

Support information

Rational design and synthesis of new acetamide–indole–benzo[d]imidazole–carboxylic acid hybrids as dual PTP1B/ α -glucosidase inhibitors

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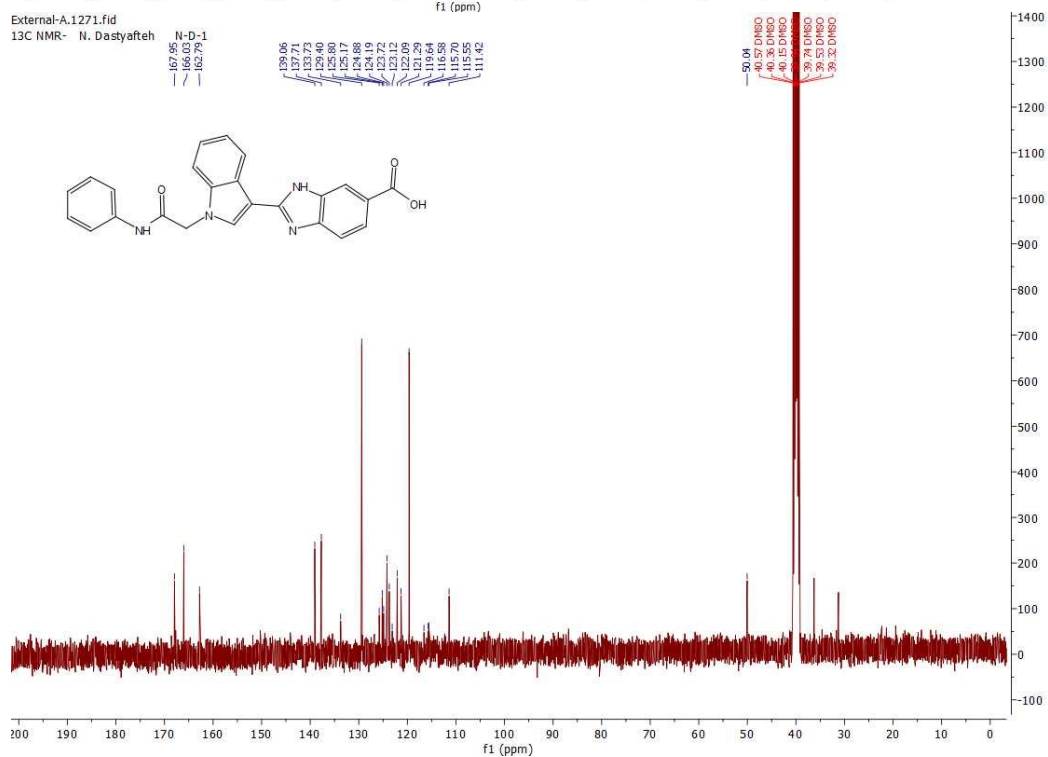
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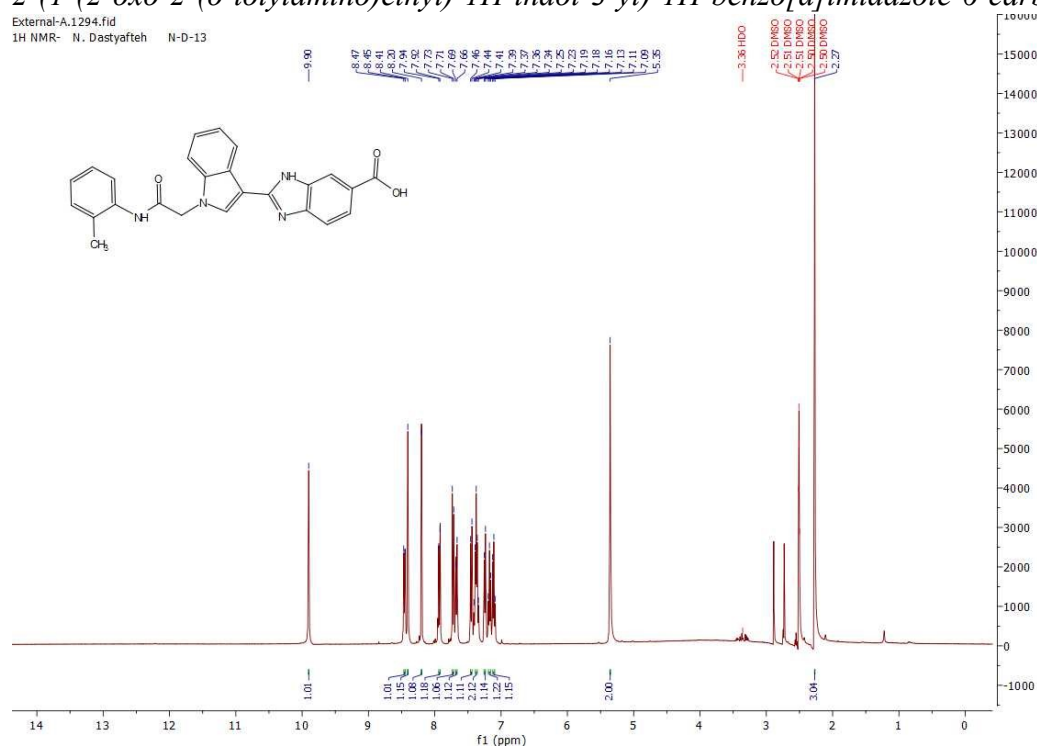
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[illegible]

2-(1-(2-oxo-2-(o-tolylamino)ethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (**8b**)

External-A.1294.fid

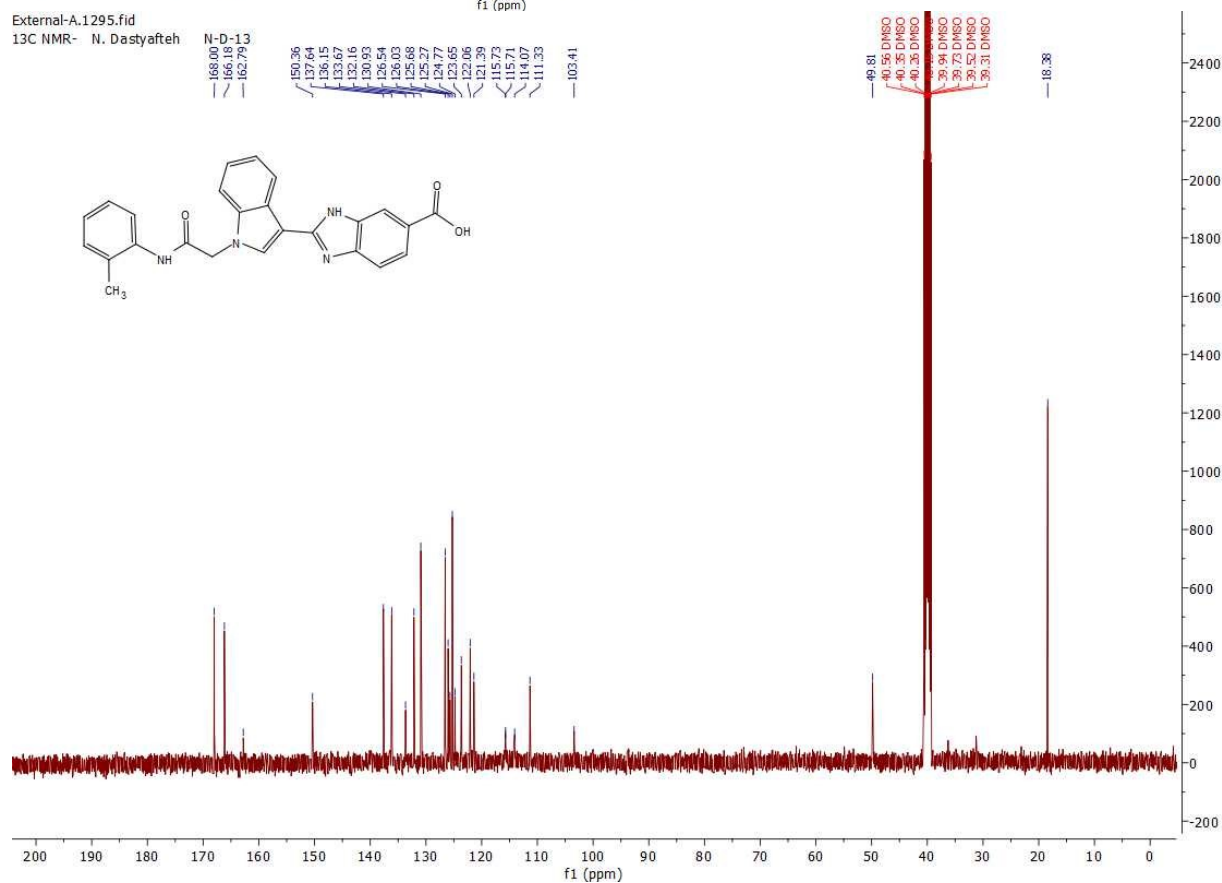
¹H NMR- N. Dastyaftah N-D-13



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¹³C NMR- N. Dastyaftah

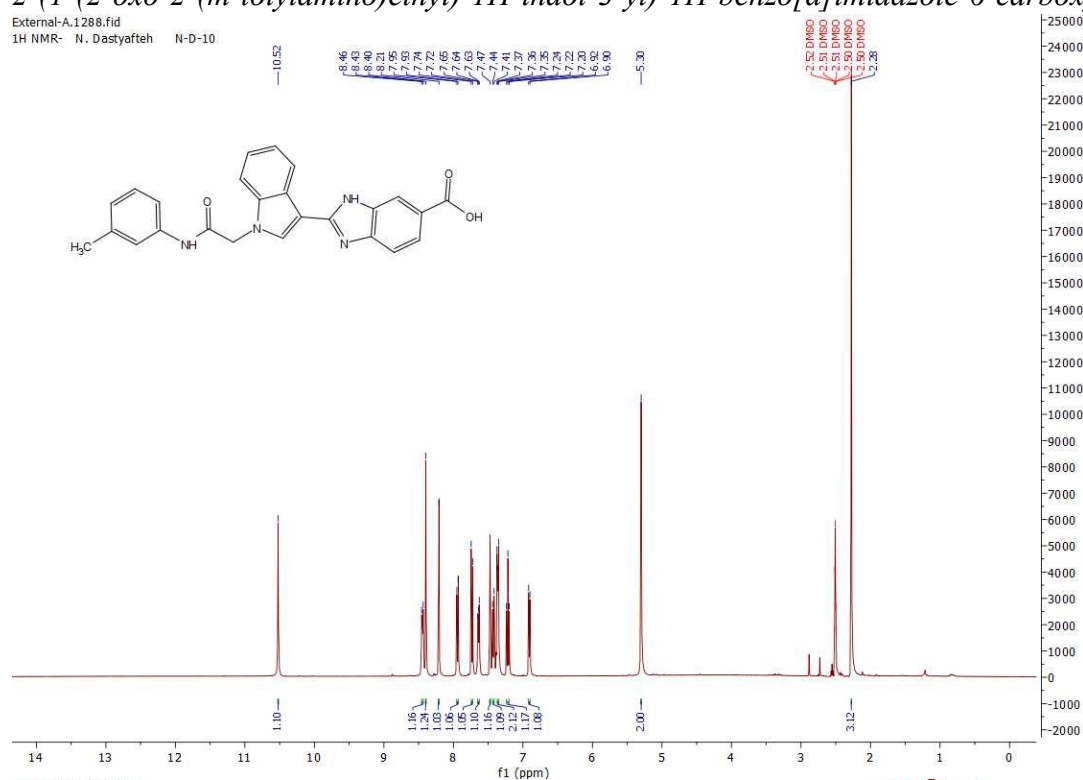
N-D-13



2-(1-(2-oxo-2-(*m*-tolylamino)ethyl)-1*H*-indol-3-yl)-1*H*-benzo[*d*]imidazole-6-carboxylic acid (**8c**)

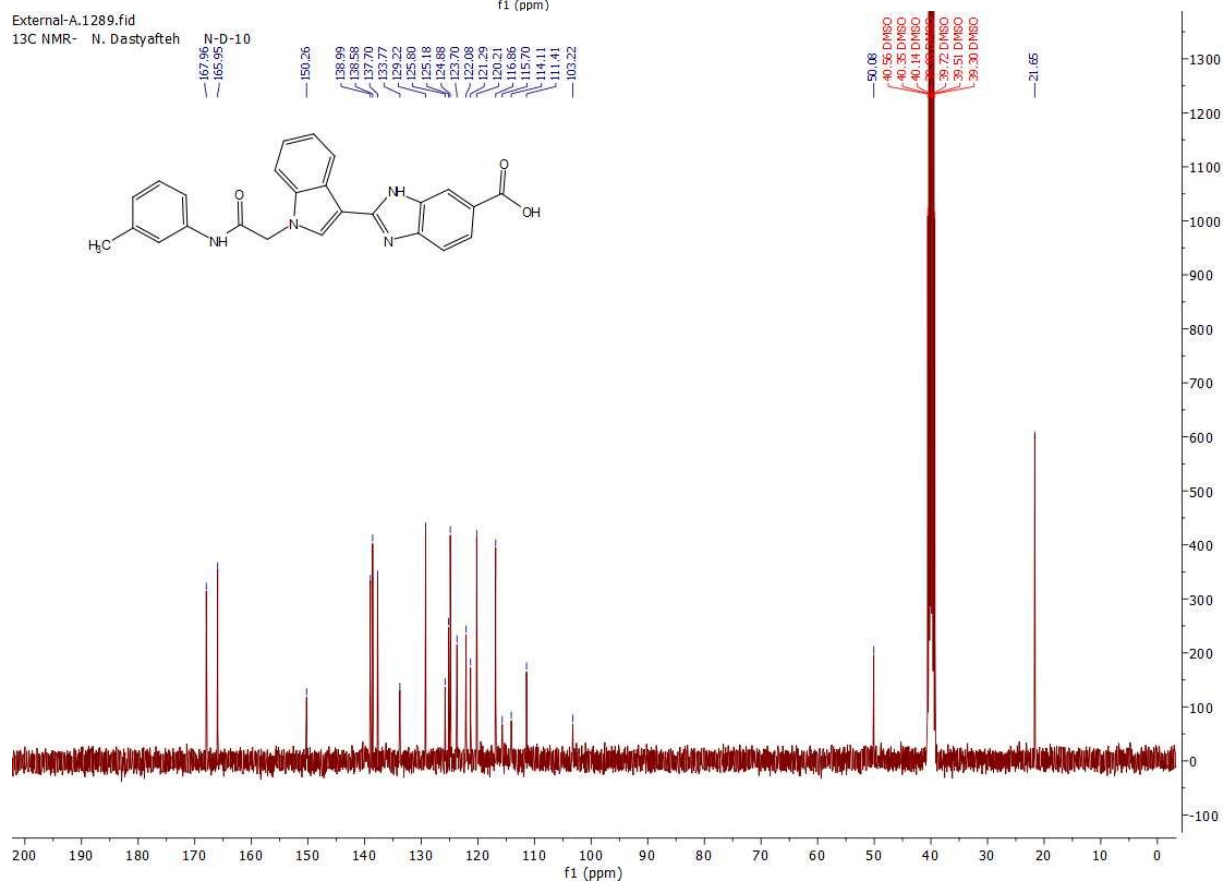
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¹H NMR- N. Dastyaftah N-D-10



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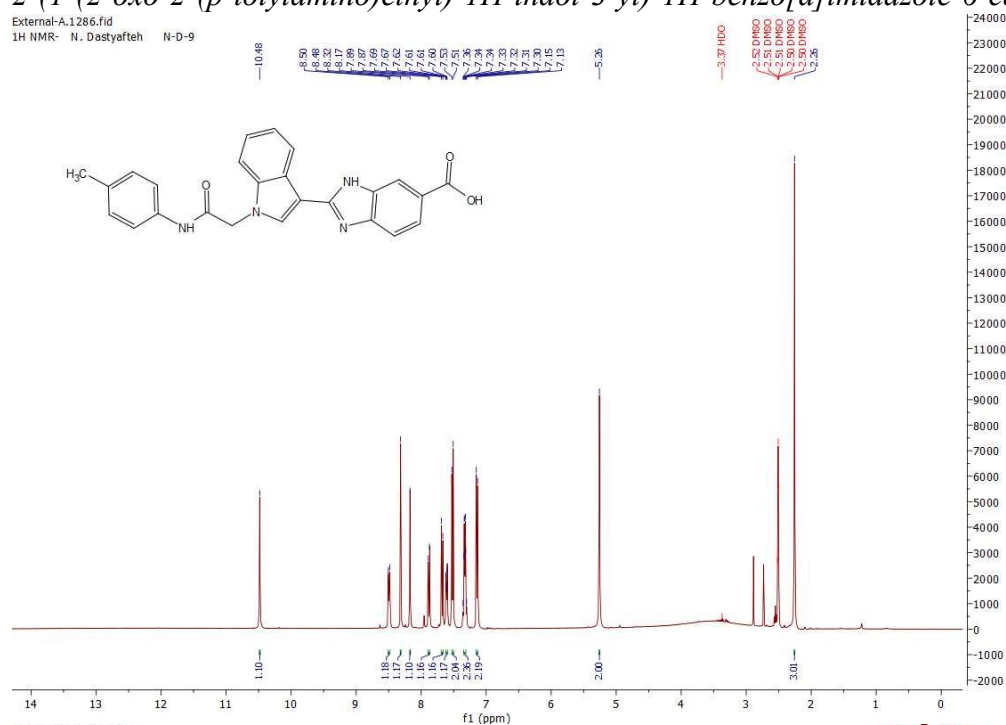
¹³C NMR- N. Dastyaftah N-D-10



2-(1-(2-oxo-2-(p-tolylamino)ethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (**8d**)

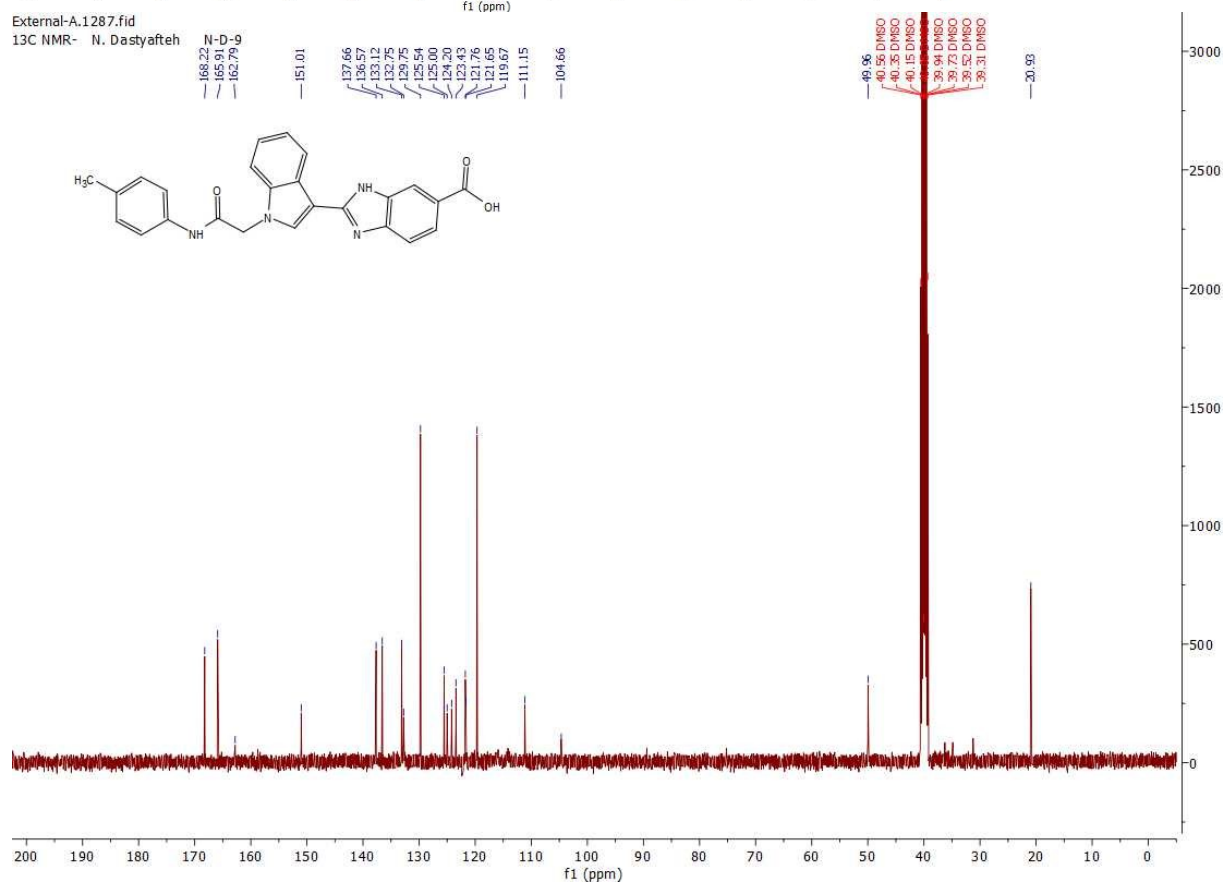
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1H NMR- N. Dastyafteh N-D-9



External-A.1287.fid

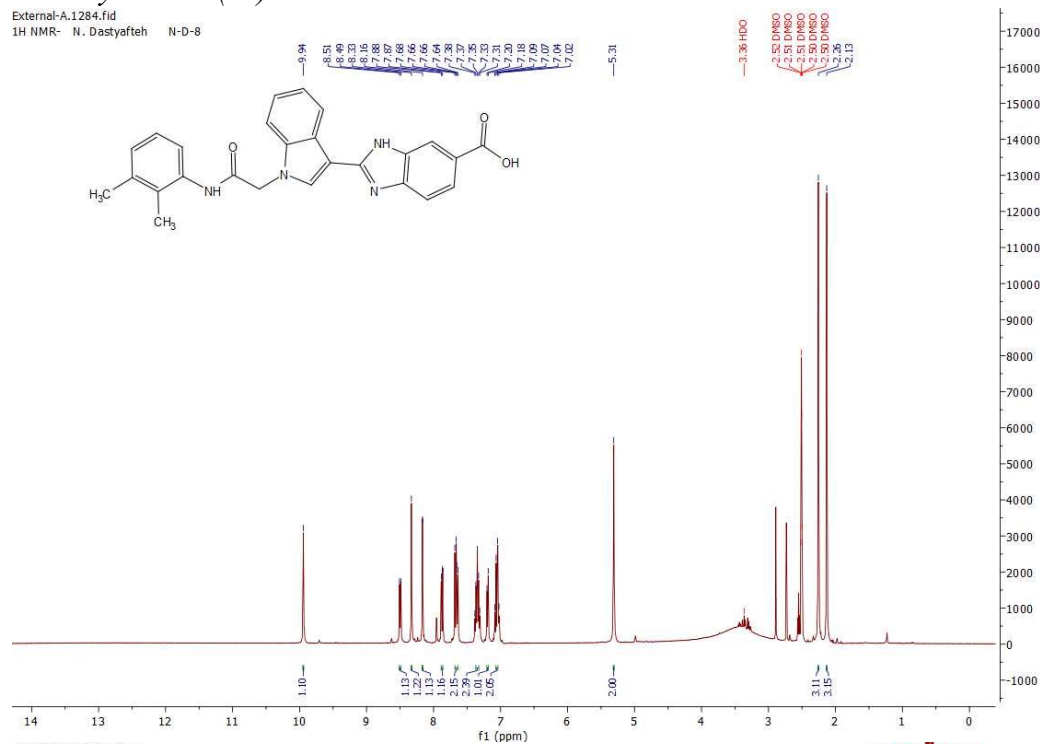
13C NMR- N. Dastyafteh N-D-9



2-(1-(2-((2,3-dimethylphenyl)amino)-2-oxoethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (**8e**)

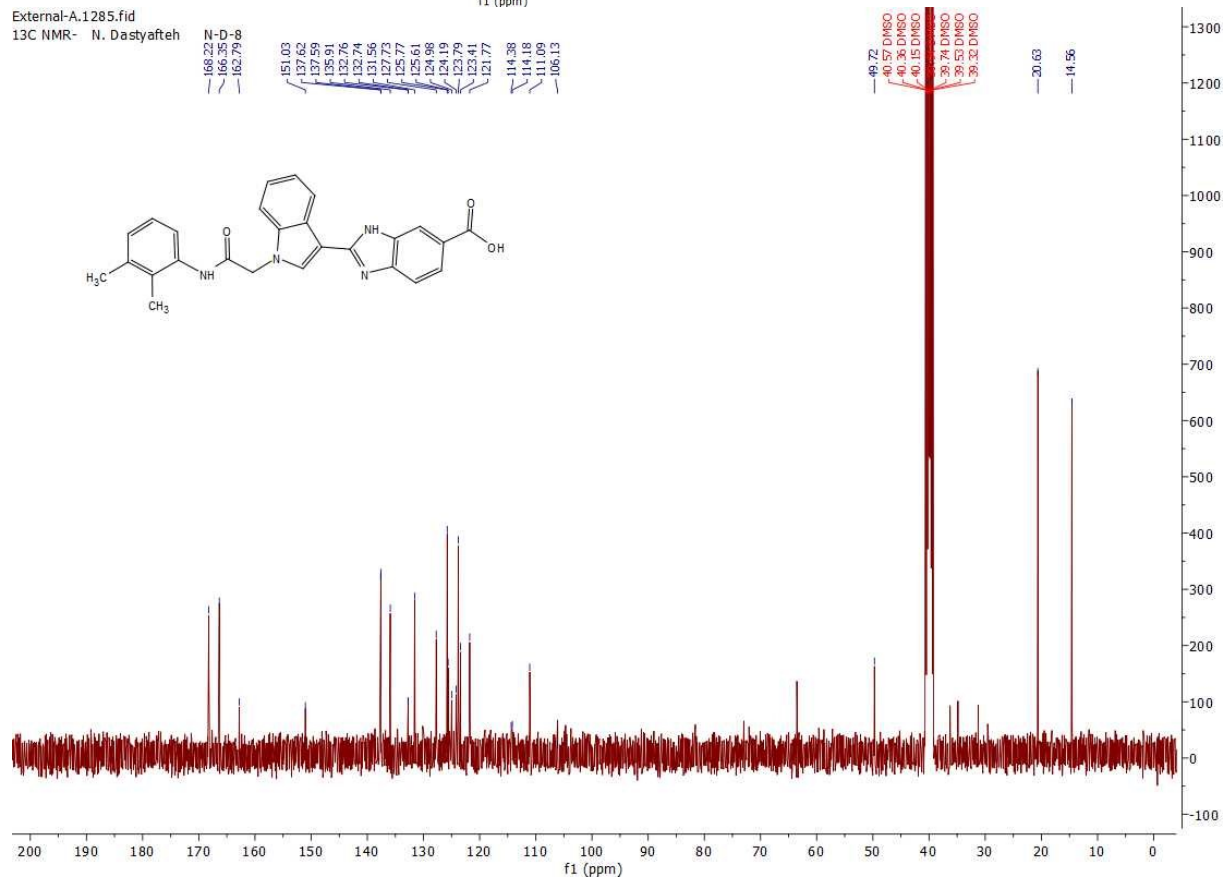
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¹H NMR- N. Dastyafteh N-D-8



External-A.1285.fid

¹³C NMR- N. Dastyafteh N-D-8



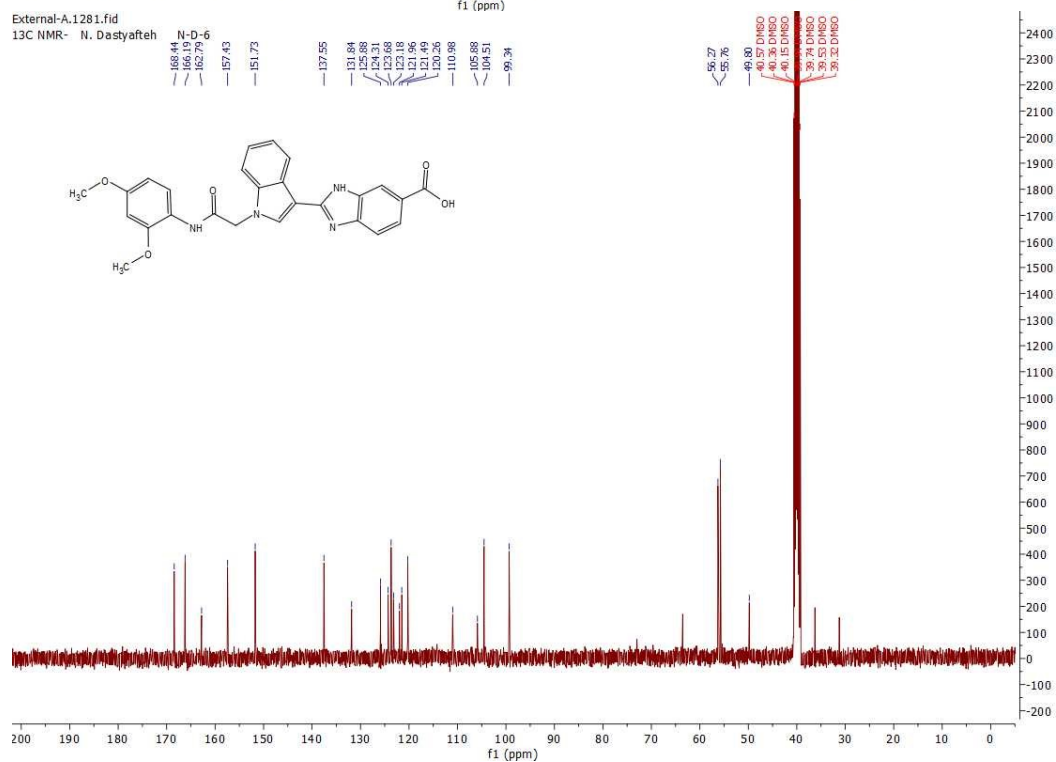
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 1H NMR- N. Dastyafteh N-D-6

Chemical structure: COc1cc(OC)ccc(NC(=O)CN2c3ccccc3nc2c4nc5ccc(C(=O)O)cc5n4)c1

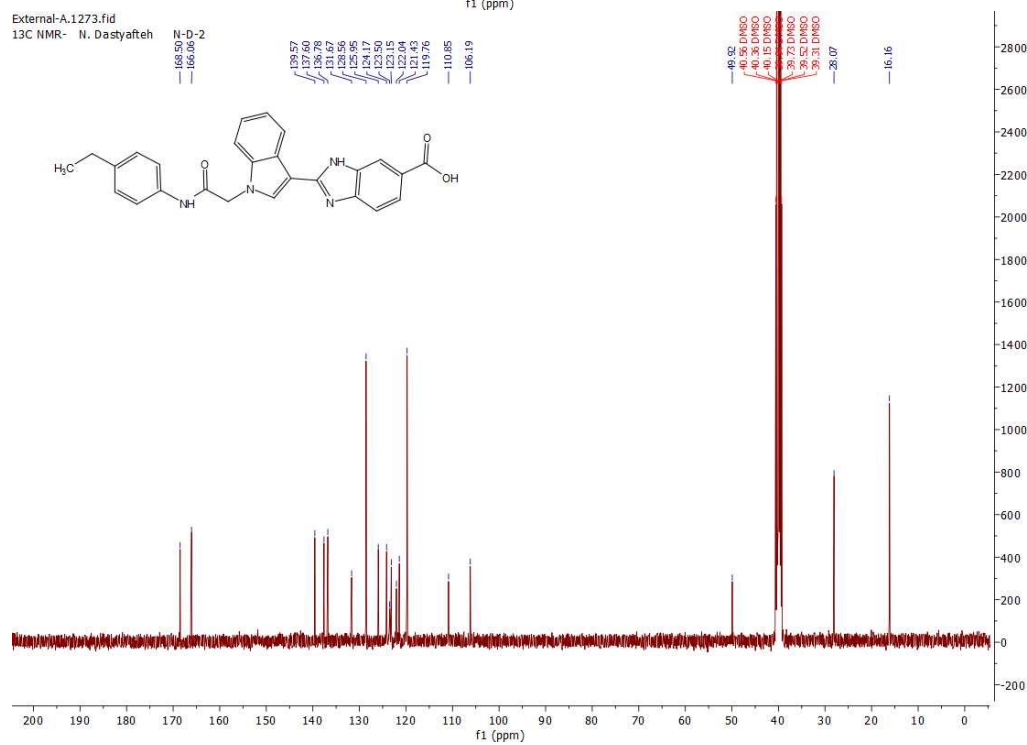
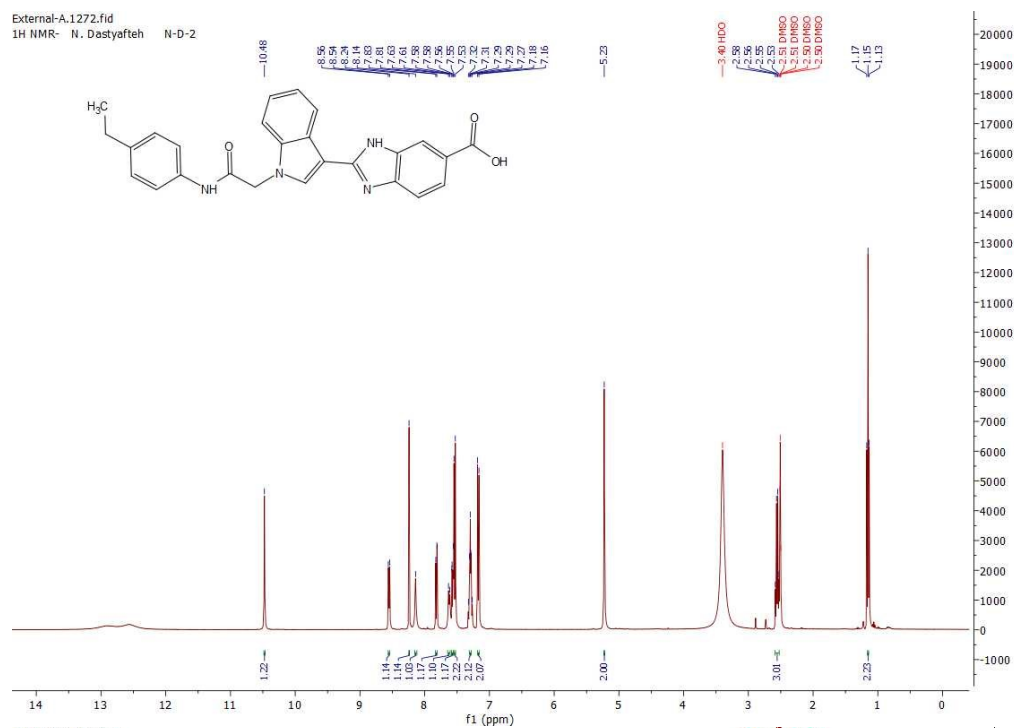
1H NMR spectrum (DMSO-d₆) showing peaks from 0 to 10 ppm. The x-axis is labeled f1 (ppm). The y-axis represents intensity. Integration values are shown below the baseline.

Peak list (ppm): 9.62, 8.95, 8.53, 8.19, 8.14, 7.88, 7.82, 7.73, 7.64, 7.60, 7.38, 7.33, 7.29, 6.66, 6.49, 6.46, 5.30, 3.86, 3.74, 3.37, 3.20, 3.19, 3.18, 3.17, 3.16, 3.15, 3.14, 3.13, 3.12, 3.11, 3.10, 3.09, 3.08, 3.07, 3.06, 3.05, 3.04, 3.03, 3.02, 3.01, 3.00, 2.99, 2.98, 2.97, 2.96, 2.95, 2.94, 2.93, 2.92, 2.91, 2.90, 2.89, 2.88, 2.87, 2.86, 2.85, 2.84, 2.83, 2.82, 2.81, 2.80, 2.79, 2.78, 2.77, 2.76, 2.75, 2.74, 2.73, 2.72, 2.71, 2.70, 2.69, 2.68, 2.67, 2.66, 2.65, 2.64, 2.63, 2.62, 2.61, 2.60, 2.59, 2.58, 2.57, 2.56, 2.55, 2.54, 2.53, 2.52, 2.51, 2.50, 2.49, 2.48, 2.47, 2.46, 2.45, 2.44, 2.43, 2.42, 2.41, 2.40, 2.39, 2.38, 2.37, 2.36, 2.35, 2.34, 2.33, 2.32, 2.31, 2.30, 2.29, 2.28, 2.27, 2.26, 2.25, 2.24, 2.23, 2.22, 2.21, 2.20, 2.19, 2.18, 2.17, 2.16, 2.15, 2.14, 2.13, 2.12, 2.11, 2.10, 2.09, 2.08, 2.07, 2.06, 2.05, 2.04, 2.03, 2.02, 2.01, 2.00, 1.99, 1.98, 1.97, 1.96, 1.95, 1.94, 1.93, 1.92, 1.91, 1.90, 1.89, 1.88, 1.87, 1.86, 1.85, 1.84, 1.83, 1.82, 1.81, 1.80, 1.79, 1.78, 1.77, 1.76, 1.75, 1.74, 1.73, 1.72, 1.71, 1.70, 1.69, 1.68, 1.67, 1.66, 1.65, 1.64, 1.63, 1.62, 1.61, 1.60, 1.59, 1.58, 1.57, 1.56, 1.55, 1.54, 1.53, 1.52, 1.51, 1.50, 1.49, 1.48, 1.47, 1.46, 1.45, 1.44, 1.43, 1.42, 1.41, 1.40, 1.39, 1.38, 1.37, 1.36, 1.35, 1.34, 1.33, 1.32, 1.31, 1.30, 1.29, 1.28, 1.27, 1.26, 1.25, 1.24, 1.23, 1.22, 1.21, 1.20, 1.19, 1.18, 1.17, 1.16, 1.15, 1.14, 1.13, 1.12, 1.11, 1.10, 1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.00, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.90, 0.89, 0.88, 0.87, 0.86, 0.85, 0.84, 0.83, 0.82, 0.81, 0.80, 0.79, 0.78, 0.77, 0.76, 0.75, 0.74, 0.73, 0.72, 0.71, 0.70, 0.69, 0.68, 0.67, 0.66, 0.65, 0.64, 0.63, 0.62, 0.61, 0.60, 0.59, 0.58, 0.57, 0.56, 0.55, 0.54, 0.53, 0.52, 0.51, 0.50, 0.49, 0.48, 0.47, 0.46, 0.45, 0.44, 0.43, 0.42, 0.41, 0.40, 0.39, 0.38, 0.37, 0.36, 0.35, 0.34, 0.33, 0.32, 0.31, 0.30, 0.29, 0.28, 0.27, 0.26, 0.25, 0.24, 0.23, 0.22, 0.21, 0.20, 0.19, 0.18, 0.17, 0.16, 0.15, 0.14, 0.13, 0.12, 0.11, 0.10, 0.09, 0.08, 0.07, 0.06, 0.05, 0.04, 0.03, 0.02, 0.01, 0.00.

Integration values: 1.03, 1.09, 1.04, 1.04, 1.07, 2.17, 2.16, 1.03, 1.15, 2.00, 3.32, 3.19, 3.18, 3.17, 3.16, 3.15, 3.14, 3.13, 3.12, 3.11, 3.10, 3.09, 3.08, 3.07, 3.06, 3.05, 3.04, 3.03, 3.02, 3.01, 3.00, 2.99, 2.98, 2.97, 2.96, 2.95, 2.94, 2.93, 2.92, 2.91, 2.90, 2.89, 2.88, 2.87, 2.86, 2.85, 2.84, 2.83, 2.82, 2.81, 2.80, 2.79, 2.78, 2.77, 2.76, 2.75, 2.74, 2.73, 2.72, 2.71, 2.70, 2.69, 2.68, 2.67, 2.66, 2.65, 2.64, 2.63, 2.62, 2.61, 2.60, 2.59, 2.58, 2.57, 2.56, 2.55, 2.54, 2.53, 2.52, 2.51, 2.50, 2.49, 2.48, 2.47, 2.46, 2.45, 2.44, 2.43, 2.42, 2.41, 2.40, 2.39, 2.38, 2.37, 2.36, 2.35, 2.34, 2.33, 2.32, 2.31, 2.30, 2.29, 2.28, 2.27, 2.26, 2.25, 2.24, 2.23, 2.22, 2.21, 2.20, 2.19, 2.18, 2.17, 2.16, 2.15, 2.14, 2.13, 2.12, 2.11, 2.10, 2.09, 2.08, 2.07, 2.06, 2.05, 2.04, 2.03, 2.02, 2.01, 2.00, 1.99, 1.98, 1.97, 1.96, 1.95, 1.94, 1.93, 1.92, 1.91, 1.90, 1.89, 1.88, 1.87, 1.86, 1.85, 1.84, 1.83, 1.82, 1.81, 1.80, 1.79, 1.78, 1.77, 1.76, 1.75, 1.74, 1.73, 1.72, 1.71, 1.70, 1.69, 1.68, 1.67, 1.66, 1.65, 1.64, 1.63, 1.62, 1.61, 1.60, 1.59, 1.58, 1.57, 1.56, 1.55, 1.54, 1.53, 1.52, 1.51, 1.50, 1.49, 1.48, 1.47, 1.46, 1.45, 1.44, 1.43, 1.42, 1.41, 1.40, 1.39, 1.38, 1.37, 1.36, 1.35, 1.34, 1.33, 1.32, 1.31, 1.30, 1.29, 1.28, 1.27, 1.26, 1.25, 1.24, 1.23, 1.22, 1.21, 1.20, 1.19, 1.18, 1.17, 1.16, 1.15, 1.14, 1.13, 1.12, 1.11, 1.10, 1.09, 1.08, 1.07, 1.06, 1.05, 1.04, 1.03, 1.02, 1.01, 1.00, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.90, 0.89, 0.88, 0.87, 0.86, 0.85, 0.84, 0.83, 0.82, 0.81, 0.80, 0.79, 0.78, 0.77, 0.76, 0.75, 0.74, 0.73, 0.72, 0.71, 0.70, 0.69, 0.68, 0.67, 0.66, 0.65, 0.64, 0.63, 0.62, 0.61, 0.60, 0.59, 0.58, 0.57, 0.56, 0.55, 0.54, 0.53, 0.52, 0.51, 0.50, 0.49, 0.48, 0.47, 0.46, 0.45, 0.44, 0.43, 0.42, 0.41, 0.40, 0.3



2-(1-(2-((4-ethylphenyl)amino)-2-oxoethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (8g)



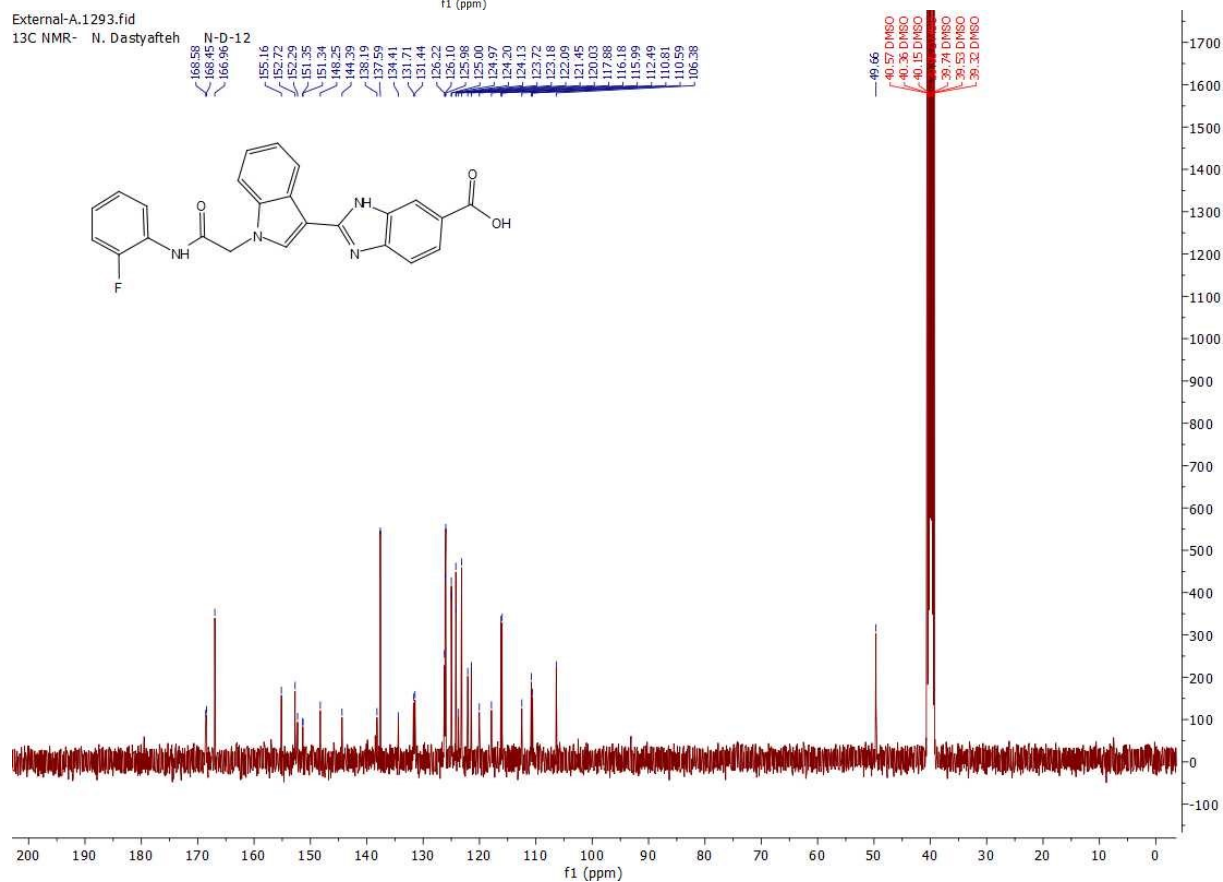
External-A1292.fid
1H NMR- N. Dastyarfeh

Chemical structure of the compound is shown above the spectrum. The structure is a complex molecule featuring a benzimidazole core substituted with a 2-fluorophenyl group, a 2-phenylacetamido group, and a 2-carboxyphenyl group.

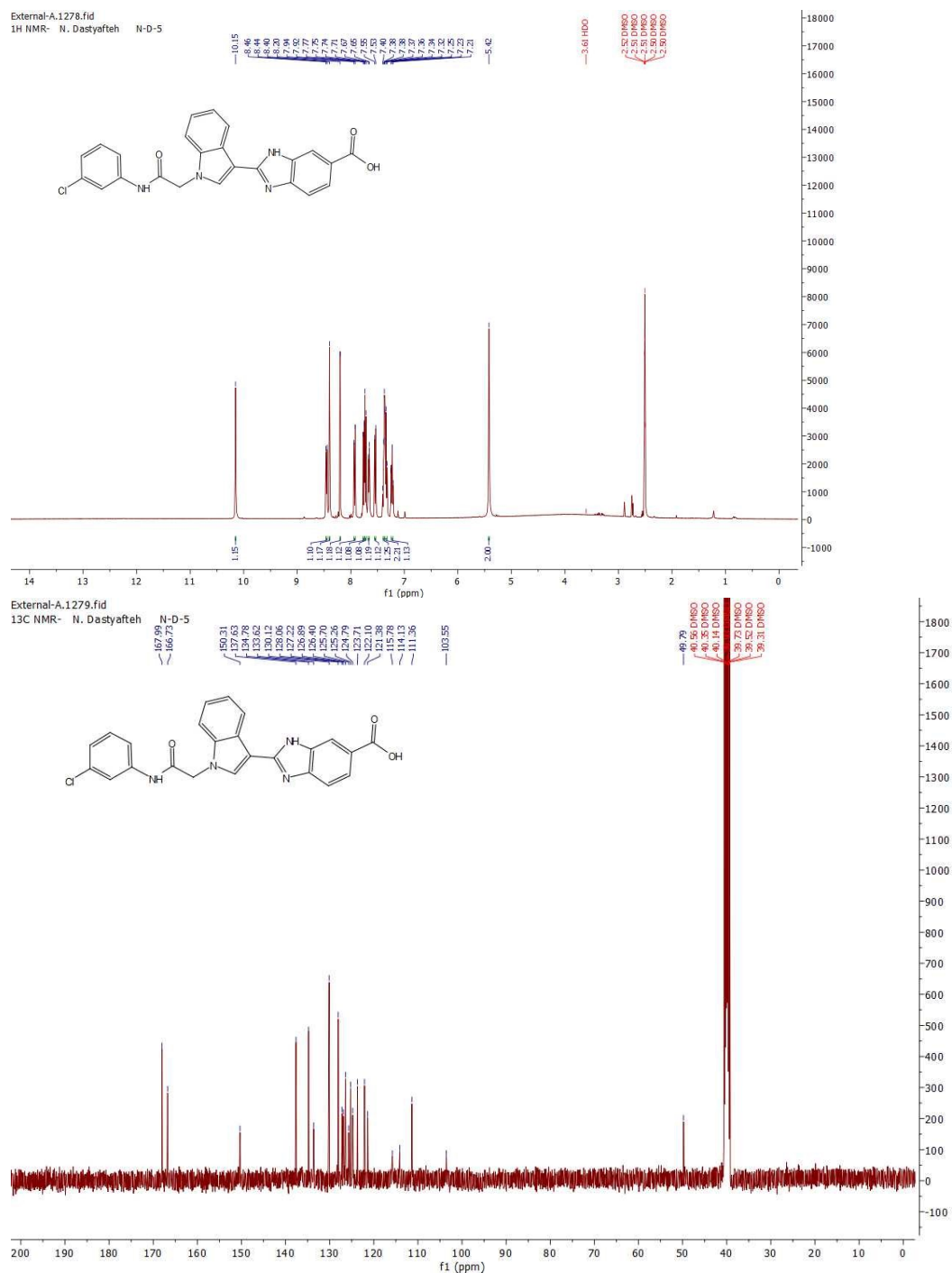
The 1H NMR spectrum (400 MHz, DMSO-d6) shows the following peaks (ppm):

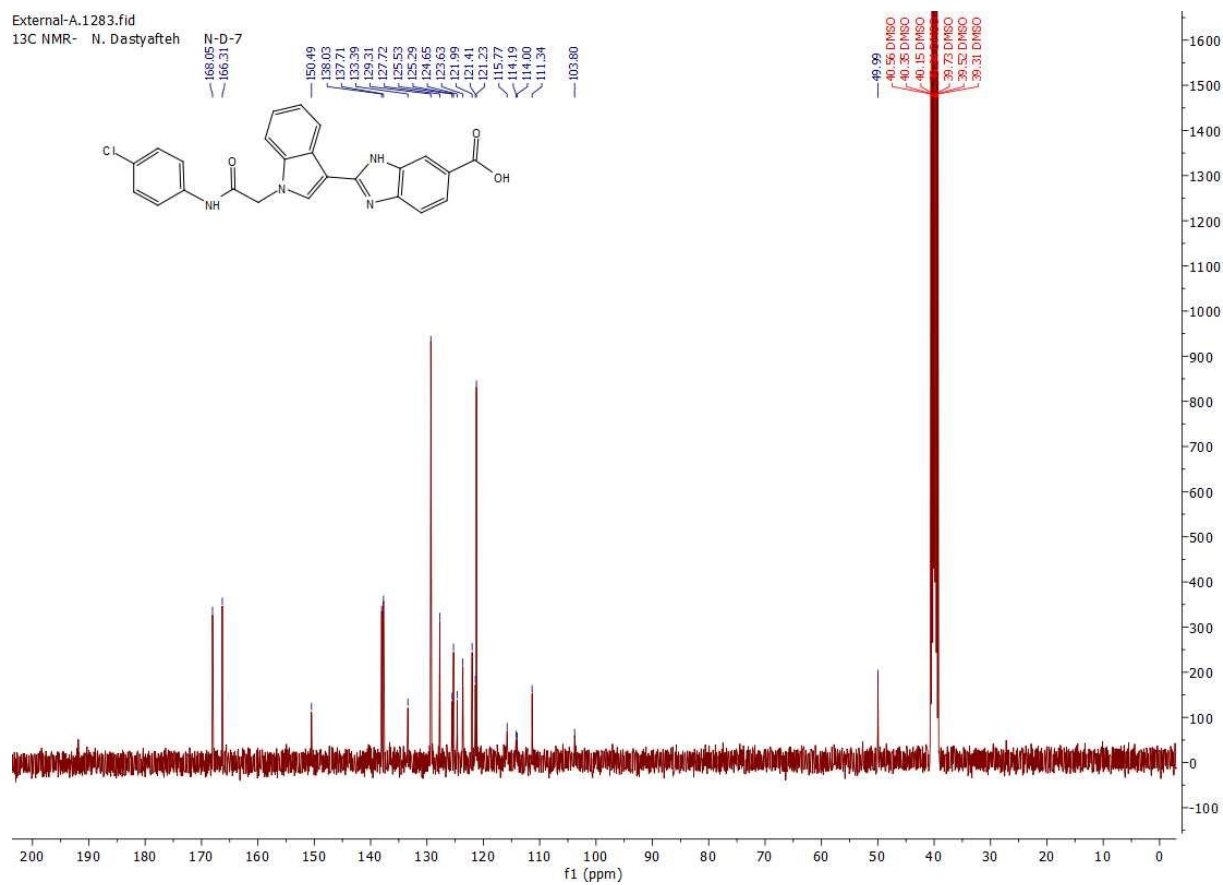
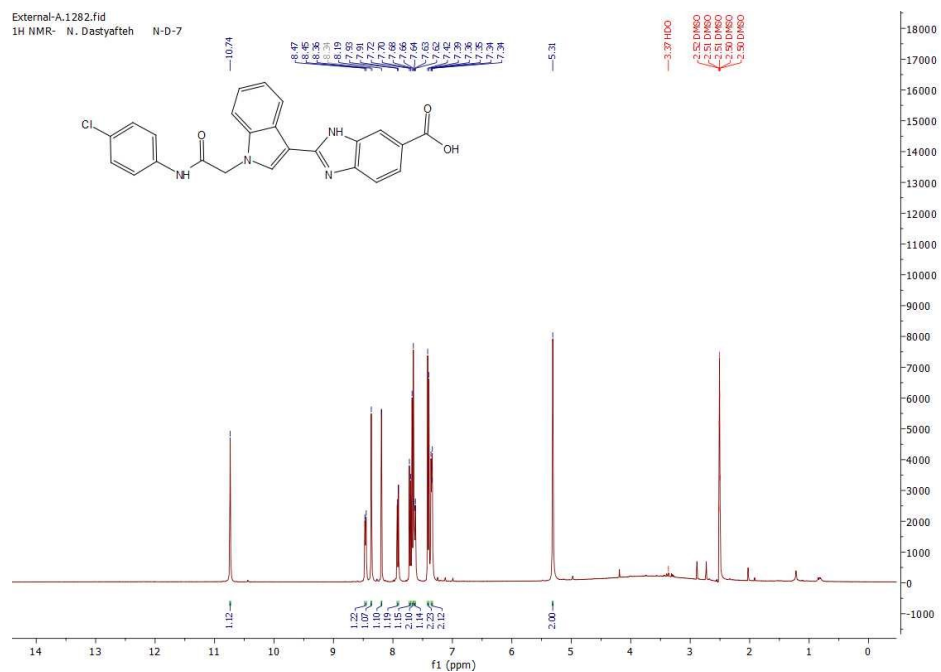
- 12.90 (s, 1H, NH)
- 12.85 (s, 1H, NH)
- 12.64 (s, 1H, NH)
- 10.32 (s, 1H, NH)
- 8.57 (s, 1H, NH)
- 8.55 (s, 1H, NH)
- 8.53 (s, 1H, NH)
- 8.23 (s, 1H, NH)
- 7.96 (s, 1H, NH)
- 7.95 (s, 1H, NH)
- 7.94 (s, 1H, NH)
- 7.91 (s, 1H, NH)
- 7.82 (s, 1H, NH)
- 7.81 (s, 1H, NH)
- 7.70 (s, 1H, NH)
- 7.68 (s, 1H, NH)
- 7.67 (s, 1H, NH)
- 7.67 (s, 1H, NH)
- 7.59 (s, 1H, NH)
- 7.54 (s, 1H, NH)
- 7.38 (s, 1H, NH)
- 7.32 (s, 1H, NH)
- 7.31 (s, 1H, NH)
- 7.30 (s, 1H, NH)
- 7.29 (s, 1H, NH)
- 7.28 (s, 1H, NH)
- 7.27 (s, 1H, NH)
- 7.20 (s, 1H, NH)
- 7.19 (s, 1H, NH)
- 7.17 (s, 1H, NH)
- 7.16 (s, 1H, NH)
- 5.35 (s, 1H, NH)

The spectrum displays a series of sharp peaks in the aromatic region (6.5-8.6 ppm) and a broad peak in the aliphatic region (7.2-7.3 ppm). Integration values are provided for several peaks: 1.08, 1.00, 1.01, 1.08, 1.27, 1.08, 2.17, 1.05, 2.02, 2.00, and 2.00.

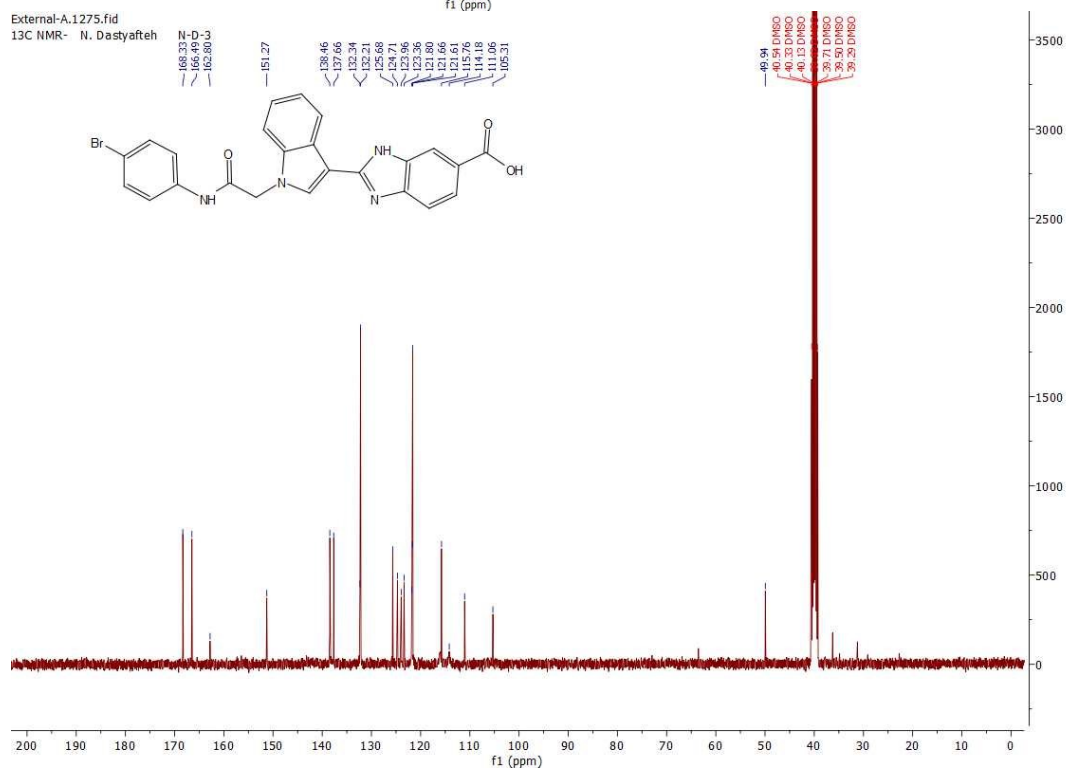


2-(1-(2-((3-chlorophenyl)amino)-2-oxoethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (8i)

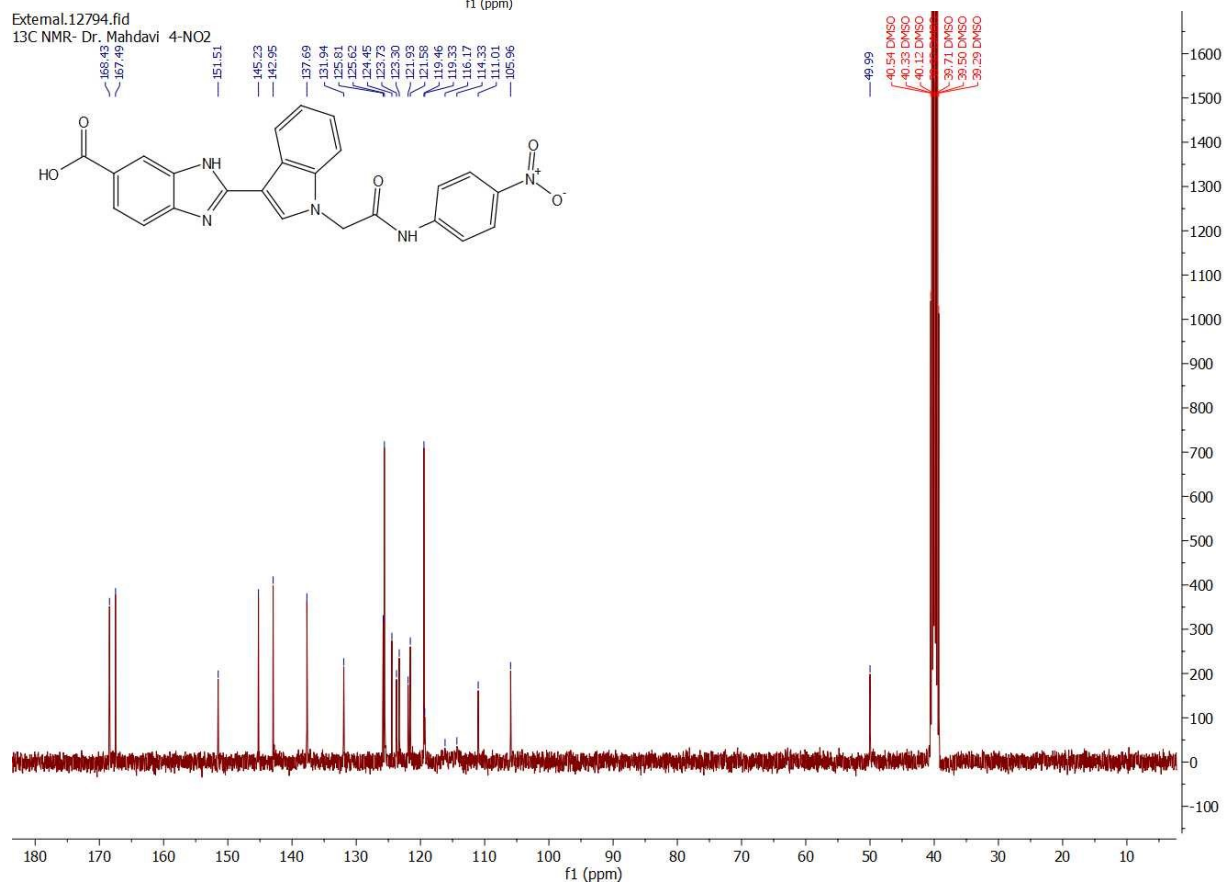
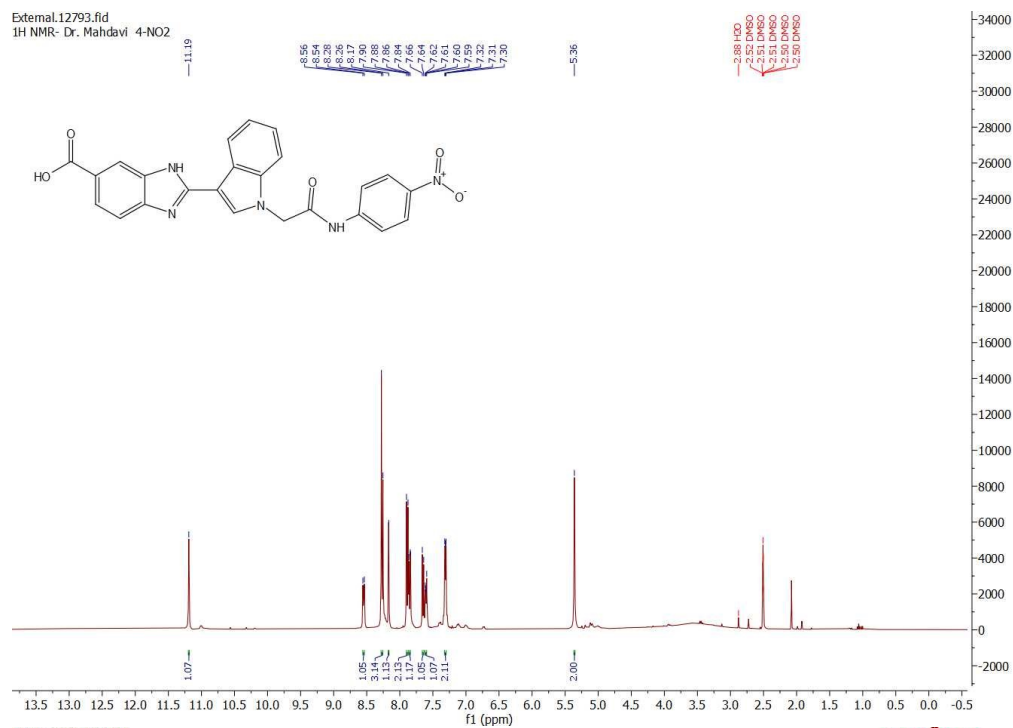




2-(1-(2-((4-bromophenyl)amino)-2-oxoethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (**8k**)



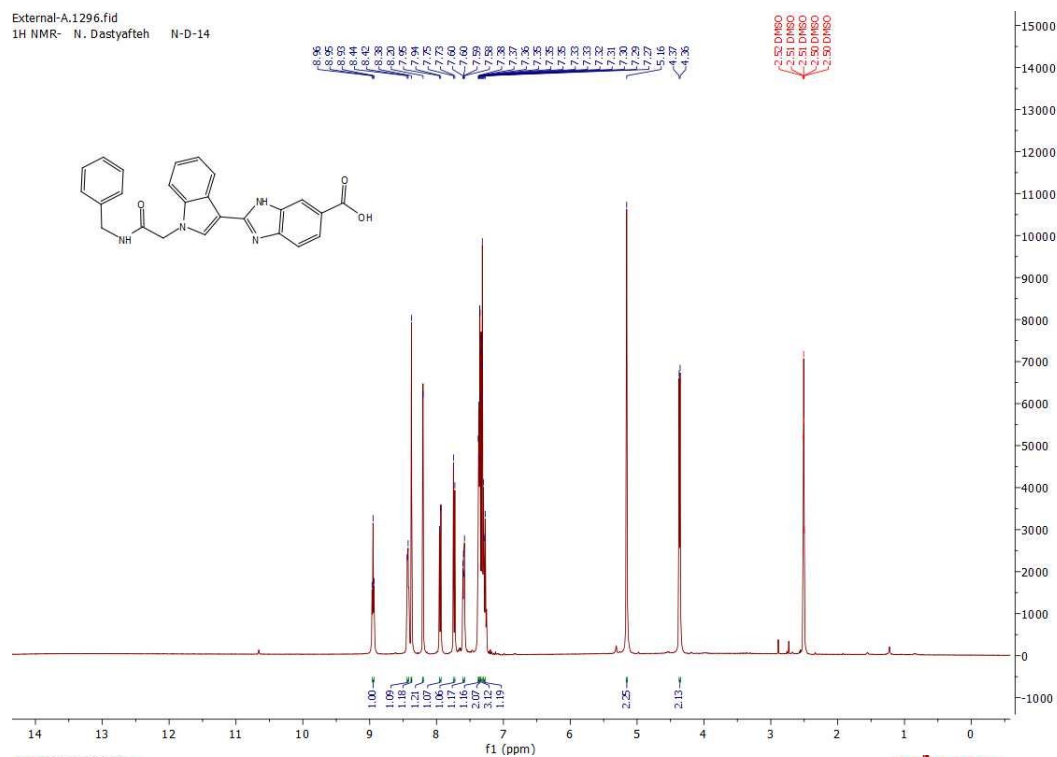
acid (8l)



2-(1-(2-(benzylamino)-2-oxoethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (**8m**)

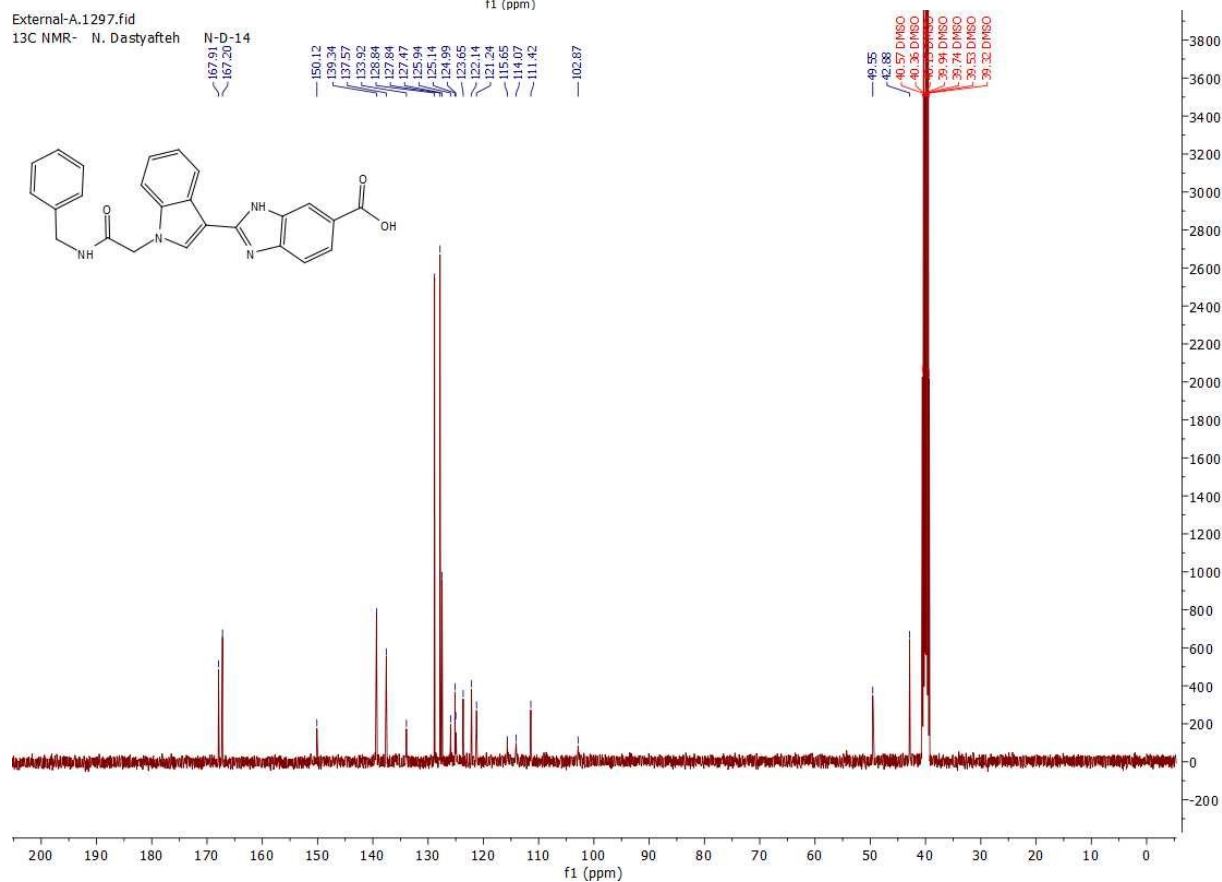
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¹H NMR- N. Dastyafteh N-D-14

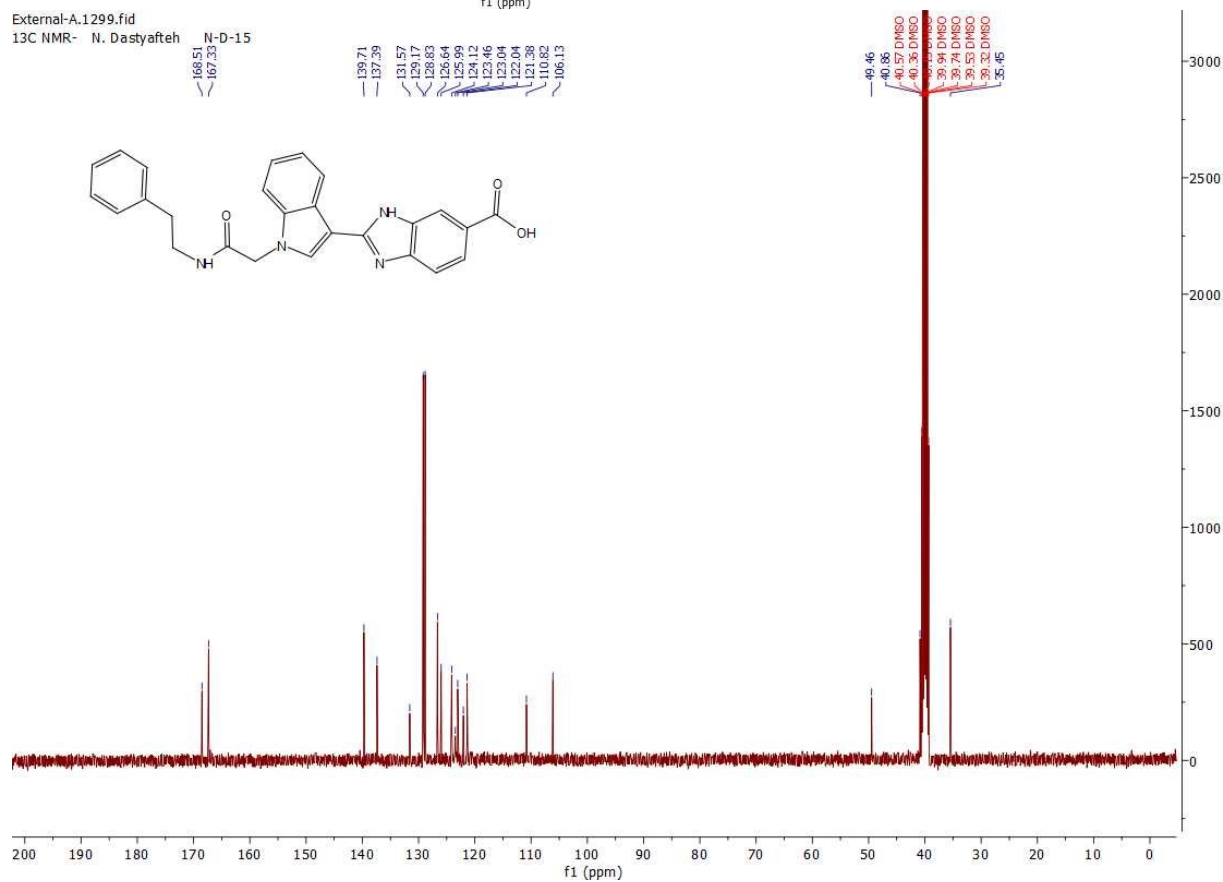
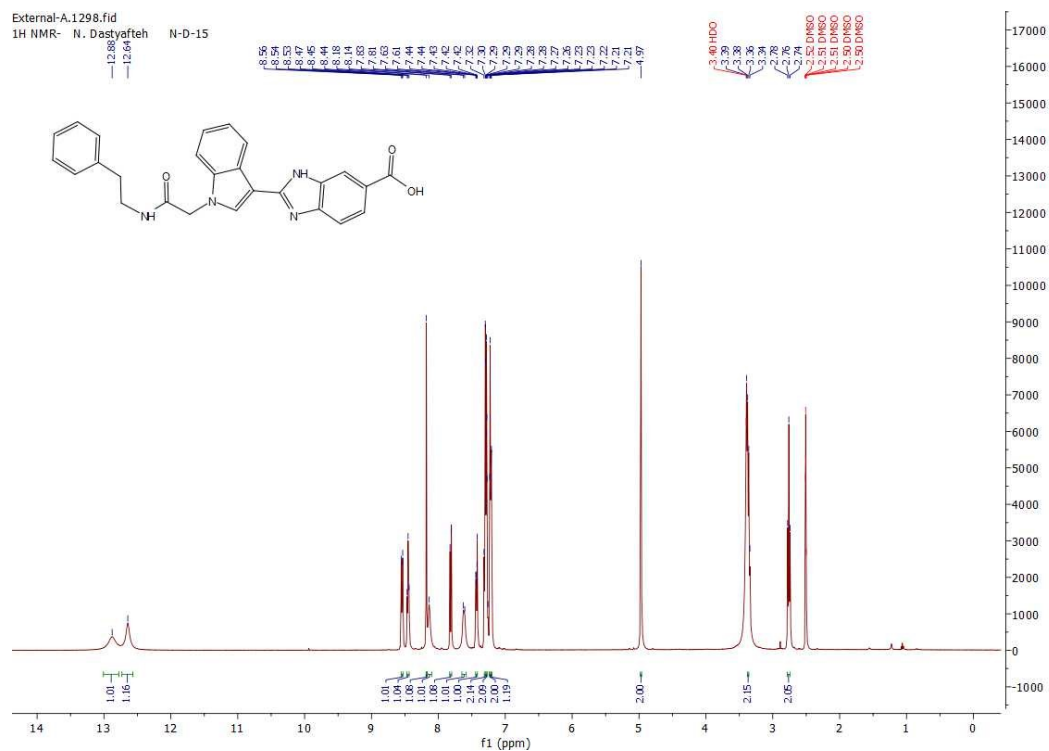


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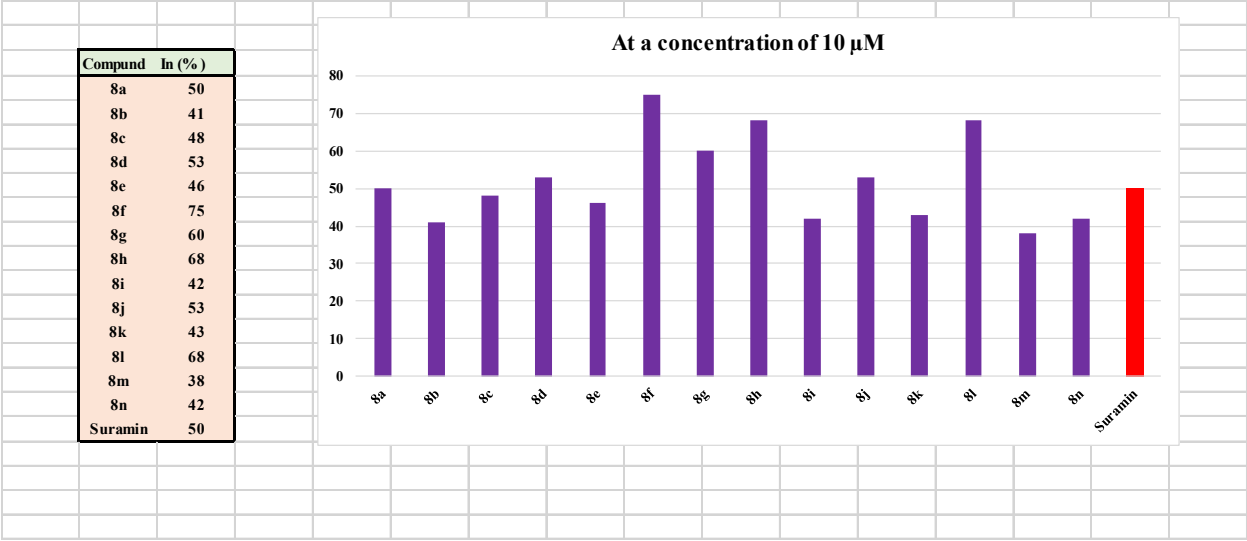
¹³C NMR- N. Dastyafteh N-D-14



2-(1-(2-oxo-2-(phenethylamino)ethyl)-1H-indol-3-yl)-1H-benzo[d]imidazole-6-carboxylic acid (8n)



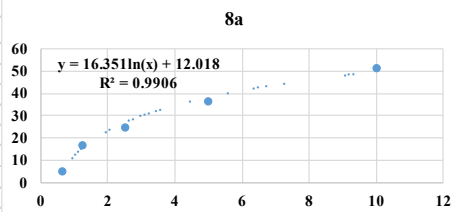
%inhibition in anti-PTP1B assay



Determination of IC_{50} values in anti-PTP1B assay

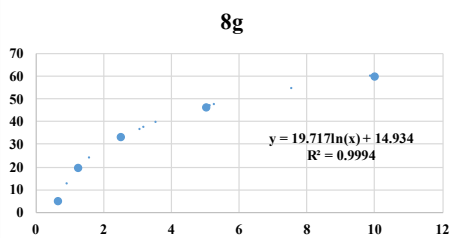
8a

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.02	0.31	0.29	51.66667
5	0.01	0.39	0.38	36.66667
2.5	0.03	0.48	0.45	25
1.25	0.01	0.51	0.5	16.66667
0.625	0.01	0.58	0.57	5
			IC50	10.20684



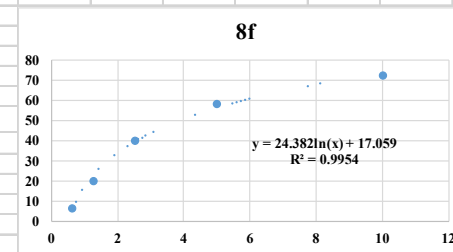
8g

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.03	0.27	0.24	60
5	0.02	0.34	0.32	46.66667
2.5	0.01	0.41	0.4	33.33333
1.25	0.02	0.5	0.48	20
0.625	0.03	0.6	0.57	5
			IC50	5.921964



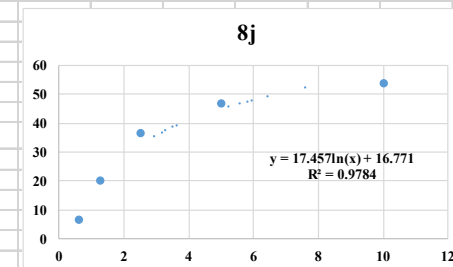
8f

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.04	0.208	0.168	72
5	0.03	0.28	0.25	58.33333
2.5	0.02	0.38	0.36	40
1.25	0.01	0.49	0.48	20
0.625	0.01	0.57	0.56	6.666667
			IC50	3.86143



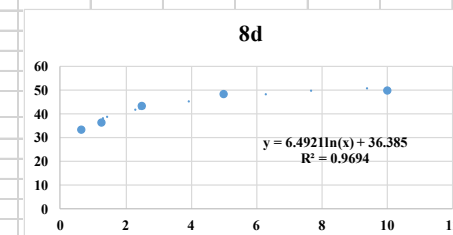
8j

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.1	0.377	0.277	53.83333
5	0.08	0.4	0.32	46.66667
2.5	0.07	0.45	0.38	36.66667
1.25	0.06	0.54	0.48	20
0.625	0.05	0.61	0.56	6.666667
			IC50	6.709183



8d

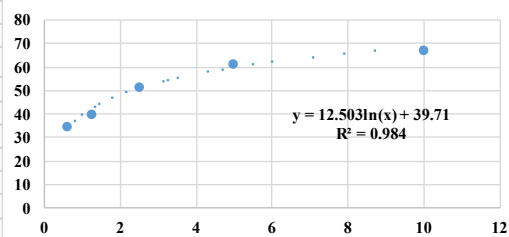
Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.09	0.39	0.3	50
5	0.06	0.37	0.31	48.33333
2.5	0.03	0.37	0.34	43.33333
1.25	0.01	0.39	0.38	36.66667
0.625	0.01	0.41	0.4	33.33333
			IC50	8.148573



8l

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.05	0.245	0.195	67.5
5	0.03	0.26	0.23	61.66667
2.5	0.02	0.31	0.29	51.66667
1.25	0.02	0.38	0.36	40
0.625	0.01	0.4	0.39	35
IC50				2.277327

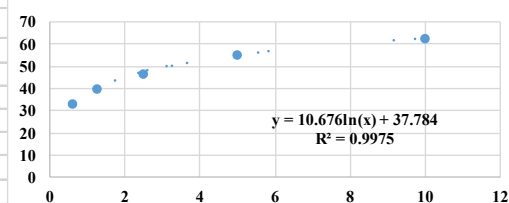
8l



8h

Conc.	OD Blank	OD Total	OD Final	In (%)
10	0.08	0.303	0.223	62.83333
5	0.07	0.34	0.27	55
2.5	0.06	0.38	0.32	46.66667
1.25	0.06	0.42	0.36	40
0.625	0.05	0.45	0.4	33.33333
IC50				3.140082

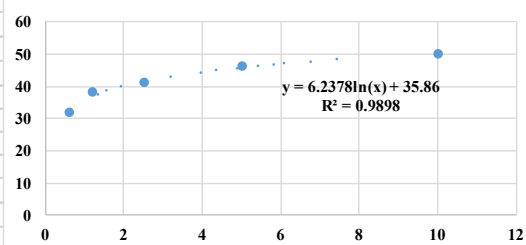
8h



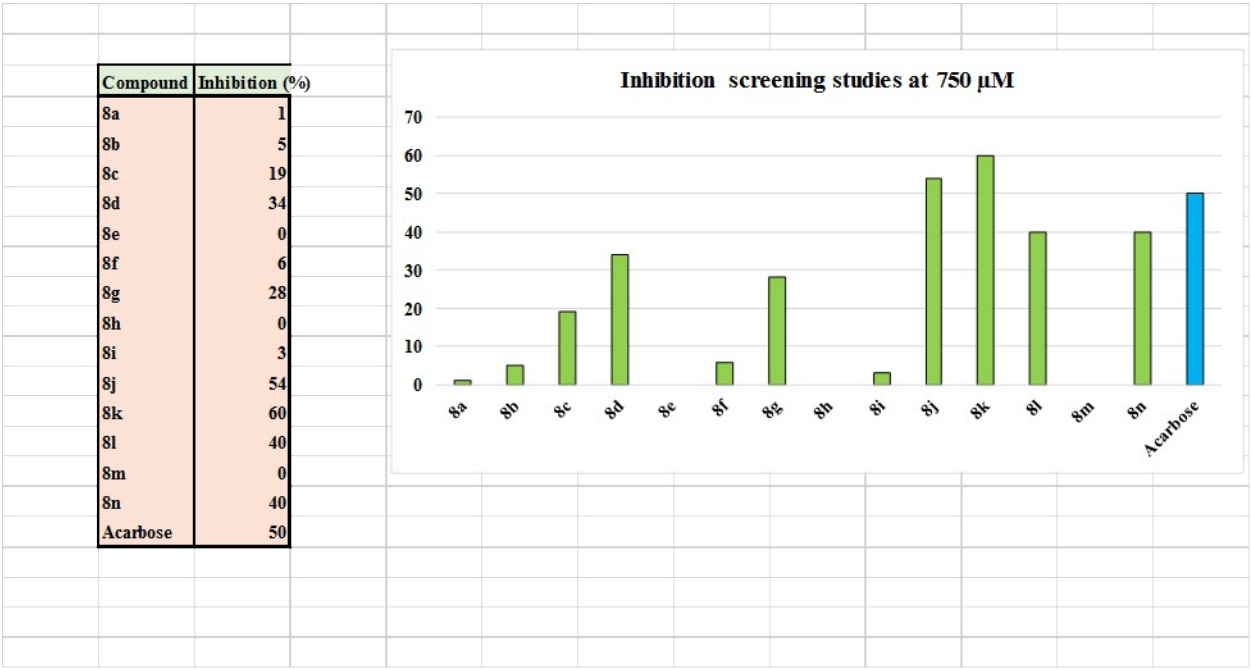
Suramin

Conc.	OD Blank	OD total	OD Final	In (%)
10	0.094	0.384	0.29	49.82699
5	0.063	0.373	0.31	46.36678
2.5	0.091	0.431	0.34	41.17647
1.2	0.066	0.516	0.45	38
0.6	0.057	0.657	0.6	32
IC50				10.0074

Suramin



%inhibition in anti-α-glucosidase assay



Determination of IC_{50} values in anti- α -glucosidase assay

