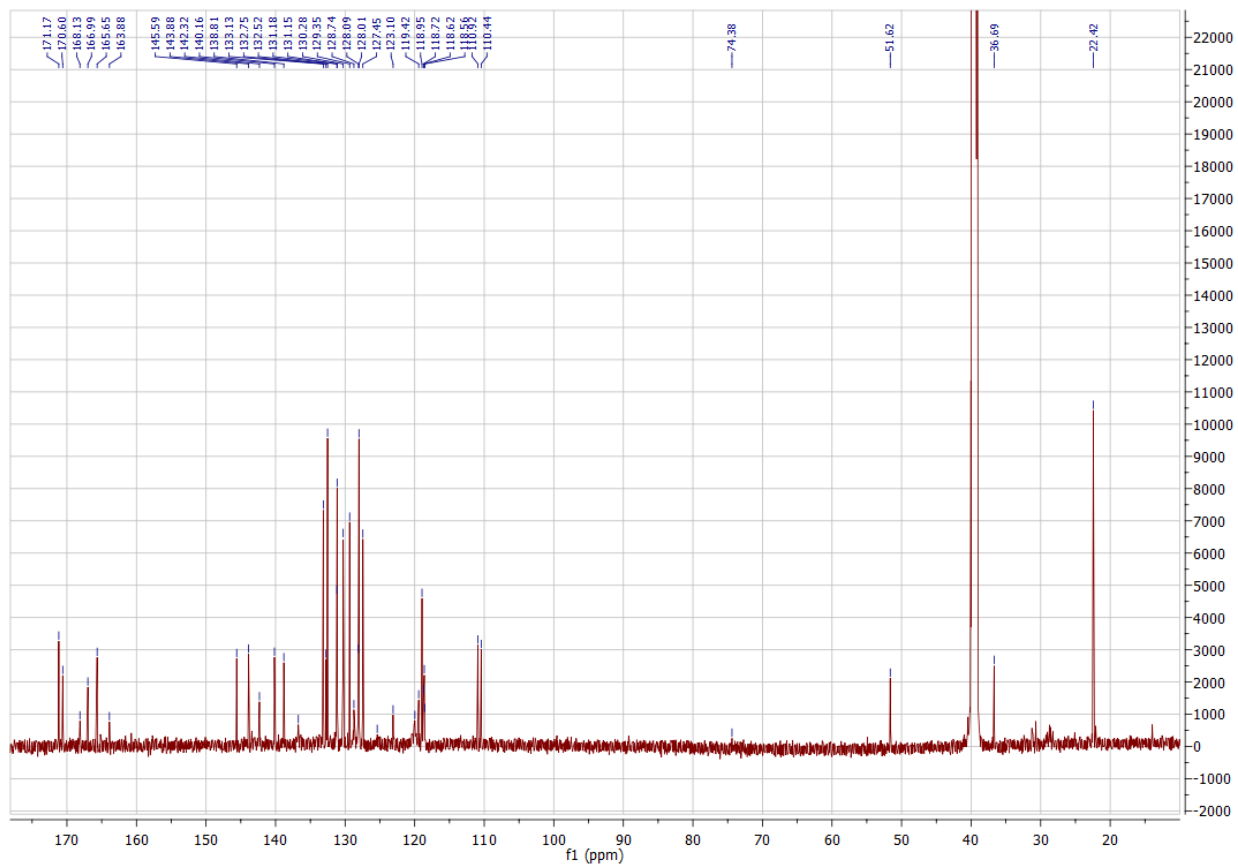
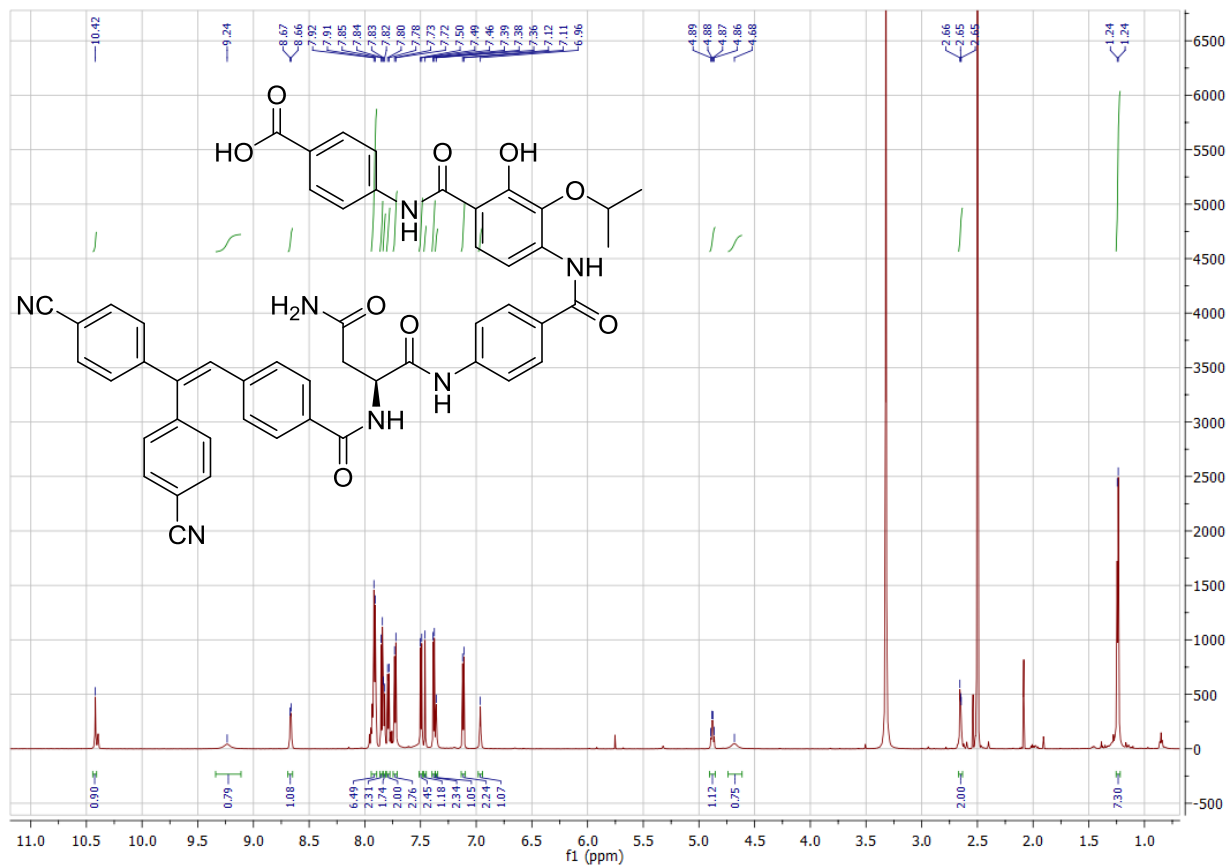
**(S)-4-(4-(4-(4-amino-2-(4-(benzo[d][1,3]dioxole-5-carboxamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (50)**



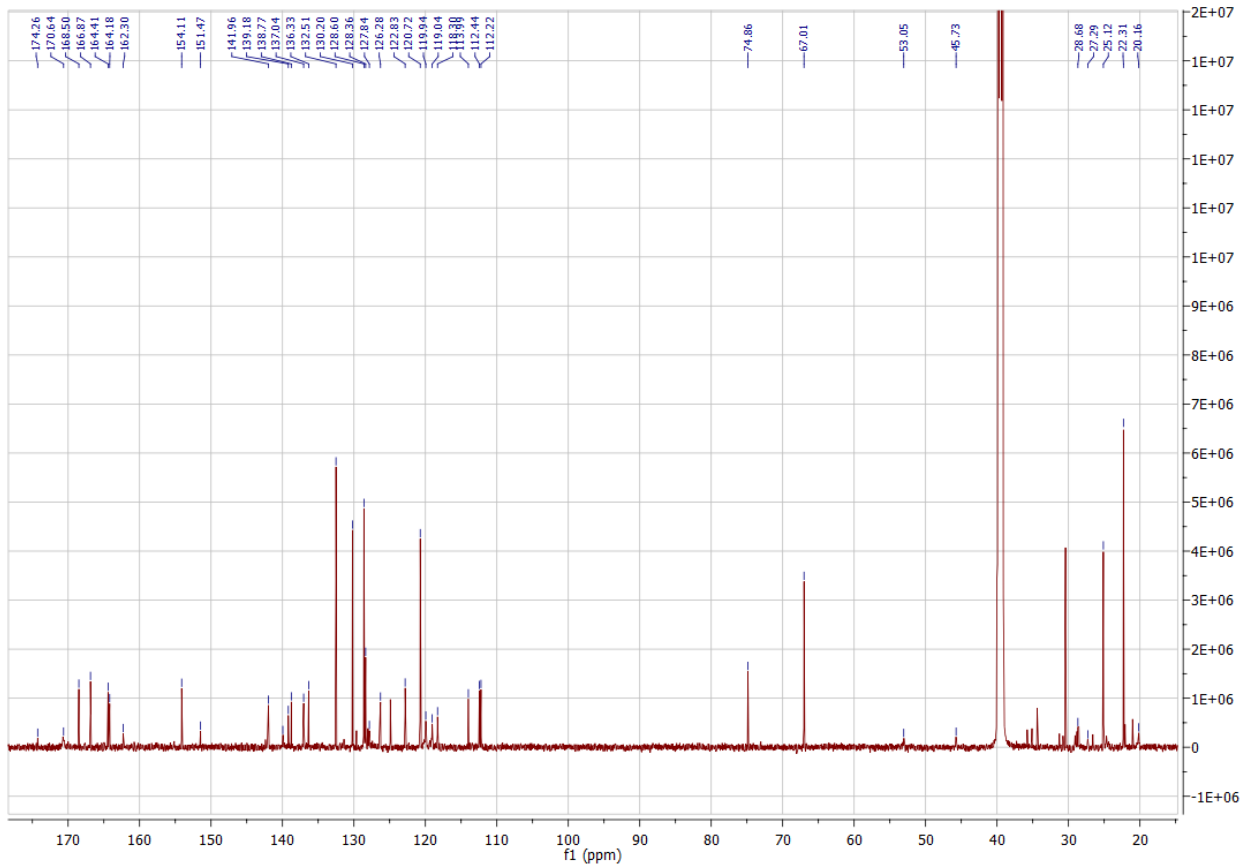
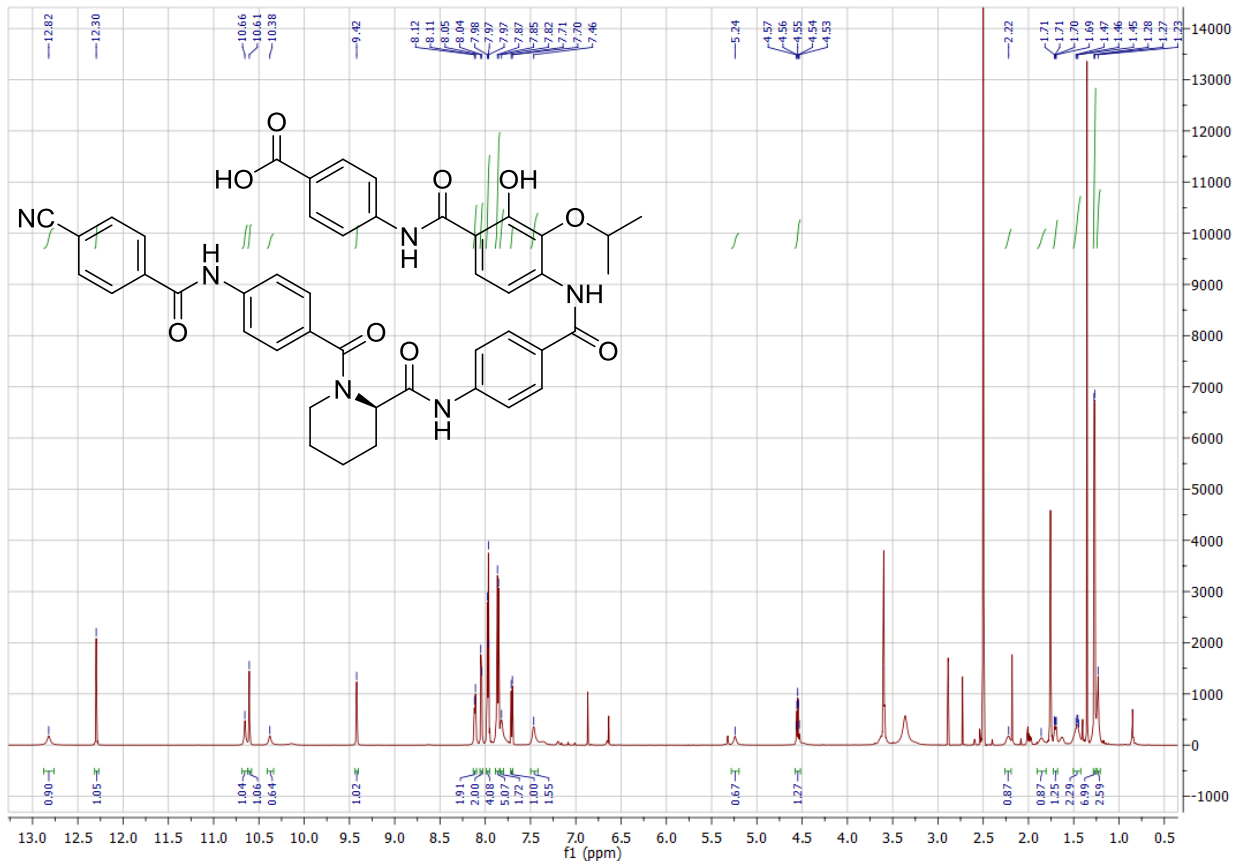
**(S)-4-(4-(4-(4-amino-2-(4-(4-morpholinobenzamido)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (51)**



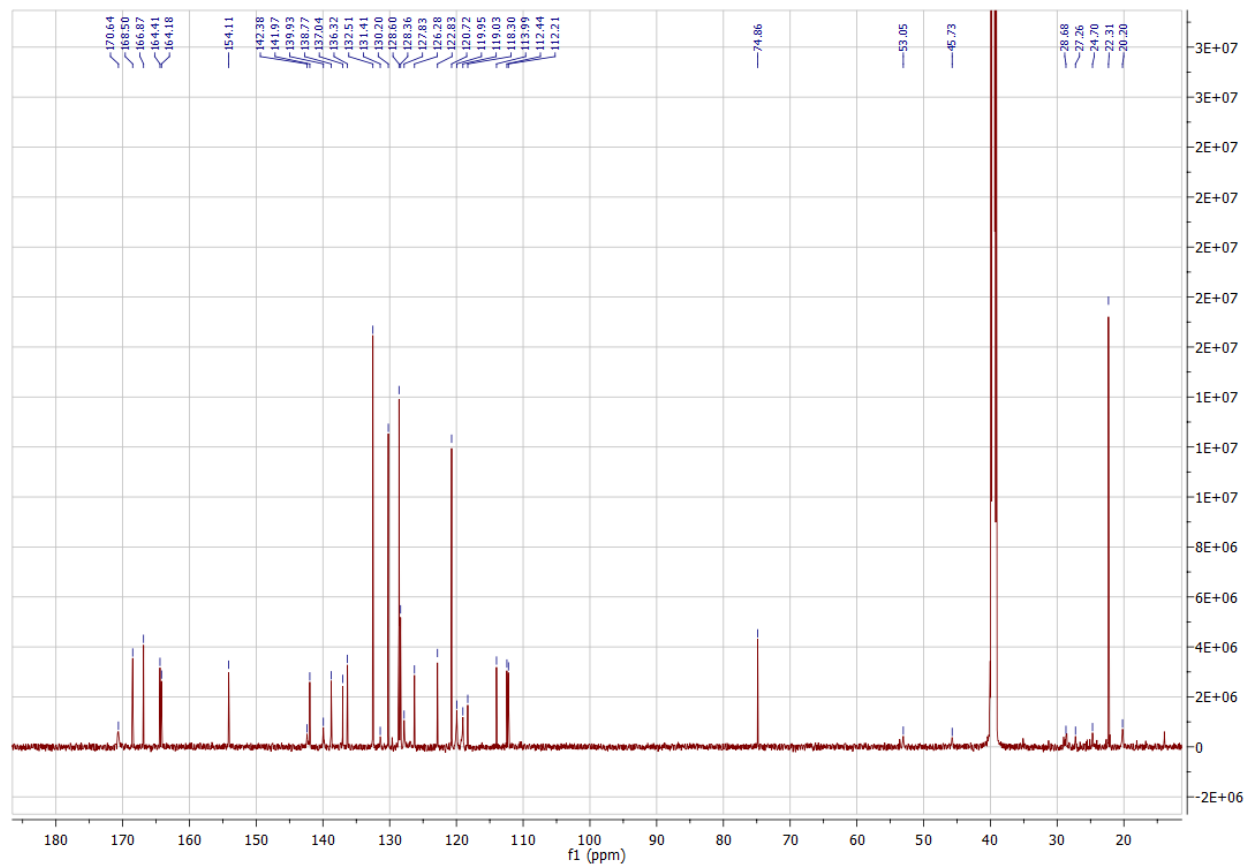
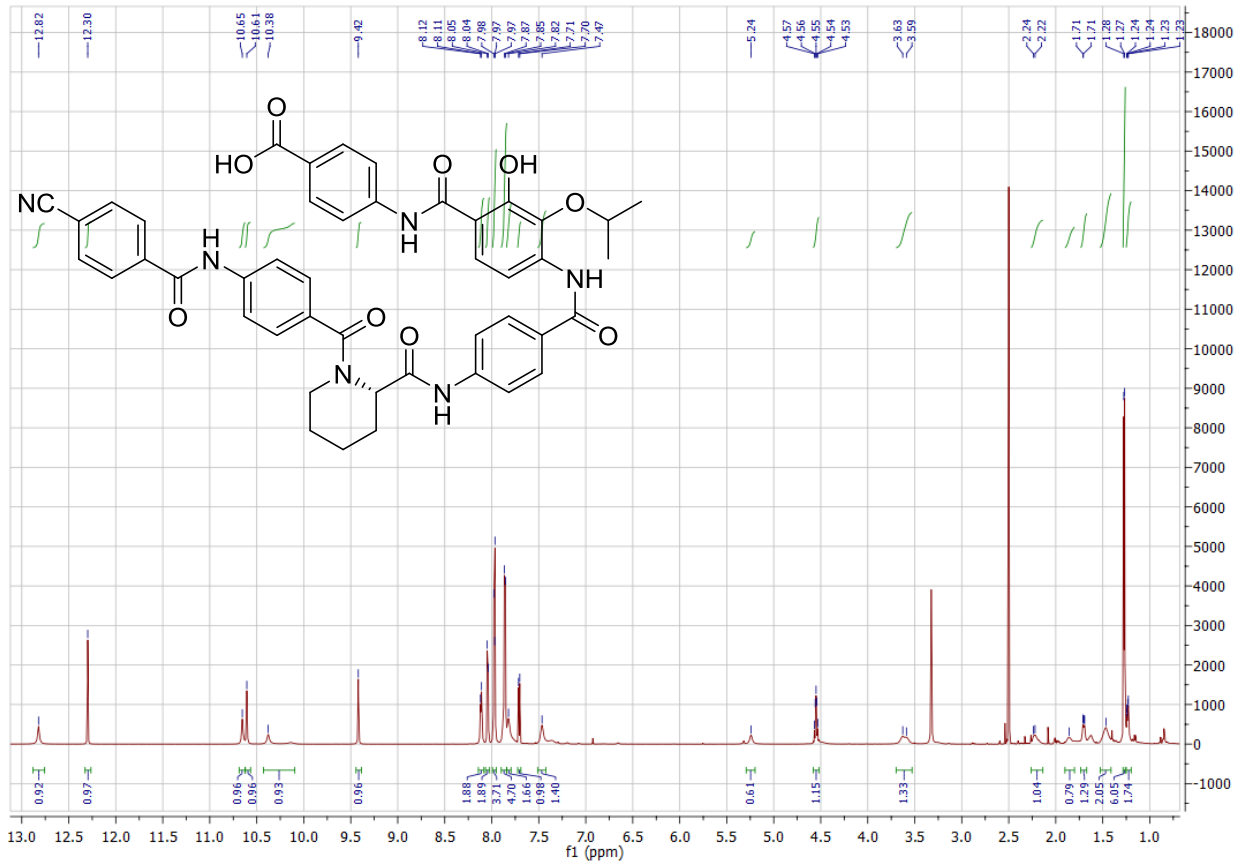
**(S)-4-(4-(4-(4-amino-2-(4-(2,2-bis(4-cyanophenyl)vinyl)benzamido)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (52)**



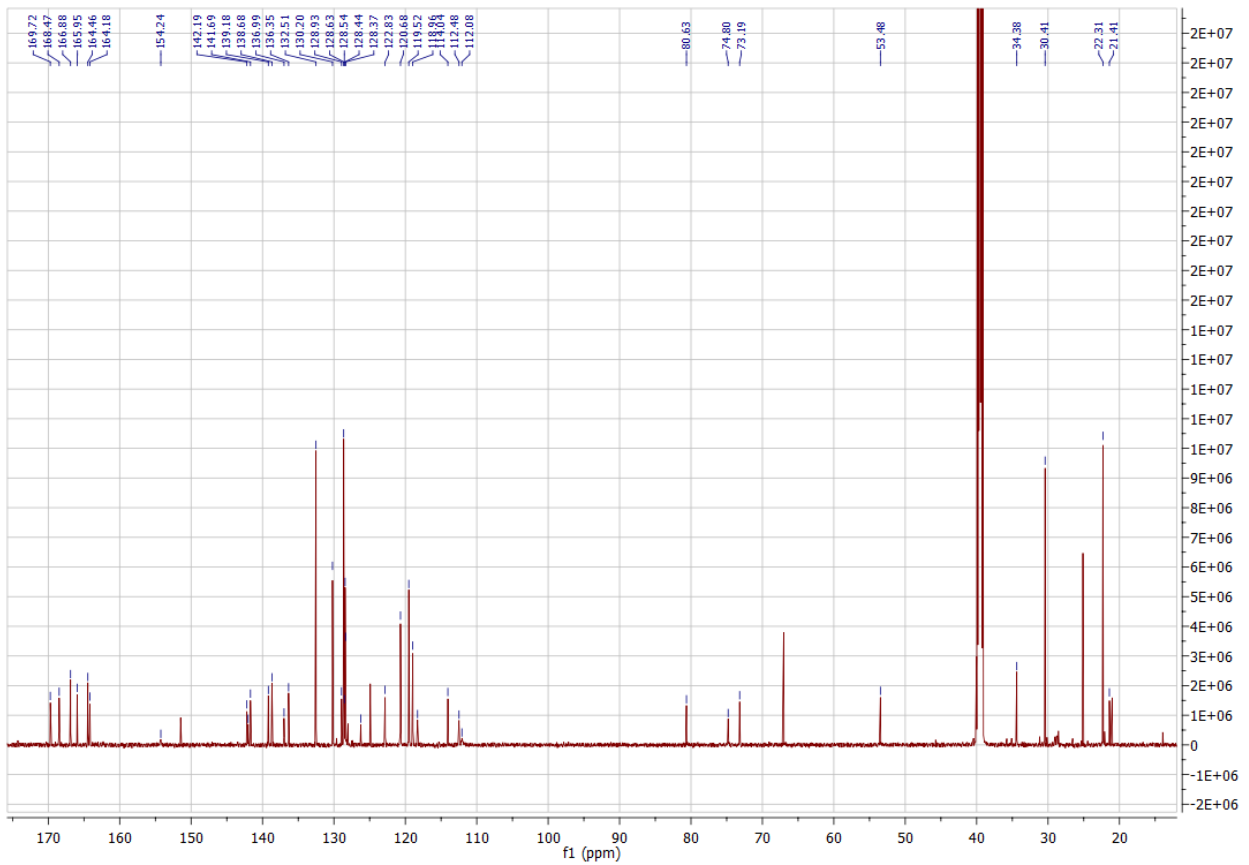
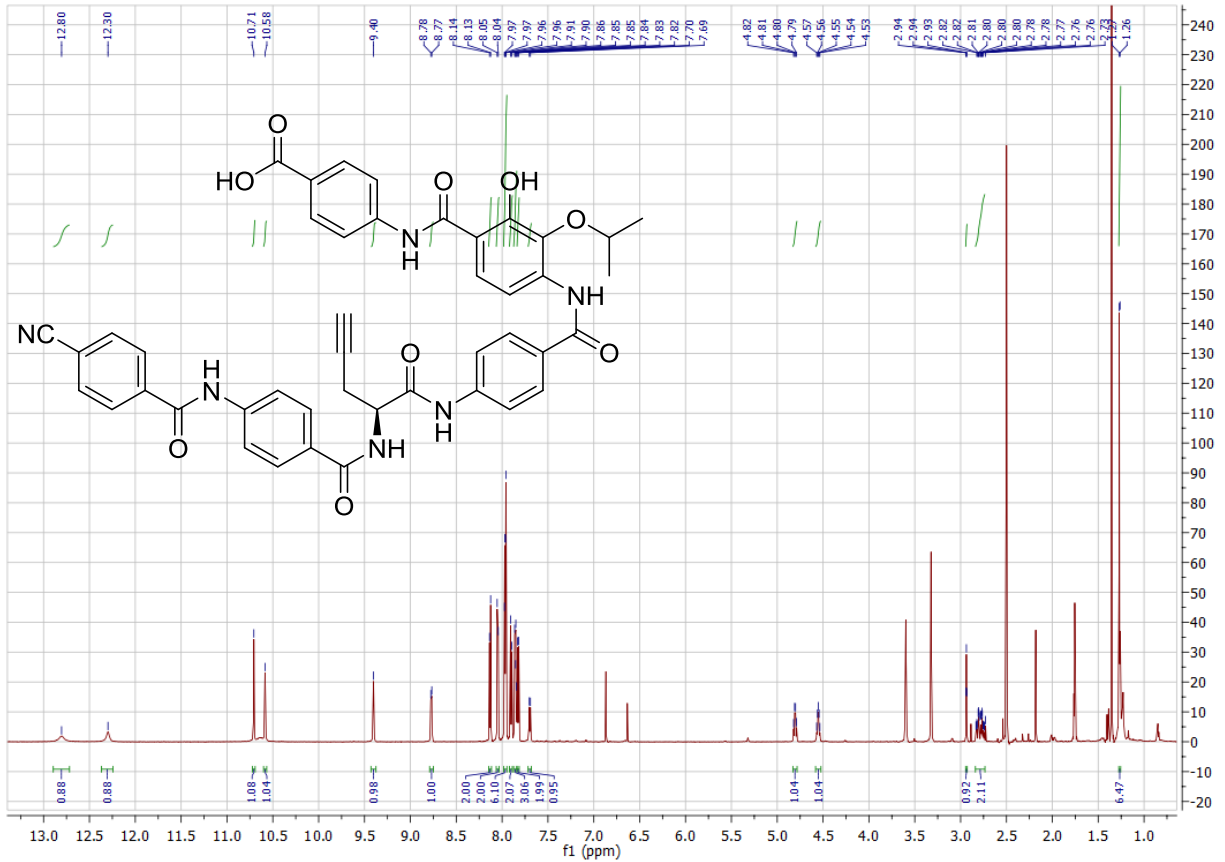
**(R)-4-(4-(4-(1-(4-(4-cyanobenzamido)benzoyl)piperidine-2-carboxamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (57)**



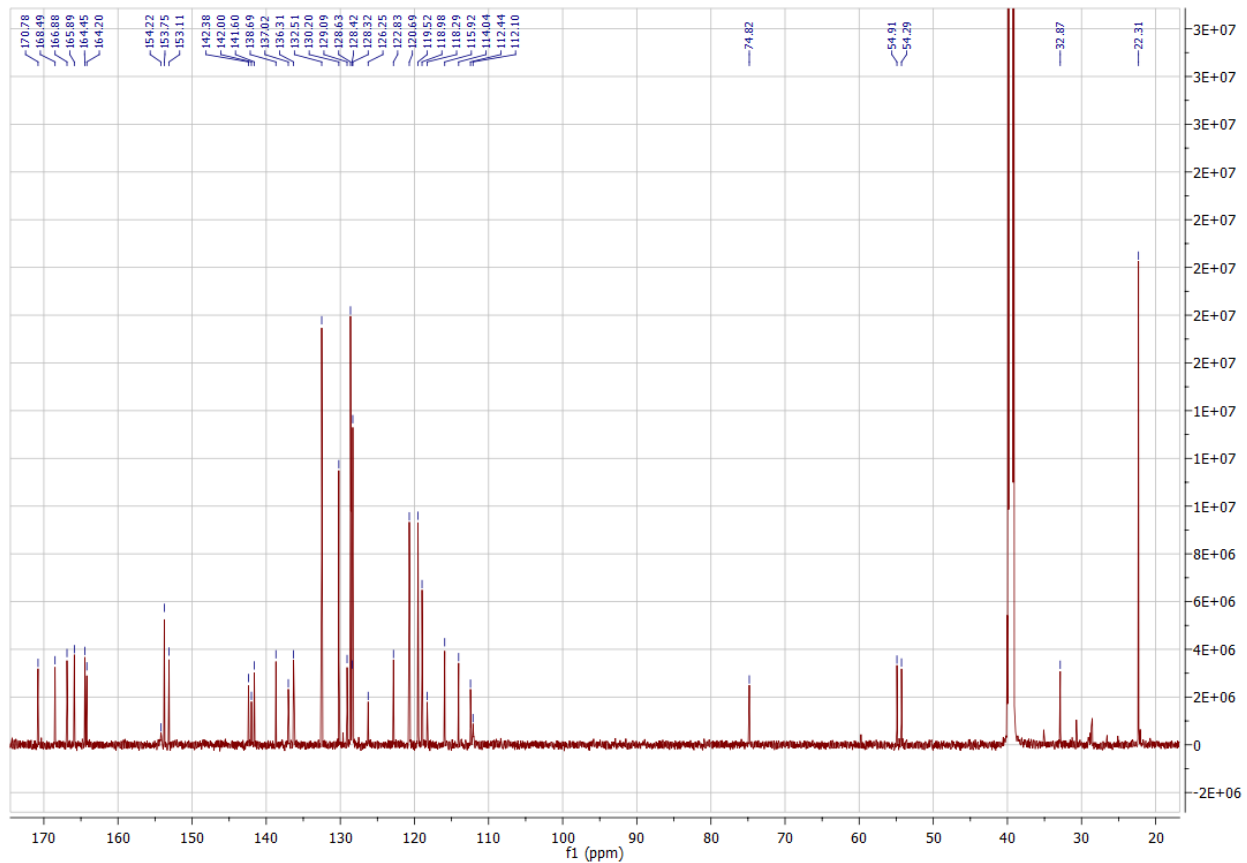
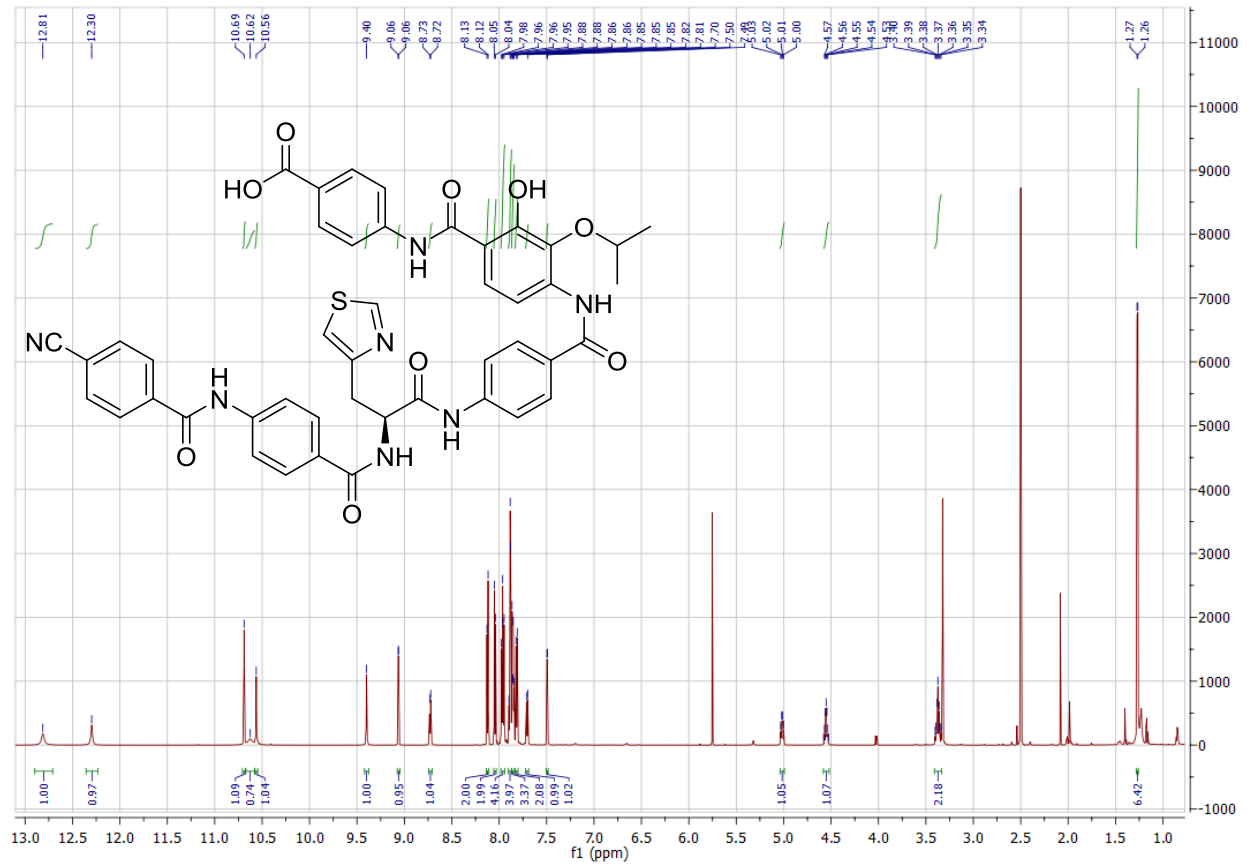
**(S)-4-(4-(4-(1-(4-(4-cyanobenzamido)benzoyl)piperidine-2-carboxamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (58)**



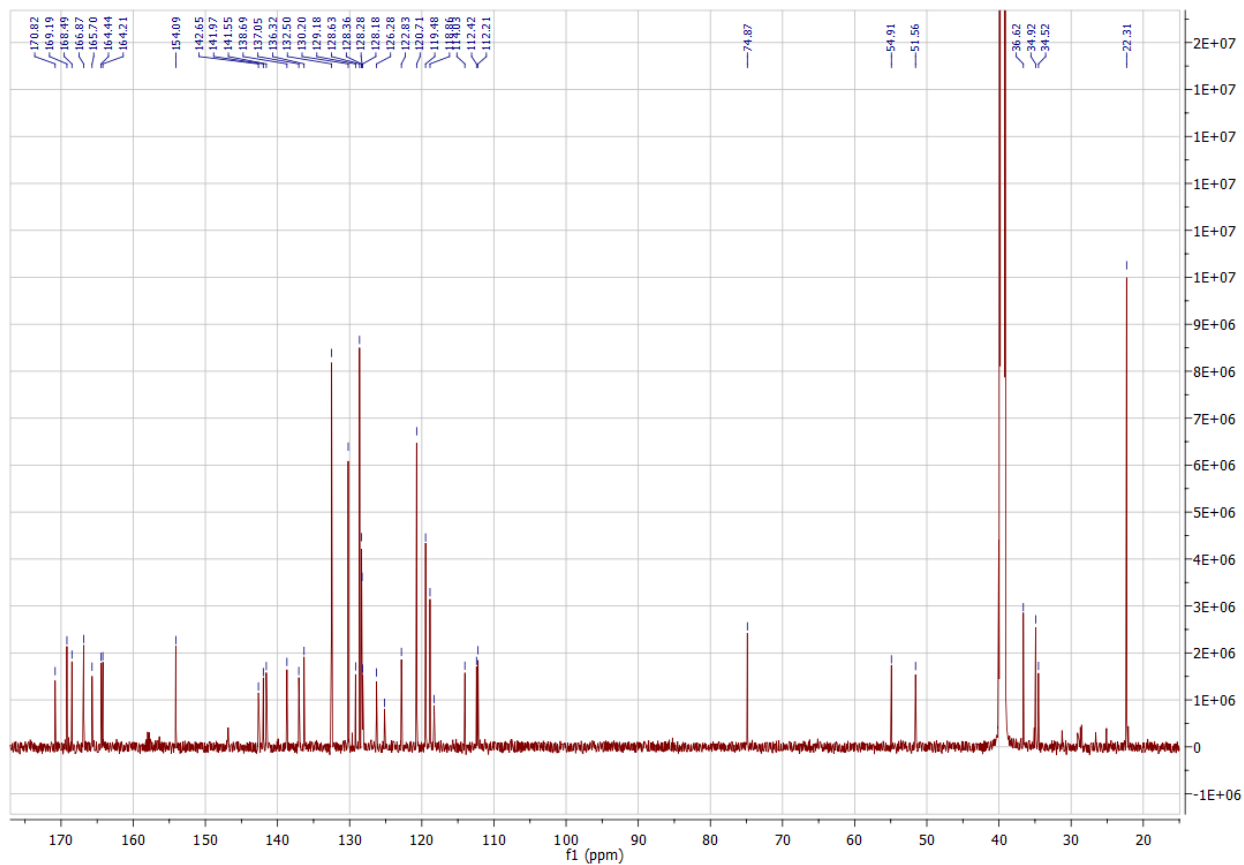
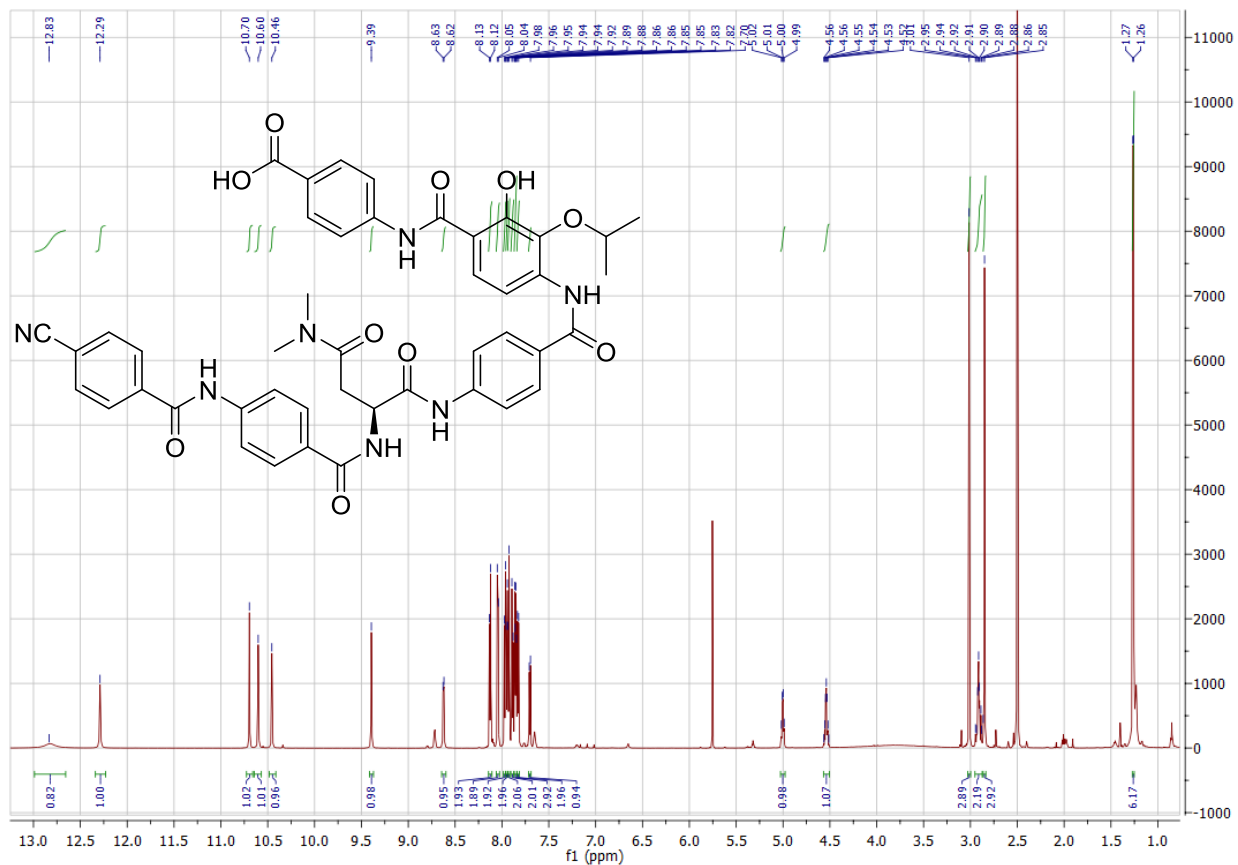
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (59)**



**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)-3-(thiazol-4-yl)propanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (60)**

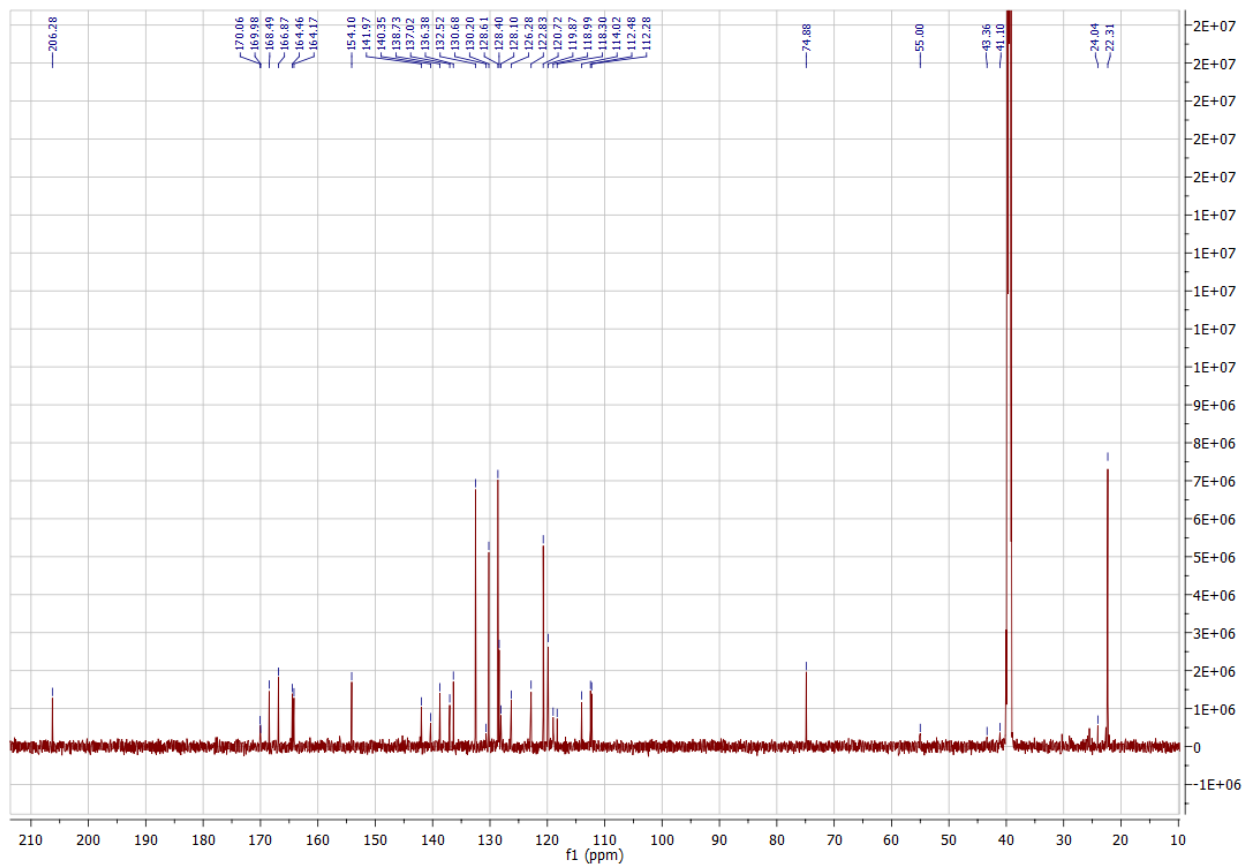
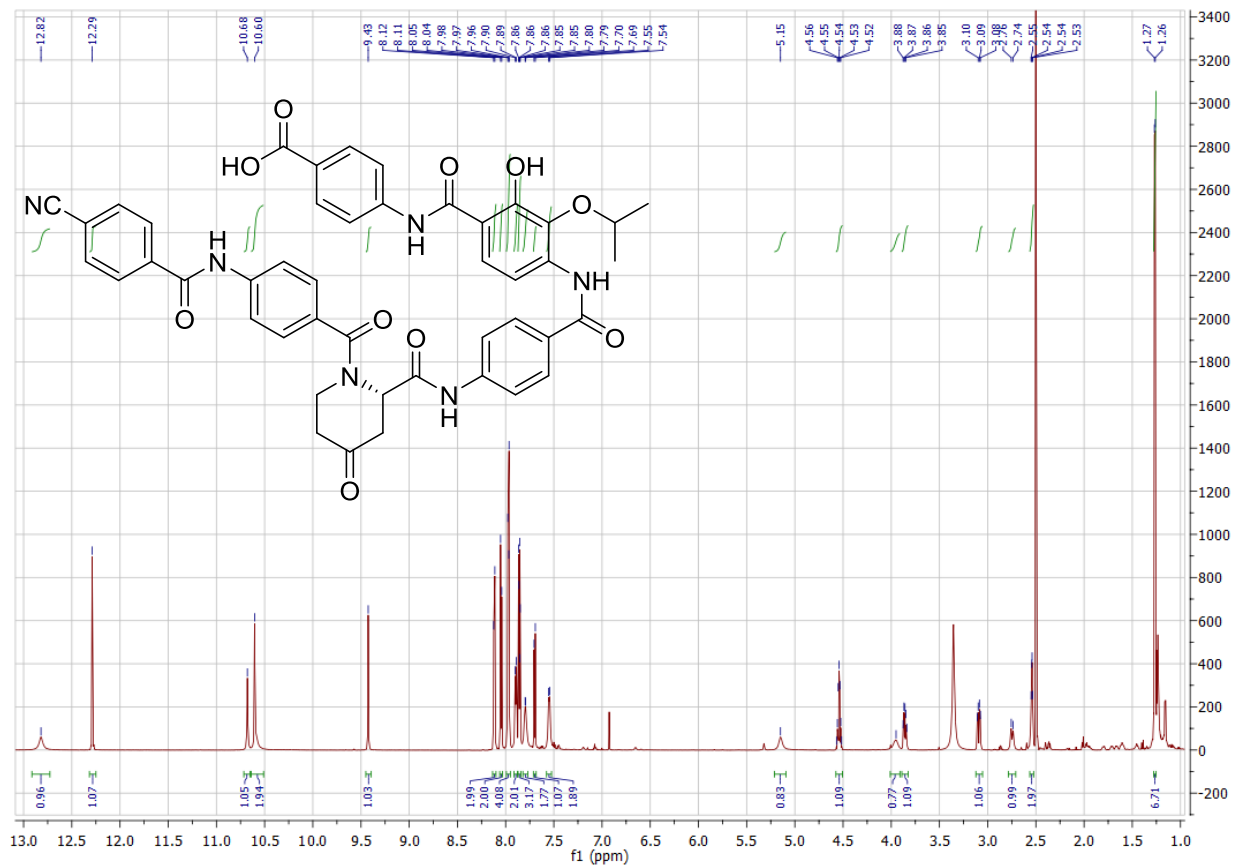


**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)-4-(dimethylamino)-4-oxobutanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (61)**

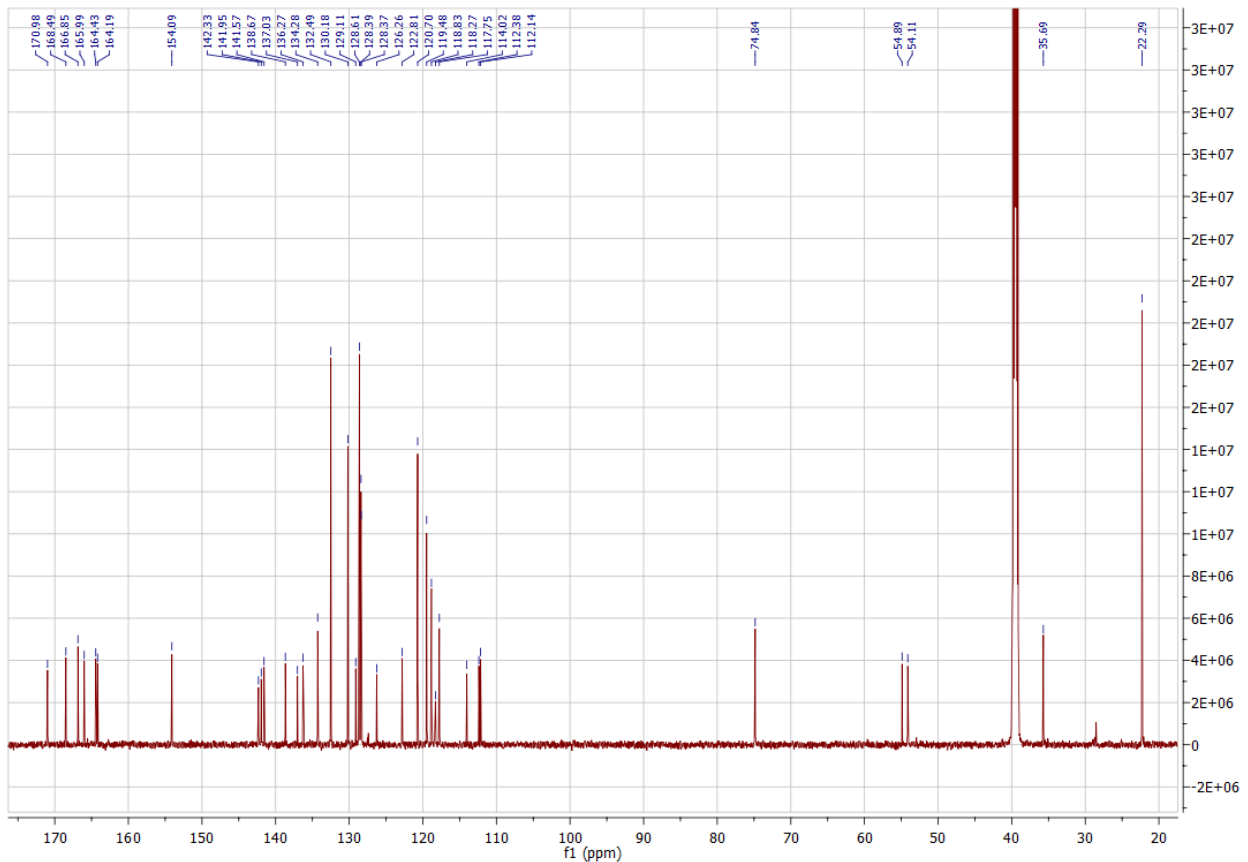
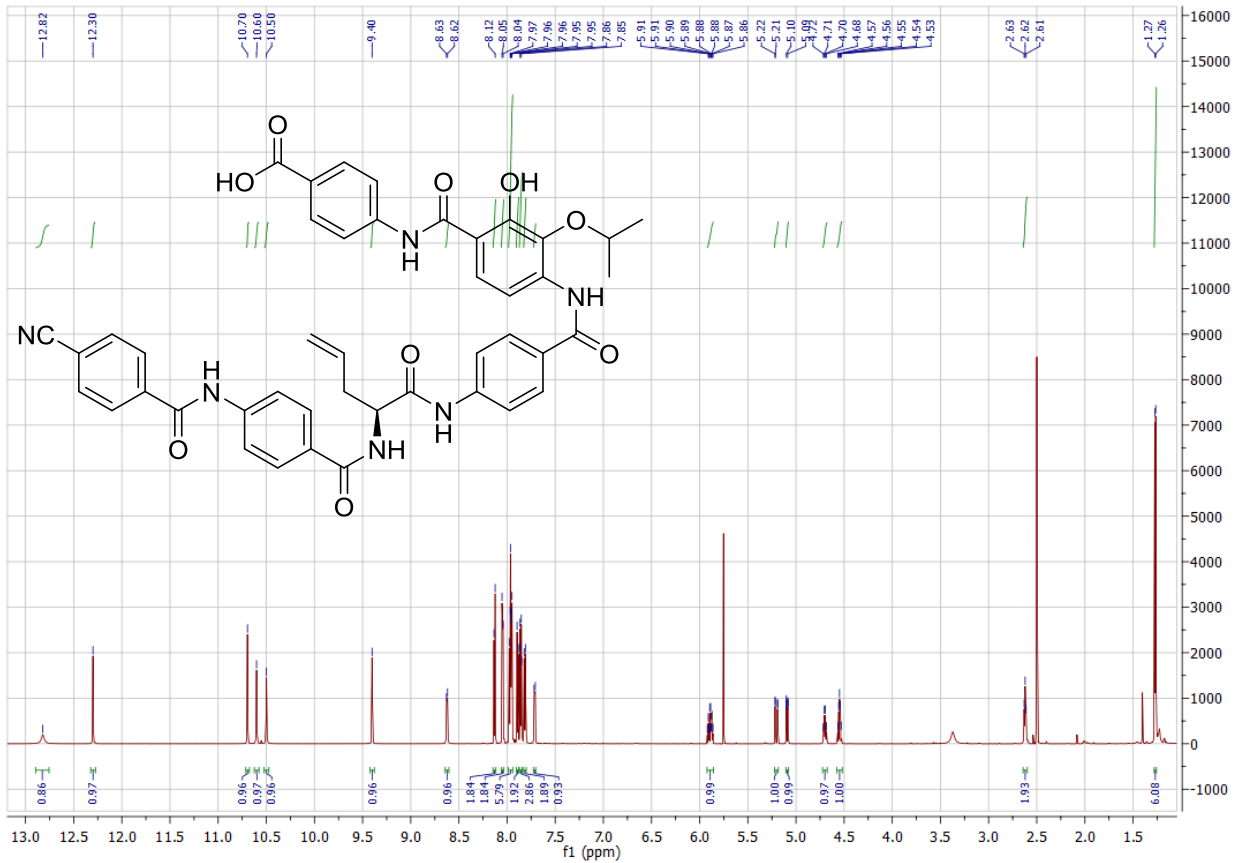




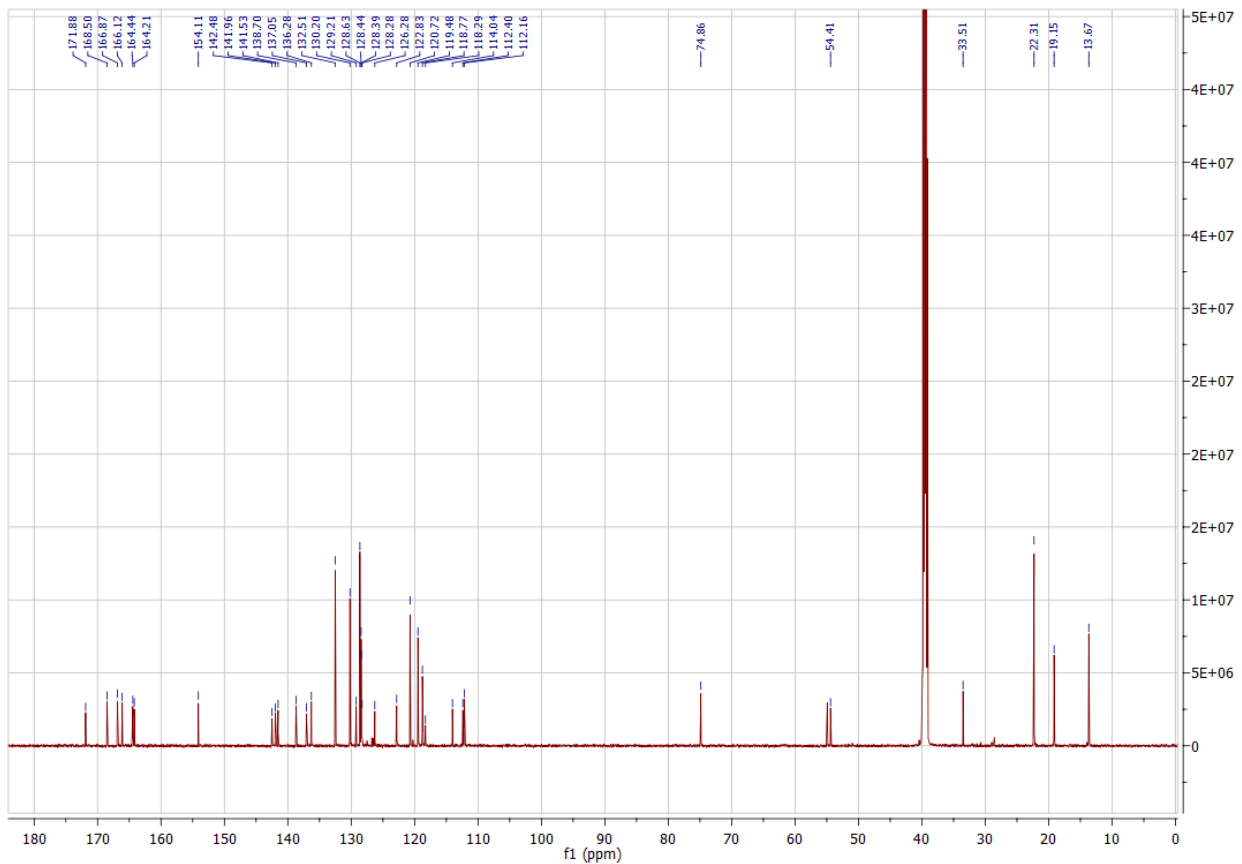
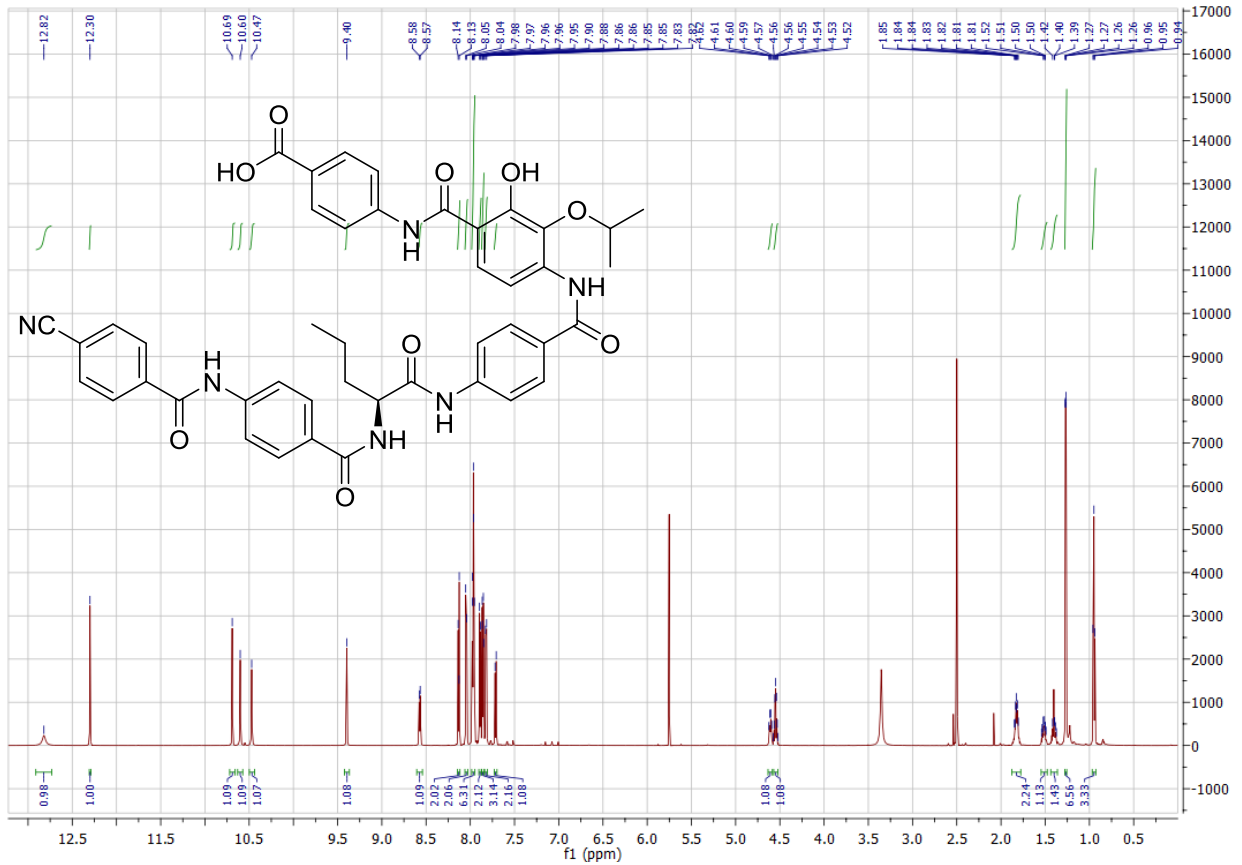
**(S)-4-(4-(4-(1-(4-(4-cyanobenzamido)benzoyl)-4-oxopiperidine-2-carboxamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (62)**



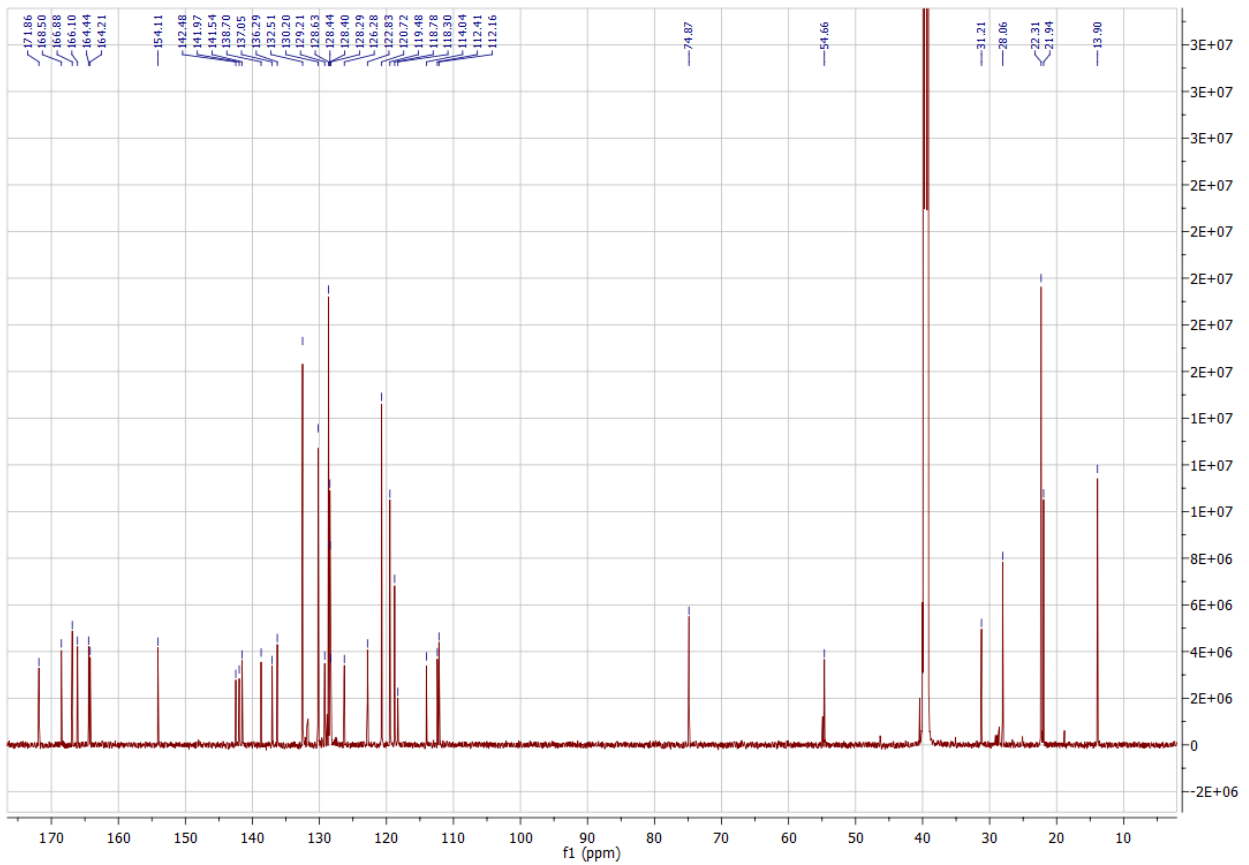
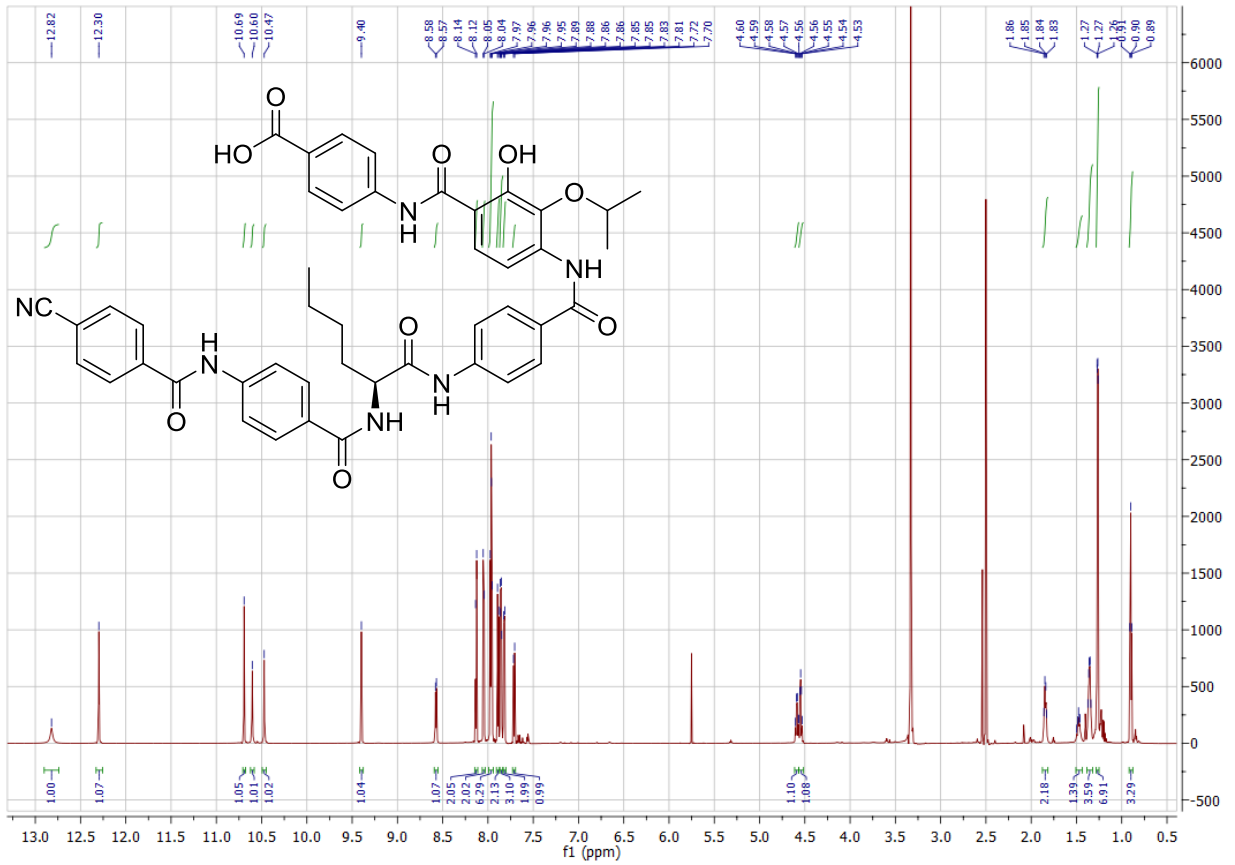
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-enamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (63)**



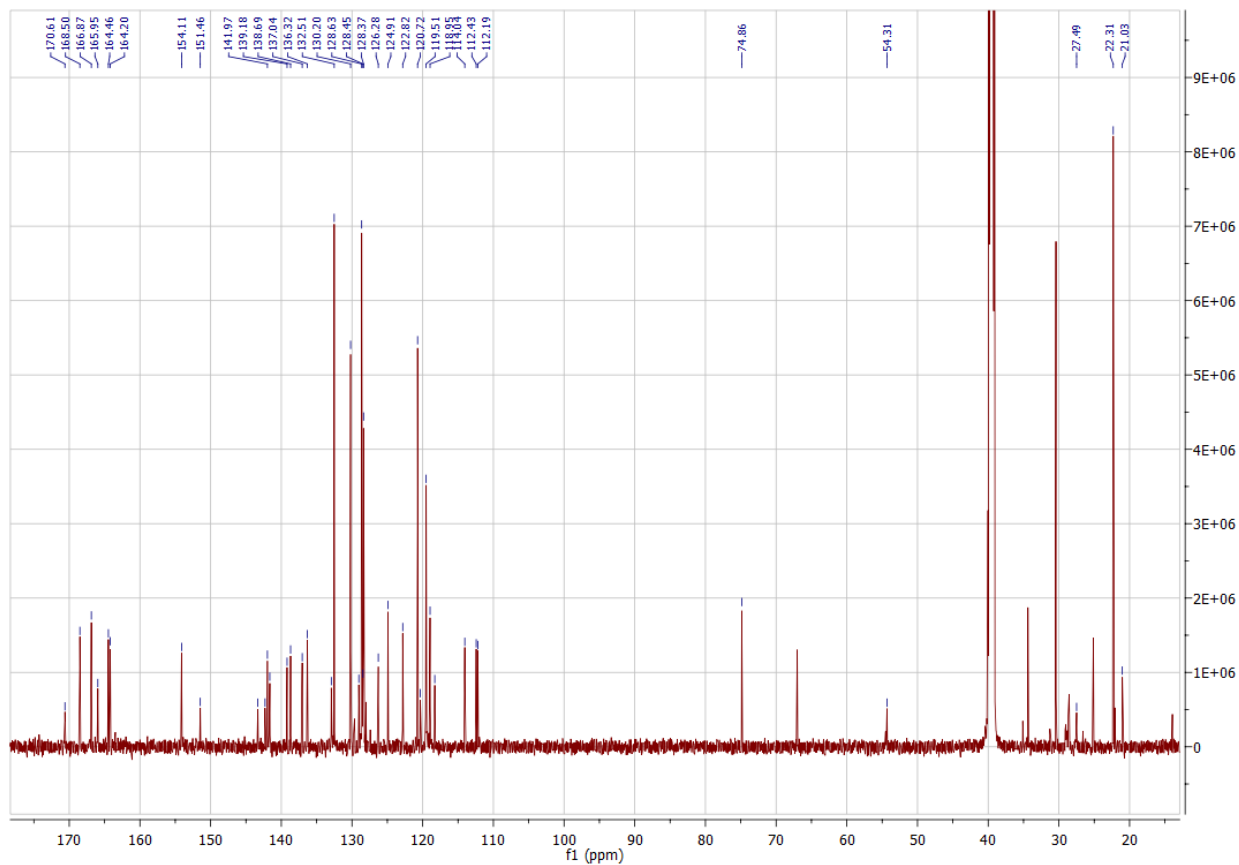
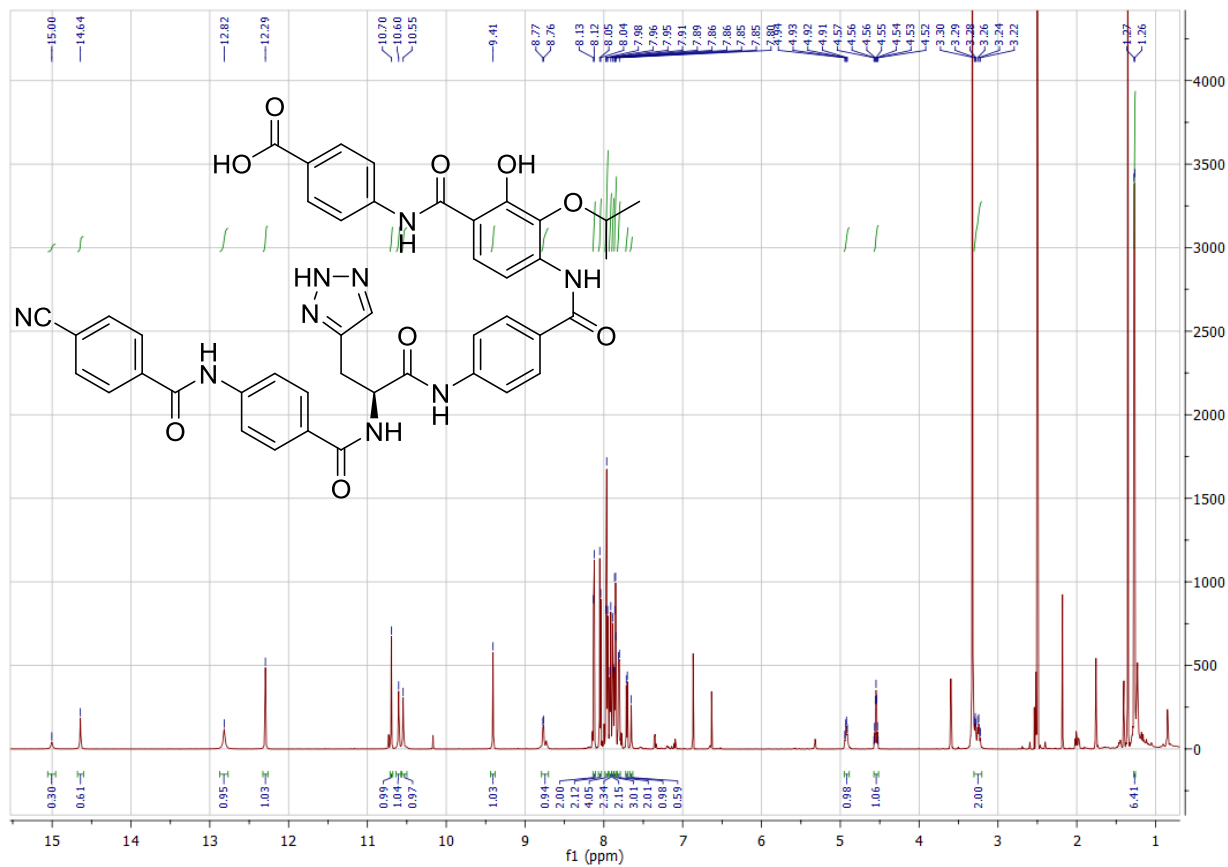
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)pentanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (64)**



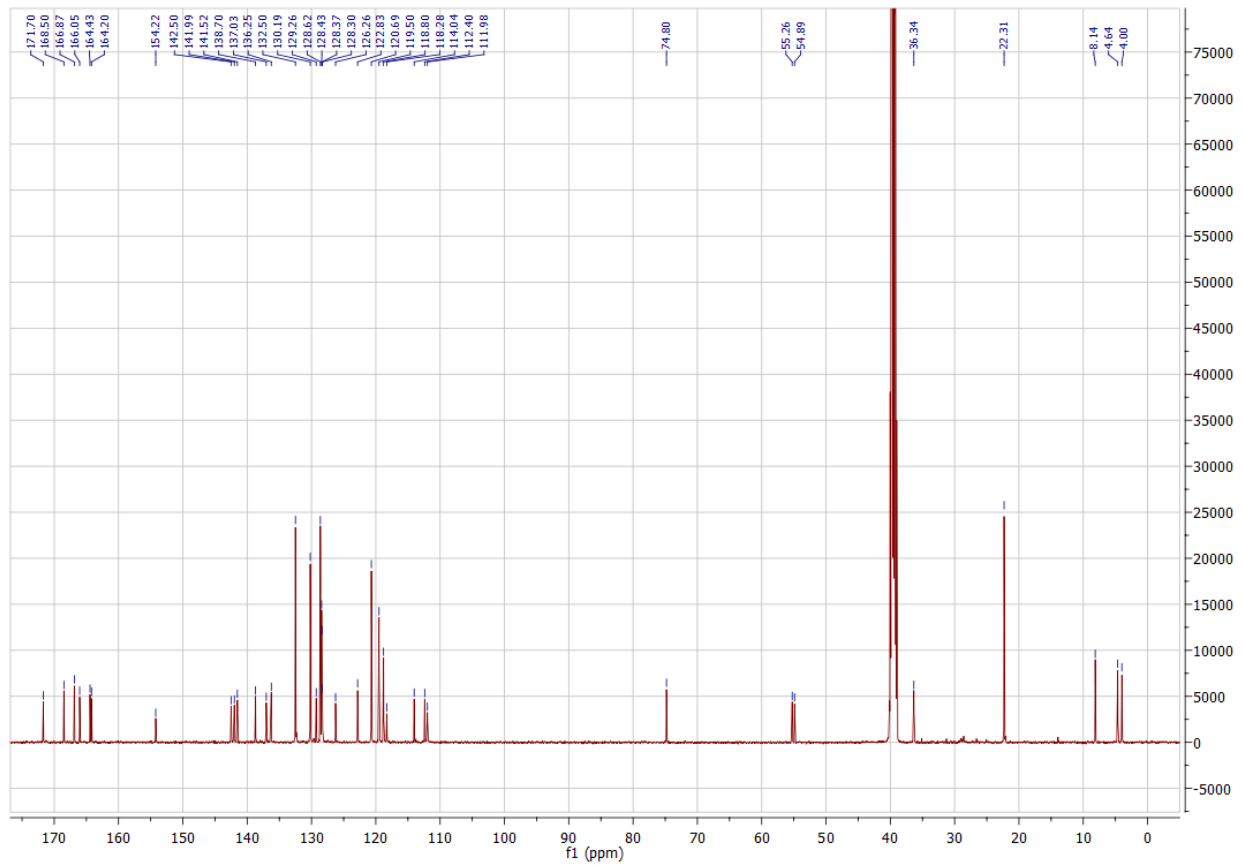
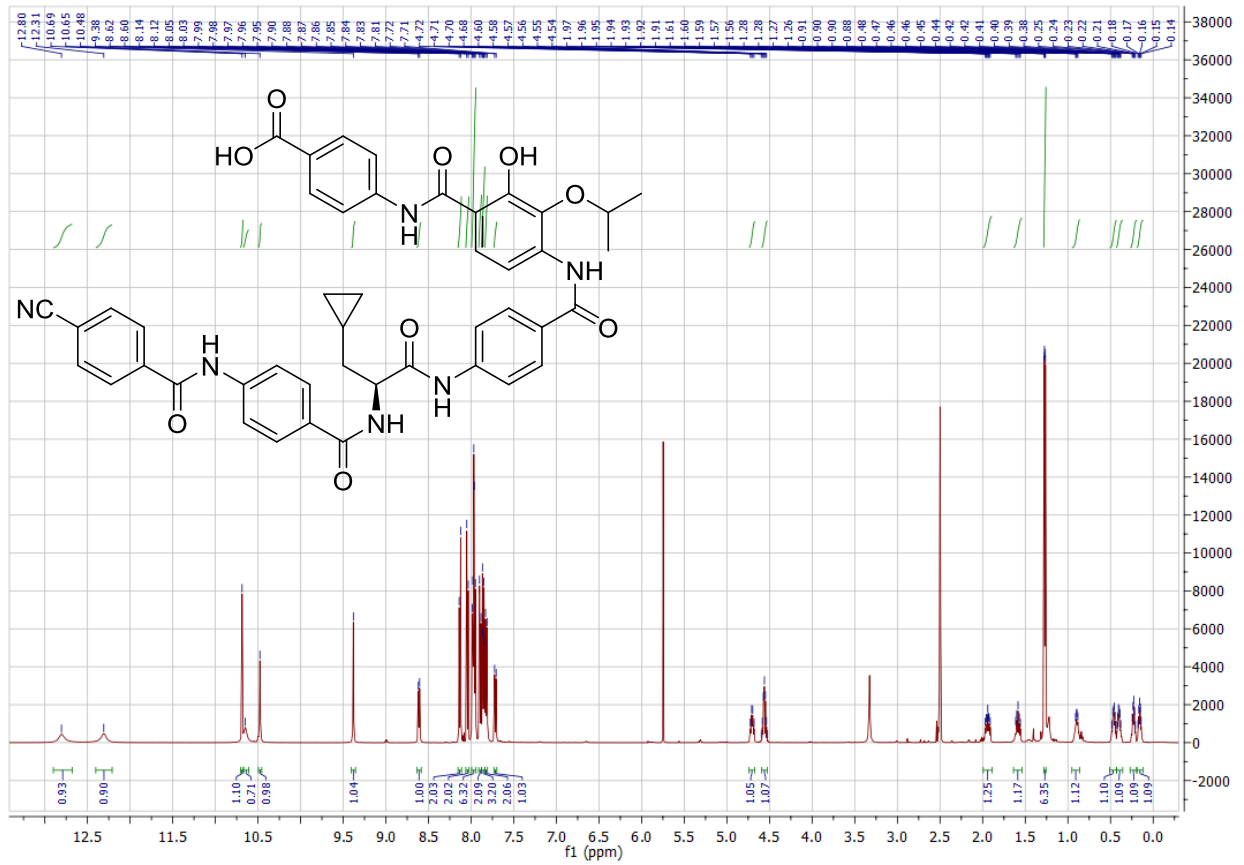
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)hexanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (65)**



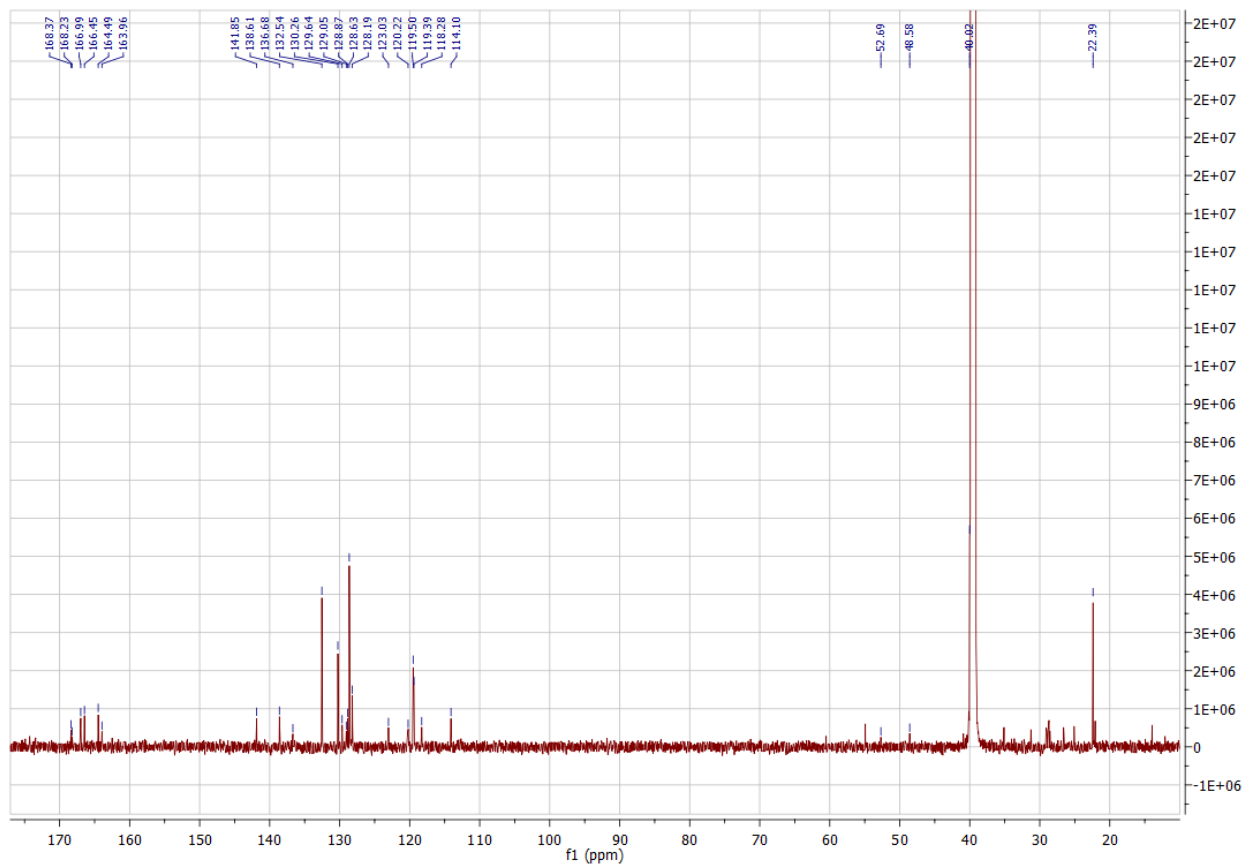
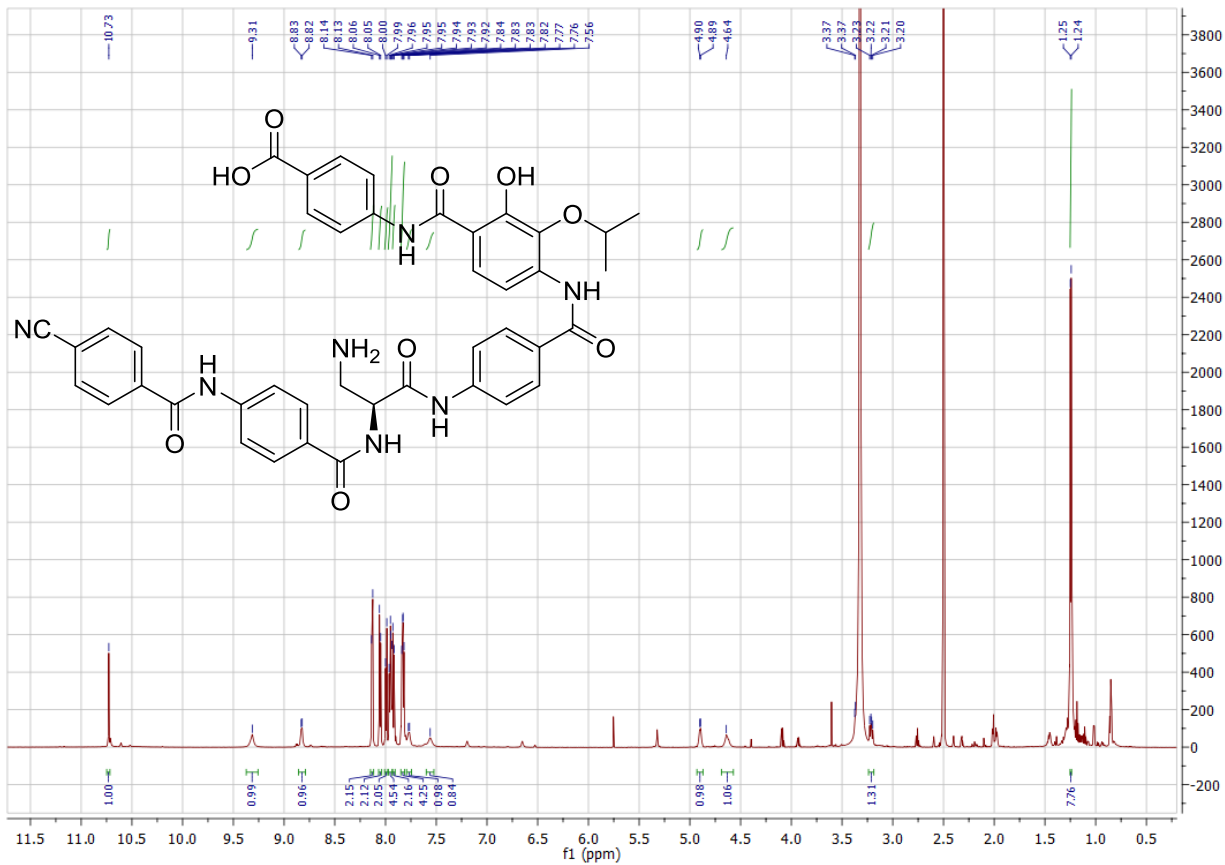
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)-3-(1,2,3-triazol-5-yl)propanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (66)**



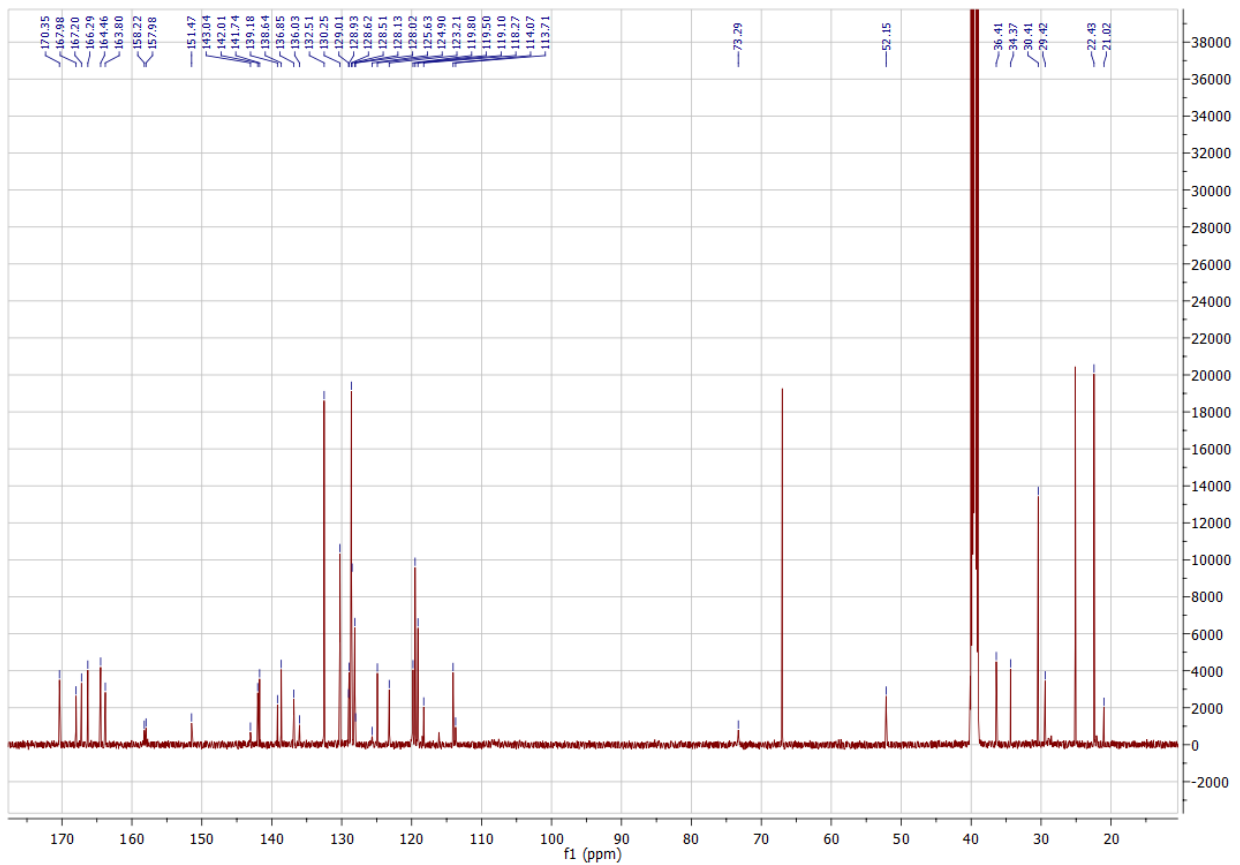
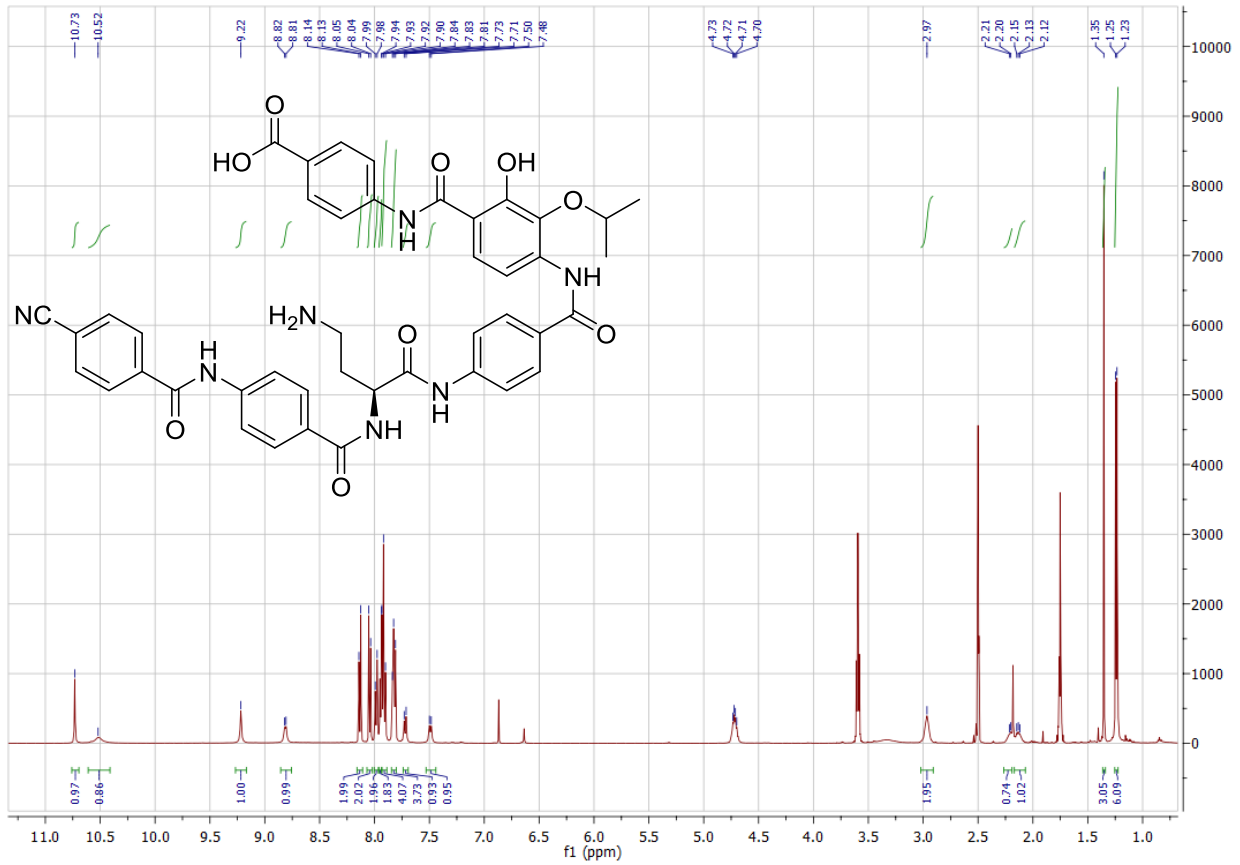
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)-3-cyclopropylpropanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (67)**



**(S)-4-(4-(4-(3-amino-2-(4-(4-cyanobenzamido)benzamido)propanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (68)**

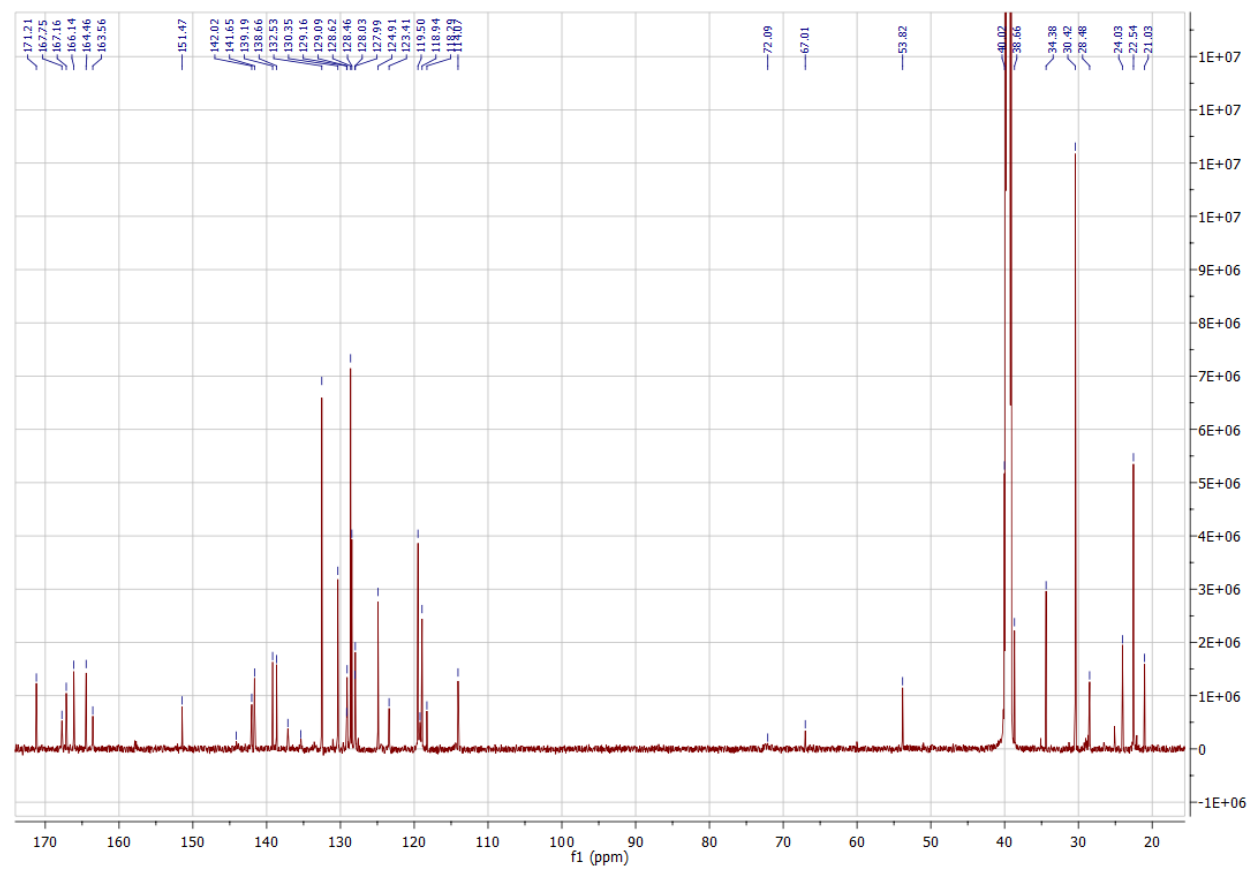
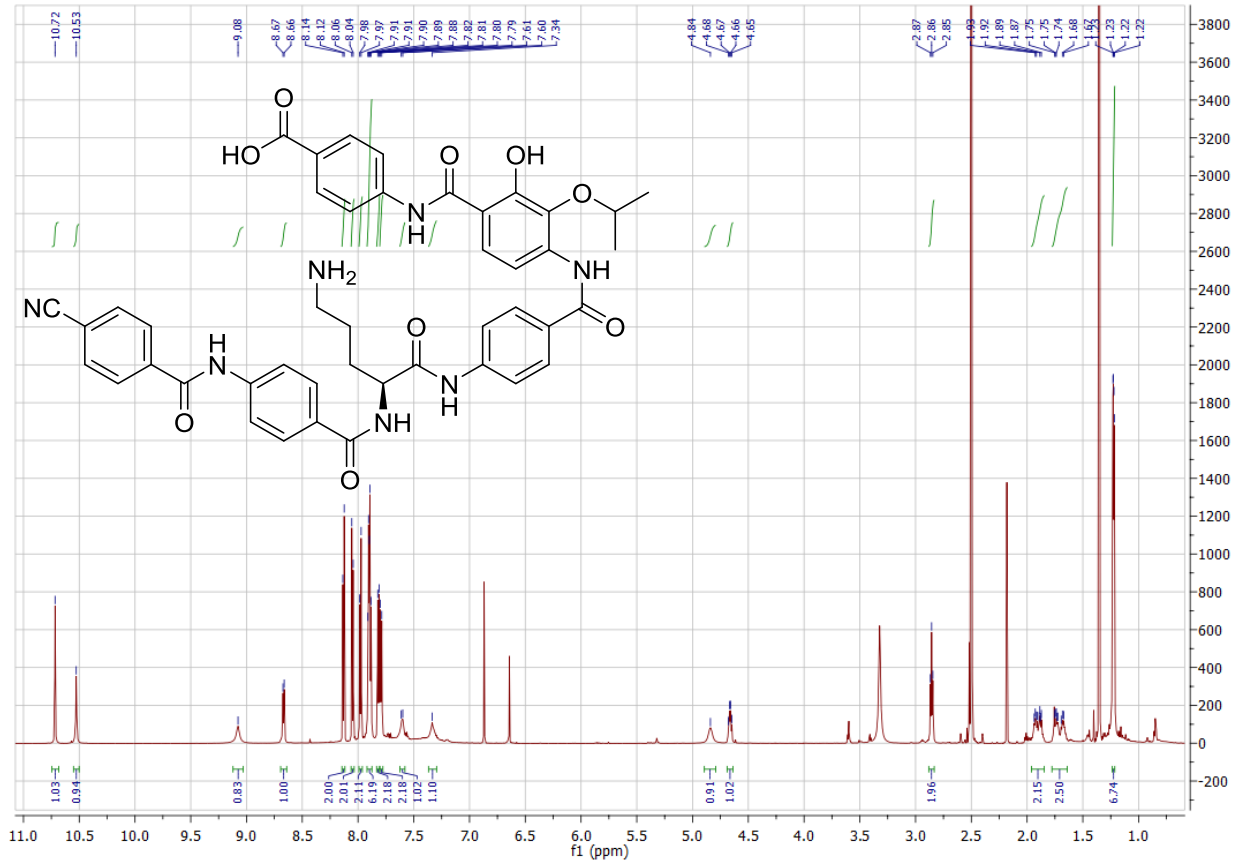


**(S)-4-(4-(4-(4-amino-2-(4-(4-cyanobenzamido)benzamido)butanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (69)**

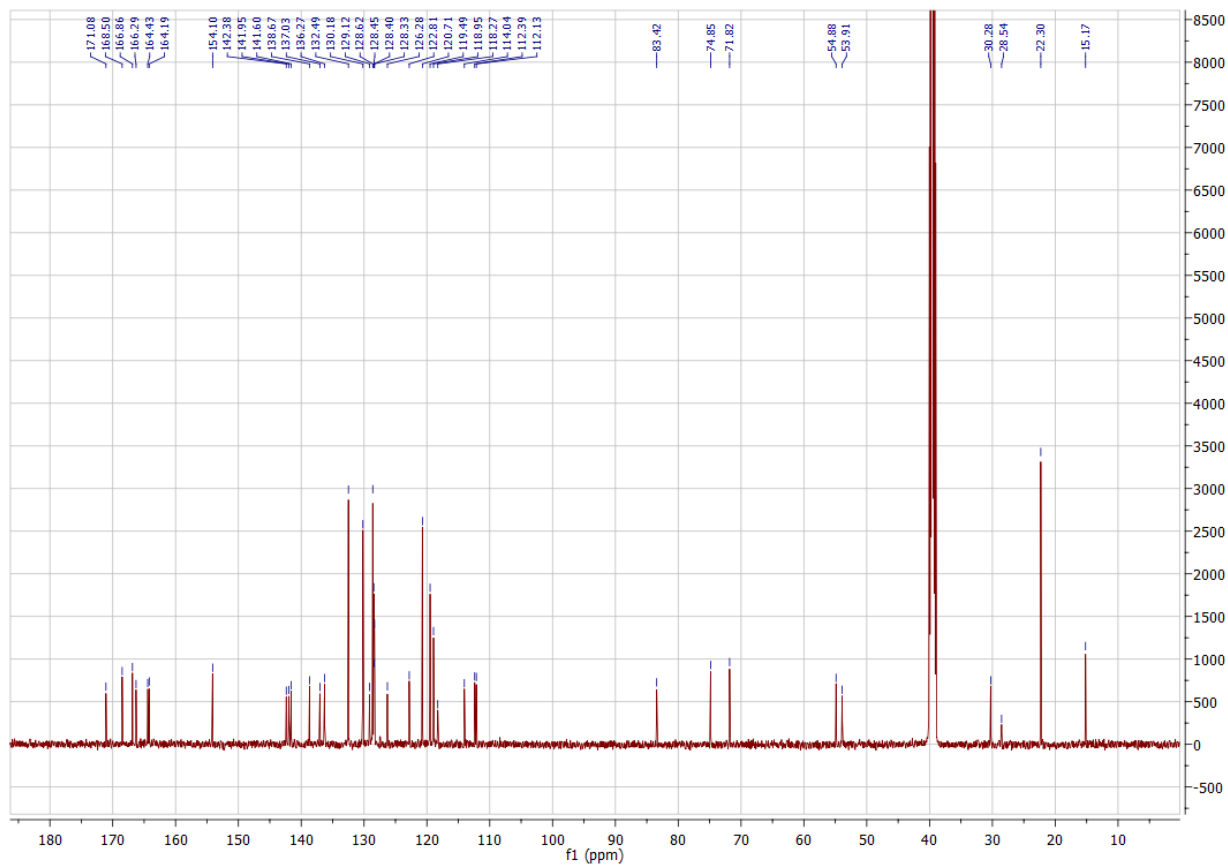
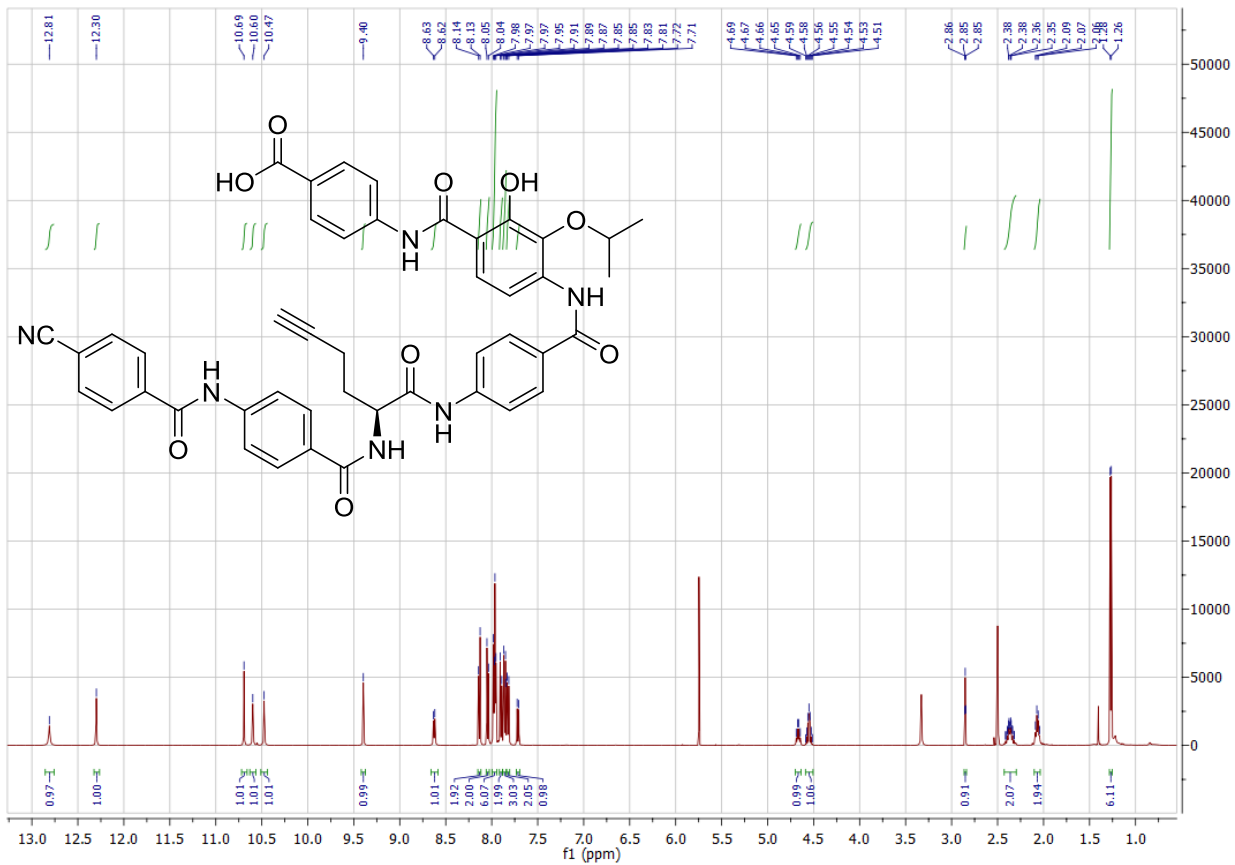




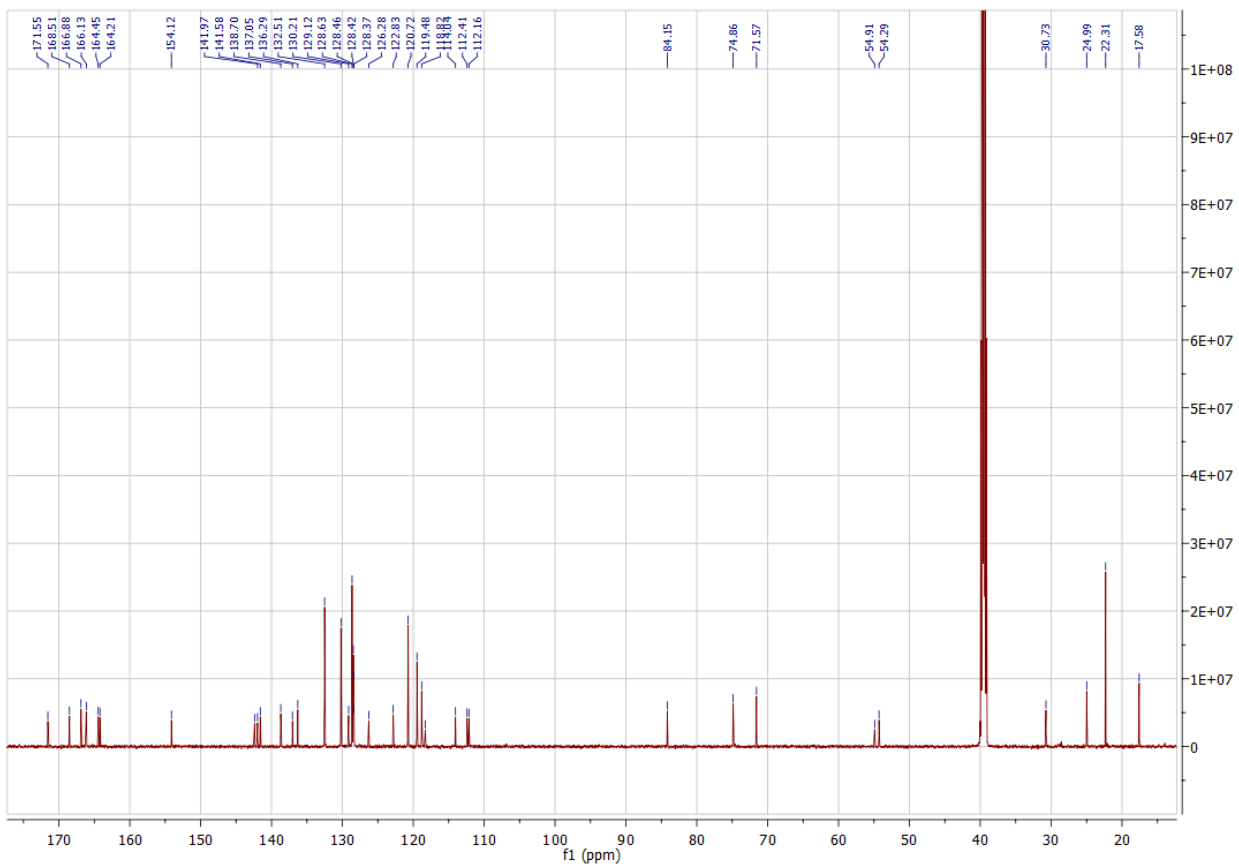
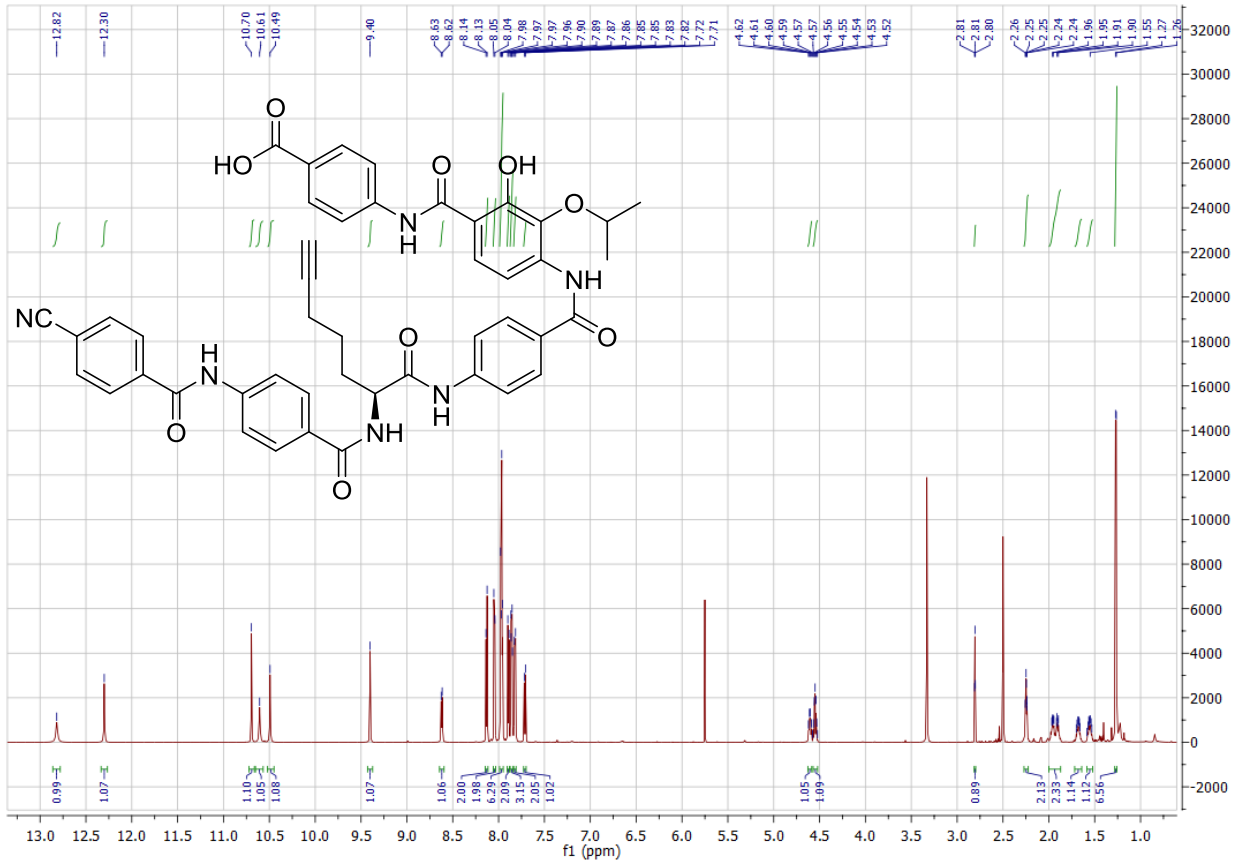
**(S)-4-(4-(4-(5-amino-2-(4-(4-cyanobenzamido)benzamido)pentanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (70)**



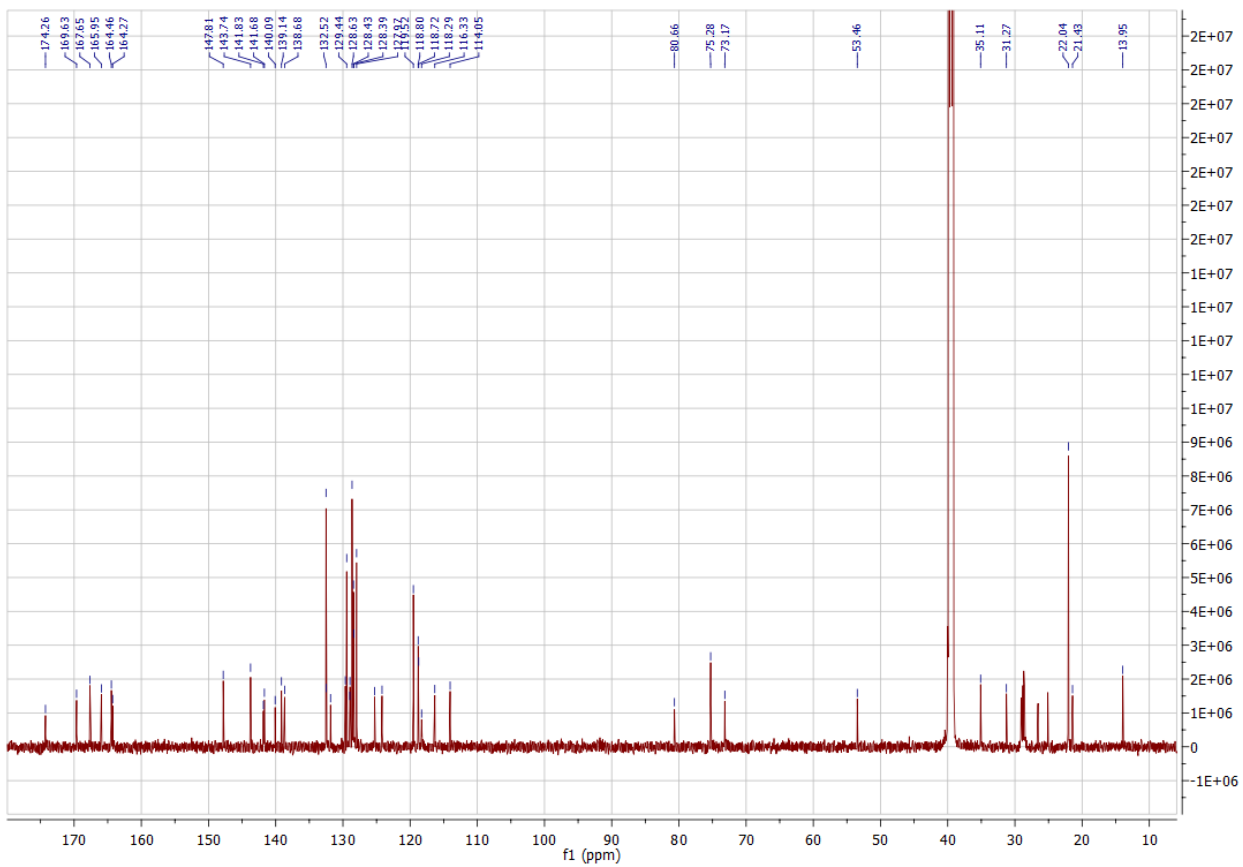
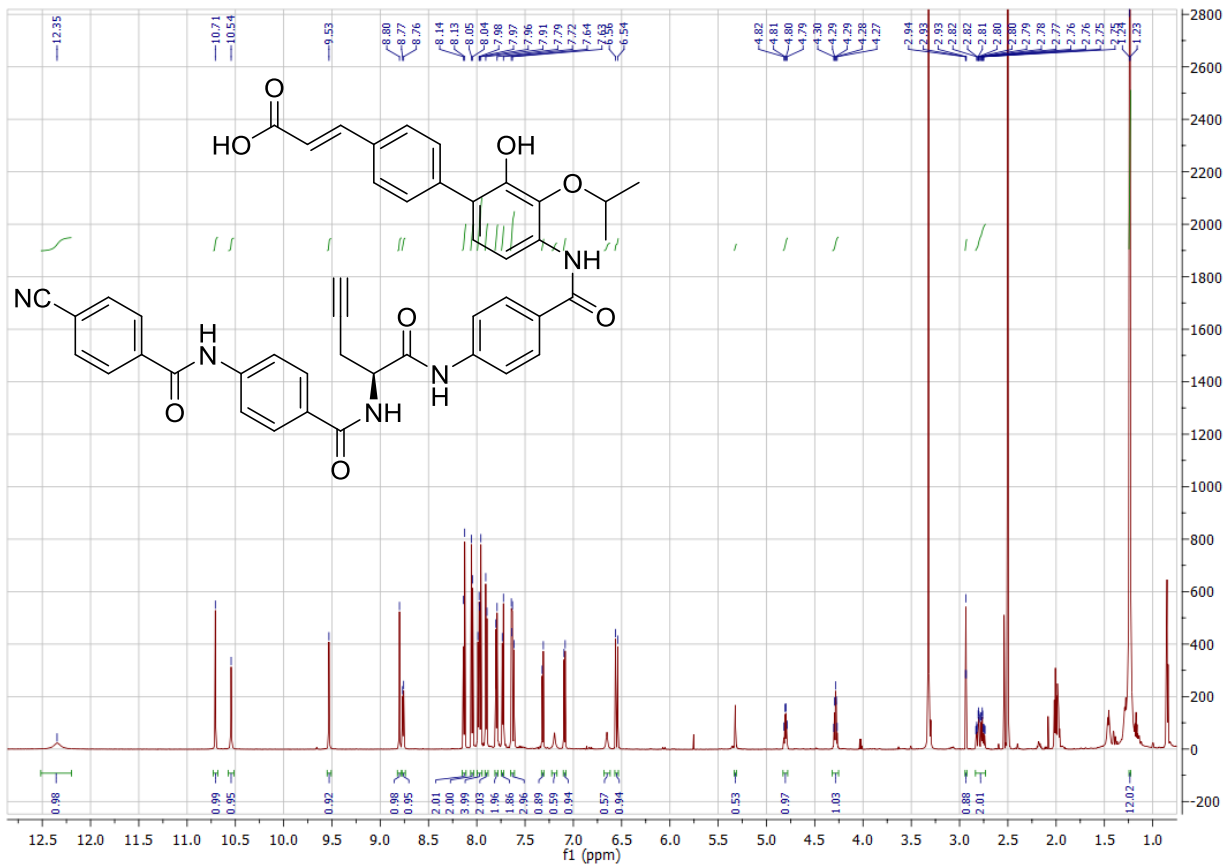
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)hex-5-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (71)**



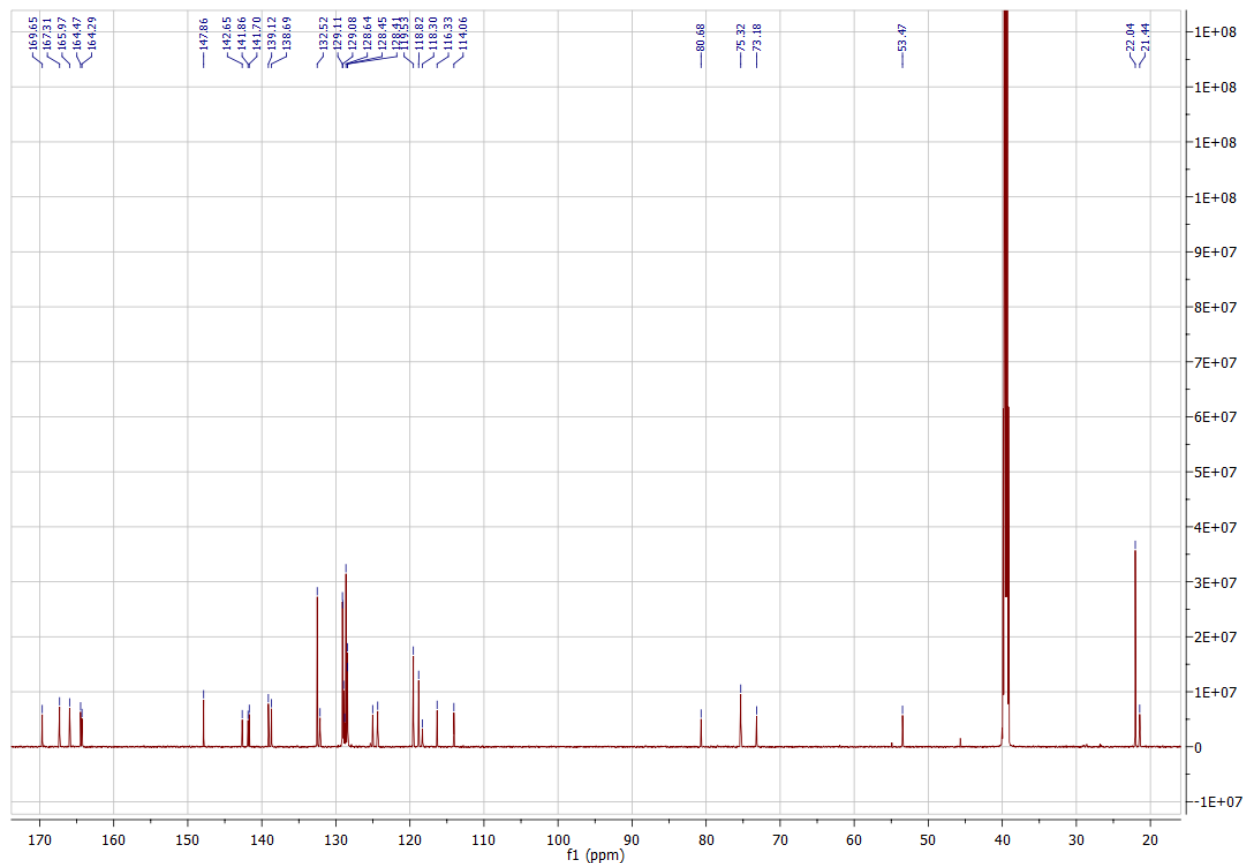
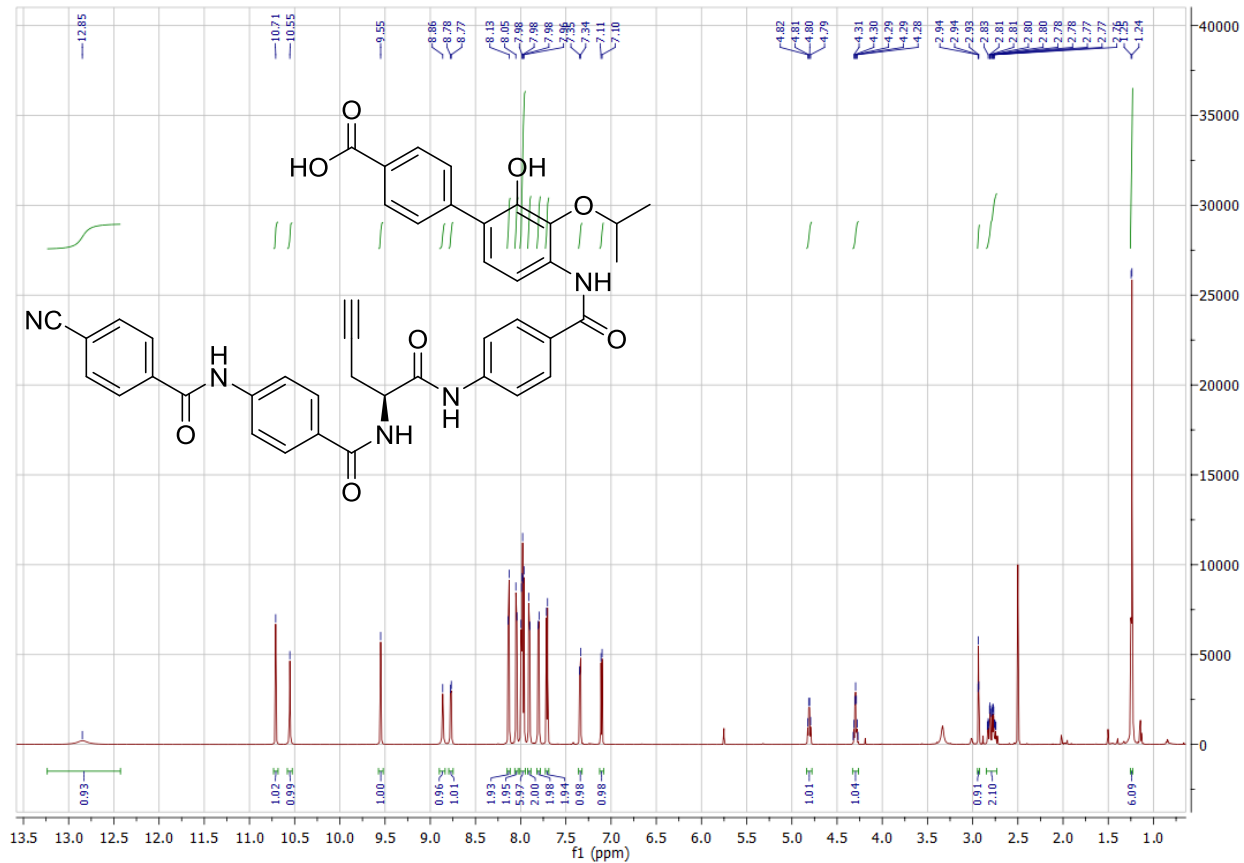
**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)hept-6-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (72)**



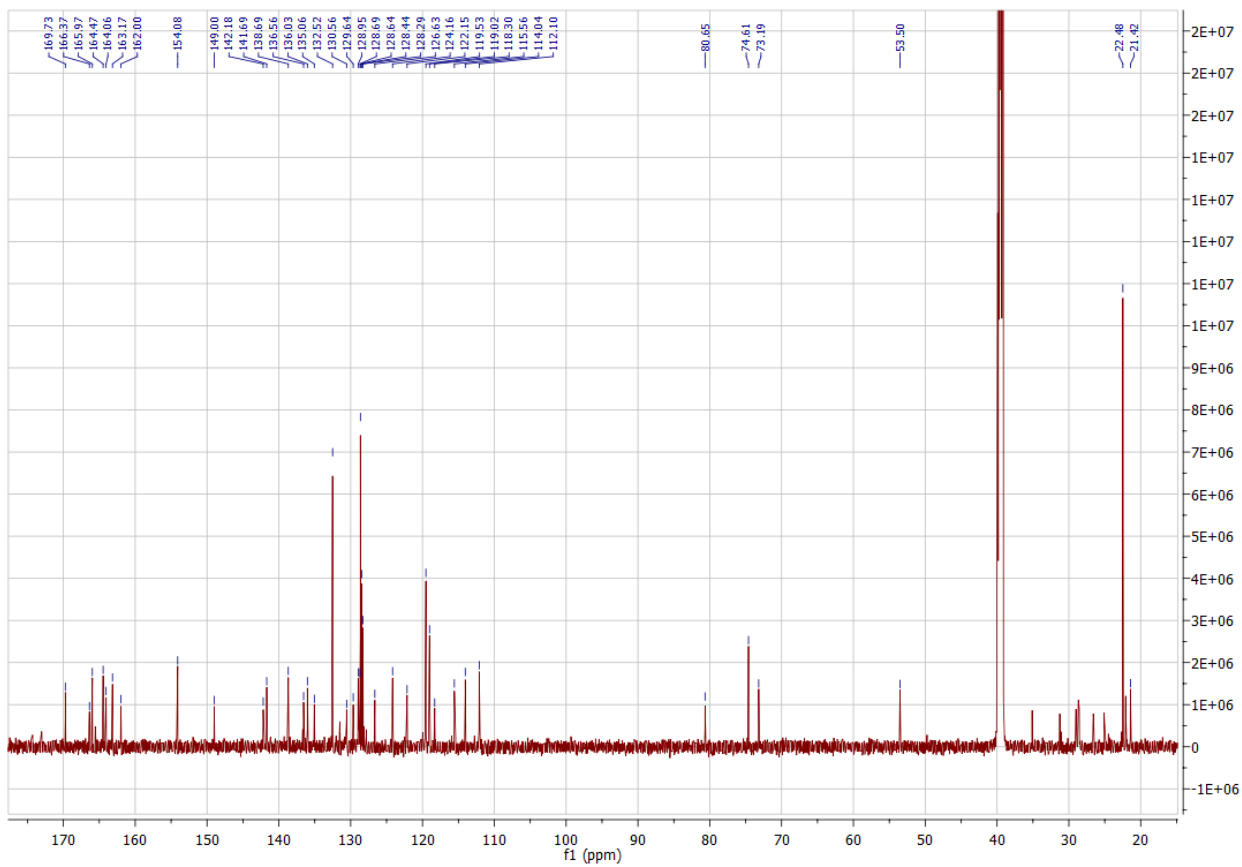
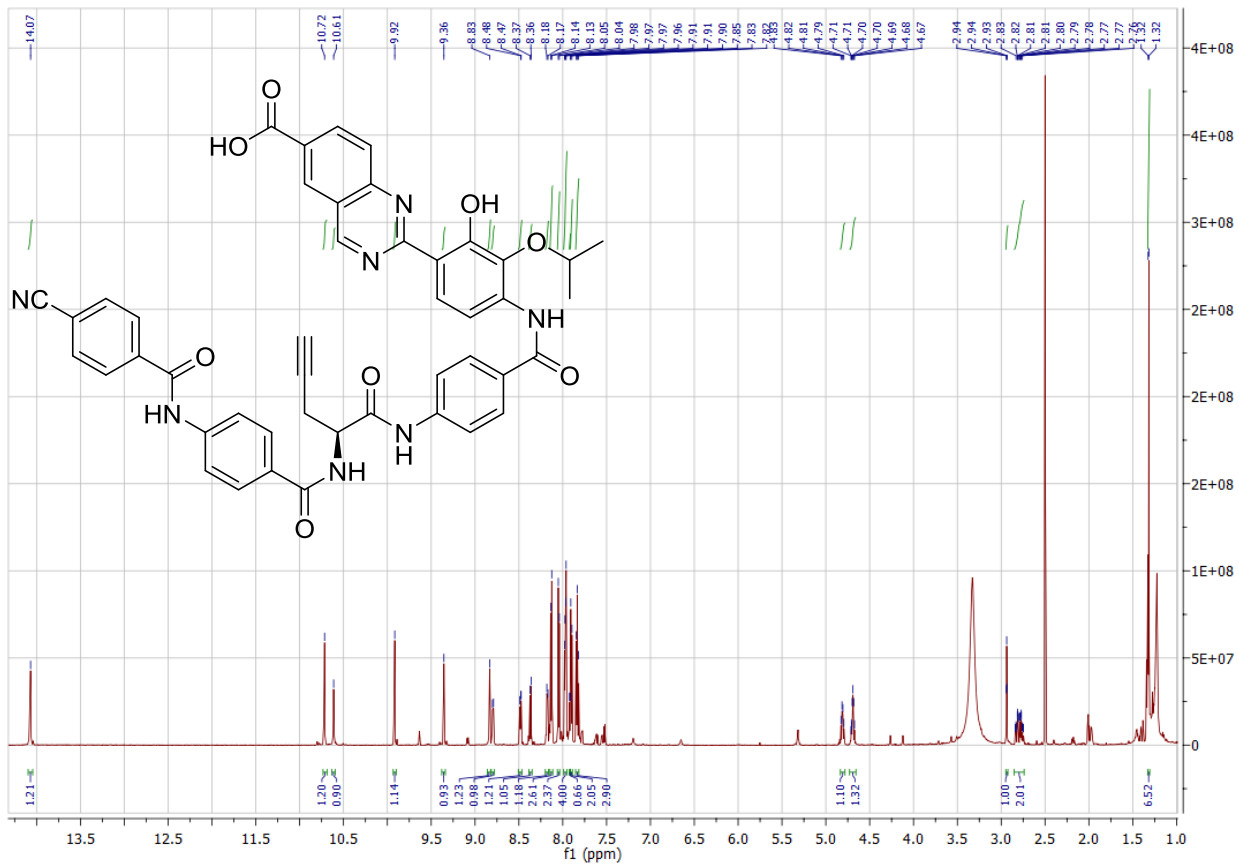
**(S,E)-3-(4'-(4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)benzamido)-2'-hydroxy-3'-isopropoxy-[1,1'-biphenyl]-4-yl)acrylic acid (88)**



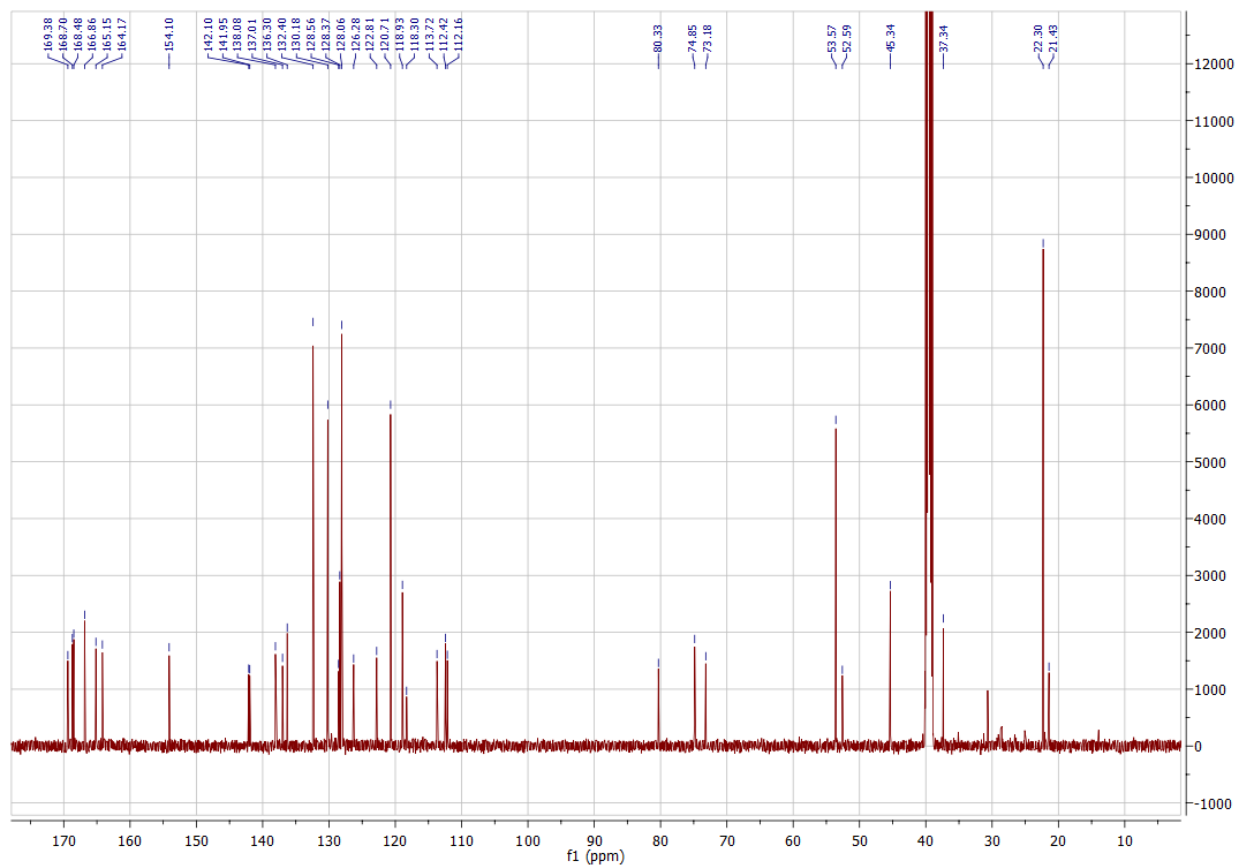
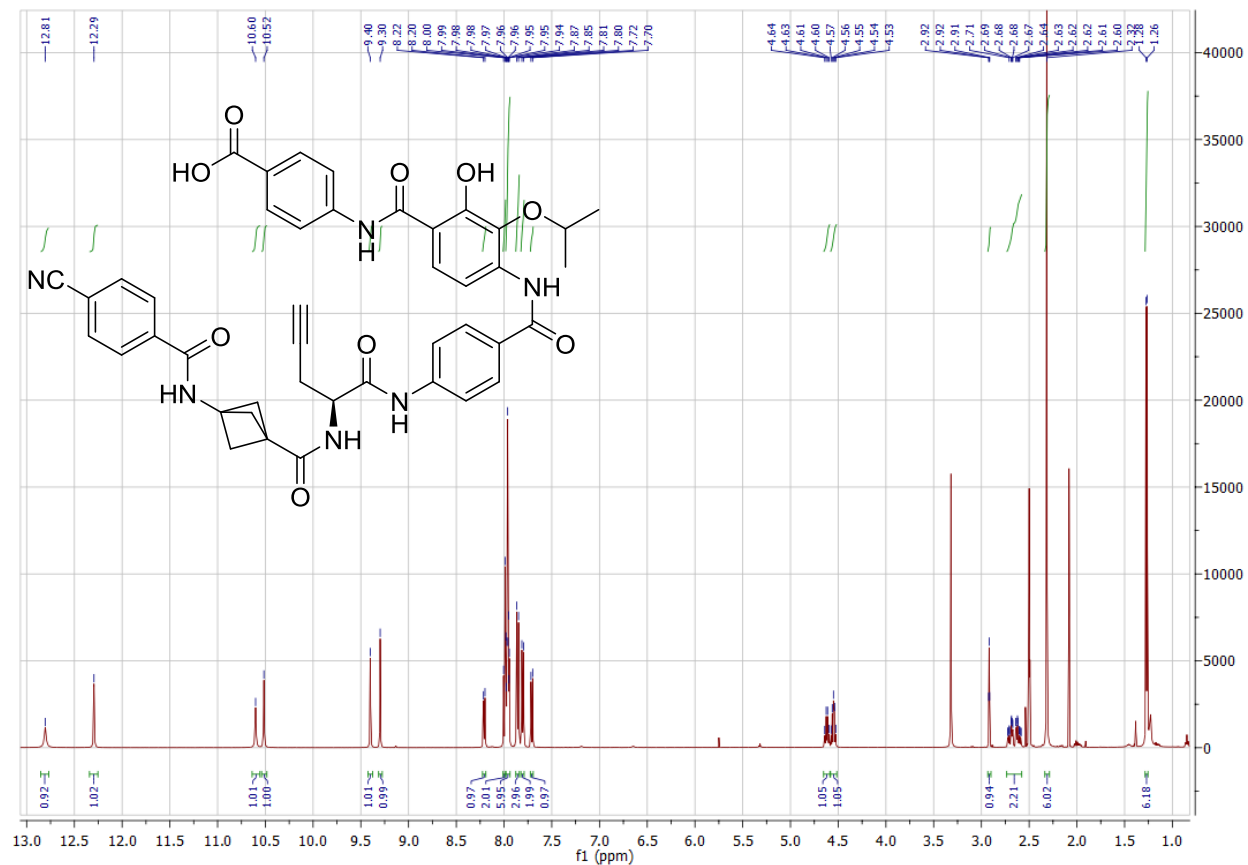
**(S)-4'-(4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)benzamido)-2'-hydroxy-3'-isopropoxy-[1,1'-biphenyl]-4-carboxylic acid (89)**



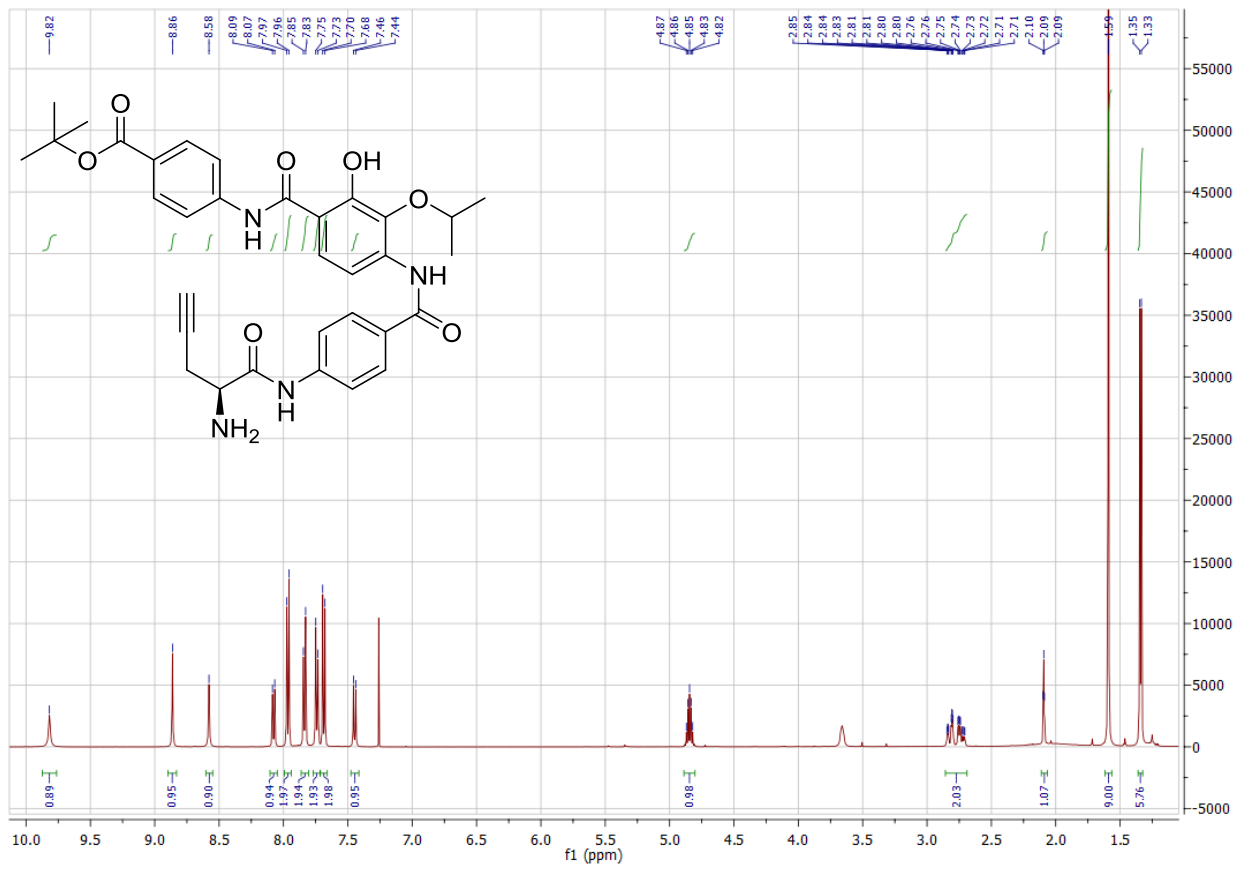
**(S)-2-(4-(4-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxyphenyl)quinazoline-6-carboxylic acid (90)**



**(S)-4-(4-(4-(2-(3-(4-cyanobenzamido)bicyclo[1.1.1]pentane-1-carboxamido)pent-4-ynamido)-benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (99)**

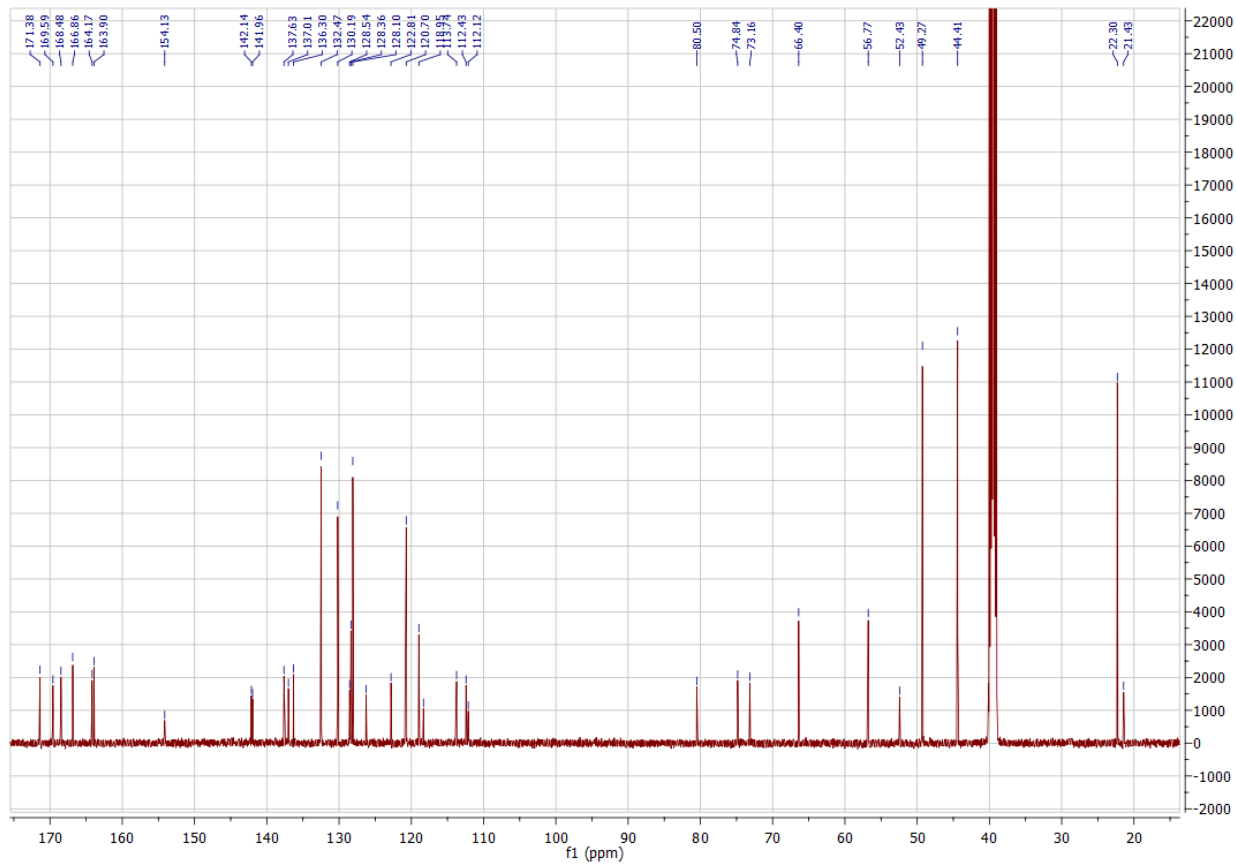
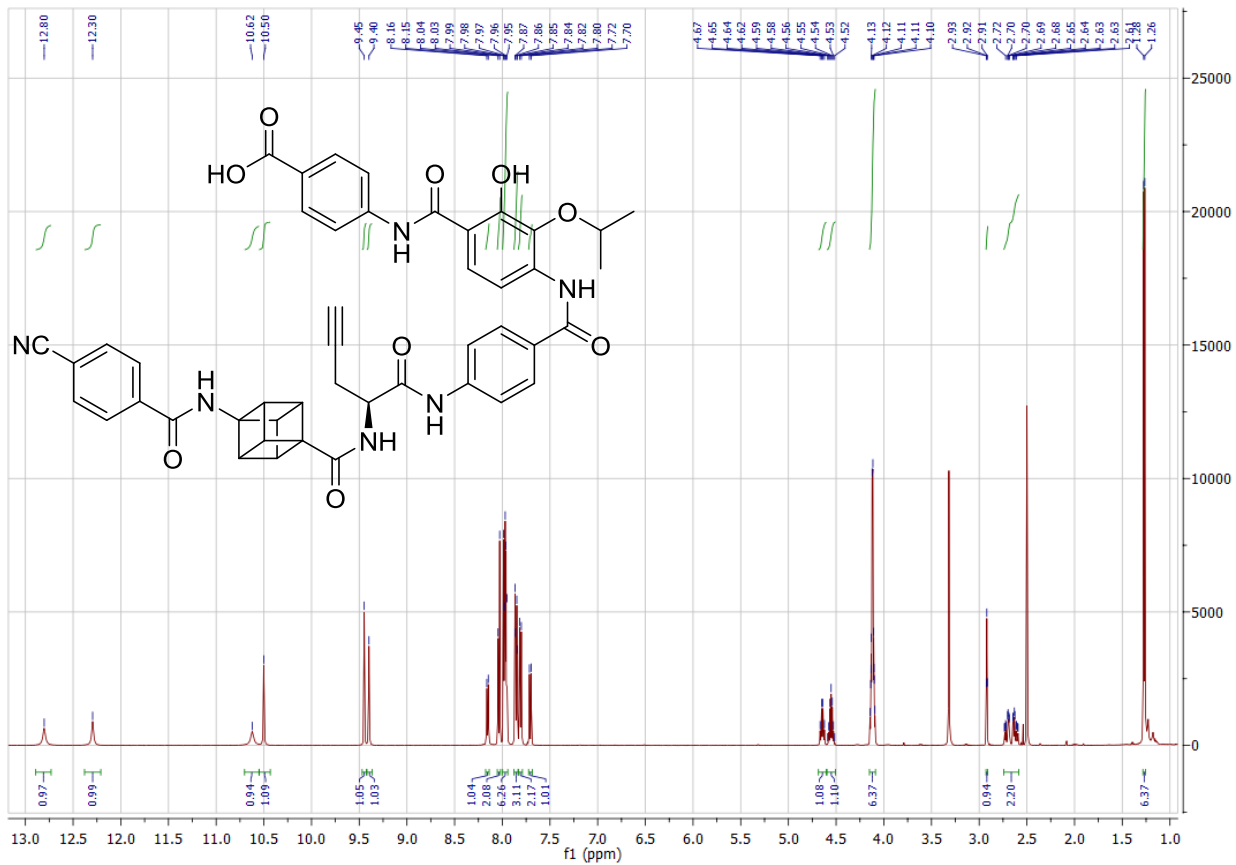


***tert*-Butyl (S)-4-(4-(4-(2-aminopent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)-benzoate**

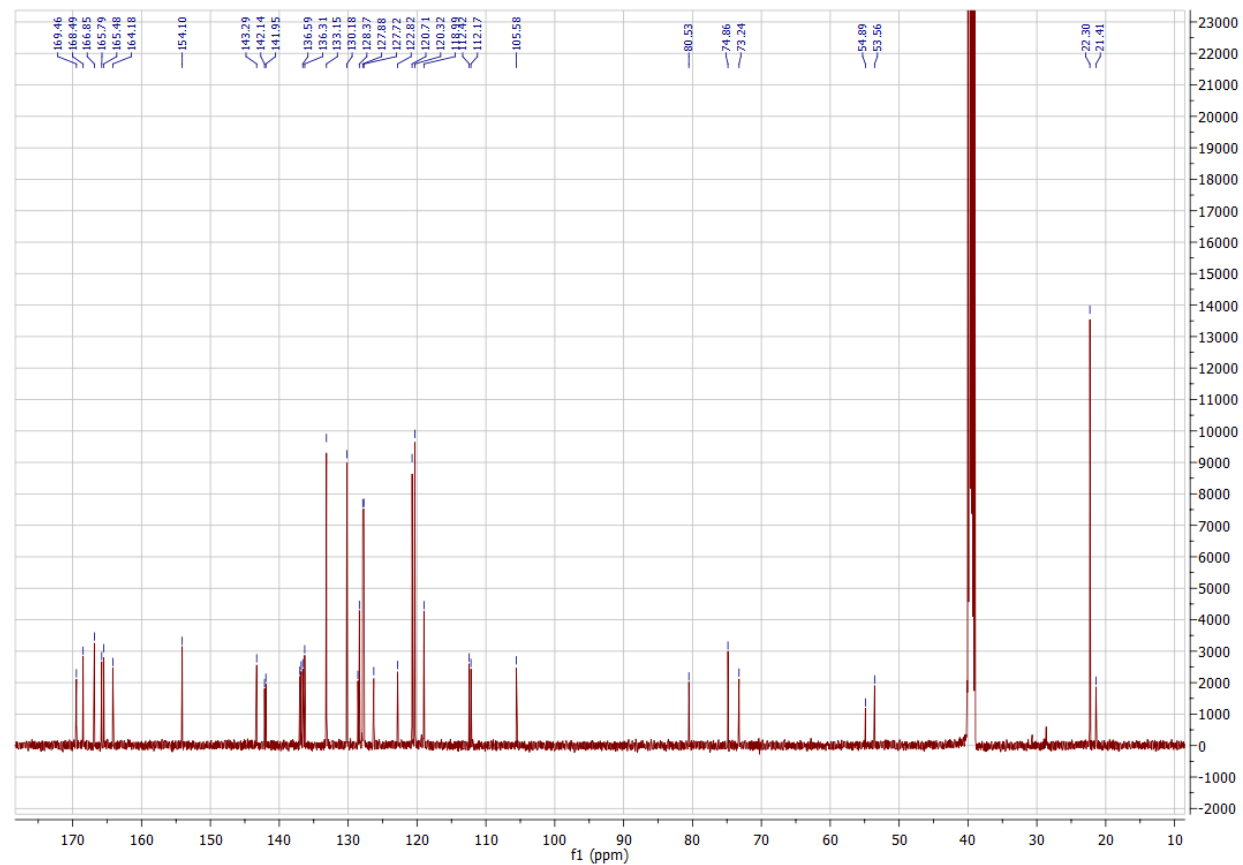
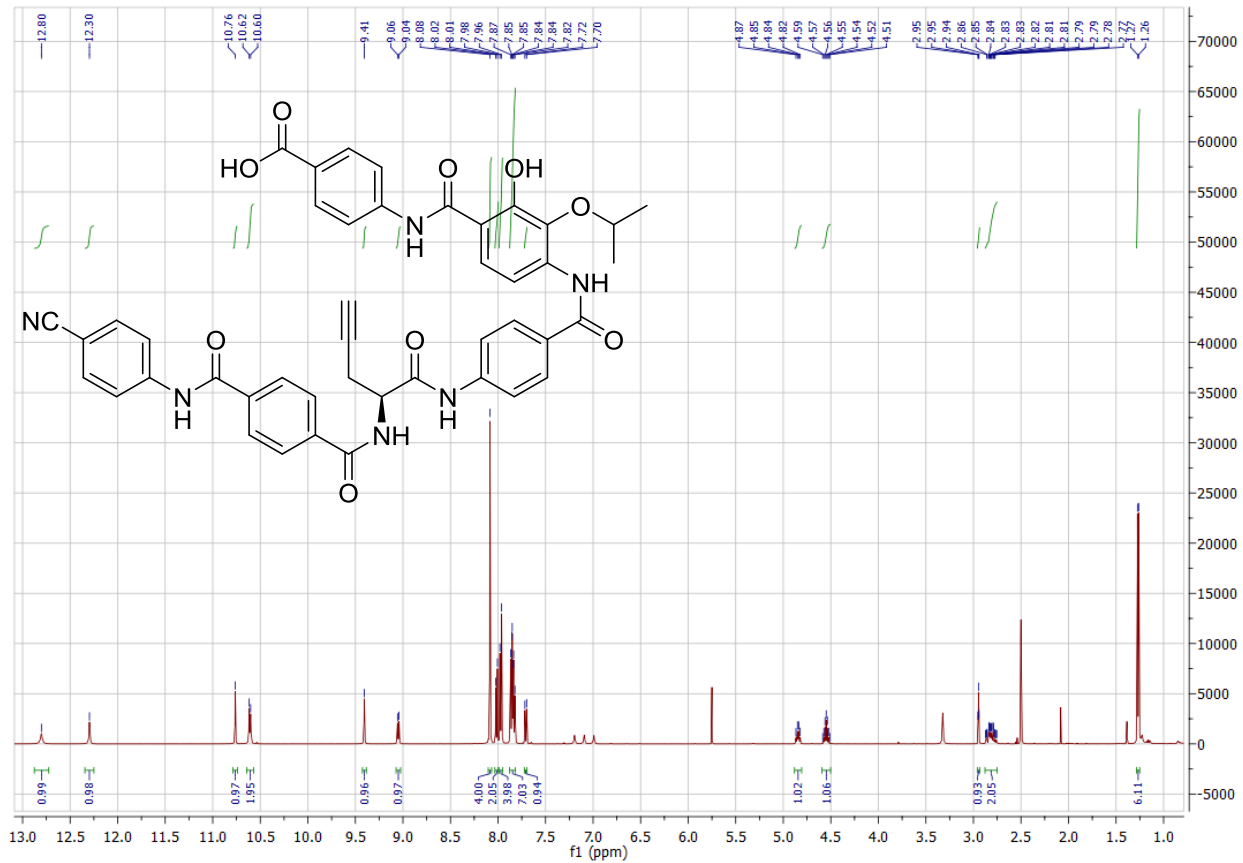




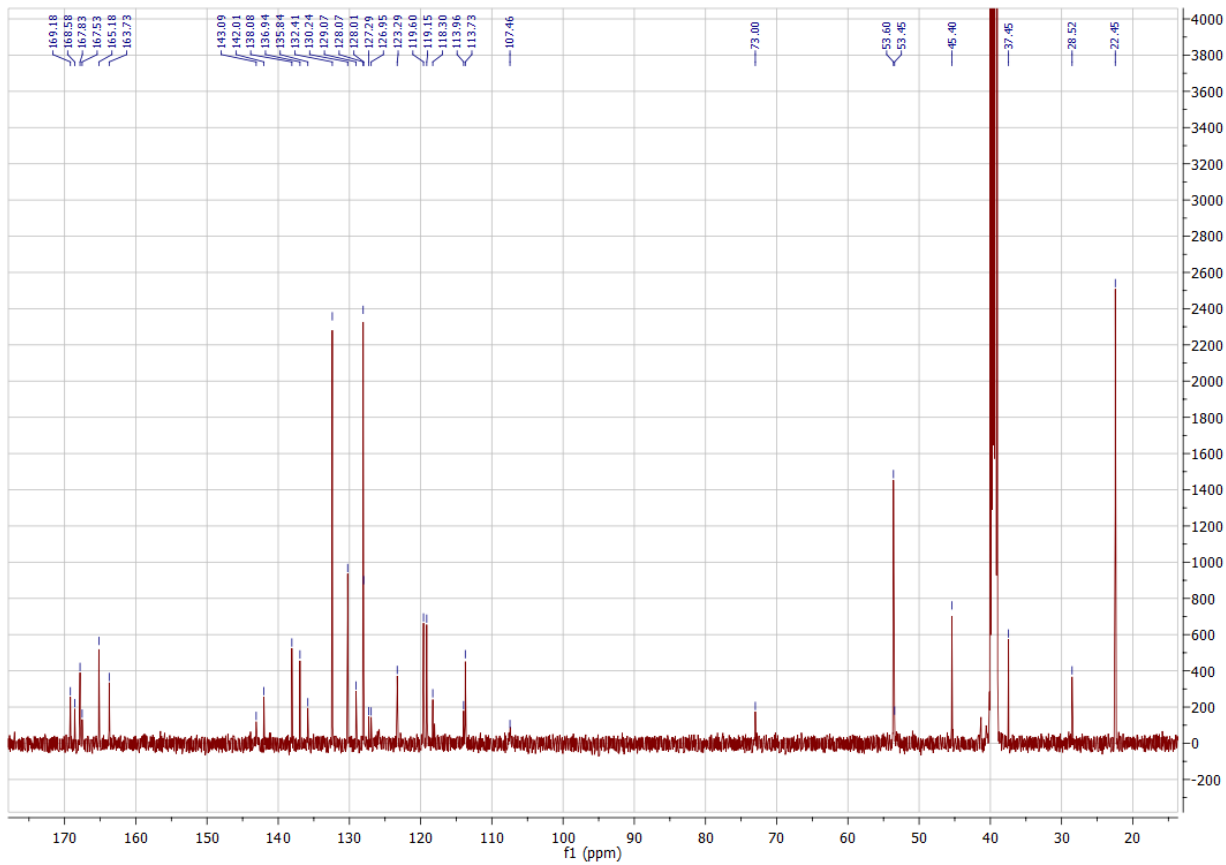
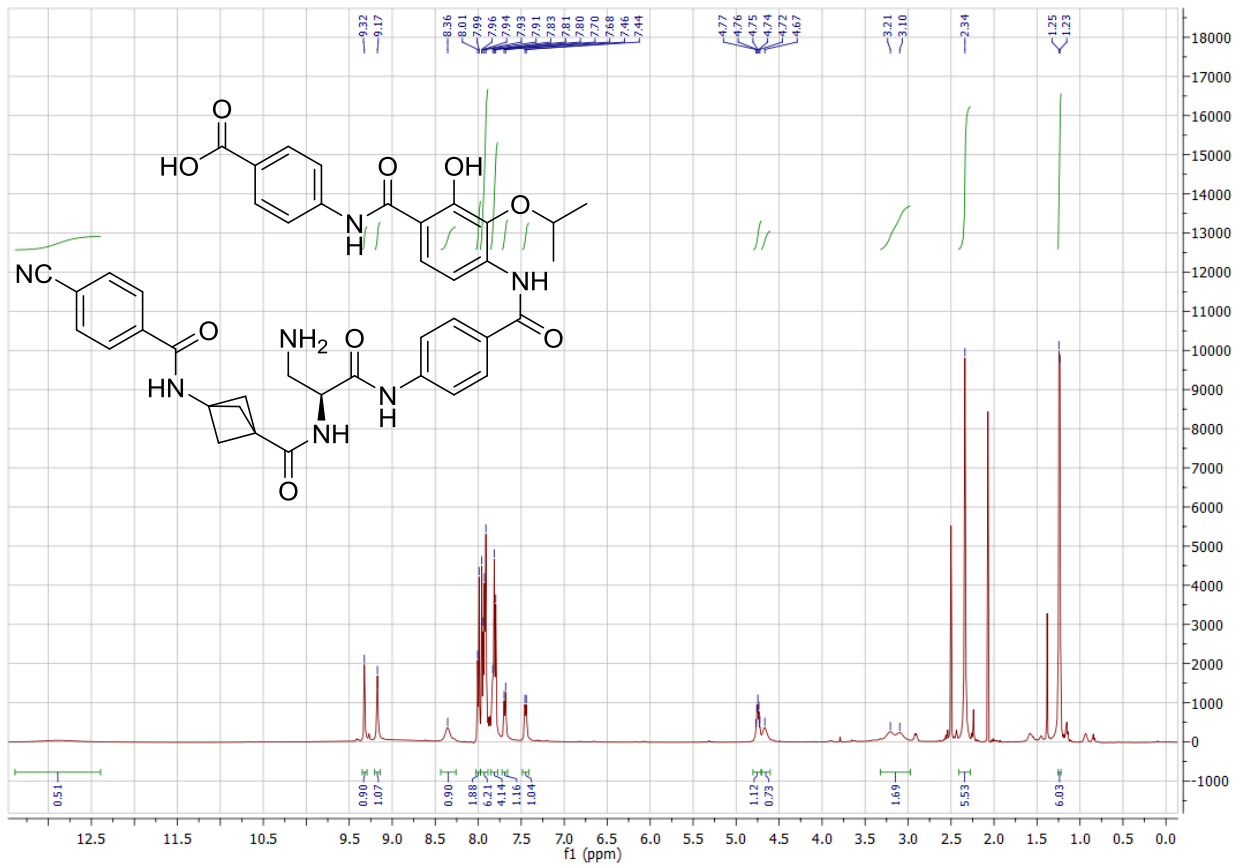
**4-(4-((S)-2-((1R,2R,3R,4R,5S,6S,7S,8R)-4-(4-cyanobenzamido)cubane-1-carboxamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (100)**



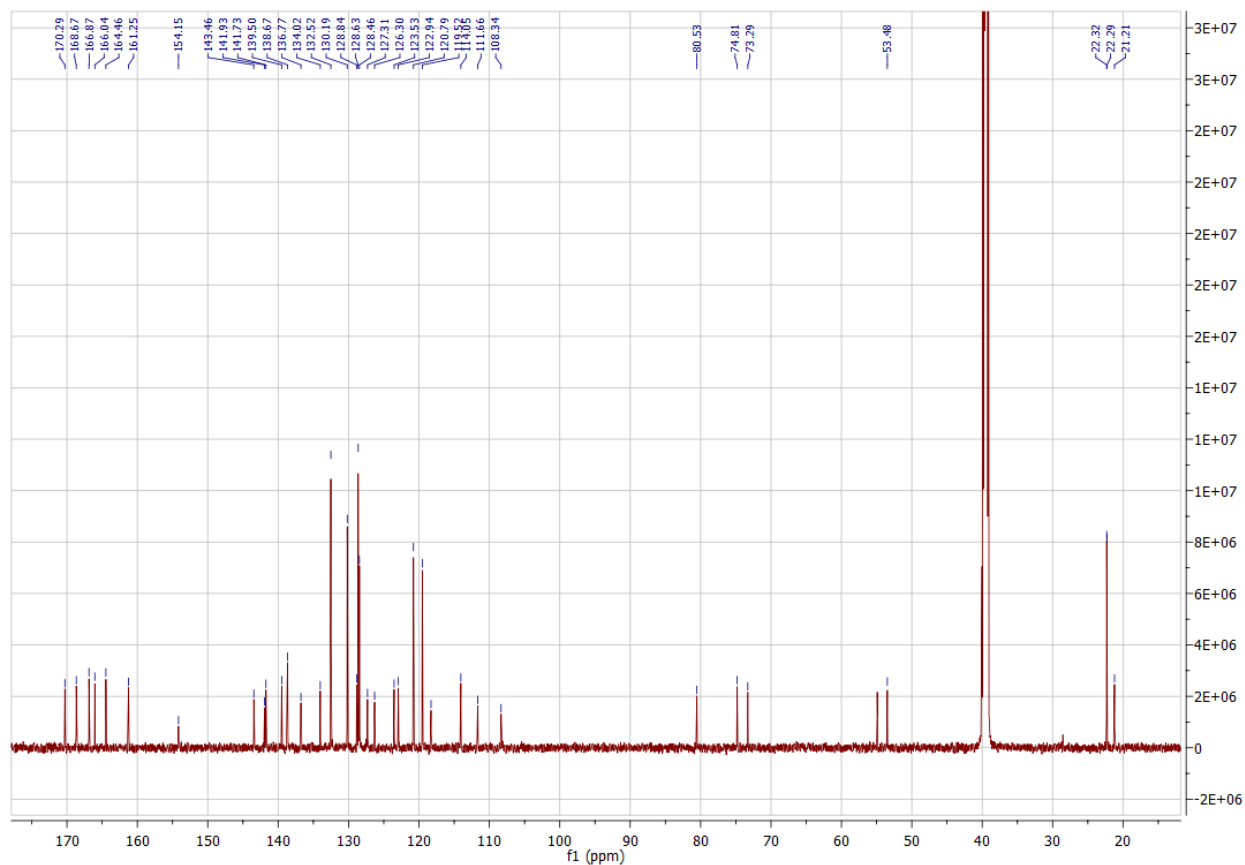
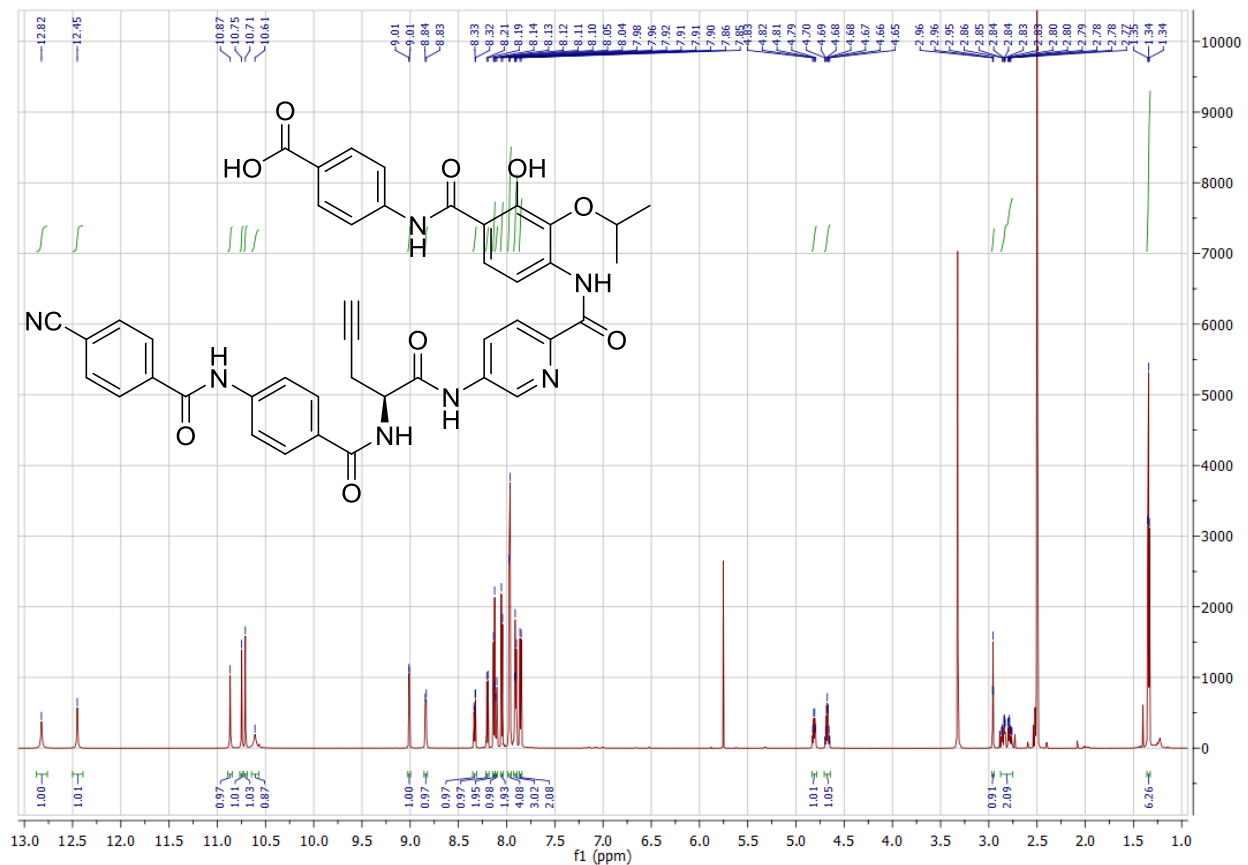
**(S)-4-(4-(4-(2-(4-((4-cyanophenyl)carbamoyl)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (101)**



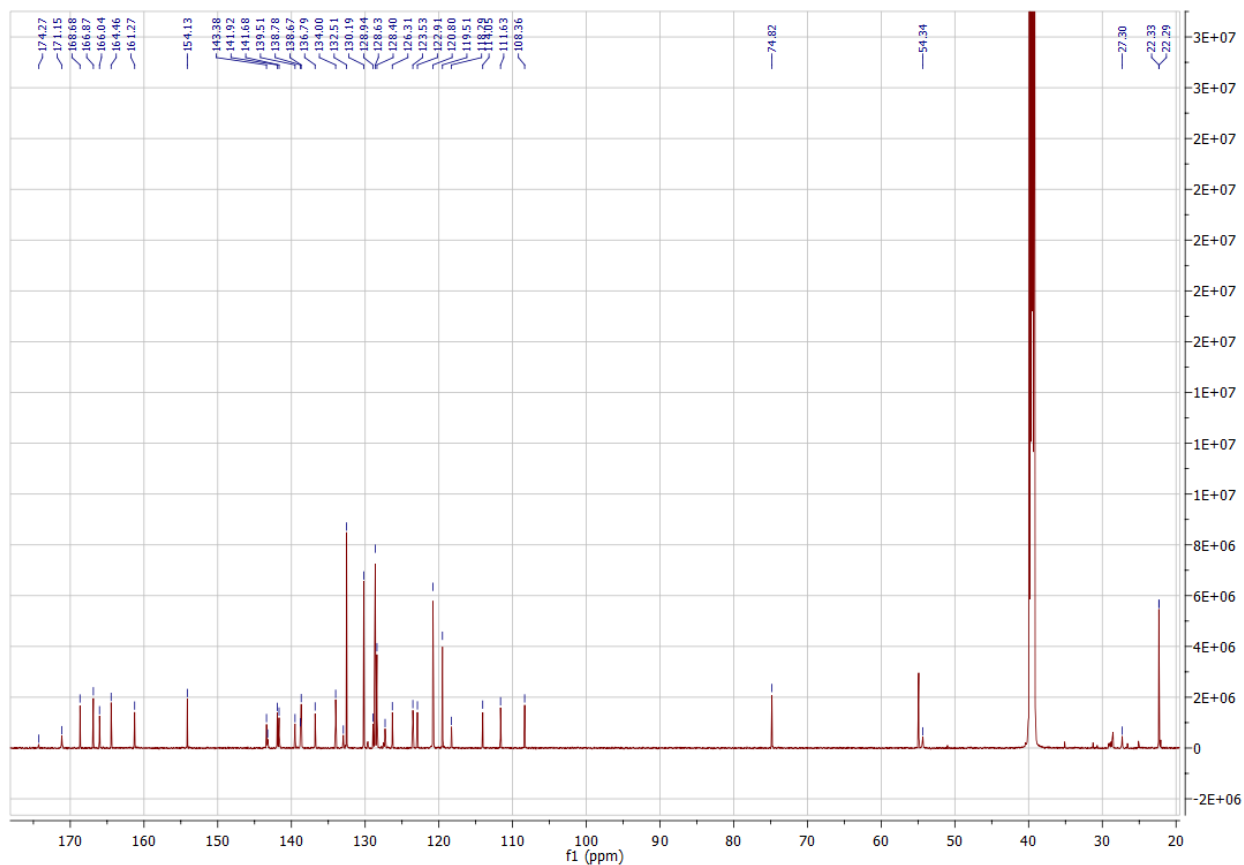
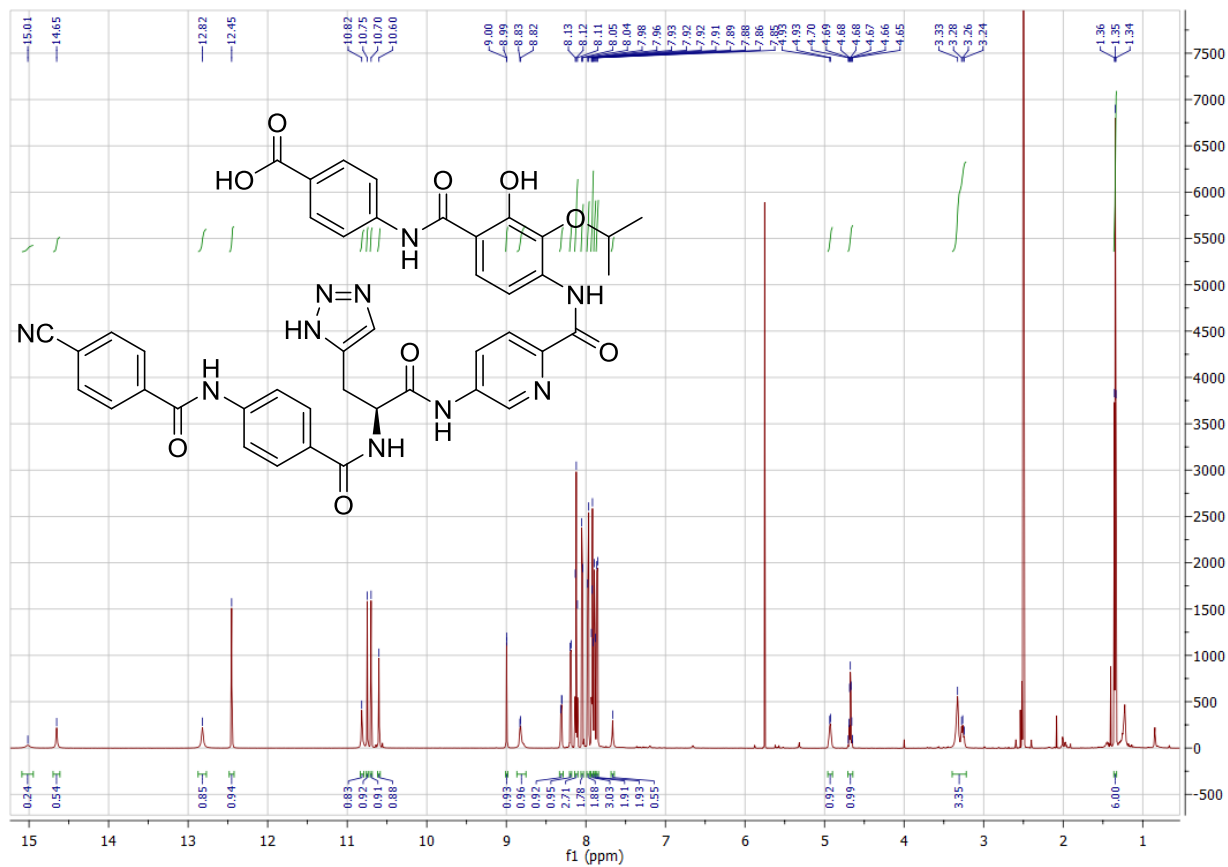
**(S)-4-(4-(4-(3-amino-2-(3-(4-cyanobenzamido)bicyclo[1.1.1]pentane-1-carboxamido)propanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (102)**



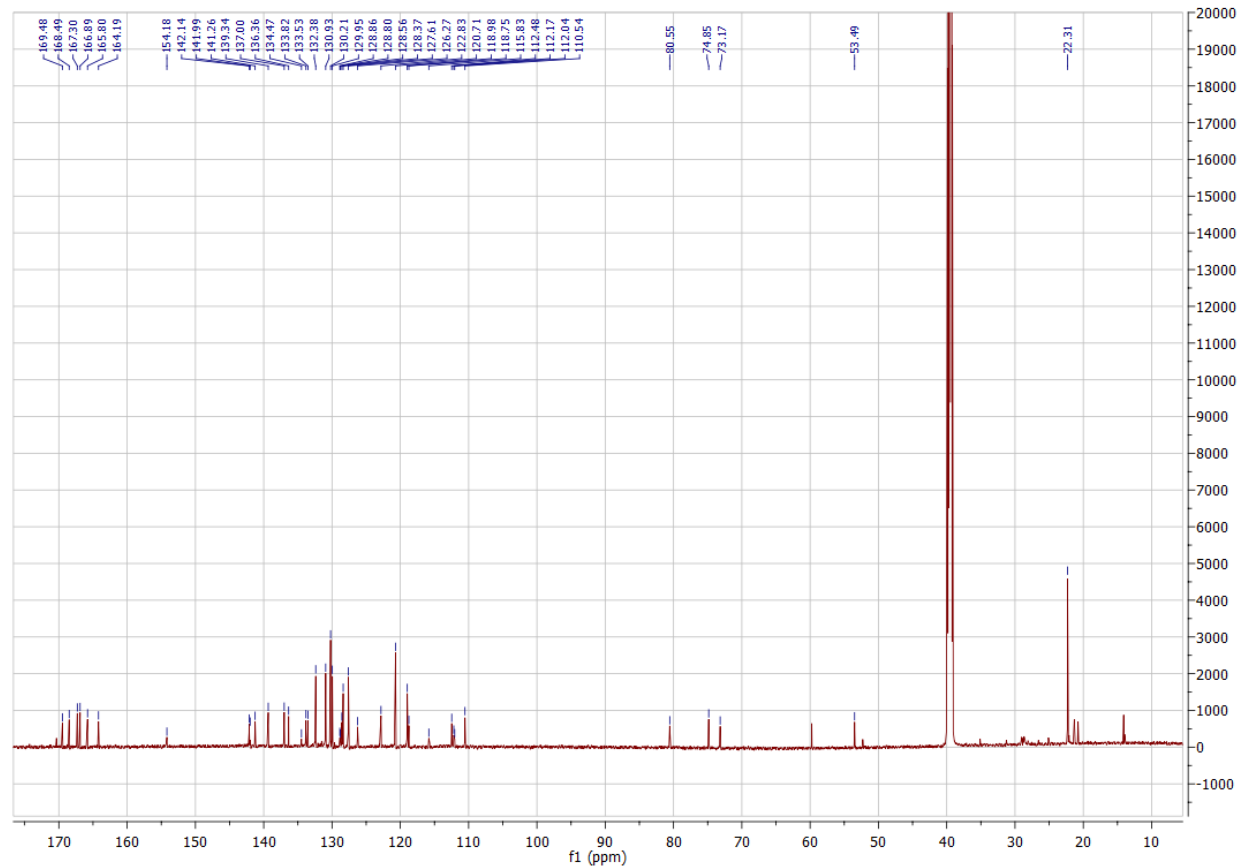
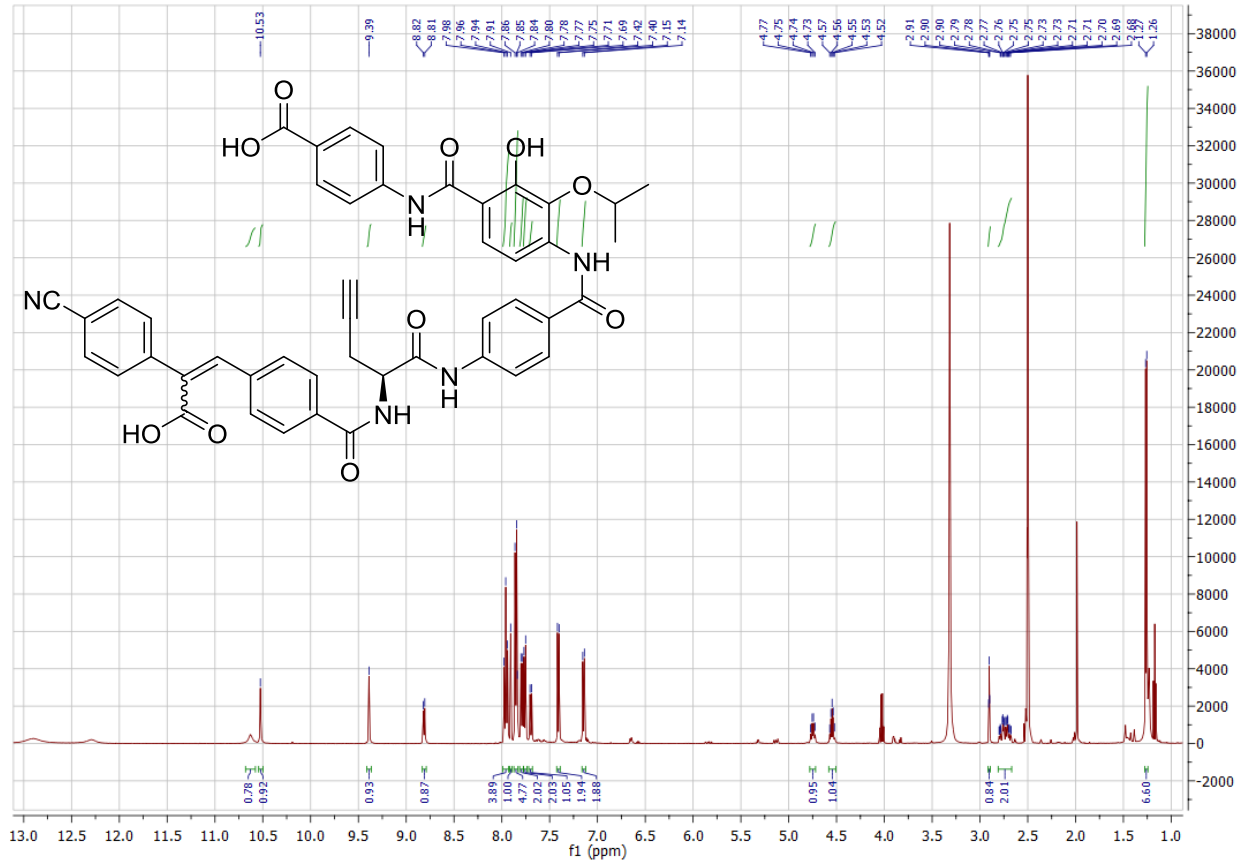
(S)-4-(4-(5-(2-(4-(4-cyanobenzamido)benzamido)pent-4-ynamido)picolinamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (103)



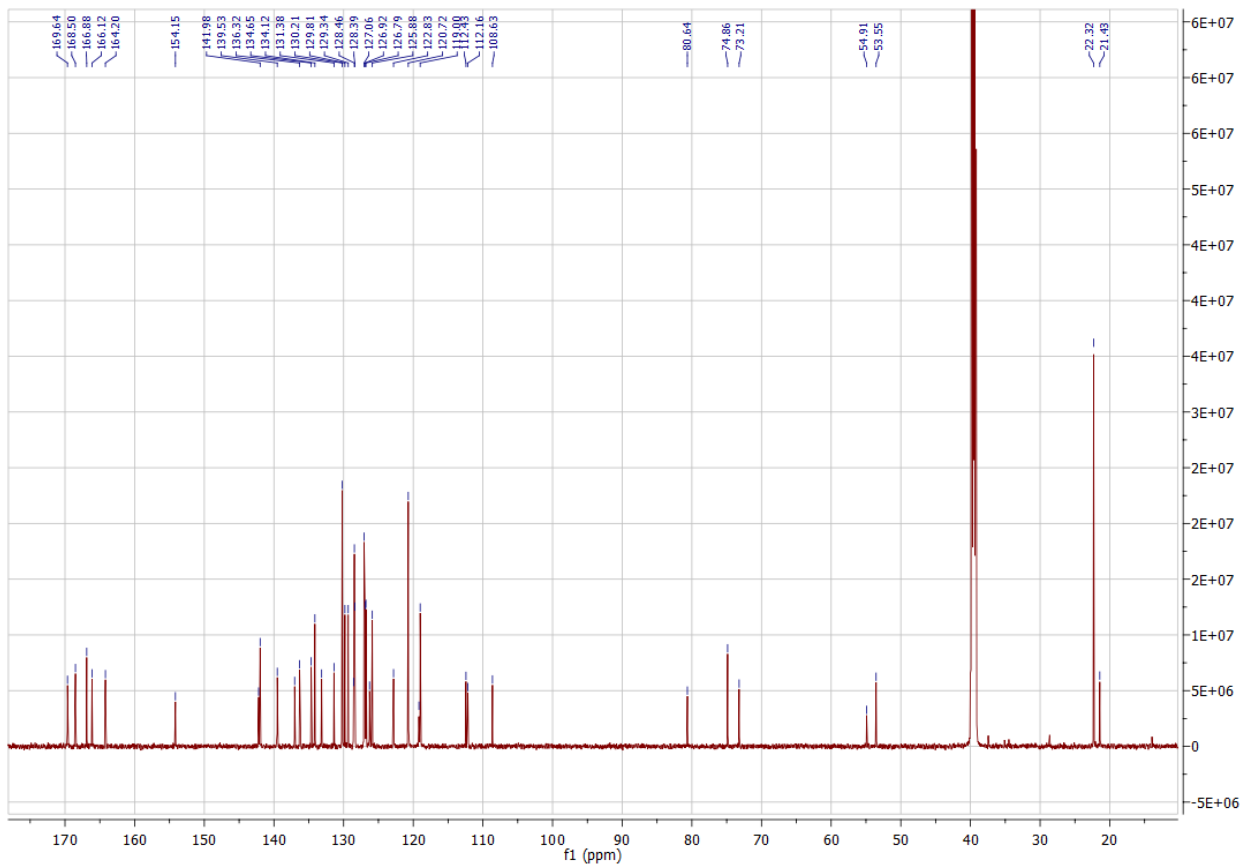
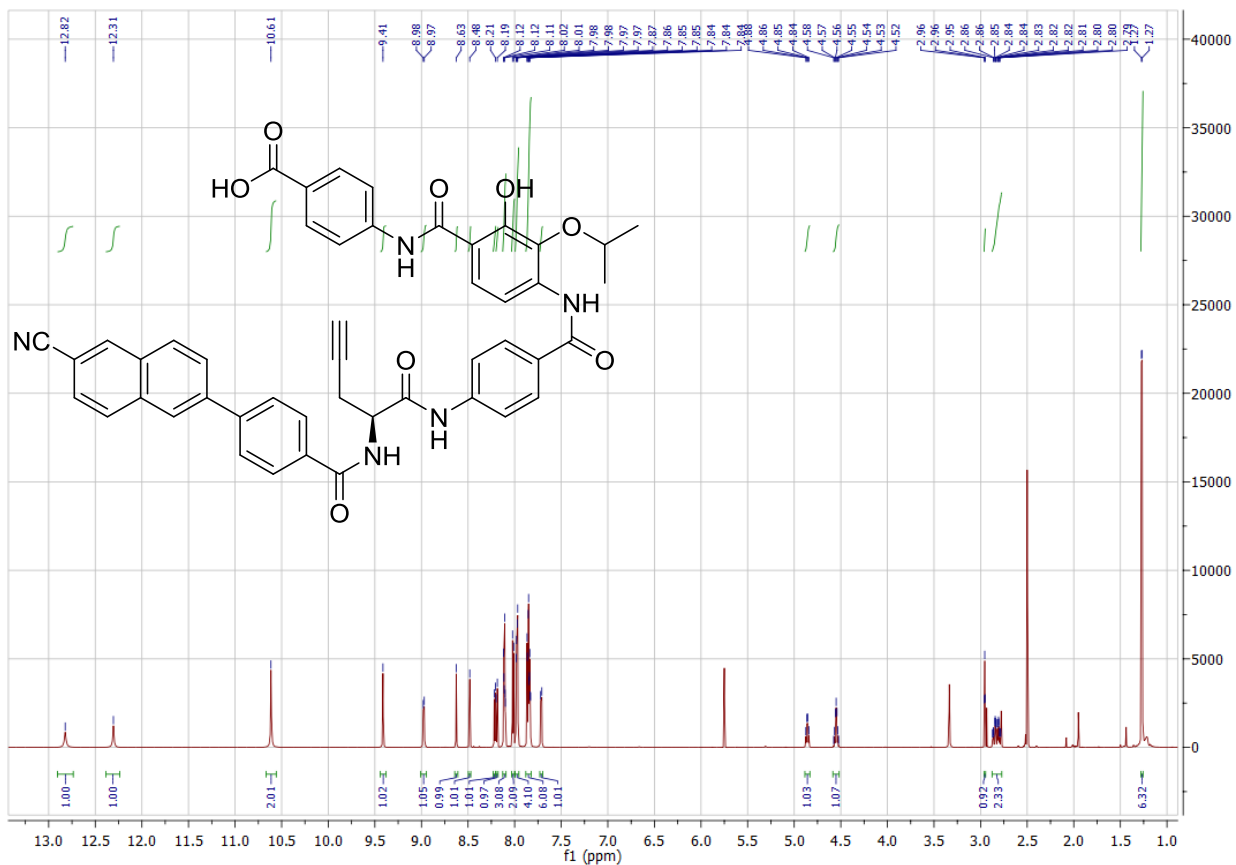
**(S)-4-(4-(5-(2-(4-(4-cyanobenzamido)benzamido)-3-(1,2,3-triazol-5-yl)propanamido)picolinamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (104)**



**(S)-4-(4-(4-(2-(4-(2-carboxy-2-(4-cyanophenyl)vinyl)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (105)**



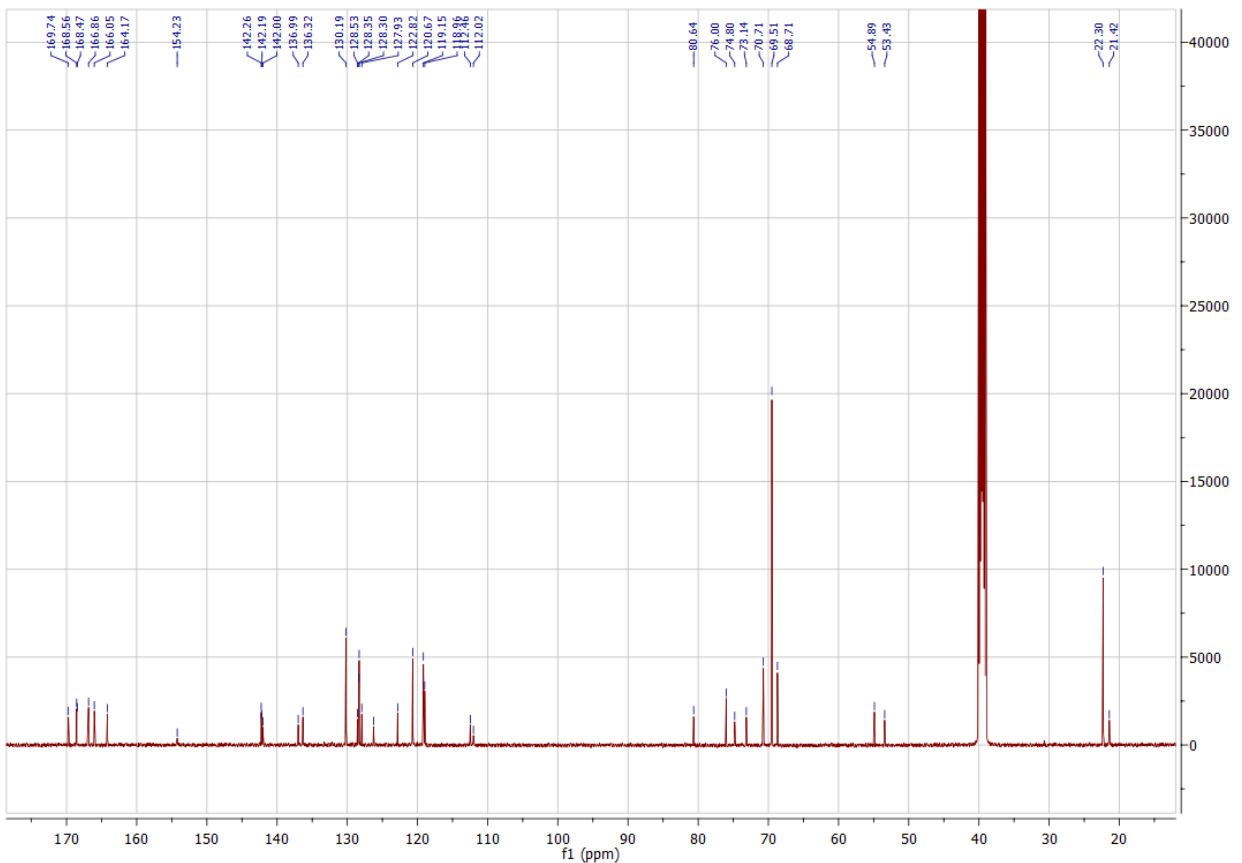
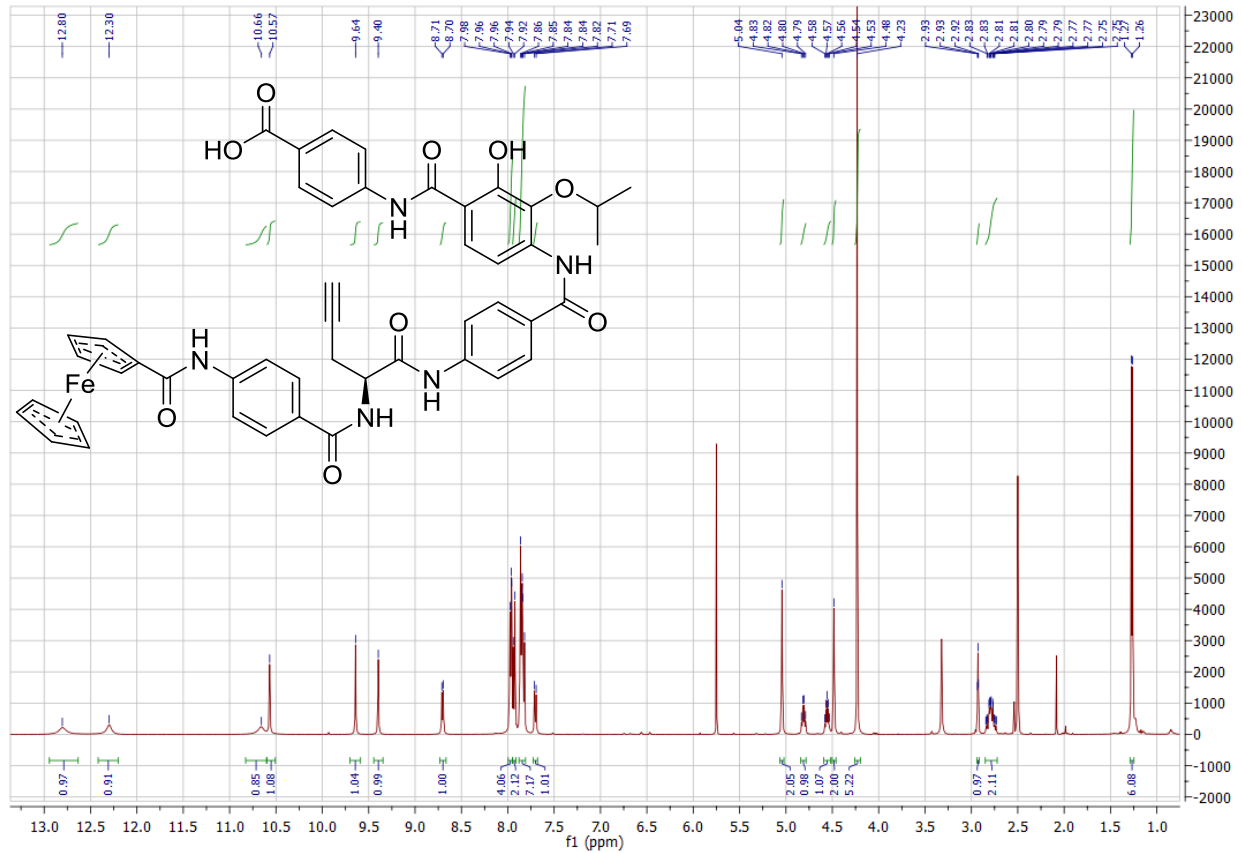
**(S)-4-(4-(4-(2-(4-(6-cyanonaphthalen-2-yl)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (112)**



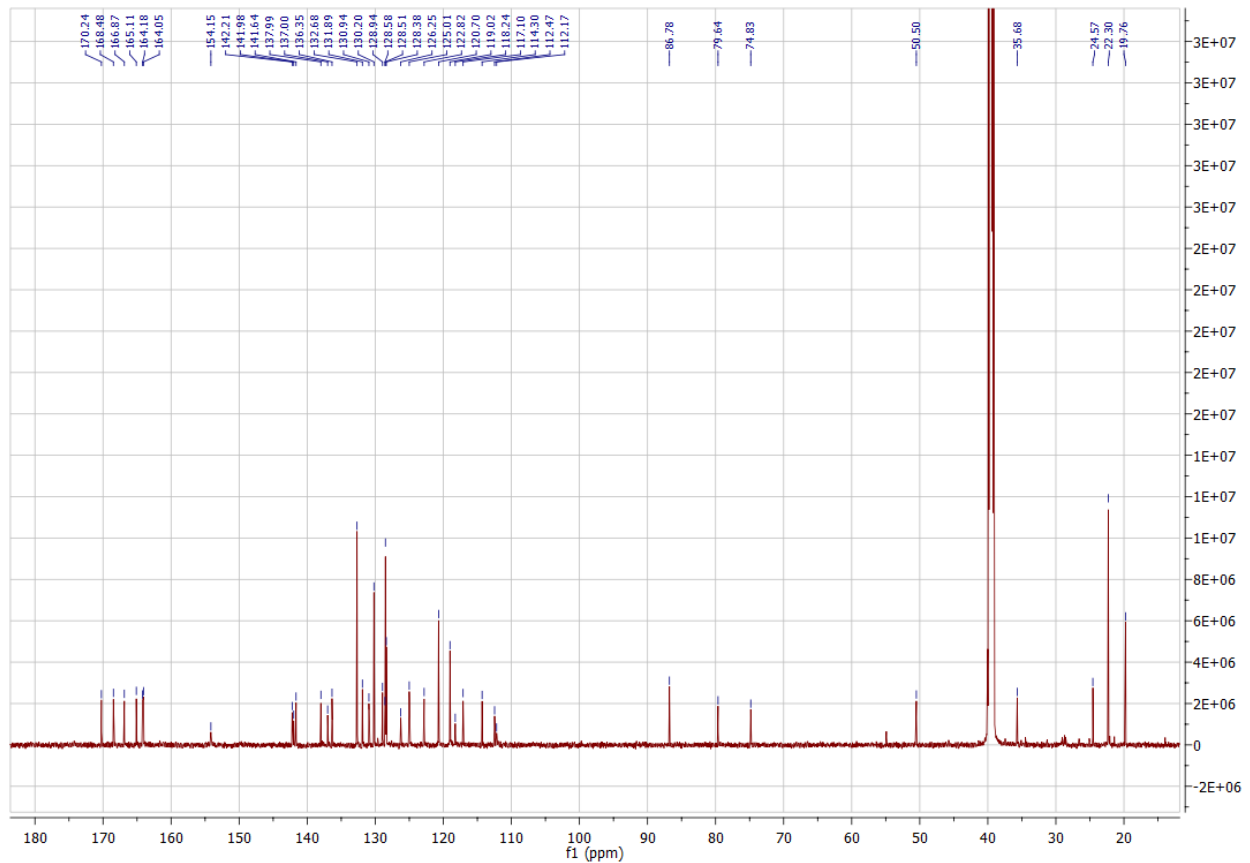
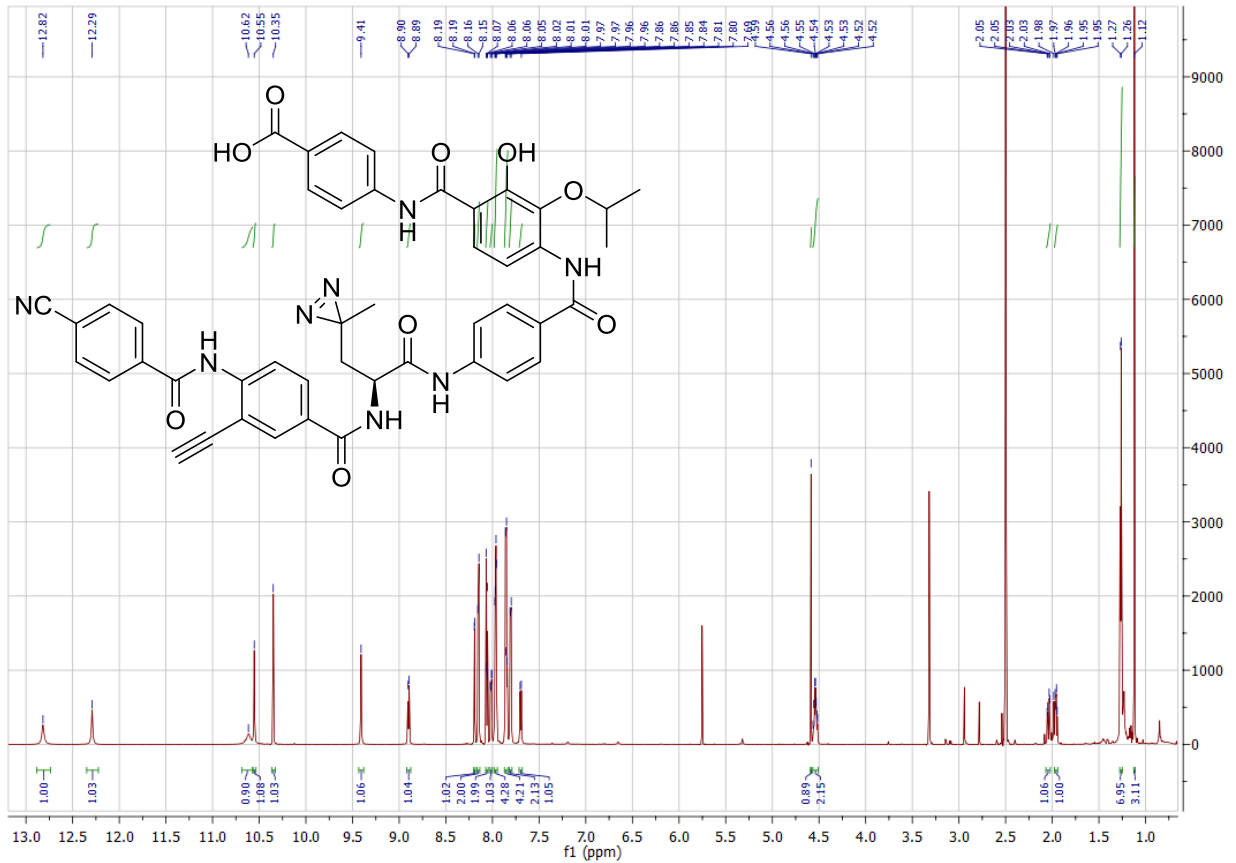




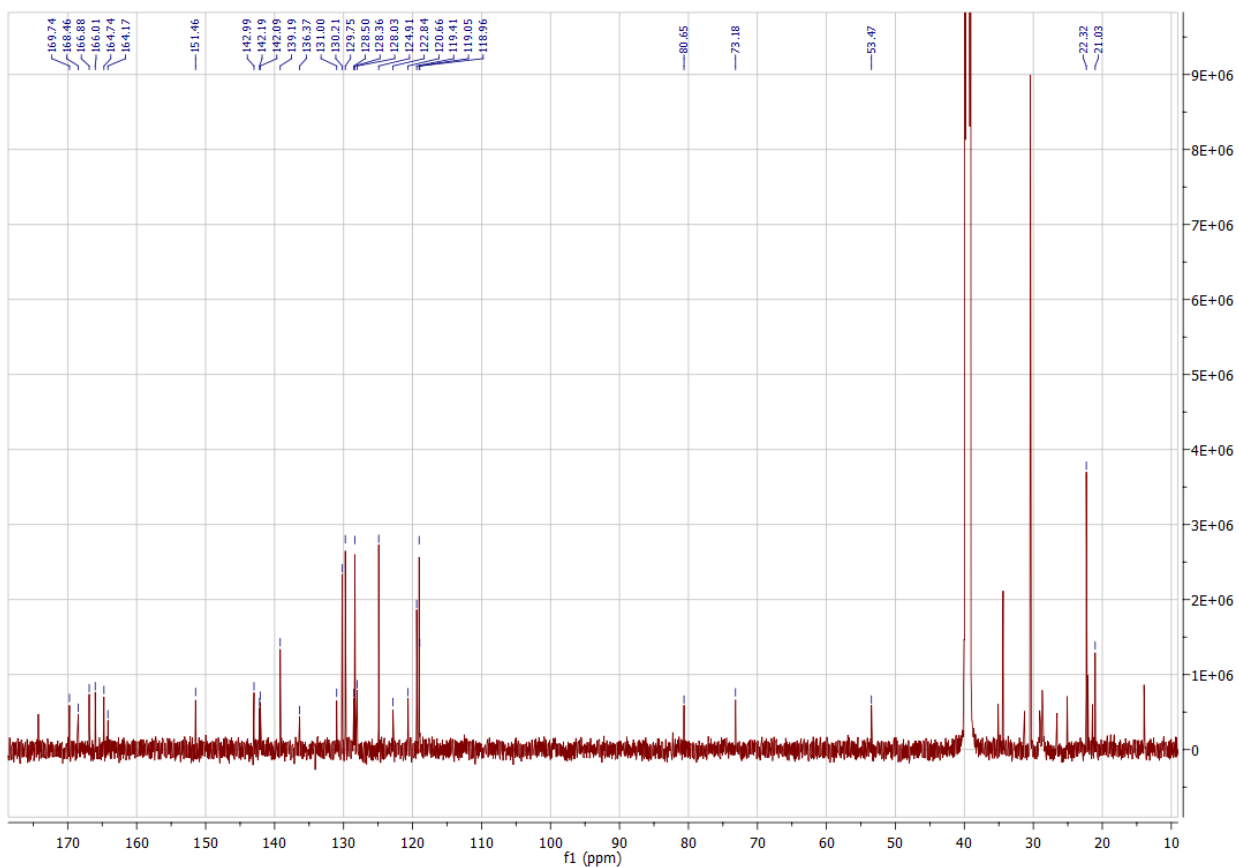
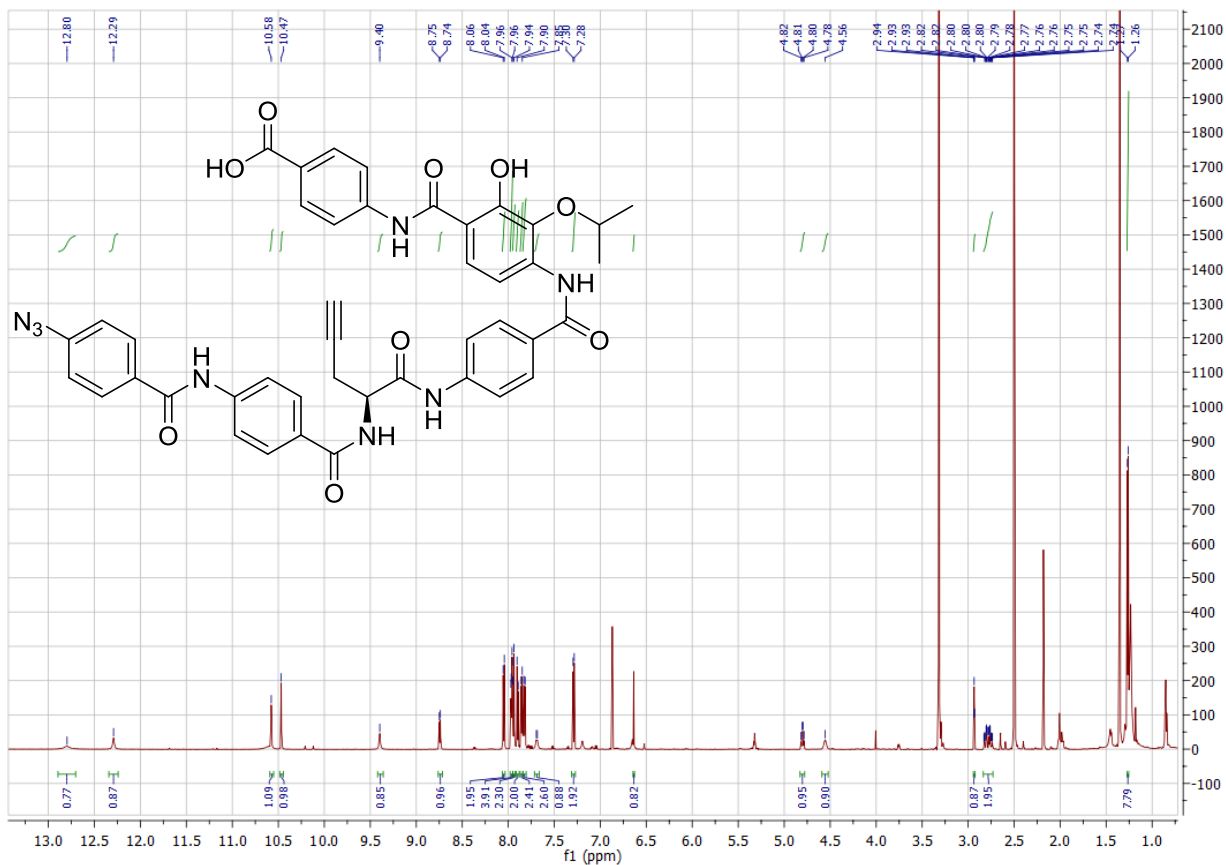
**(S)-4-(4-(4-(2-(4-(ferrocenecarboxamido)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (114)**



**(S)-4-(4-(4-(2-(4-(4-cyanobenzamido)-3-ethynylbenzamido)-3-(3-methyl-3H-diazirin-3-yl)propanamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (115)**



**(S)-4-(4-(4-(2-(4-(4-azidobenzamido)benzamido)pent-4-ynamido)benzamido)-2-hydroxy-3-isopropoxybenzamido)benzoic acid (116)**



**(S)-4-(2-hydroxy-3-isopropoxy-4-(4-(2-(4-(4-(2,2,2-trifluoro-1,1-dihydroxyethyl)benzamido)benzamido)pent-4-ynamido)benzamido)benzamido)benzoic acid (117)**

