

Synthesis and antibacterial activity of new azole, diazole and triazole derivatives based on *p*-aminobenzoic acid

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SUPPORTING INFORMATION

- ❖ **NMR Spectra (2-24) (All in DMSO-*d*₆)**
- ❖ **Bacteria strains used in the biological evaluation**

1-(4-Carboxyphenyl)-5-oxopyrrolidine-3-carboxylic acid 2

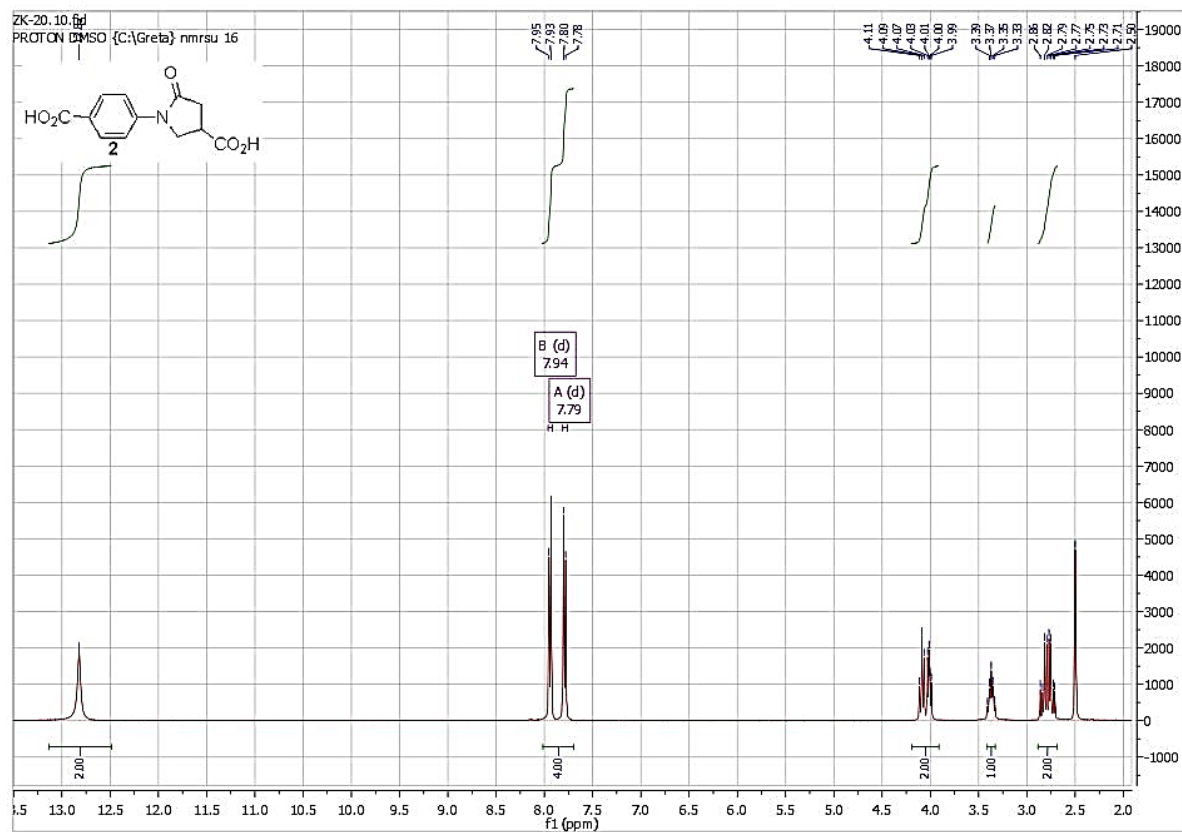


Figure S1: ^1H NMR of compound 2

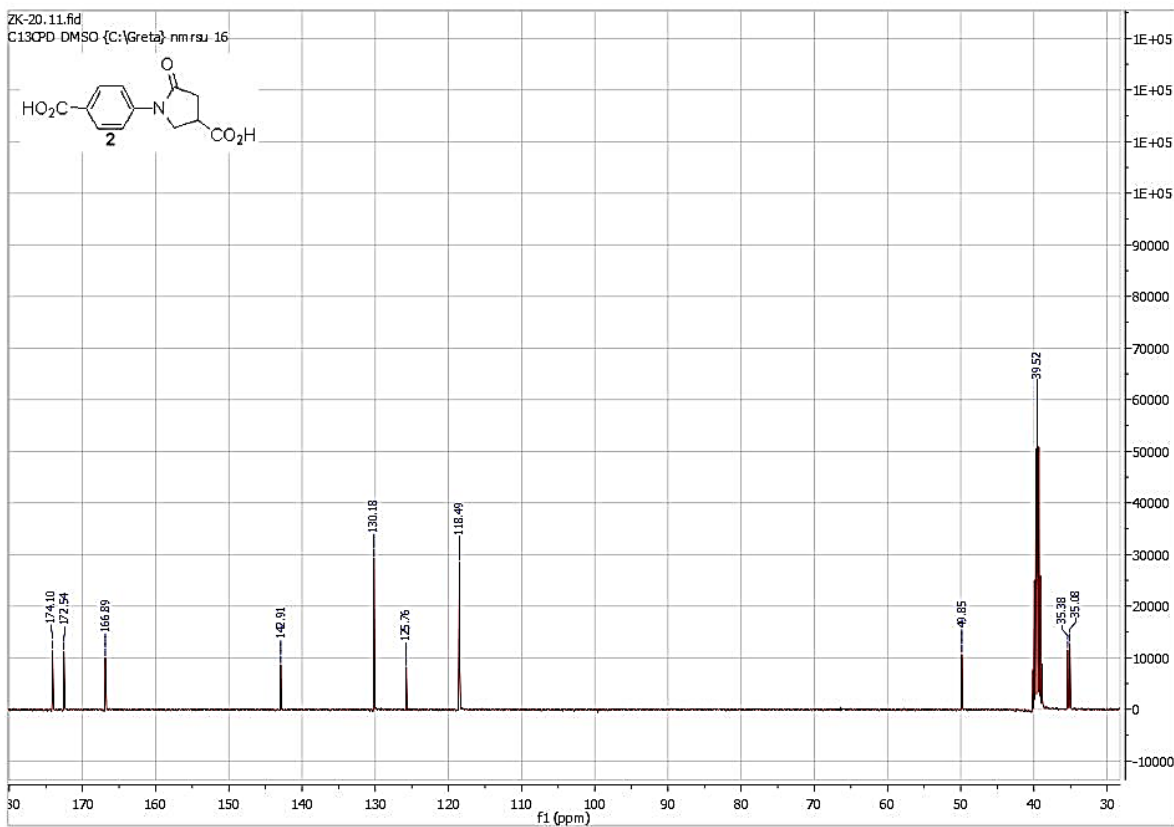


Figure S2: ^{13}C NMR of compound 2

Methyl 1-[4-(methoxycarbonyl)phenyl]-5-oxopyrrolidine-3-carboxylate 3

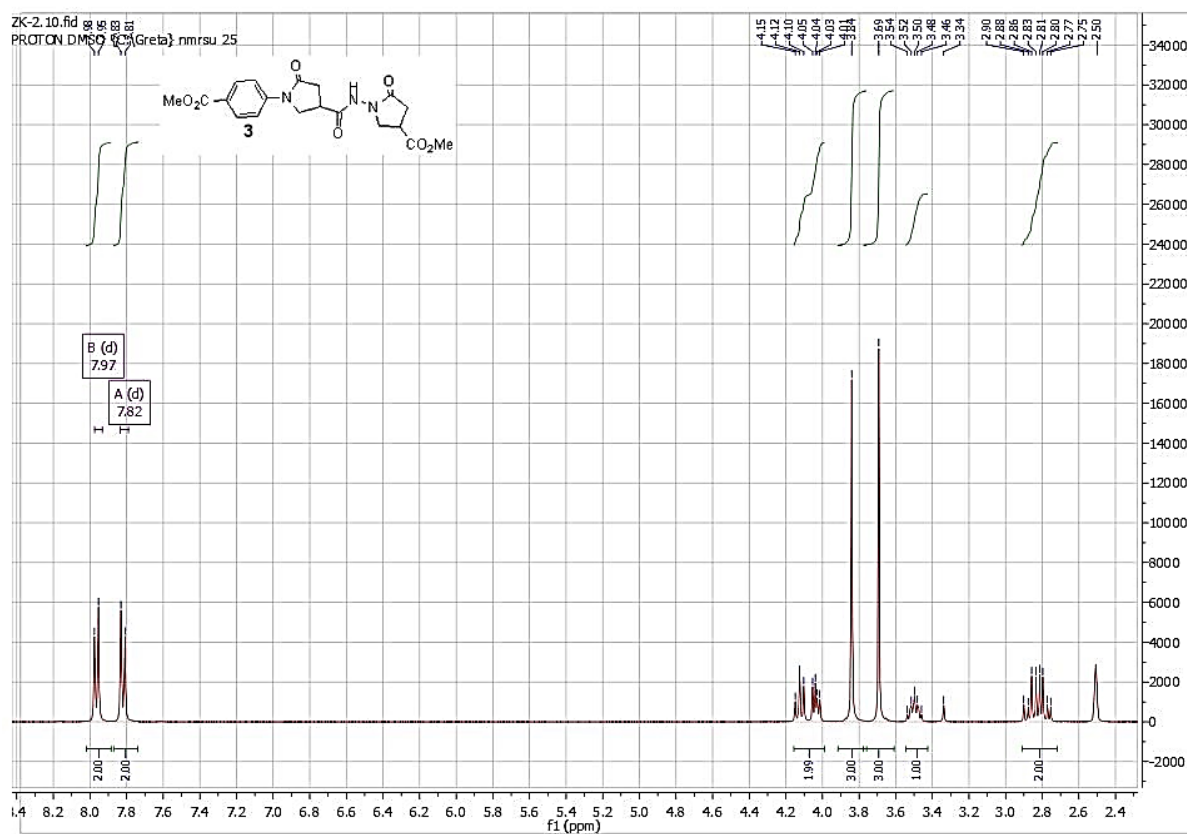


Figure S3: ^1H NMR of compound 3

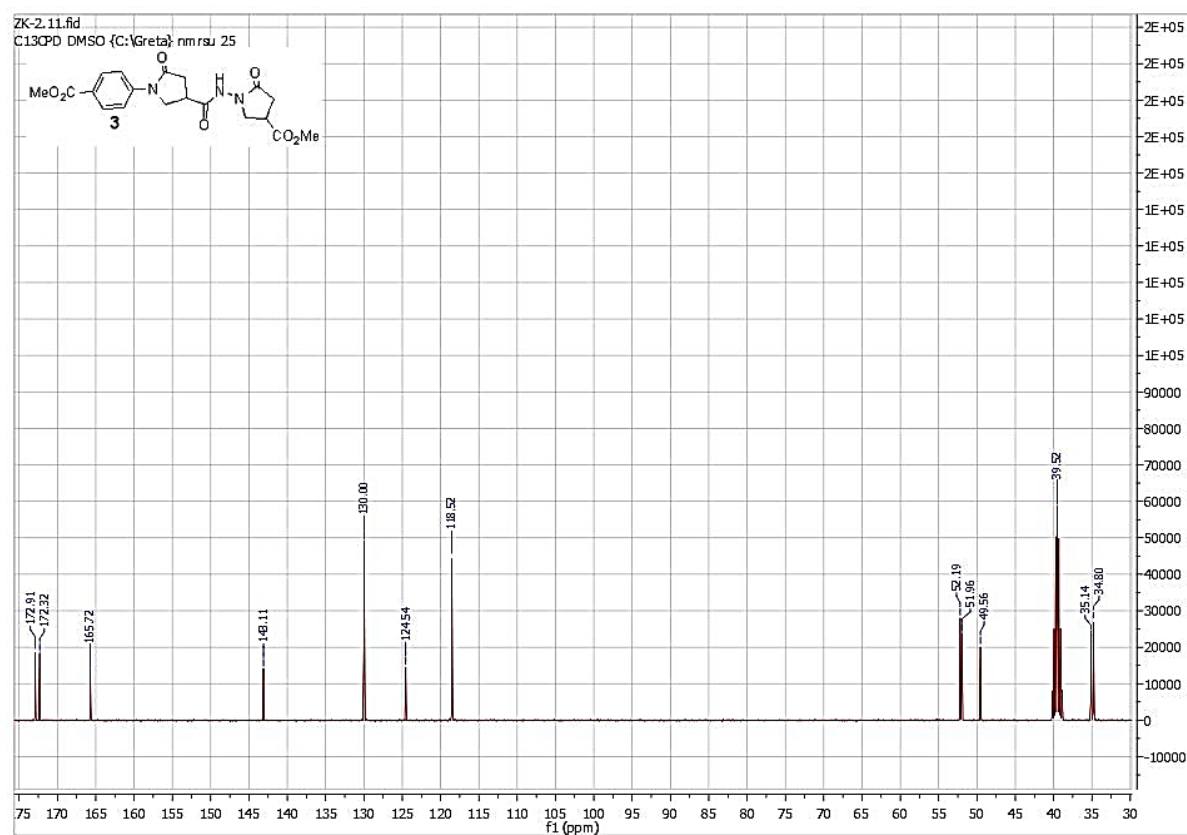


Figure S4: ^{13}C NMR of compound 3

Methyl 4-[3-(hydrazinocarbonyl)-5-oxopyrrolidin-1-yl]benzoate 4

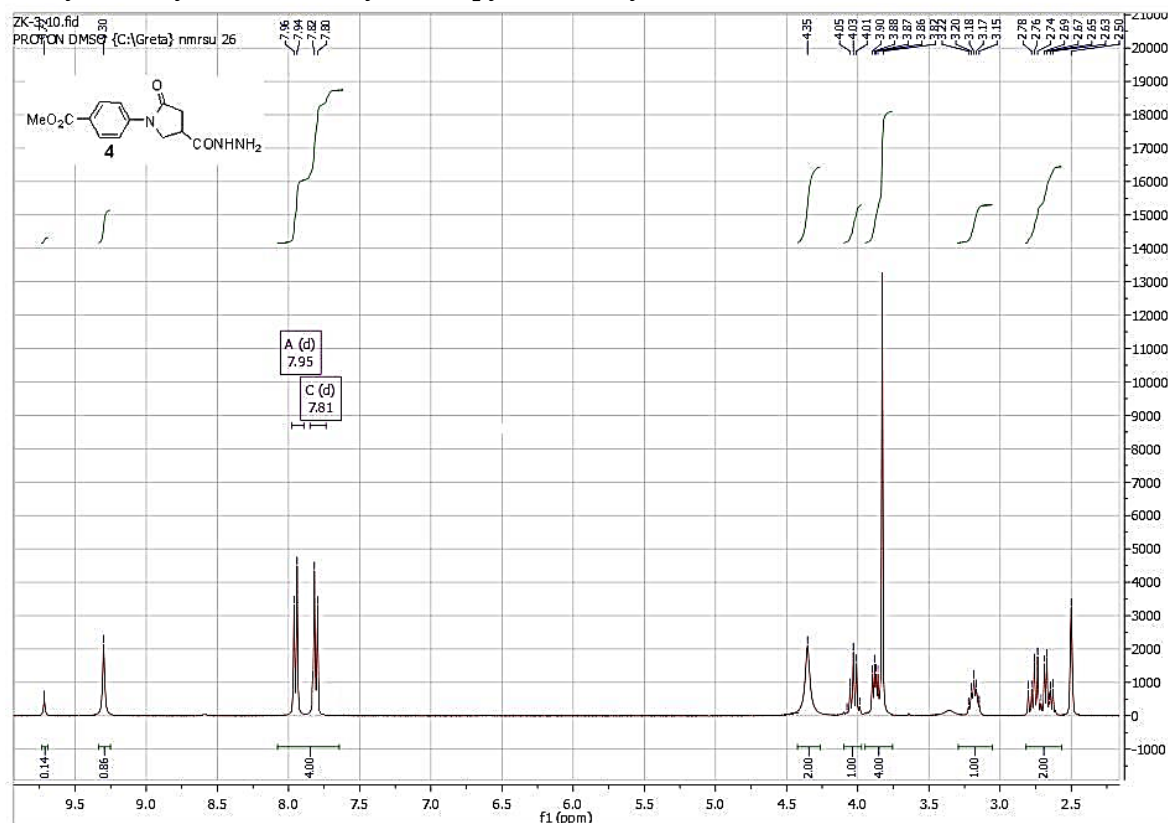


Figure S5: ^1H NMR of compound 4

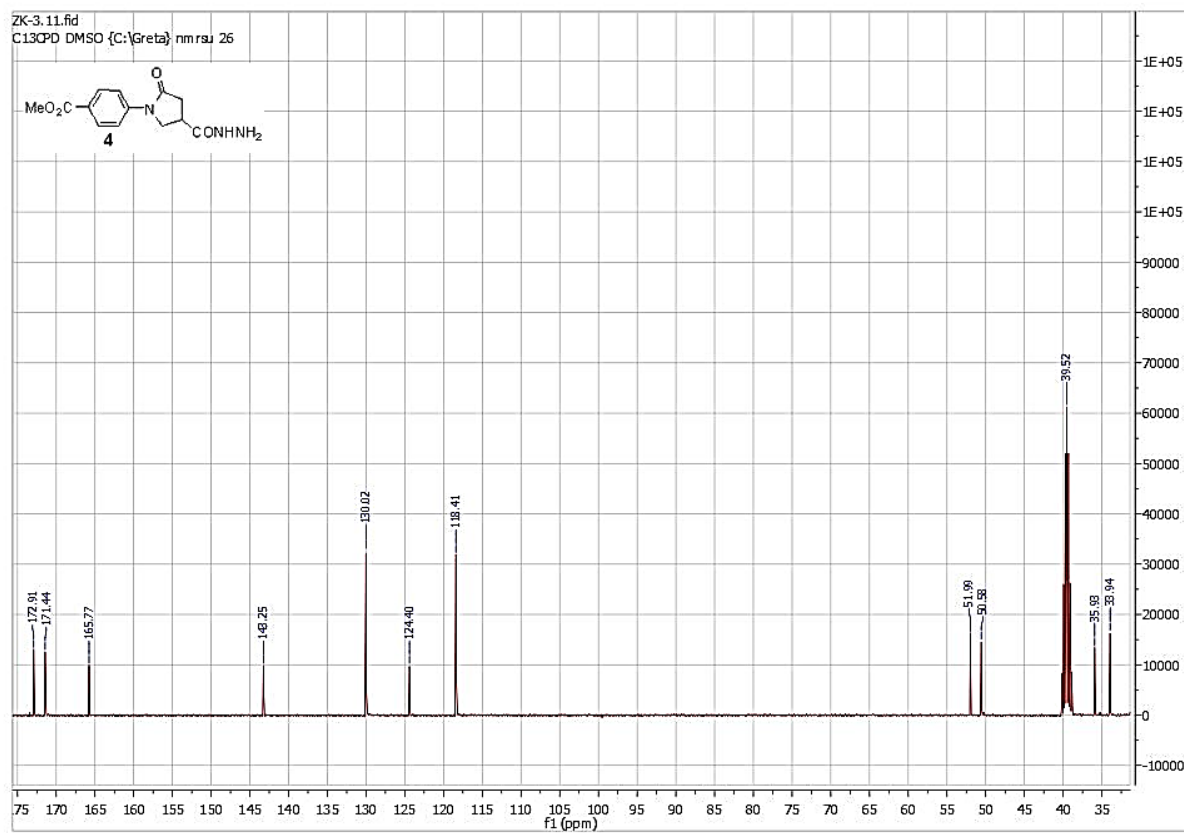


Figure S6: ^{13}C NMR of compound 4

Methyl 4-(4-(3,5-dimethyl-1H-pyrazole-1-carbonyl)-2-oxopyrrolidin-1-yl)benzoate 5

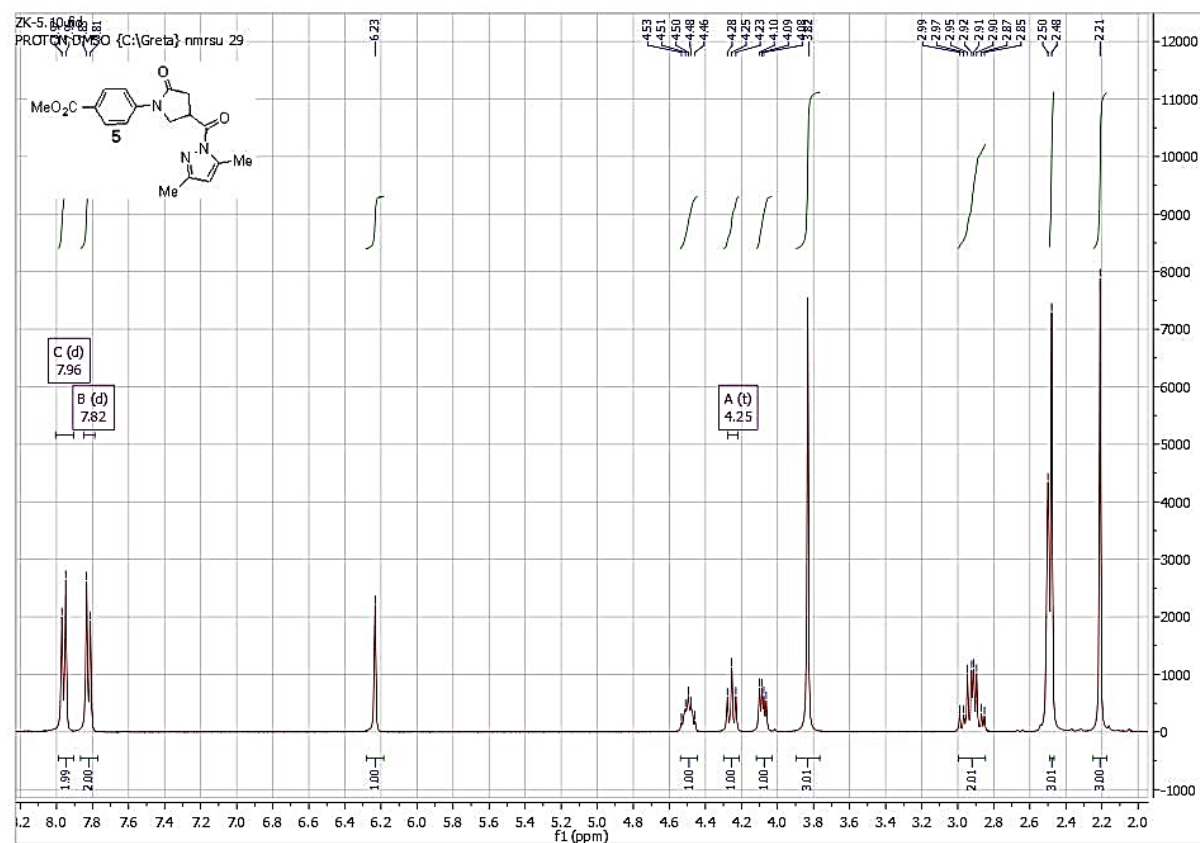


Figure S7: ^1H NMR of compound 5

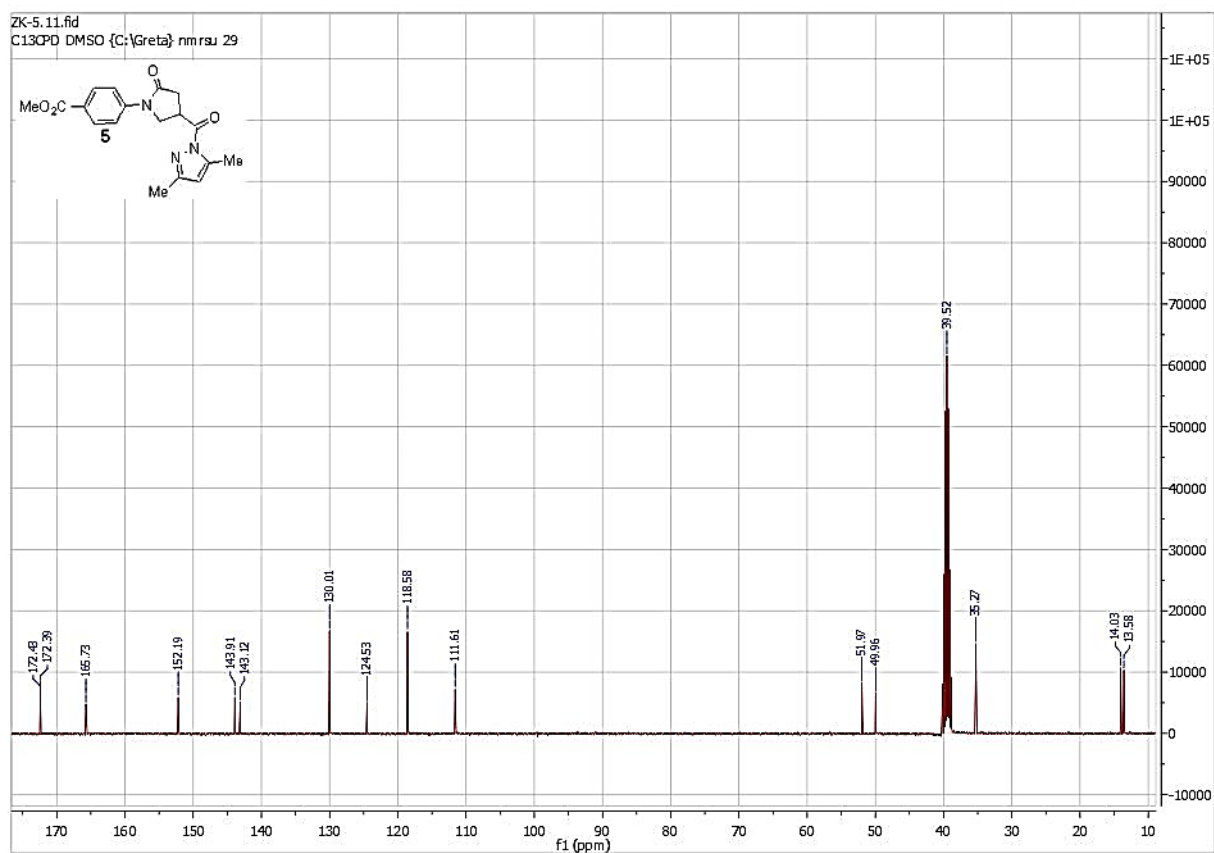


Figure S8: ^{13}C NMR of compound 5

Methyl 4-((2,5-dimethyl-1H-pyrrol-1-yl)carbamoyl)-2-oxopyrrolidin-1-yl)benzoate 6

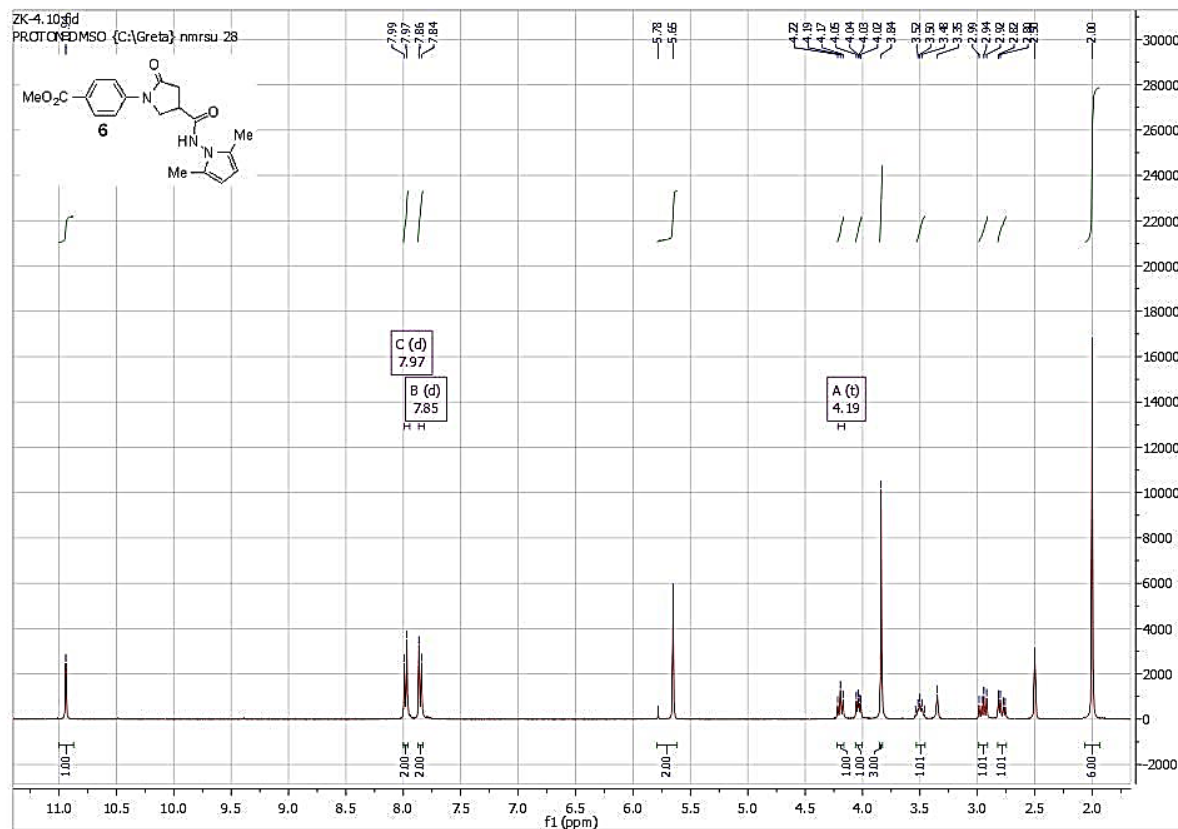


Figure S9: ^1H NMR of compound 6

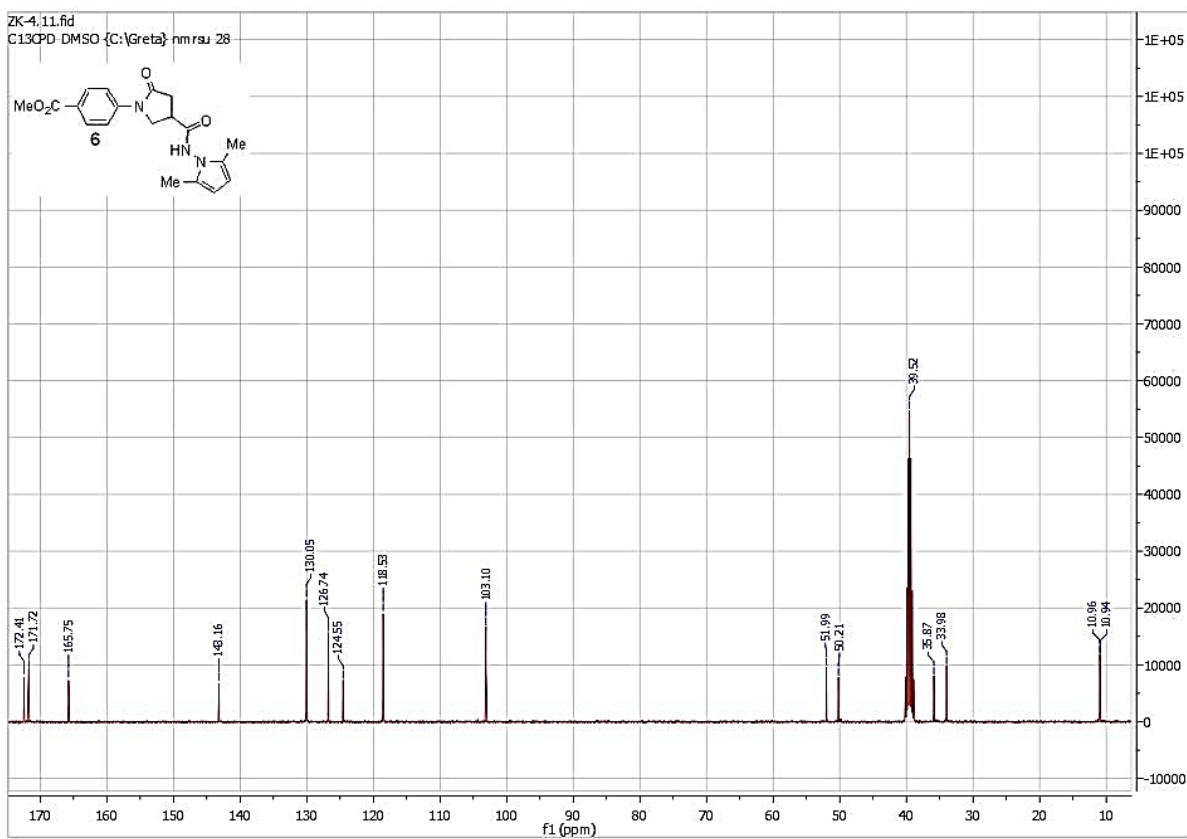


Figure S10: ^{13}C NMR of compound 6

ZK-6.18.d
PROTON NMR DMSO-d₆ {CA Greta} nmrsu 30

COC(=O)c1ccc(cc1)N2CC(=O)NC(=O)N2/C=C/c3ccccc3
7a

Integration values (from left to right): 0.99, 0.30, 0.70, 2.00, 1.99, 3.00, 2.70, 3.00, 0.30, 2.00.

Peak list (ppm): 8.24, 8.05, 7.99, 7.98, 7.97, 7.96, 7.84, 7.73, 7.72, 7.71, 7.45, 7.44, 7.43, 4.21, 4.19, 4.18, 4.17, 4.11, 4.05, 4.04, 4.02, 3.83, 3.82, 3.46, 3.38, 2.90, 2.88, 2.86, 2.65, 2.51, 2.50.

1H NMR spectrum of compound 7b

Chemical structure of 7b: COc1ccc(cc1)/N=C(N)C(=O)N2CC(=O)N(c3ccc(OC)cc3)C2=O

1H NMR Data (CDCl₃):

Chemical Shift (ppm)	Integration
7.84 (d)	0.10
7.64 (d)	0.30
7.85 (d)	2.60
7.65 (d)	2.00
7.66 (d)	2.00
7.63 (d)	2.00
7.01 (s)	2.01
3.81 (s)	3.00
3.61 (s)	6.00
3.80 (s)	2.00
2.50 (s)	2.00

Figure S12: ^1H NMR of compound **7b**

Methyl 4-(4-(2-(4-(dimethylamino)benzylidene)hydrazine-1-carbonyl)-2-oxopyrrolidin-1-yl)benzoate 7c

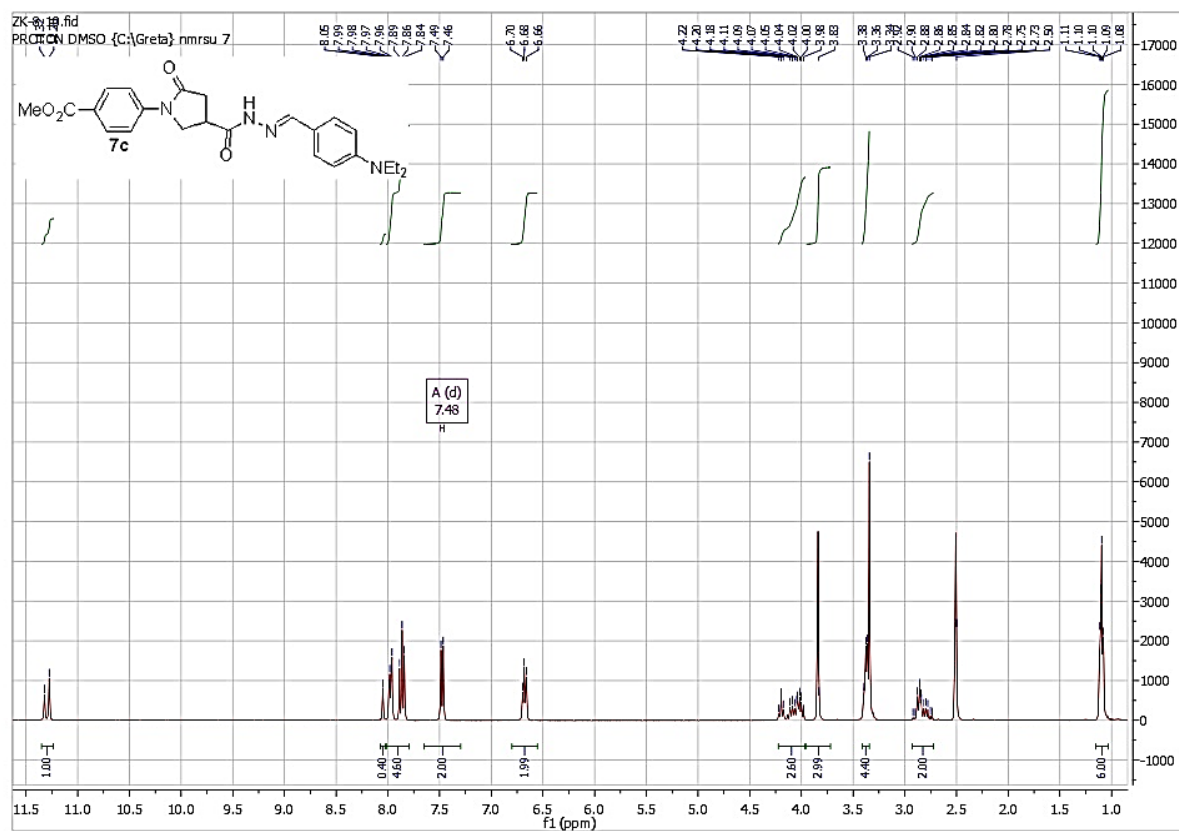


Figure S13: ¹H NMR of compound 7c

1-(1-(4-(Methoxycarbonyl)phenyl)-5-oxopyrrolidine-3-carboxamido)-5-oxopyrrolidine-3-carboxylic acid 8

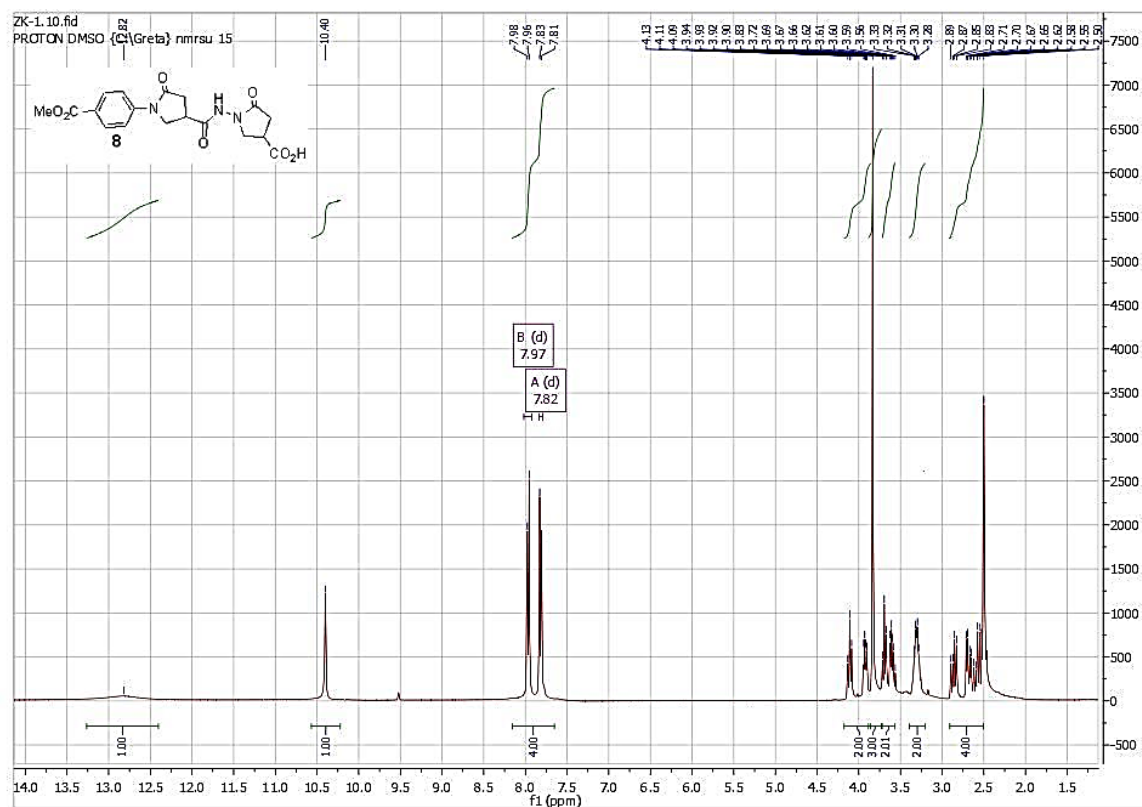


Figure S14: ^1H NMR of compound 8

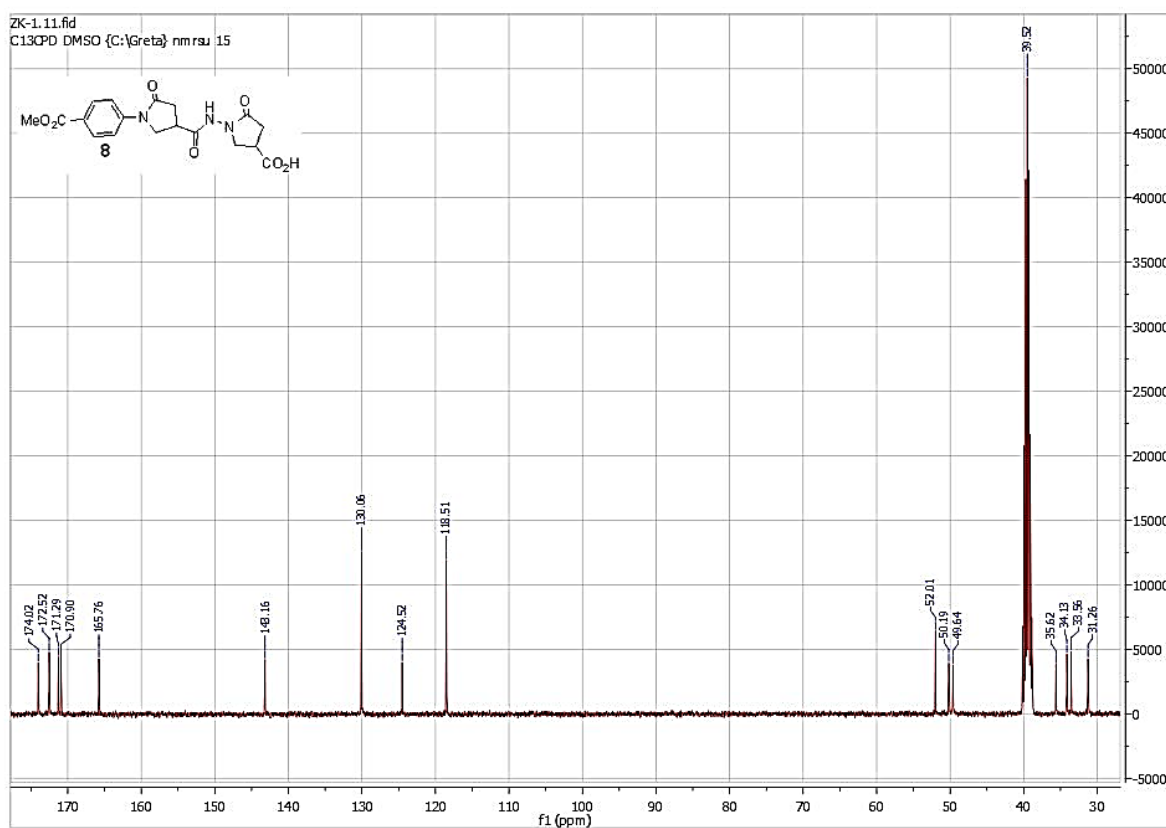


Figure S15: ^{13}C NMR of compound 8

Methyl 4-(4-(2-benzoylhydrazine-1-carbonyl)-2-oxopyrrolidin-1-yl)benzoate 9

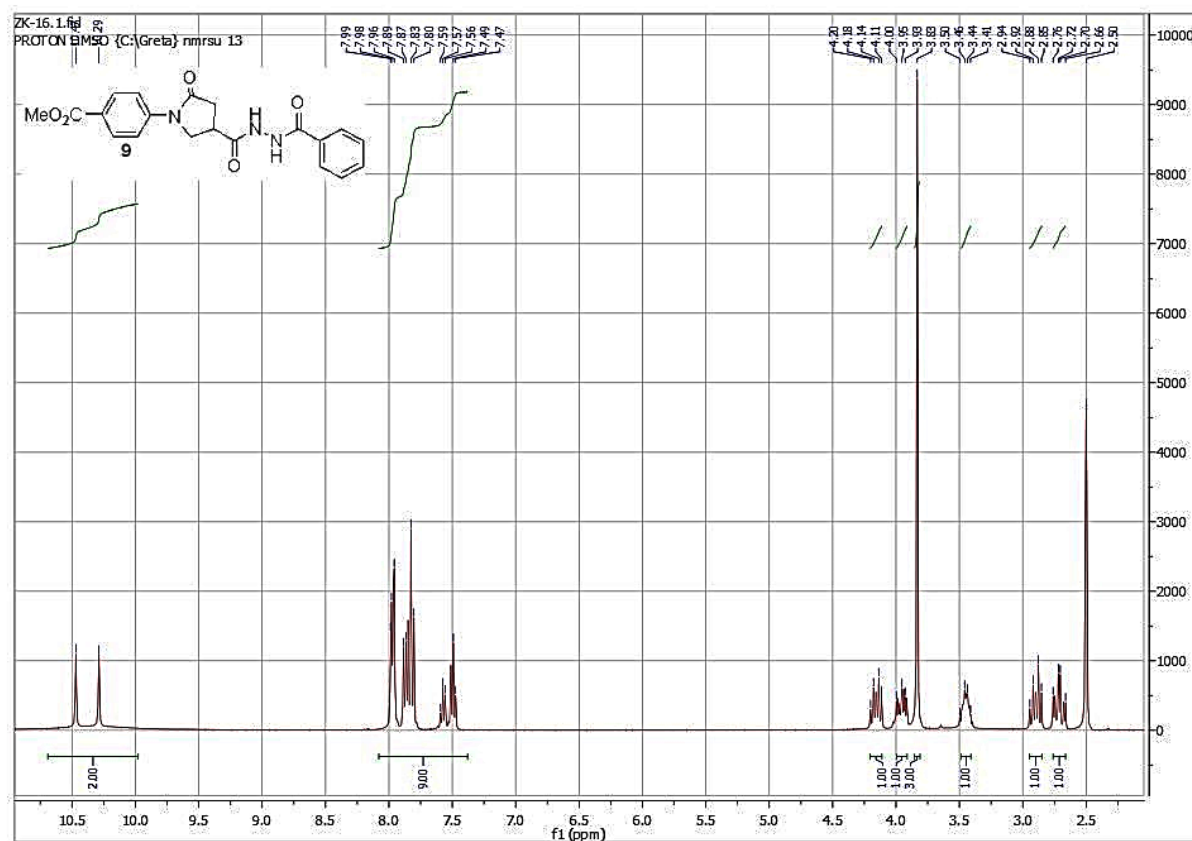


Figure S16: ^1H NMR of compound 9

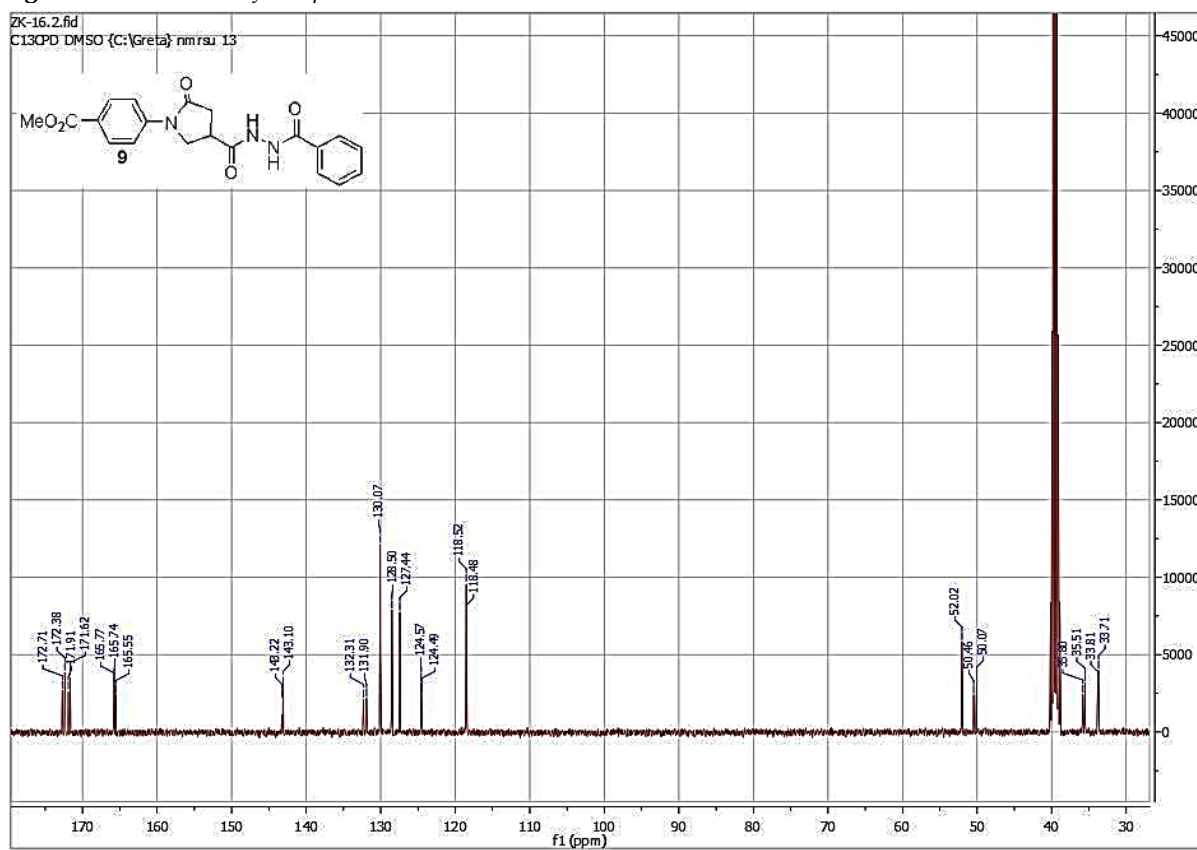


Figure S17: ^{13}C NMR of compound 9

1-(4-(Hydrazinecarbonyl)phenyl)-5-oxopyrrolidine-3-carbohydrazide 10

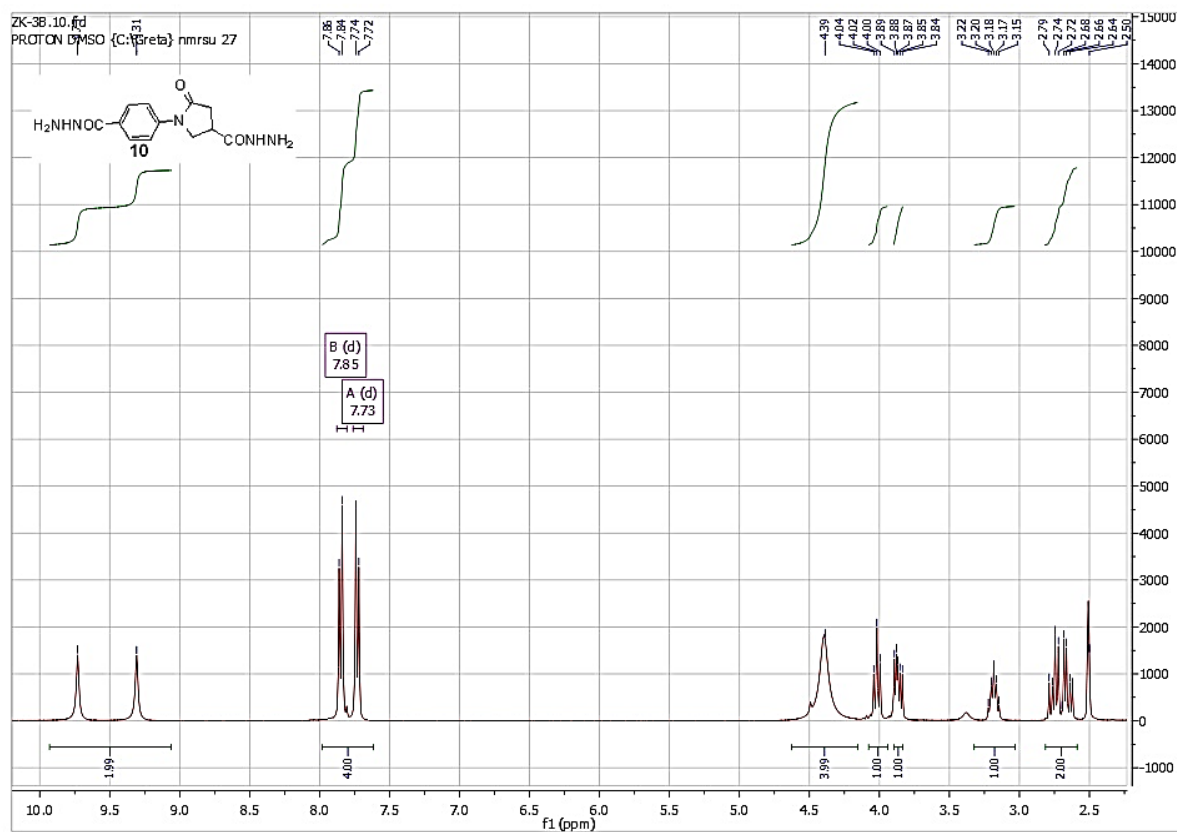


Figure S18: ^1H NMR of compound **10**

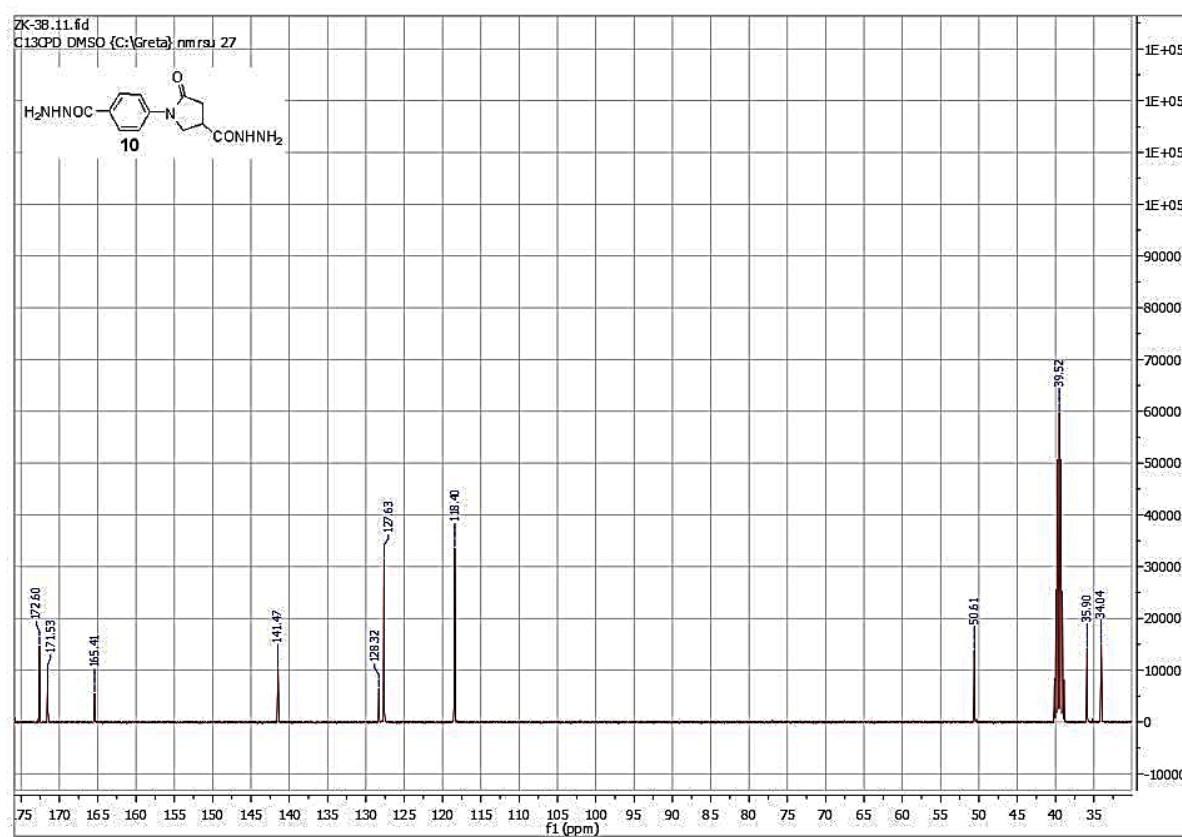


Figure S19: ^{13}C NMR of compound **10**

N-(4-nitrobenzylidene)-1-[4-[2-(4-nitrobenzylidenehydrazinocarbonyl)]phenyl]-5-oxopyrrolidine-3-carbohydrazide 11a

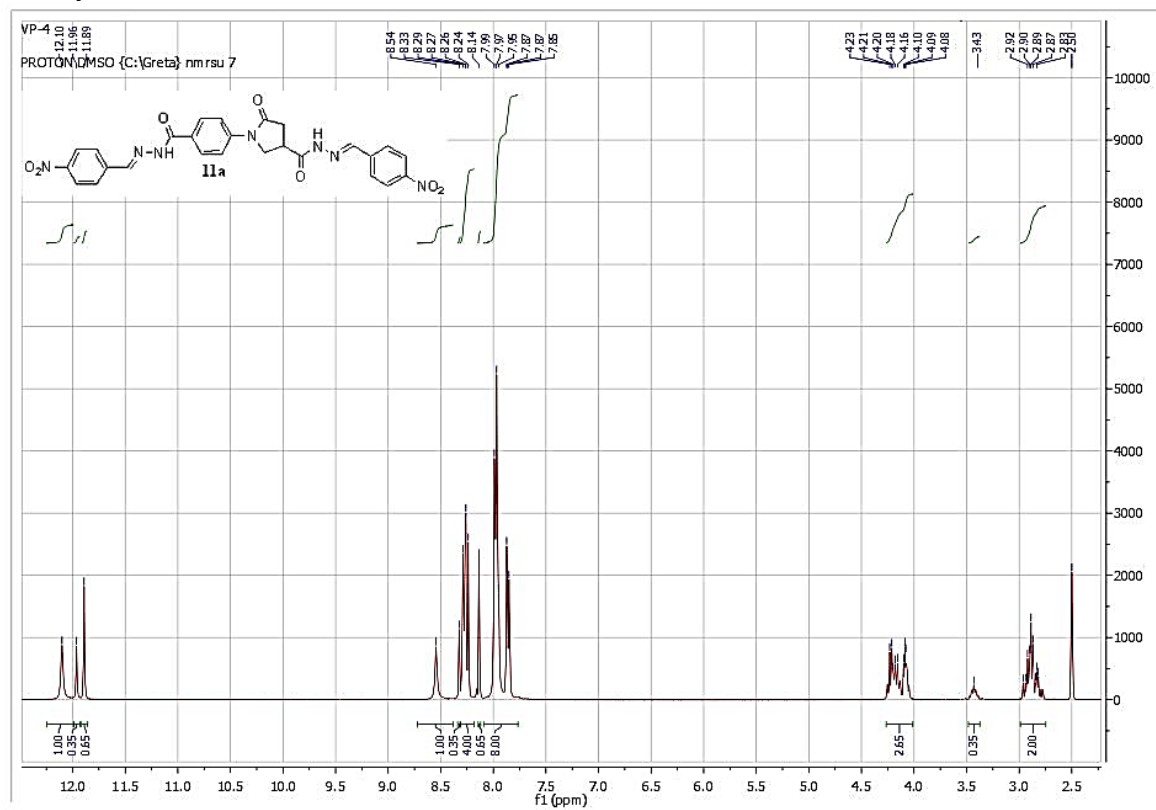


Figure S20: ^1H NMR of compound 11a

N-(4-chlorobenzylidene)-1-[4-[2-(4-chlorobenzylidenehydrazinocarbonyl)]phenyl]-5-oxopyrrolidine-3-carbohydrazide 11b

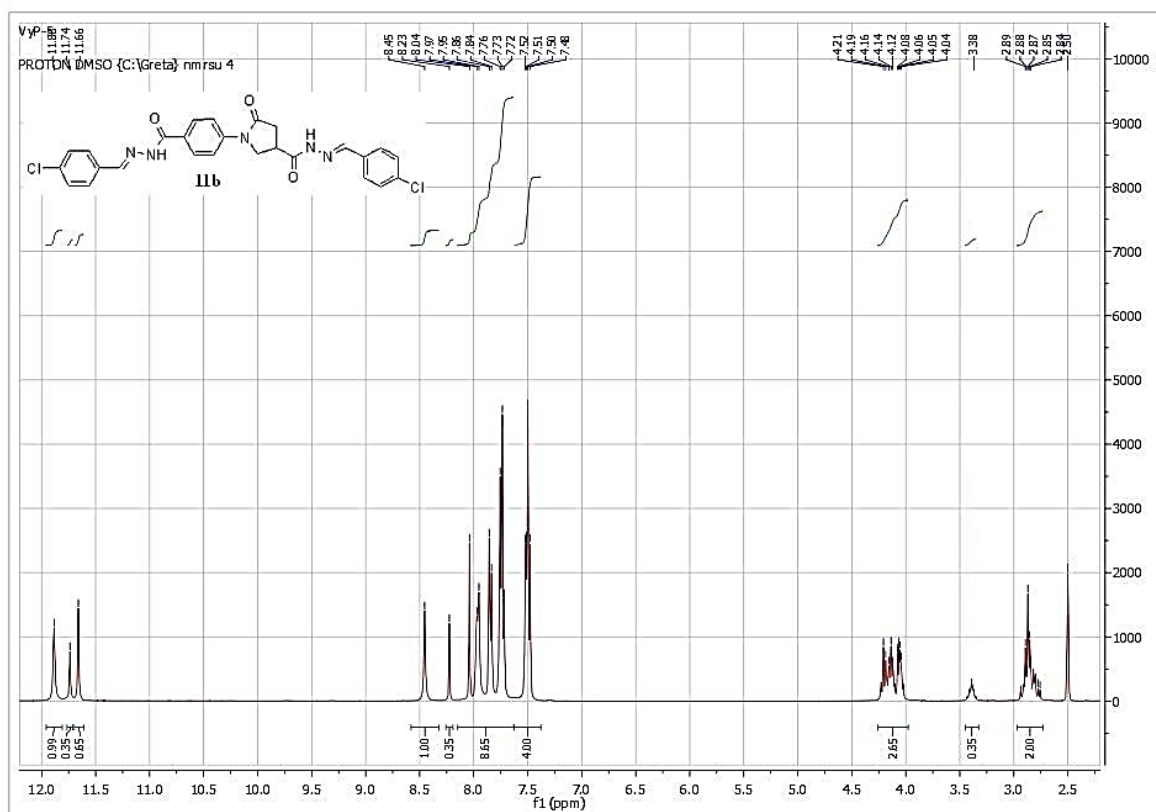


Figure S21: ^1H NMR of compound 11b

1-[[5-Oxo-1-(4-[(phenylcarbamoylthioamino)carbamoyl]pyrrolidin-3-carbonyl]-3-phenylthiocarbamide 12

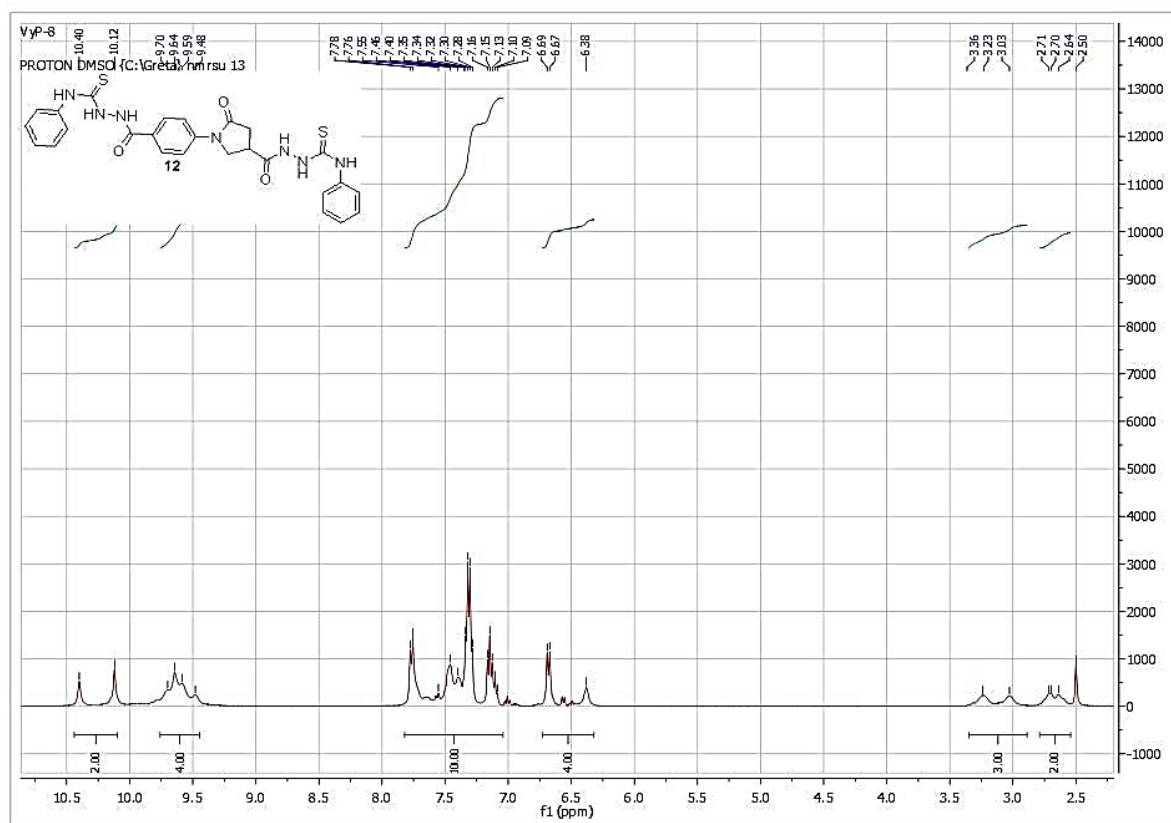


Figure S22: ¹H NMR of compound 12

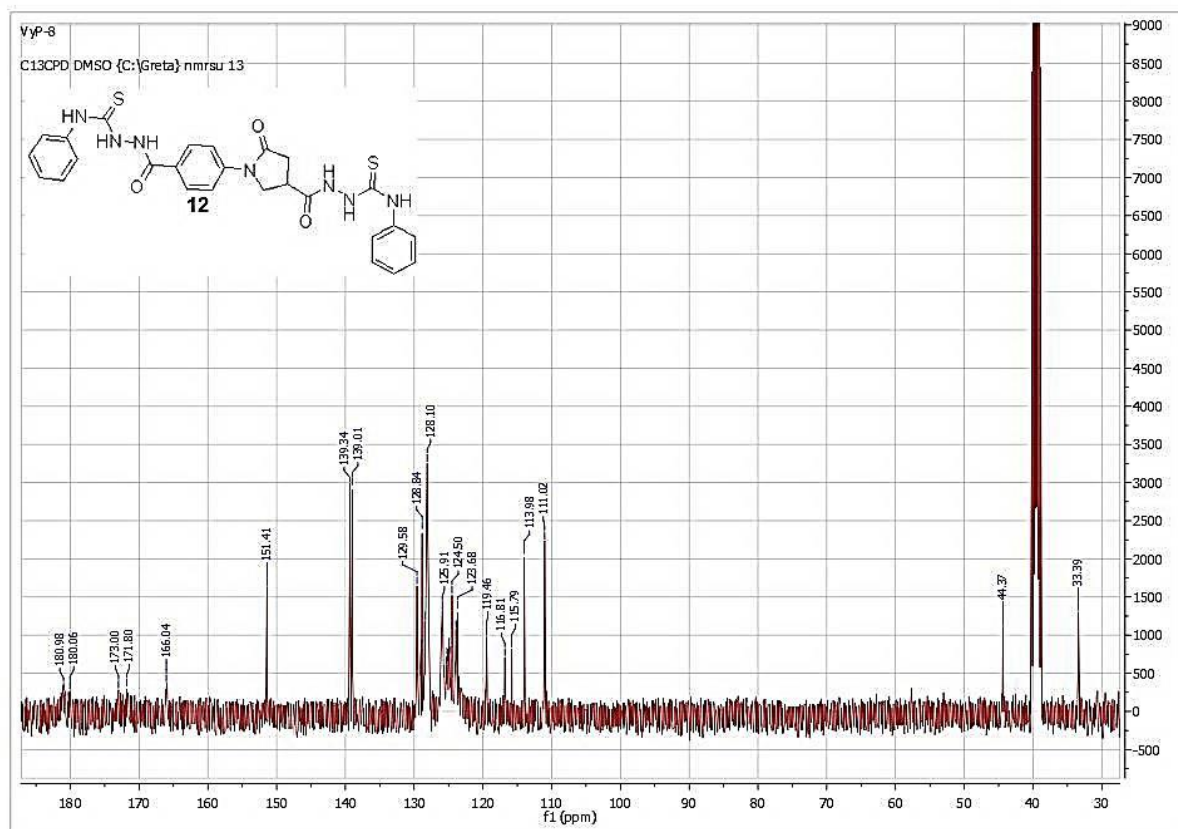


Figure S23: ¹³C NMR of compound 12

4-(4-phenyl-5-thioxo-4,5-dihydro-1H-1,2,4-triazol-3-yl)-1-(4-(4-phenyl-5-thioxo-4,5-dihydro-1H-1,2,4-triazol-3-yl)phenyl)pyrrolidin-2-one 13

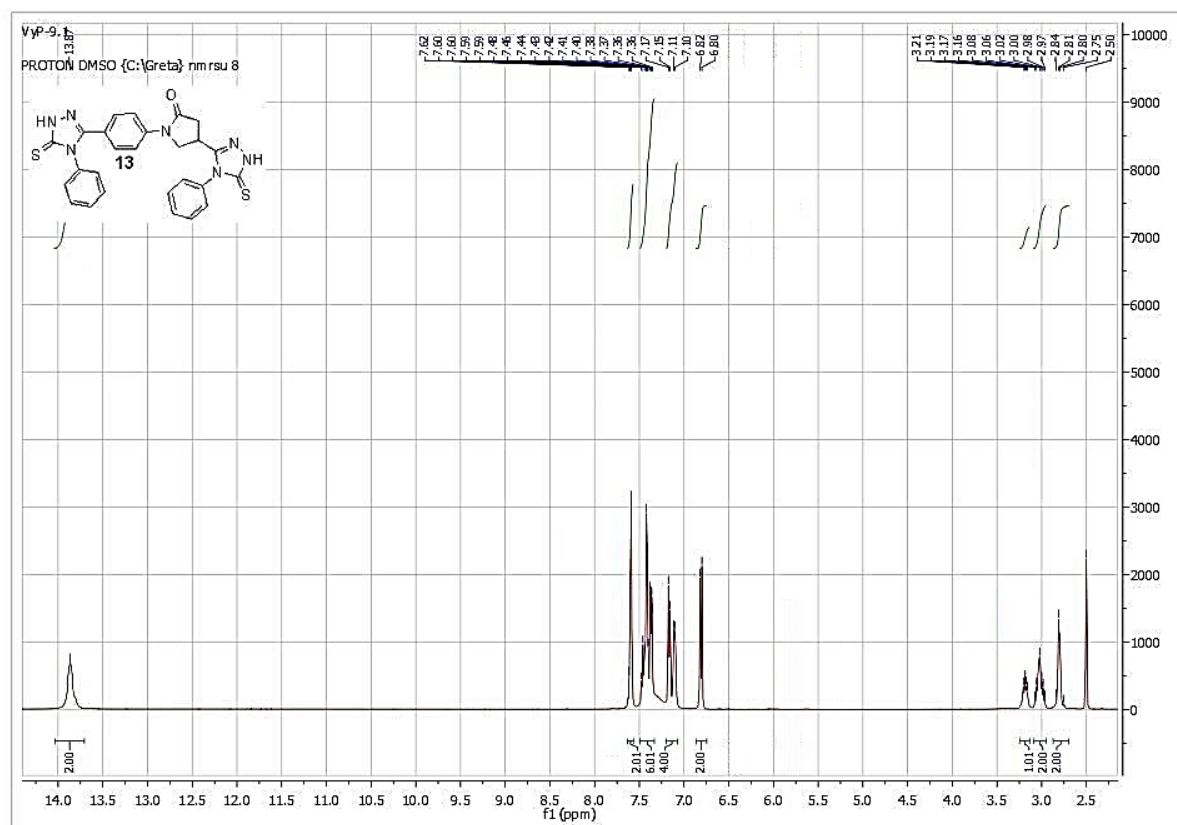


Figure S24: ^1H NMR of compound 13

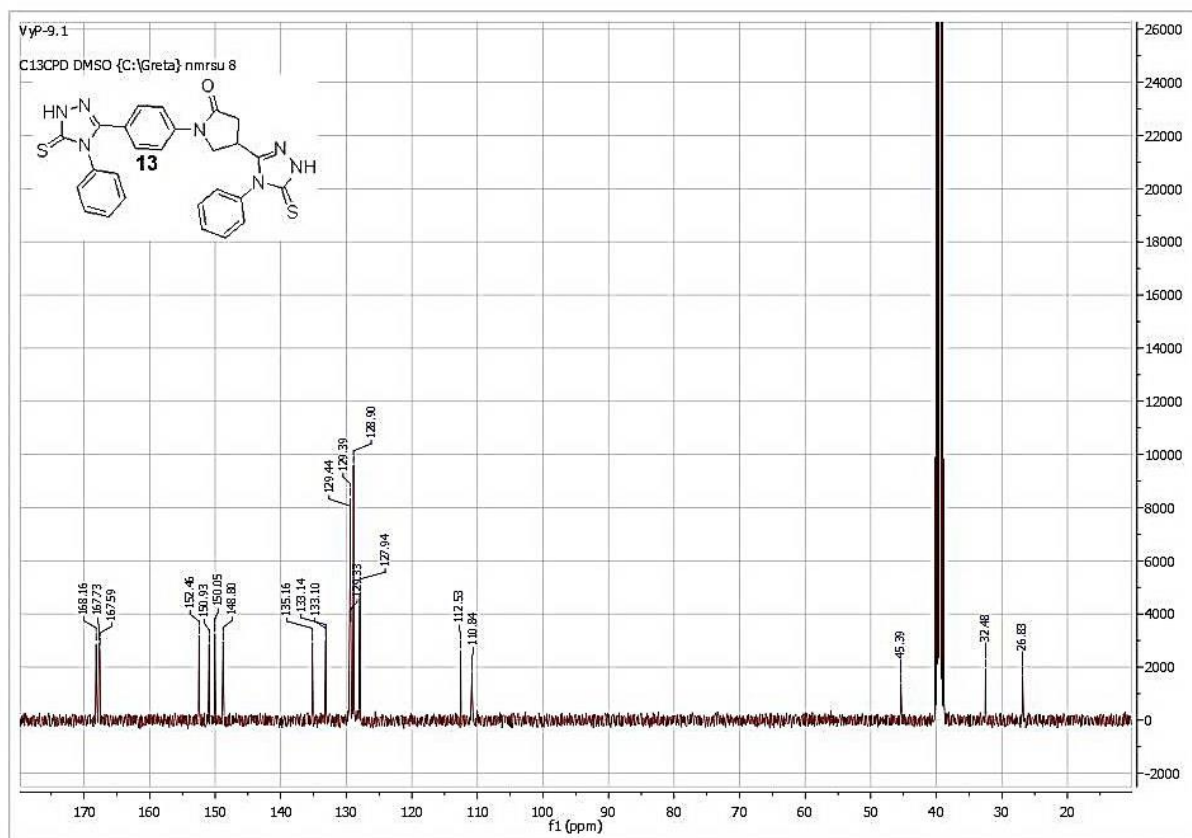


Figure S25: ^{13}C NMR of compound 13

Synthesis of benzimidazoles 14-18

3-(1H-benzimidazol-2-yl)-1-[4-(1H-benzimidazol-2-yl)phenyl]pyrrolidin-5-one 14

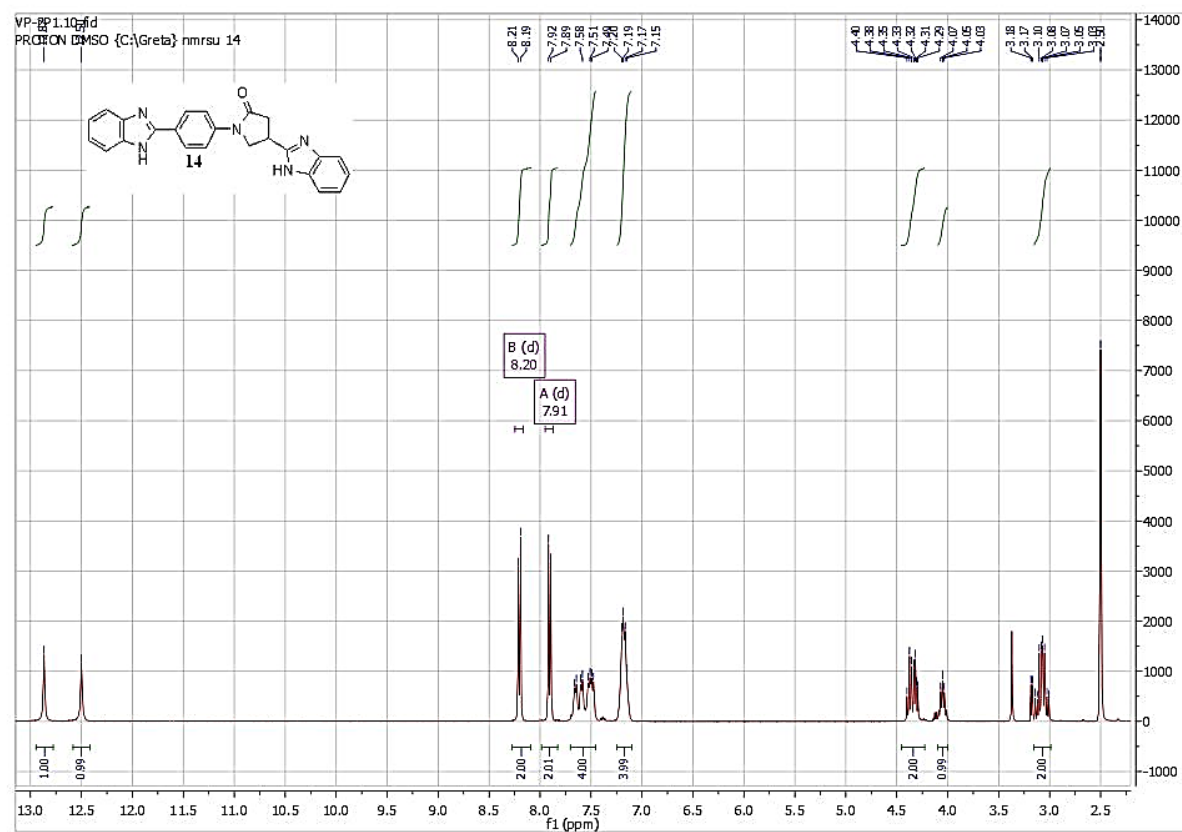


Figure S26: ^1H NMR of compound 14

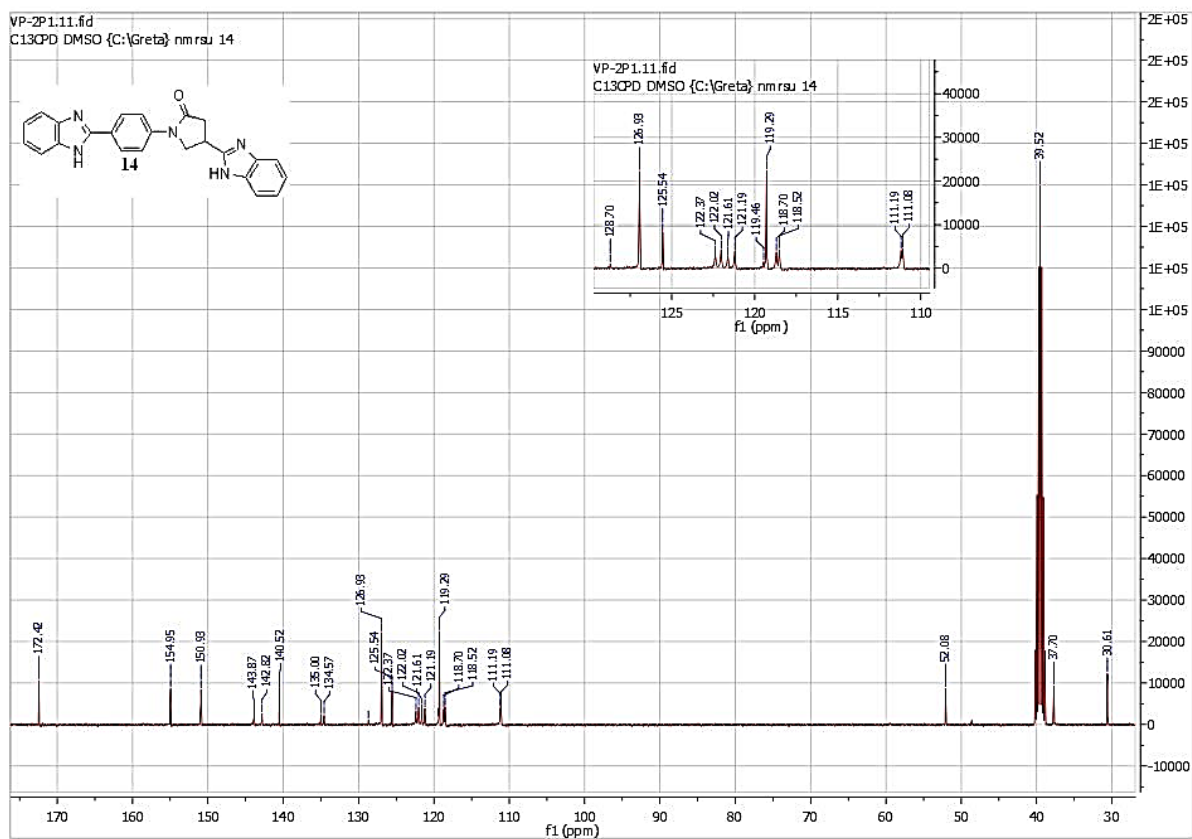


Figure S27: ^{13}C NMR of compound 14

3-(6-methyl-1H-benzimidazol-2-yl)-1-[4-(6-methyl-1H-benzimidazol-2-yl)phenyl]pyrrolidin-5-one
15

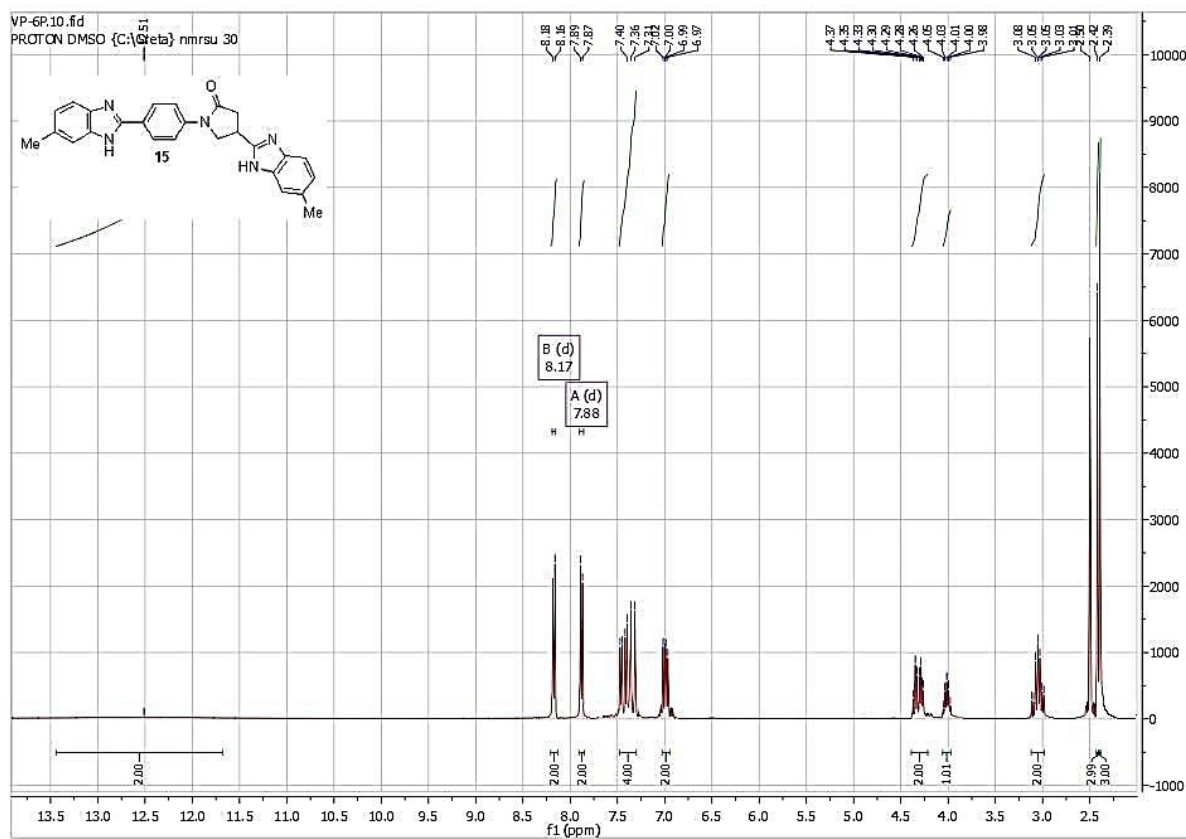


Figure S28: ^1H NMR of compound 15

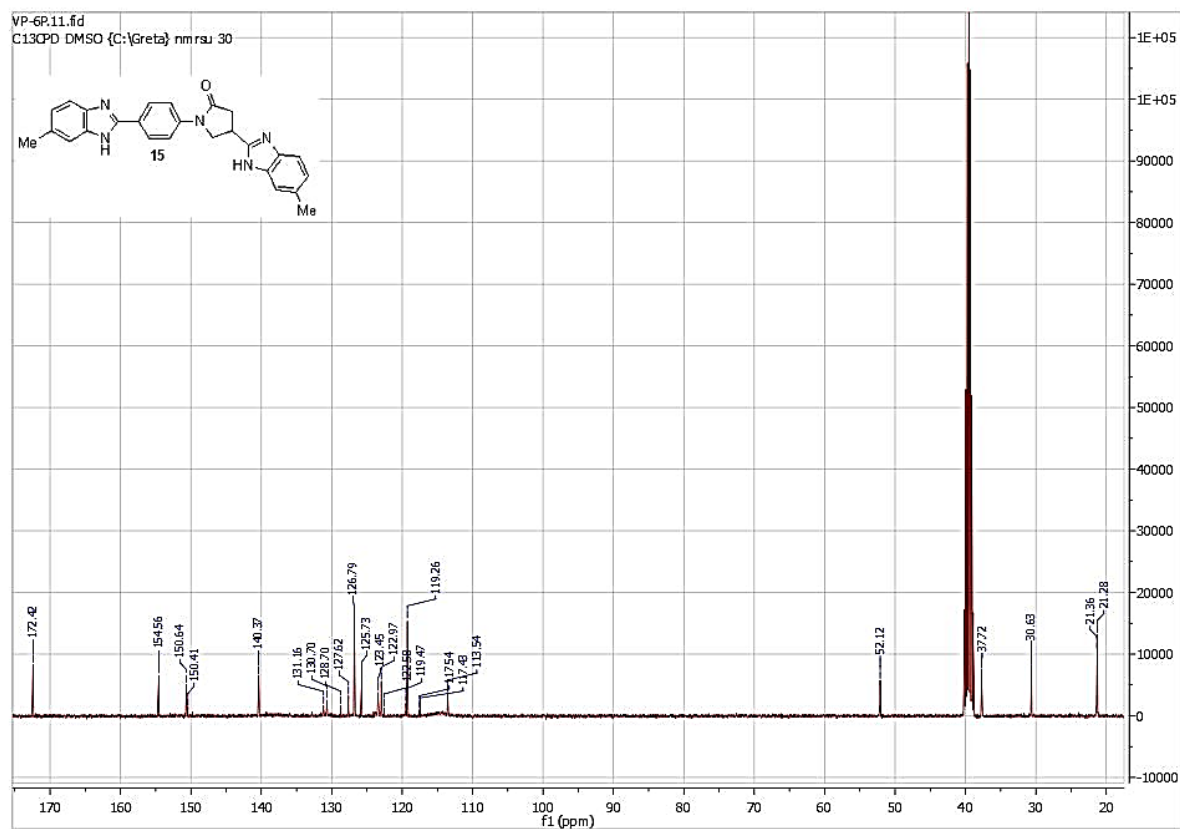


Figure S29: ^{13}C NMR of compound 15

3-(1H-benzimidazol-2-yl)-4-[4-(1H-benzimidazol-2-yl)anilino]butanoic acid **16**

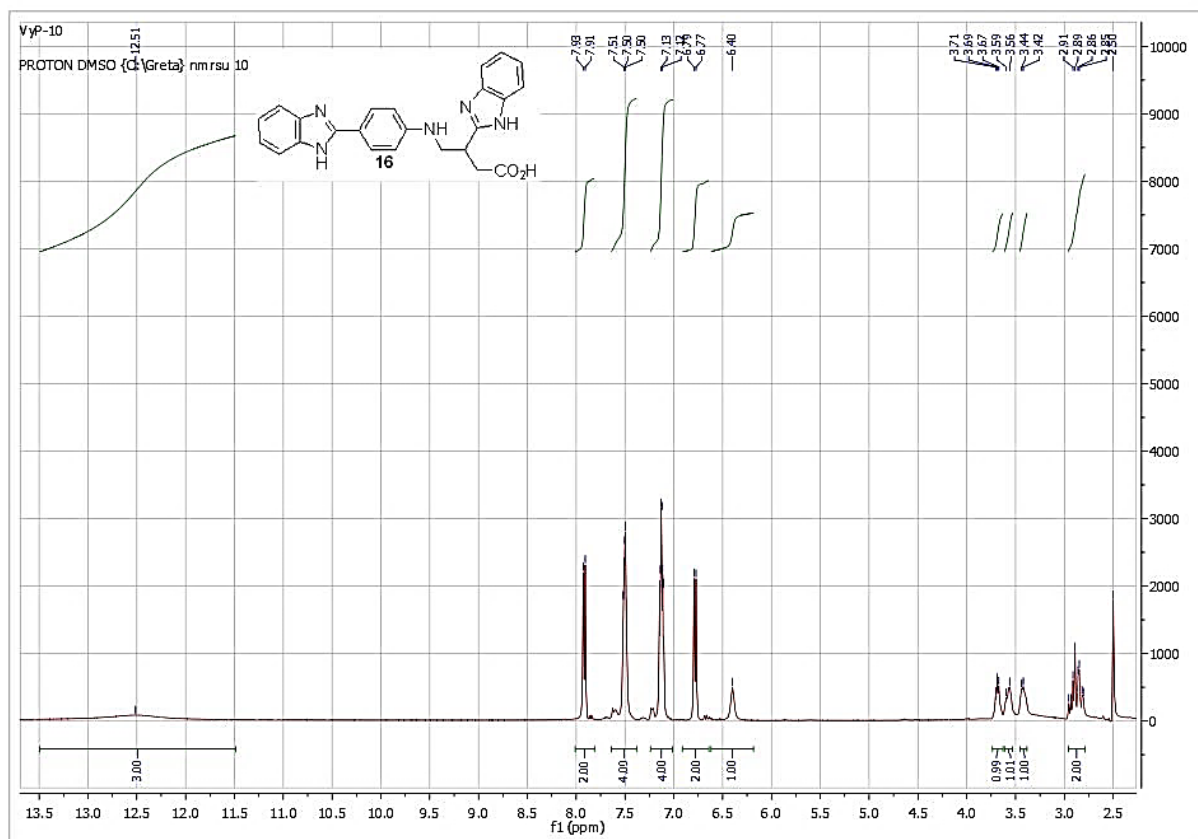


Figure S30: ¹H NMR of compound **16**

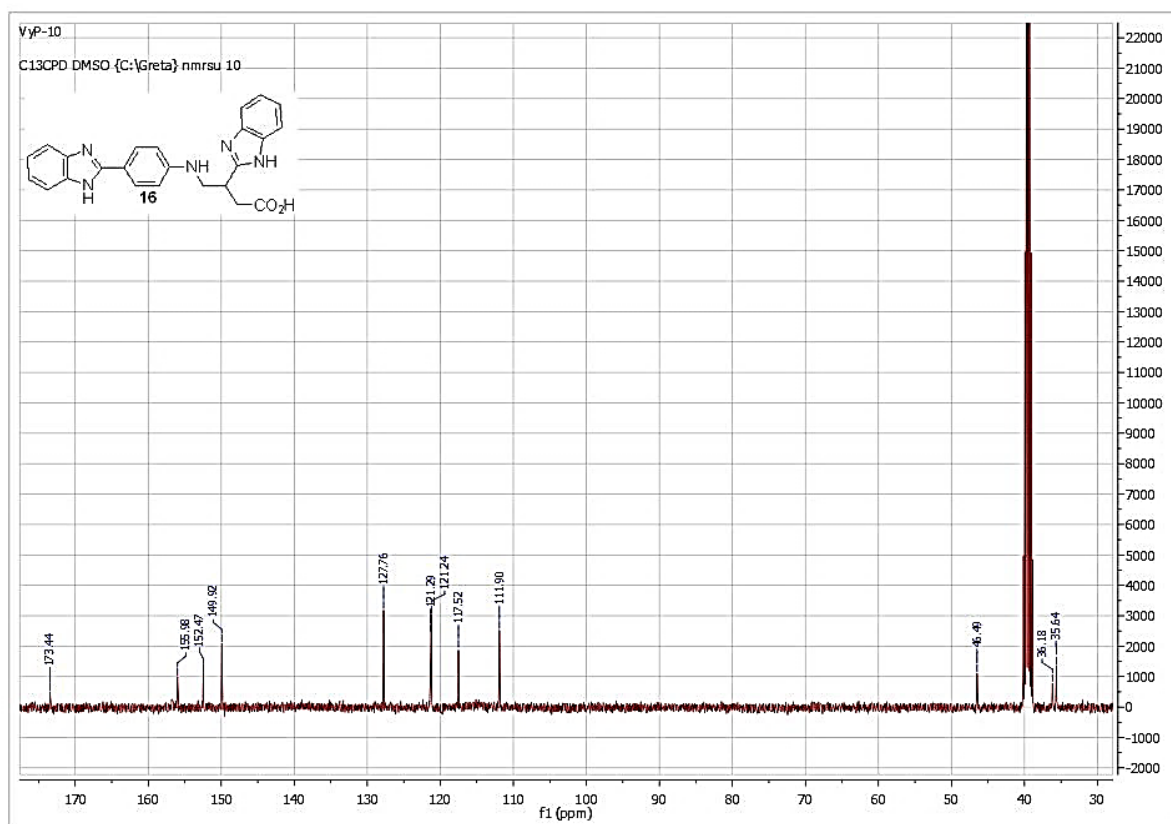


Figure S13: ¹³C NMR of compound **16**

4-((4-(1H-benzimidazol-2-yl)phenyl)amino)-3-(1H-benzimidazol-2-yl)butanehydrazide 17

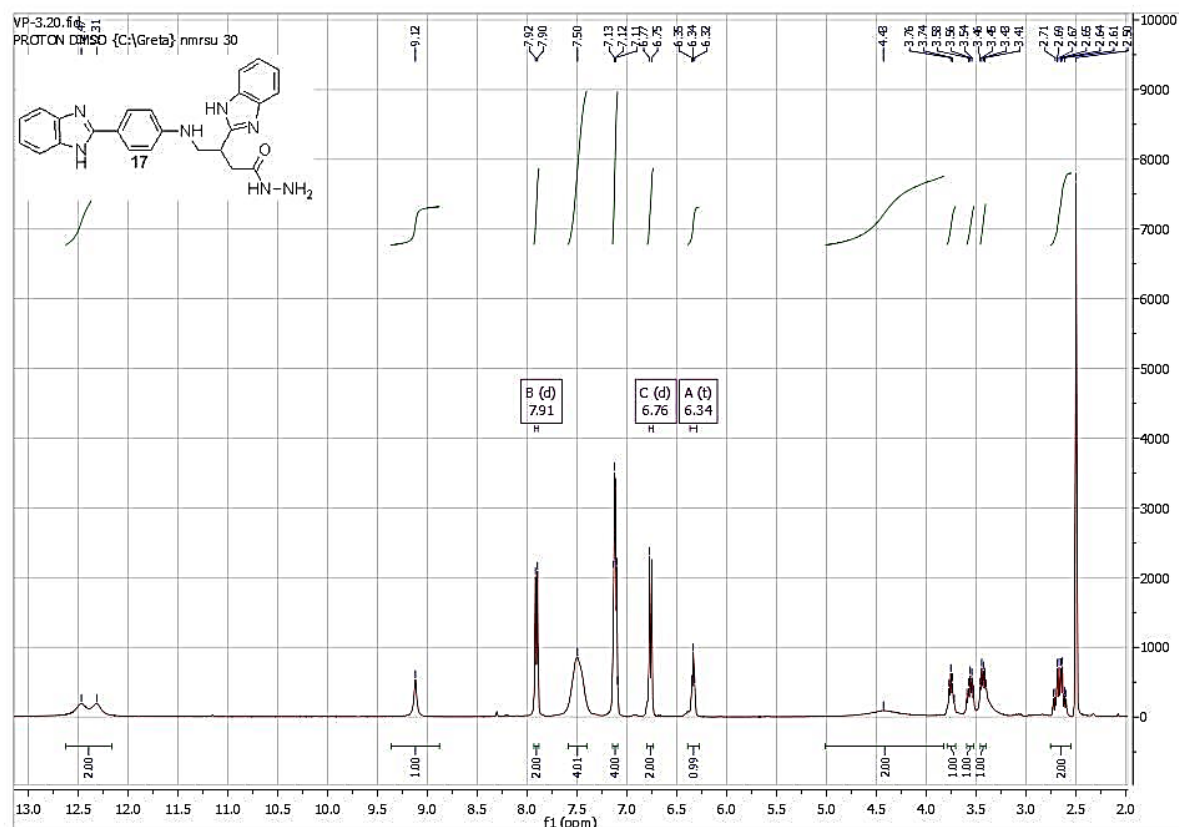


Figure S32: ^1H NMR of compound 17

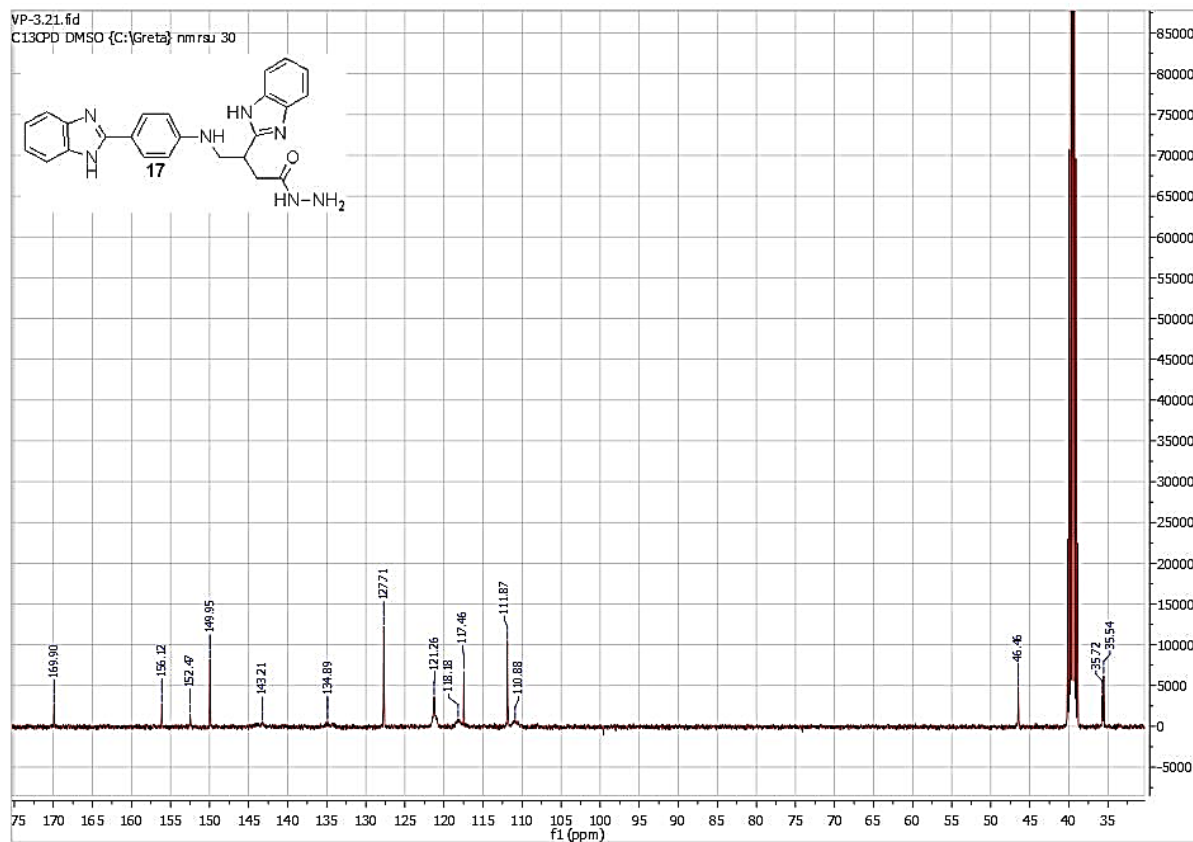


Figure S33: ^{13}C NMR of compound 17

4-((4-(1H-benzimidazol-2-yl)phenyl)amino)-3-(1H-benzimidazol-2-yl)-N-(2,5-dimethyl-1H-pyrrol-2-yl)butanamide 18

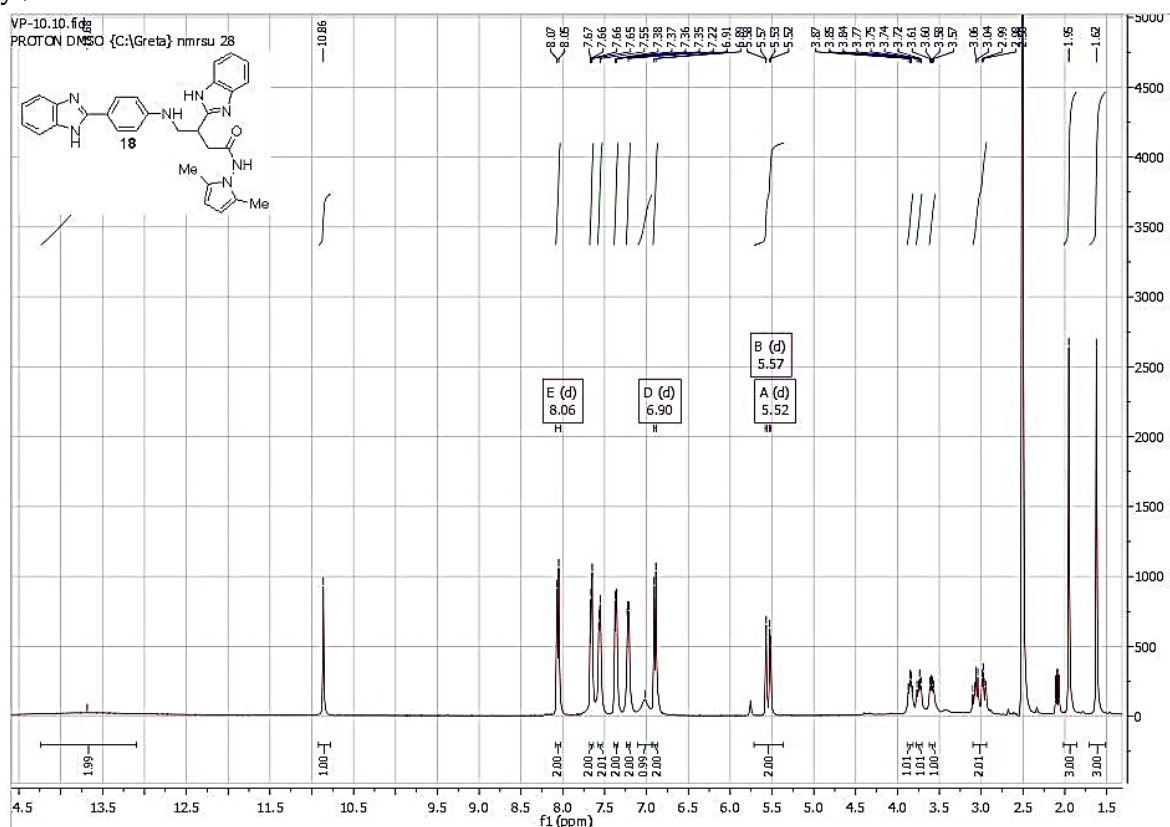


Figure S34: ^1H NMR of compound 18

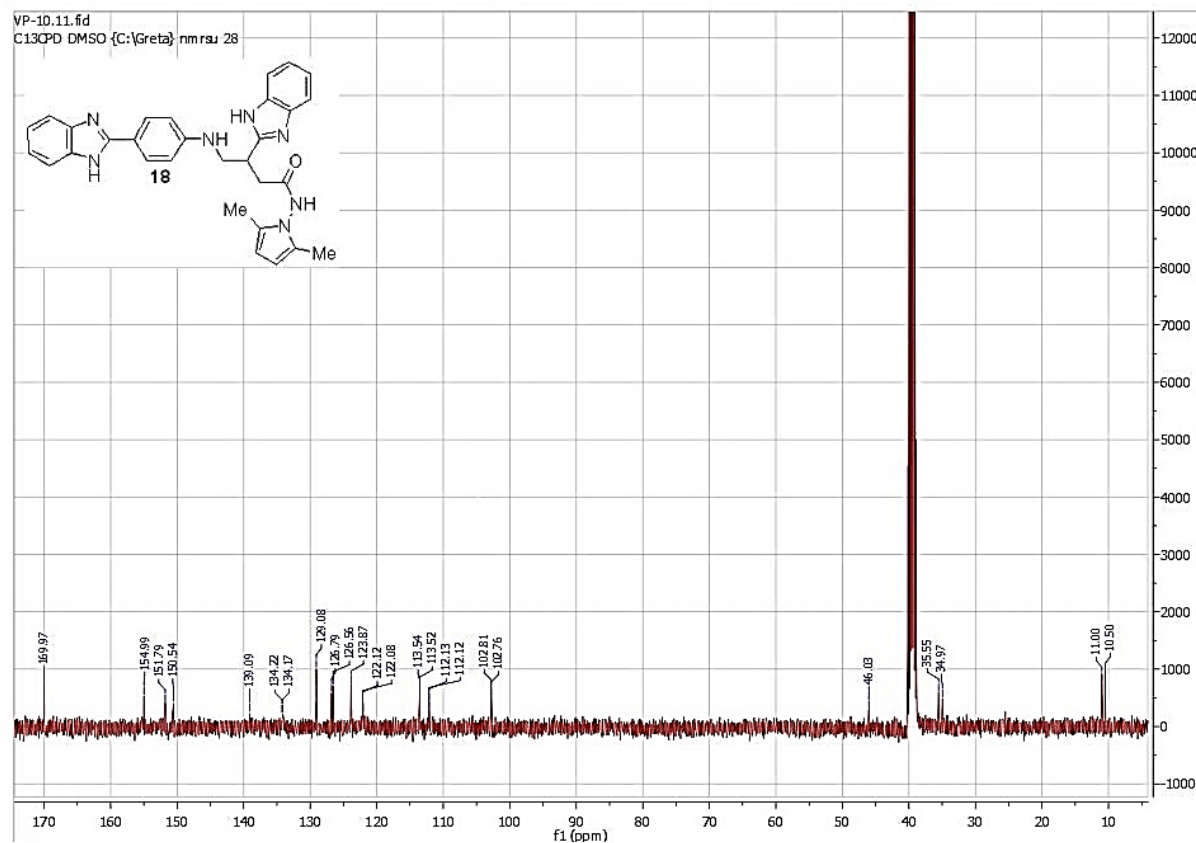


Figure S35: ^{13}C NMR of compound 18

Synthesis of bisbenzimidazoles 19-24

Ethyl 2-(2-(4-(4-(1-(2-ethoxy-2-oxoethyl)-1H-benzimidazol-2-yl)-2-oxopyrrolidin-1-yl)phenyl)-1H-benzimidazol-1-yl)acetate 19

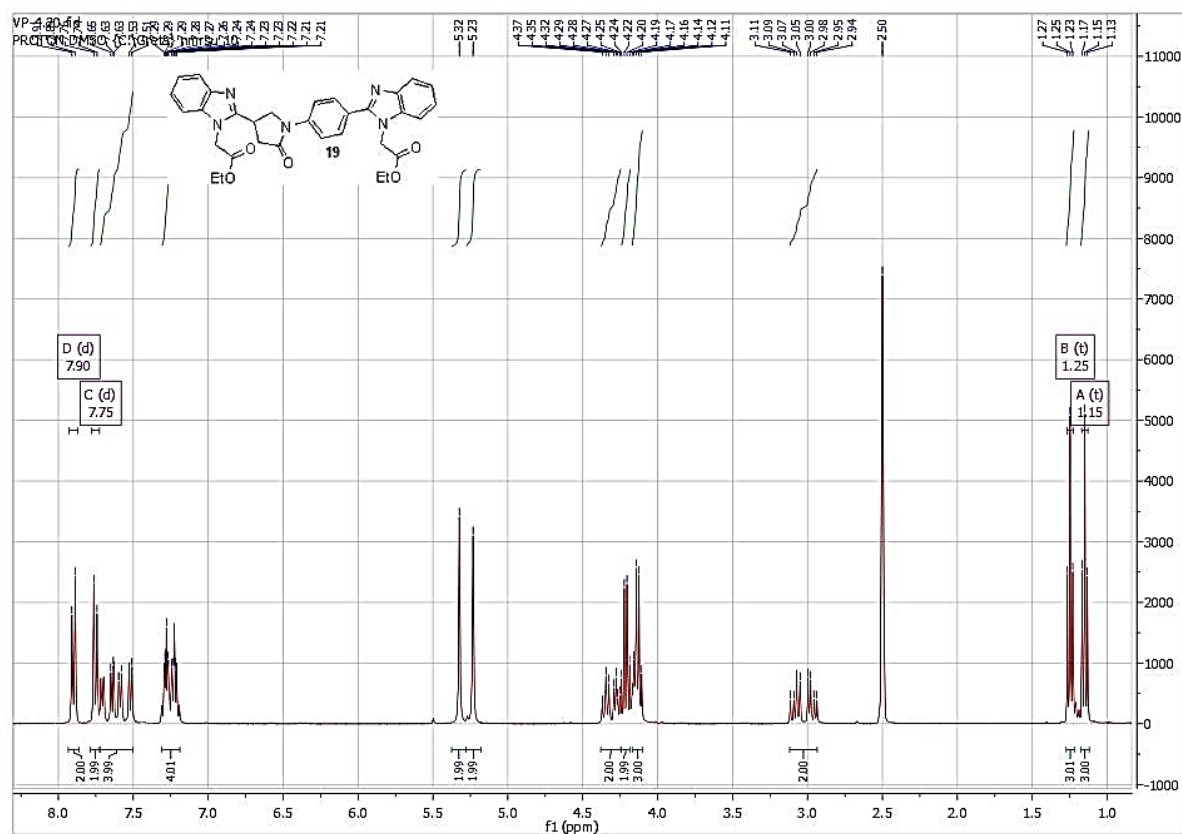


Figure S36: ¹H NMR of compound 19

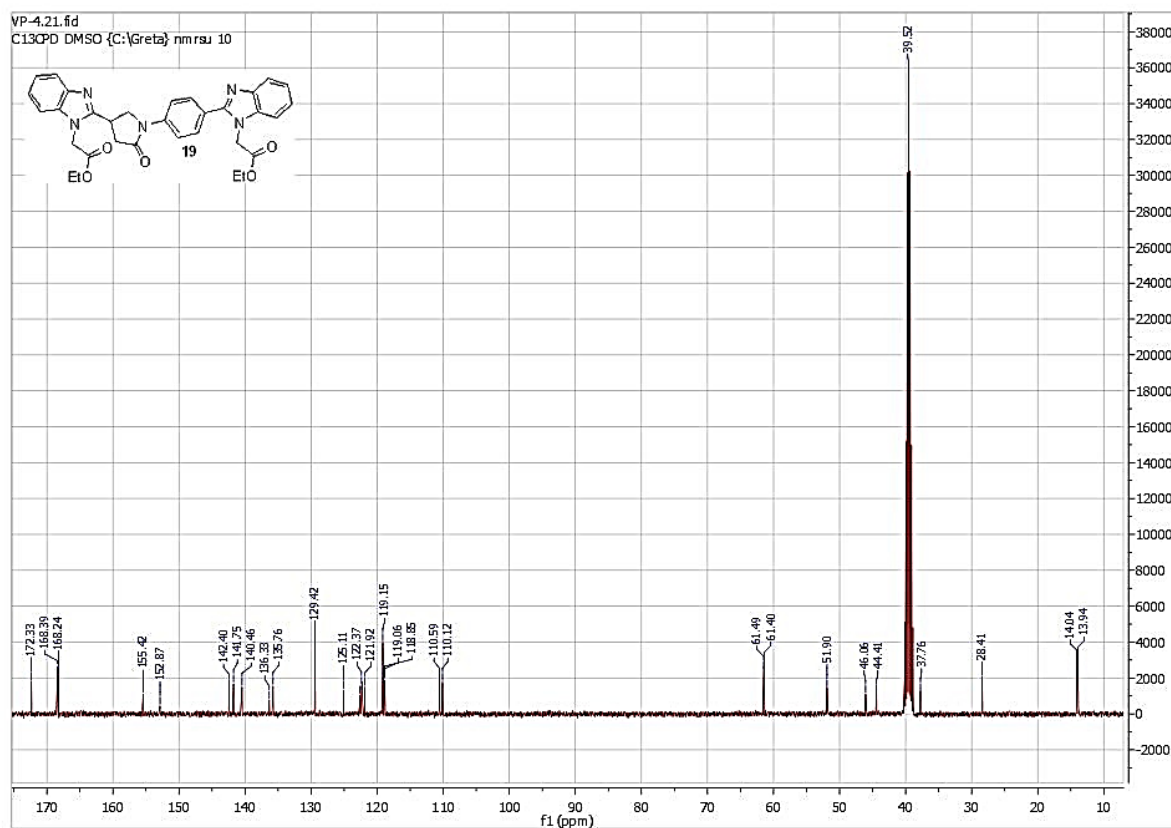


Figure S37: ¹³C NMR of compound 19

2-(2-(4-(4-(1-(2-hydrazinyl-2-oxoethyl)-1H-benzimidazol-2-yl)-2-oxopyrrolidin-1-yl)phenyl)-1H-benzimidazol-1-yl)acetohydrazide 20

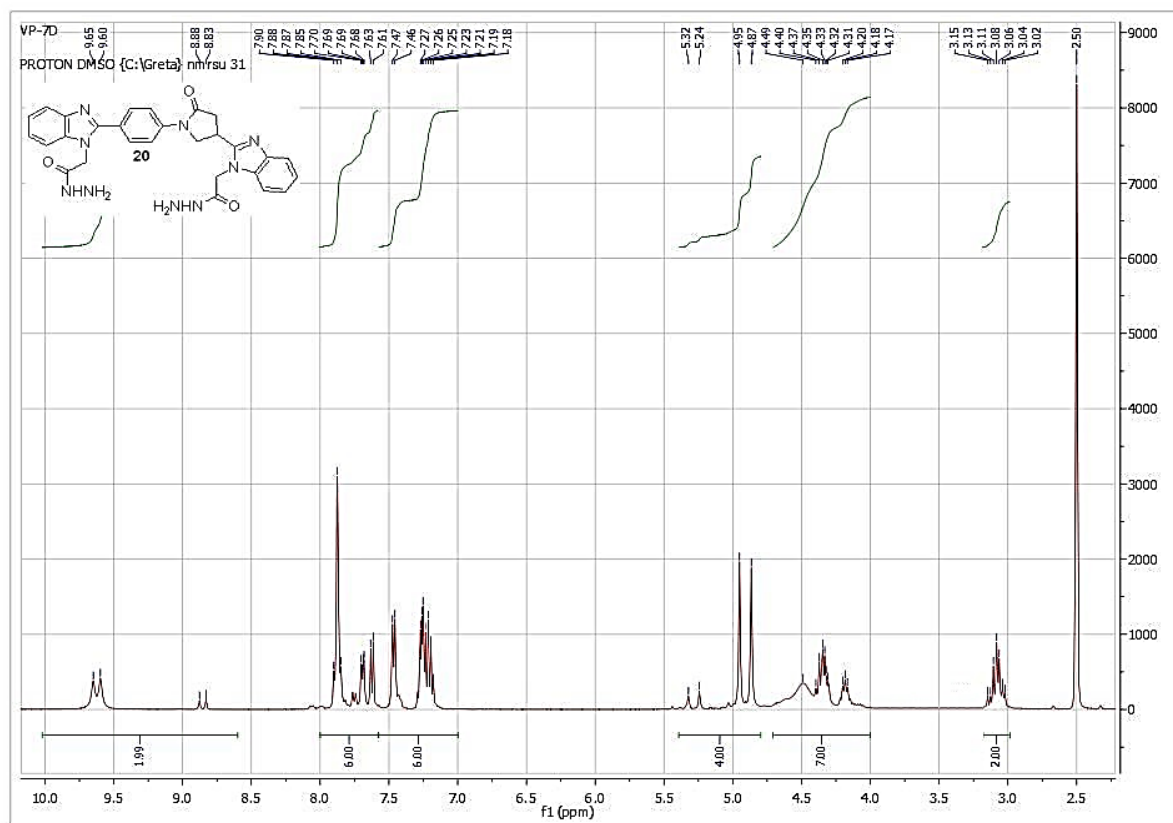


Figure S38: ¹H NMR of compound 20

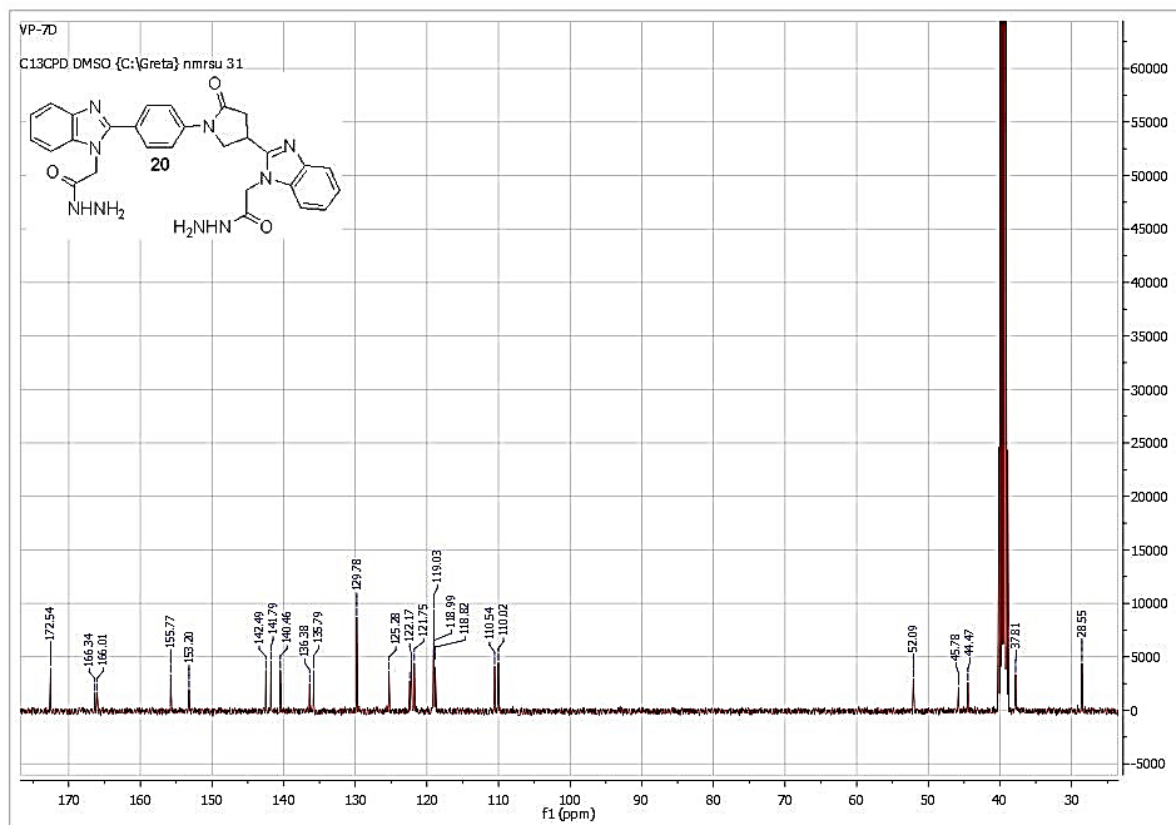


Figure S39: ¹³C NMR of compound 20

4-(1-(2-(3,5-dimethyl-1H-pyrazol-1-yl)-2-oxoethyl)-1H-benzimidazol-2-yl)-1-(4-(1-(3,5-dimethyl-1H-pyrazol-1-yl)-2-oxoethyl)-1H-benzimidazol-2-yl)phenylpyrrolidin-2-one 21

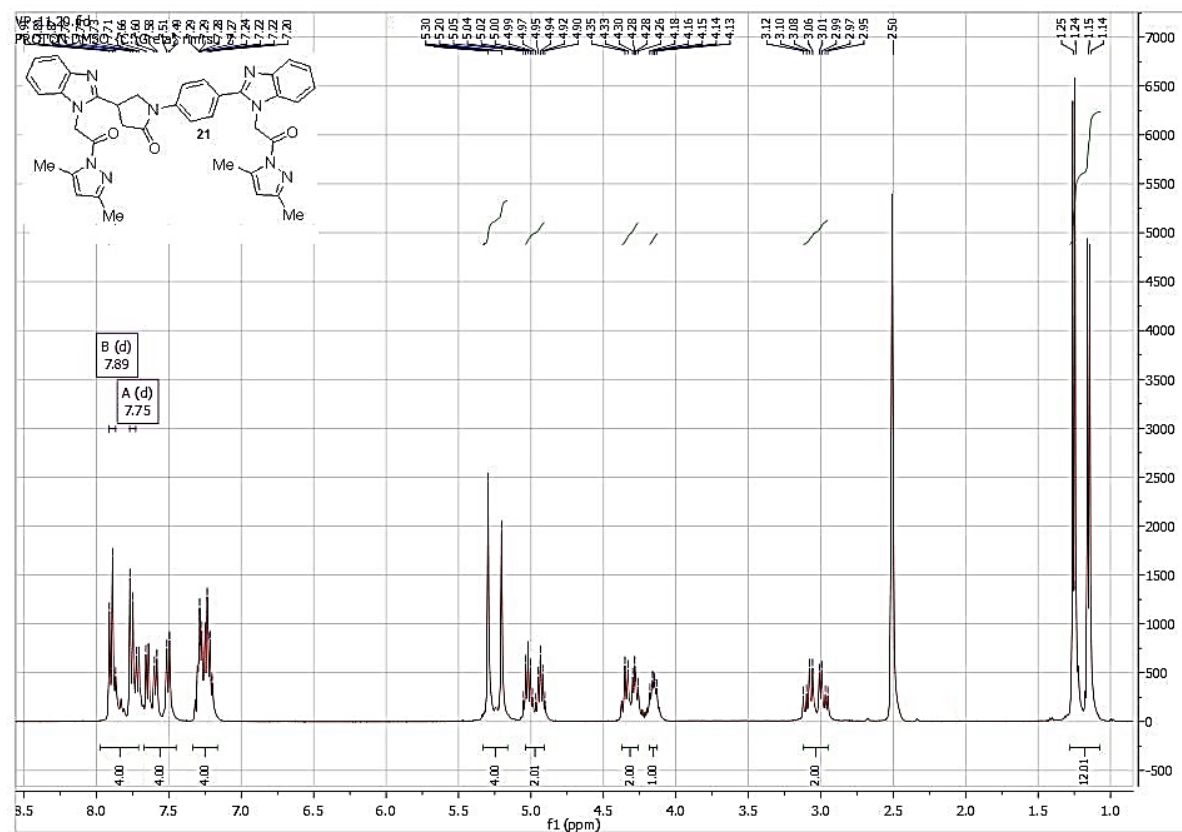


Figure S40: ^1H NMR of compound 21

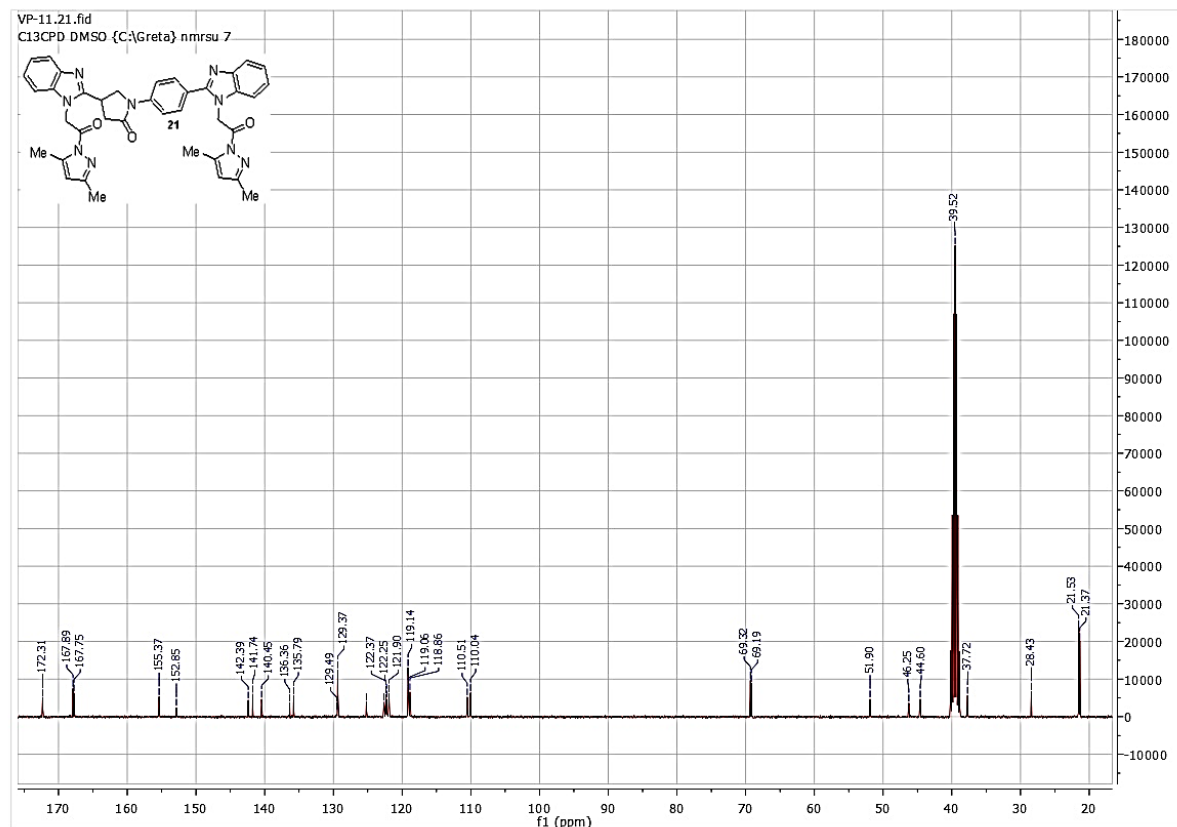


Figure S41: ^{13}C NMR of compound 21

4-(1-((5-thioxo-4,5-dihydro-1,3,4-oxadiazol-2-yl)methyl)-1H-benzo[d]imidazol-2-yl)-1-(4-(1-((5-thioxo-4,5-dihydro-1,3,4-oxadiazol-2-yl)methyl)-1H-benzo[d]imidazol-2-yl)phenyl)pyrrolidin-2-one
22

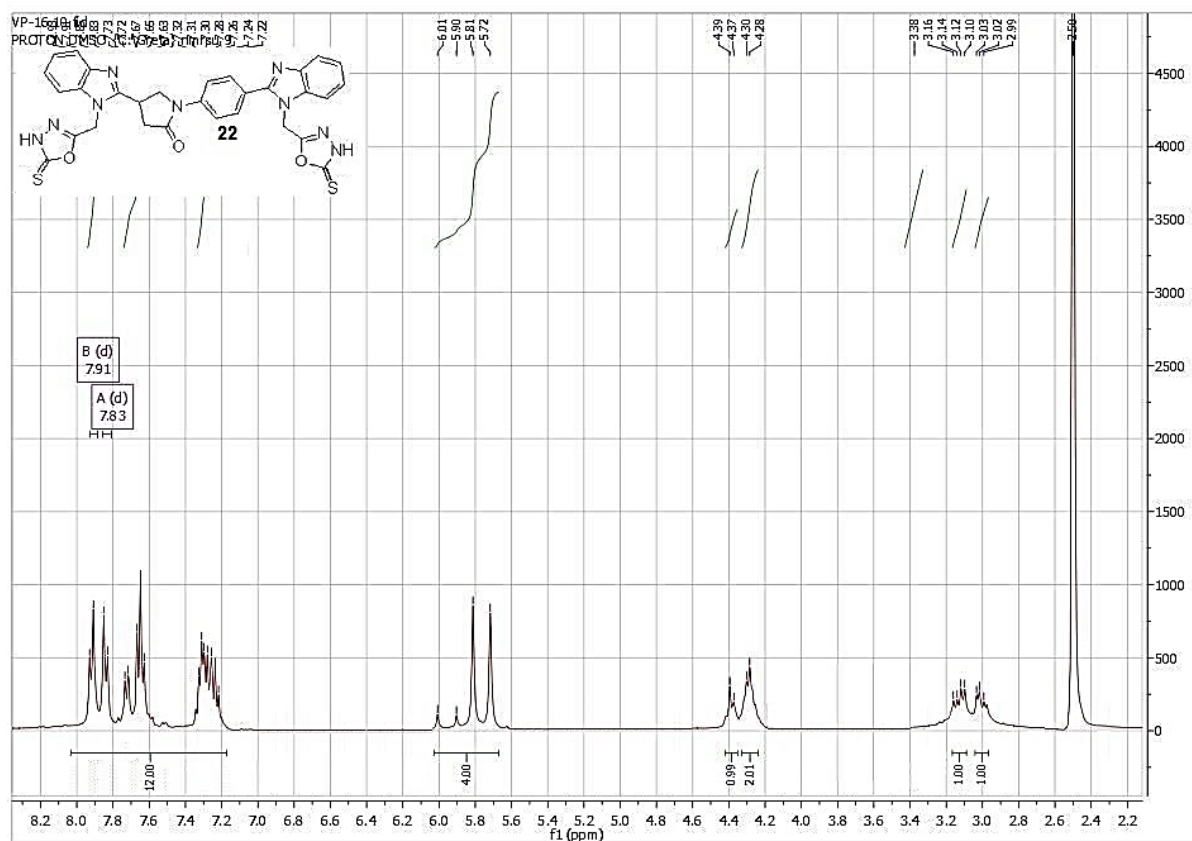


Figure S42: ^1H NMR of compound 22

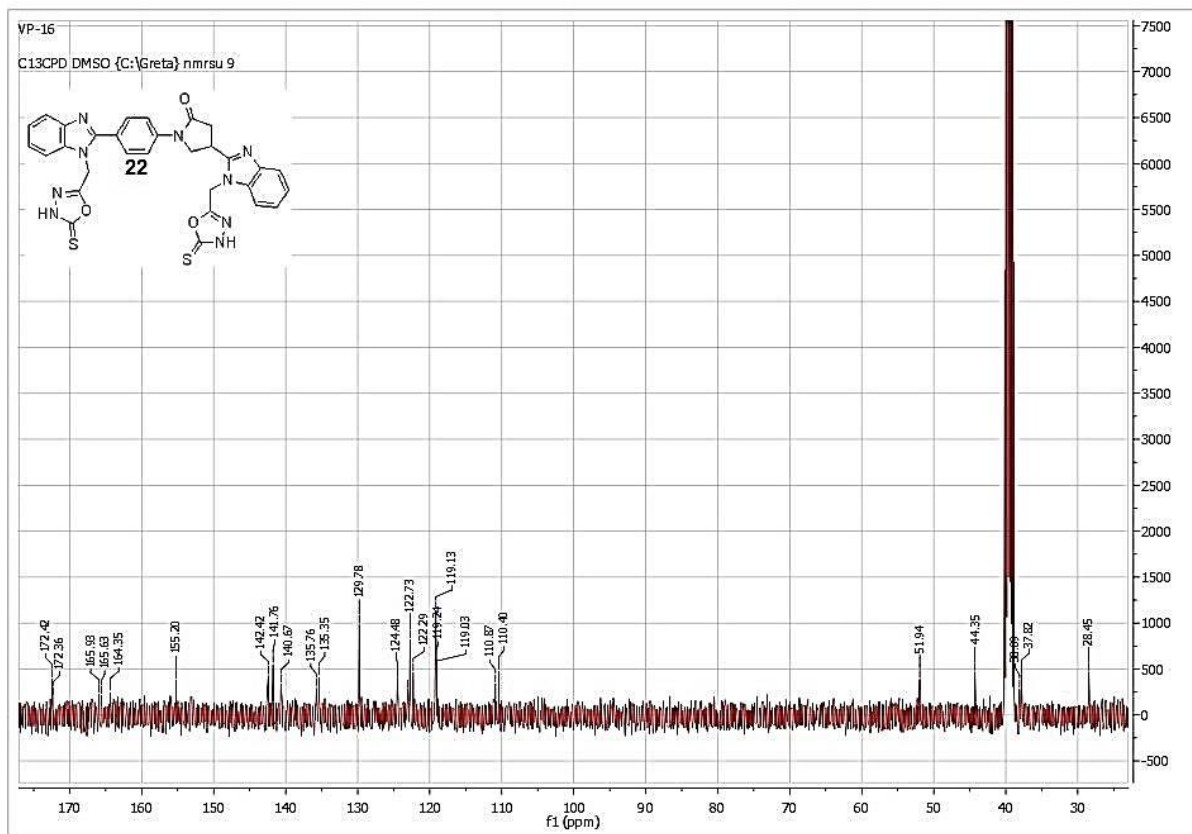


Figure S43: ^{13}C NMR of compound 22

2-(2-(2-(5-oxo-1-(4-(1-(2-oxo-2-(2-(phenylcarbamothioyl)hydrazinyl)ethyl)-1H-benzimidazol-2-yl)phenyl)pyrrolidin-3-yl)-1H-benzimidazol-1-yl)acetyl)-N-phenylhydrazin-1-carbothioamide 23

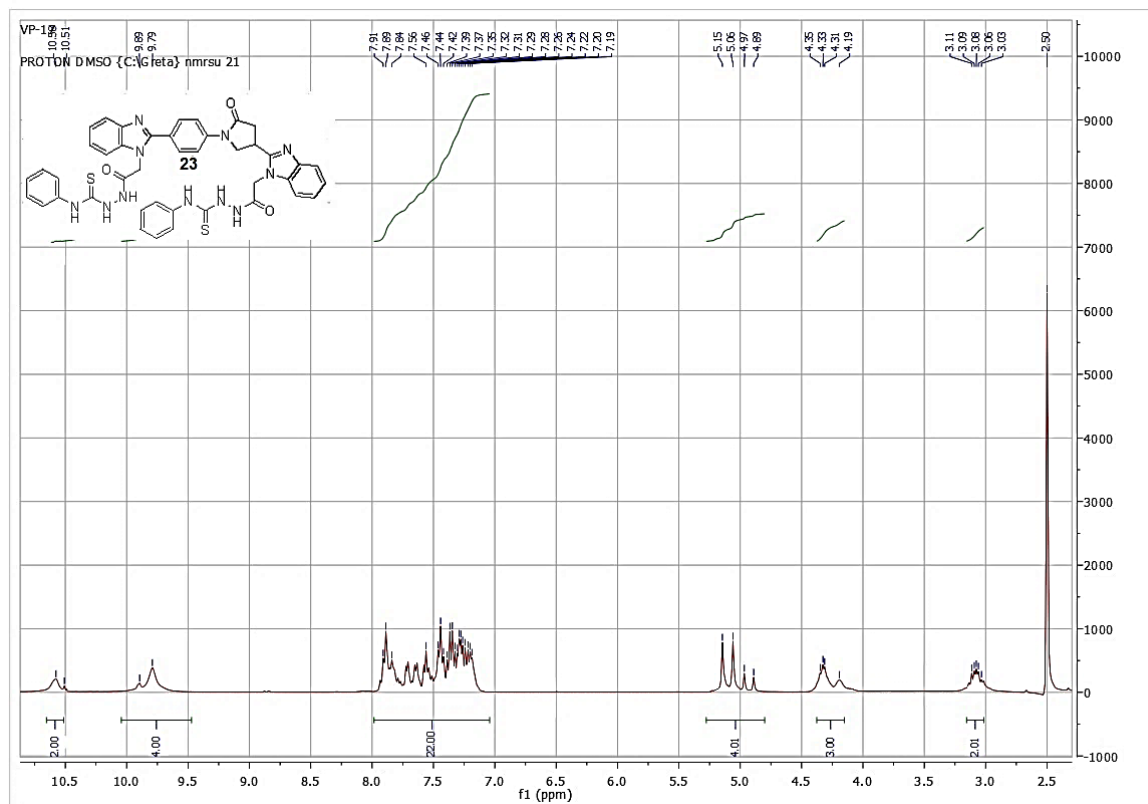


Figure S44: ^1H NMR of compound 23

N'-benzylidene-2-(2-(4-(4-(1-(2-(2-(benzylidene)hydrazinyl)-2-oxoethyl)-1H-benzo[d]imidazol-2-yl)-2-oxopyrrolidin-1-yl)phenyl)-1H-benzo[d]imidazol-1-yl)acetohydrazide 24a

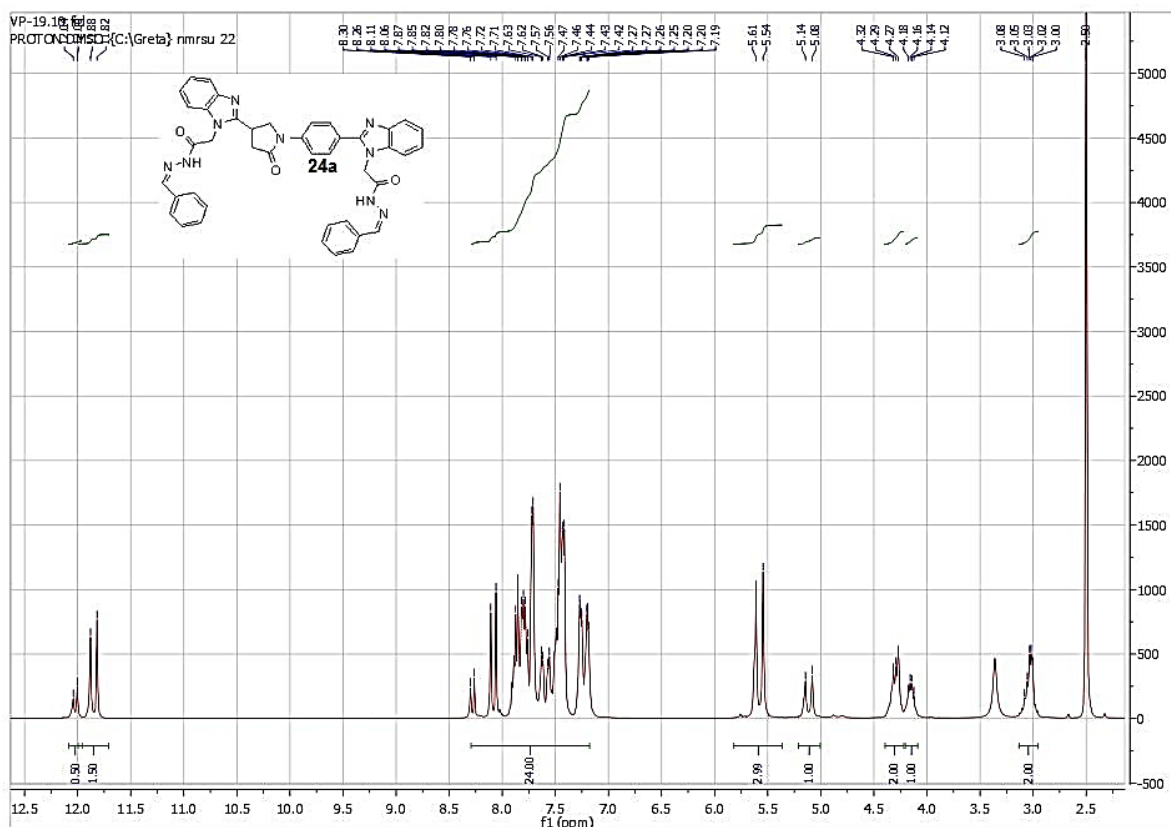


Figure S45: ^1H NMR of compound 24a

VP-28 10/10/16
PROTON NMR (DMSO-*d*₆) {C:\Greta} nmrsu 10

Chemical structure of **24b** is shown in the top left. The structure is a symmetrical molecule consisting of a central benzene ring substituted with two 1-(4-nitrophenyl)-1H-imidazole-2-carbonyl groups and two 1-(4-nitrophenyl)-1H-imidazole-2-carbonyl groups.

The ¹H NMR spectrum (DMSO-*d*₆) shows the following peaks (ppm):

- 12.30 (s, 1H, integration 0.50)
- 12.10 (s, 1H, integration 1.50)
- 8.30-7.10 (m, aromatic protons, integration 22.00)
- 5.66 (s, 2H, integration 2.99)
- 5.60 (s, 2H, integration 1.00)
- 4.34 (s, 2H, integration 3.00)
- 4.31 (s, 2H, integration 1.99)
- 4.29 (s, 2H, integration 1.99)
- 4.27 (s, 2H, integration 1.99)
- 4.15 (s, 2H, integration 1.99)
- 4.12 (s, 2H, integration 1.99)
- 3.05 (s, 2H, integration 1.99)
- 3.02 (s, 2H, integration 1.99)
- 2.99 (s, 2H, integration 1.99)
- 2.97 (s, 2H, integration 1.99)
- 2.95 (s, 2H, integration 1.99)
- 2.93 (s, 2H, integration 1.99)
- 2.91 (s, 2H, integration 1.99)
- 2.89 (s, 2H, integration 1.99)
- 2.87 (s, 2H, integration 1.99)
- 2.85 (s, 2H, integration 1.99)
- 2.83 (s, 2H, integration 1.99)
- 2.81 (s, 2H, integration 1.99)
- 2.79 (s, 2H, integration 1.99)
- 2.77 (s, 2H, integration 1.99)
- 2.75 (s, 2H, integration 1.99)
- 2.73 (s, 2H, integration 1.99)
- 2.71 (s, 2H, integration 1.99)
- 2.69 (s, 2H, integration 1.99)
- 2.67 (s, 2H, integration 1.99)
- 2.65 (s, 2H, integration 1.99)
- 2.63 (s, 2H, integration 1.99)
- 2.61 (s, 2H, integration 1.99)
- 2.59 (s, 2H, integration 1.99)
- 2.57 (s, 2H, integration 1.99)
- 2.55 (s, 2H, integration 1.99)
- 2.53 (s, 2H, integration 1.99)
- 2.51 (s, 2H, integration 1.99)
- 2.49 (s, 2H, integration 1.99)
- 2.47 (s, 2H, integration 1.99)
- 2.45 (s, 2H, integration 1.99)
- 2.43 (s, 2H, integration 1.99)
- 2.41 (s, 2H, integration 1.99)
- 2.39 (s, 2H, integration 1.99)
- 2.37 (s, 2H, integration 1.99)
- 2.35 (s, 2H, integration 1.99)
- 2.33 (s, 2H, integration 1.99)
- 2.31 (s, 2H, integration 1.99)
- 2.29 (s, 2H, integration 1.99)
- 2.27 (s, 2H, integration 1.99)
- 2.25 (s, 2H, integration 1.99)
- 2.23 (s, 2H, integration 1.99)
- 2.21 (s, 2H, integration 1.99)
- 2.19 (s, 2H, integration 1.99)

N'-(4-fluorobenzylidene)-2-(2-(4-(4-(1-(2-(2-(4-fluorobenzylidene)hydrazinyl)-2-oxoethyl)-1H-benzo[d]imidazol-2-yl)-2-oxopyrrolidin-1-yl)phenyl)-1H-benzo[d]imidazol-1-yl)acetohydrazide 24c

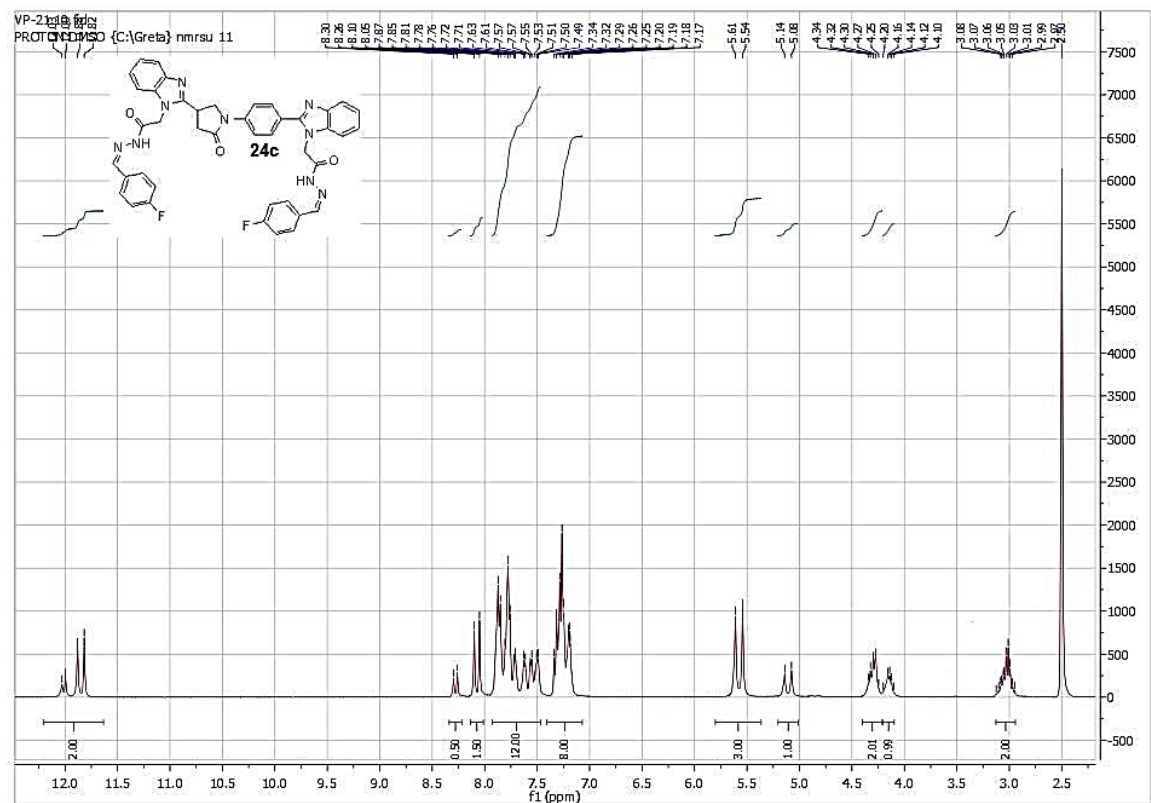


Figure S47: ^1H NMR of compound 24c

VP-22.10.f.d
PROTON DMSO-d₆ (Agilent) nmrsu 10

O=C1CC(=O)N1C2=CC=C(C=C2)/N=N/C3=CC=C(C=C3)C(=O)N/C4=CC=C(C=C4)C(=O)N/C5=CC=C(C=C5)C(=O)N/C6=CC=C(C=C6)C(=O)N/C7=CC=C(C=C7)C(=O)N/C8=CC=C(C=C8)C(=O)N/C9=CC=C(C=C9)C(=O)N/C10=CC=C(C=C10)C(=O)N/C11=CC=C(C=C11)C(=O)N/C12=CC=C(C=C12)C(=O)N/C13=CC=C(C=C13)C(=O)N/C14=CC=C(C=C14)C(=O)N/C15=CC=C(C=C15)C(=O)N/C16=CC=C(C=C16)C(=O)N/C17=CC=C(C=C17)C(=O)N/C18=CC=C(C=C18)C(=O)N/C19=CC=C(C=C19)C(=O)N/C20=CC=C(C=C20)C(=O)N/C21=CC=C(C=C21)C(=O)N/C22=CC=C(C=C22)C(=O)N/C23=CC=C(C=C23)C(=O)N/C24=CC=C(C=C24)C(=O)N/C25=CC=C(C=C25)C(=O)N/C26=CC=C(C=C26)C(=O)N/C27=CC=C(C=C27)C(=O)N/C28=CC=C(C=C28)C(=O)N/C29=CC=C(C=C29)C(=O)N/C30=CC=C(C=C30)C(=O)N/C31=CC=C(C=C31)C(=O)N/C32=CC=C(C=C32)C(=O)N/C33=CC=C(C=C33)C(=O)N/C34=CC=C(C=C34)C(=O)N/C35=CC=C(C=C35)C(=O)N/C36=CC=C(C=C36)C(=O)N/C37=CC=C(C=C37)C(=O)N/C38=CC=C(C=C38)C(=O)N/C39=CC=C(C=C39)C(=O)N/C40=CC=C(C=C40)C(=O)N/C41=CC=C(C=C41)C(=O)N/C42=CC=C(C=C42)C(=O)N/C43=CC=C(C=C43)C(=O)N/C44=CC=C(C=C44)C(=O)N/C45=CC=C(C=C45)C(=O)N/C46=CC=C(C=C46)C(=O)N/C47=CC=C(C=C47)C(=O)N/C48=CC=C(C=C48)C(=O)N/C49=CC=C(C=C49)C(=O)N/C50=CC=C(C=C50)C(=O)N/C51=CC=C(C=C51)C(=O)N/C52=CC=C(C=C52)C(=O)N/C53=CC=C(C=C53)C(=O)N/C54=CC=C(C=C54)C(=O)N/C55=CC=C(C=C55)C(=O)N/C56=CC=C(C=C56)C(=O)N/C57=CC=C(C=C57)C(=O)N/C58=CC=C(C=C58)C(=O)N/C59=CC=C(C=C59)C(=O)N/C60=CC=C(C=C60)C(=O)N/C61=CC=C(C=C61)C(=O)N/C62=CC=C(C=C62)C(=O)N/C63=CC=C(C=C63)C(=O)N/C64=CC=C(C=C64)C(=O)N/C65=CC=C(C=C65)C(=O)N/C66=CC=C(C=C66)C(=O)N/C67=CC=C(C=C67)C(=O)N/C68=CC=C(C=C68)C(=O)N/C69=CC=C(C=C69)C(=O)N/C70=CC=C(C=C70)C(=O)N/C71=CC=C(C=C71)C(=O)N/C72=CC=C(C=C72)C(=O)N/C73=CC=C(C=C73)C(=O)N/C74=CC=C(C=C74)C(=O)N/C75=CC=C(C=C75)C(=O)N/C76=CC=C(C=C76)C(=O)N/C77=CC=C(C=C77)C(=O)N/C78=CC=C(C=C78)C(=O)N/C79=CC=C(C=C79)C(=O)N/C80=CC=C(C=C80)C(=O)N/C81=CC=C(C=C81)C(=O)N/C82=CC=C(C=C82)C(=O)N/C83=CC=C(C=C83)C(=O)N/C84=CC=C(C=C84)C(=O)N/C85=CC=C(C=C85)C(=O)N/C86=CC=C(C=C86)C(=O)N/C87=CC=C(C=C87)C(=O)N/C88=CC=C(C=C88)C(=O)N/C89=CC=C(C=C89)C(=O)N/C90=CC=C(C=C90)C(=O)N/C91=CC=C(C=C91)C(=O)N/C92=CC=C(C=C92)C(=O)N/C93=CC=C(C=C93)C(=O)N/C94=CC=C(C=C94)C(=O)N/C95=CC=C(C=C95)C(=O)N/C96=CC=C(C=C96)C(=O)N/C97=CC=C(C=C97)C(=O)N/C98=CC=C(C=C98)C(=O)N/C99=CC=C(C=C99)C(=O)N/C100=CC=C(C=C100)C(=O)N/C101=CC=C(C=C101)C(=O)N/C102=CC=C(C=C102)C(=O)N/C103=CC=C(C=C103)C(=O)N/C104=CC=C(C=C104)C(=O)N/C105=CC=C(C=C105)C(=O)N/C106=CC=C(C=C106)C(=O)N/C107=CC=C(C=C107)C(=O)N/C108=CC=C(C=C108)C(=O)N/C109=CC=C(C=C109)C(=O)N/C110=CC=C(C=C110)C(=O)N/C111=CC=C(C=C111)C(=O)N/C112=CC=C(C=C112)C(=O)N/C113=CC=C(C=C113)C(=O)N/C114=CC=C(C=C114)C(=O)N/C115=CC=C(C=C115)C(=O)N/C116=CC=C(C=C116)C(=O)N/C117=CC=C(C=C117)C(=O)N/C118=CC=C(C=C118)C(=O)N/C119=CC=C(C=C119)C(=O)N/C120=CC=C(C=C120)C(=O)N/C121=CC=C(C=C121)C(=O)N/C122=CC=C(C=C122)C(=O)N/C123=CC=C(C=C123)C(=O)N/C124=CC=C(C=C124)C(=O)N/C125=CC=C(C=C125)C(=O)N/C126=CC=C(C=C126)C(=O)N/C127=CC=C(C=C127)C(=O)N/C128=CC=C(C=C128)C(=O)N/C129=CC=C(C=C129)C(=O)N/C130=CC=C(C=C130)C(=O)N/C131=CC=C(C=C131)C(=O)N/C132=CC=C(C=C132)C(=O)N/C133=CC=C(C=C133)C(=O)N/C134=CC=C(C=C134)C(=O)N/C135=CC=C(C=C135)C(=O)N/C136=CC=C(C=C136)C(=O)N/C137=CC=C(C=C137)C(=O)N/C138=CC=C(C=C138)C(=O)N/C139=CC=C(C=C139)C(=O)N/C140=CC=C(C=C140)C(=O)N/C141=CC=C(C=C141)C(=O)N/C142=CC=C(C=C142)C(=O)N/C143=CC=C(C=C143)C(=O)N/C144=CC=C(C=C144)C(=O)N/C145=CC=C(C=C145)C(=O)N/C146=CC=C(C=C146)C(=O)N/C147=CC=C(C=C147)C(=O)N/C148=CC=C(C=C148)C(=O)N/C149=CC=C(C=C149)C(=O)N/C150=CC=C(C=C150)C(=O)N/C151=CC=C(C=C151)C(=O)N/C152=CC=C(C=C152)C(=O)N/C153=CC=C(C=C153)C(=O)N/C154=CC=C(C=C154)C(=O)N/C155=CC=C(C=C155)C(=O)N/C156=CC=C(C=C156)C(=O)N/C157=CC=C(C=C157)C(=O)N/C158=CC=C(C=C158)C(=O)N/C159=CC=C(C=C159)C(=O)N/C160=CC=C(C=C160)C(=O)N/C161=CC=C(C=C161)C(=O)N/C162=CC=C(C=C162)C(=O)N/C163=CC=C(C=C163)C(=O)N/C164=CC=C(C=C164)C(=O)N/C165=CC=C(C=C165)C(=O)N/C166=CC=C(C=C166)C(=O)N/C167=CC=C(C=C167)C(=O)N/C168=CC=C(C=C168)C(=O)N/C169=CC=C(C=C169)C(=O)N/C170=CC=C(C=C170)C(=O)N/C171=CC=C(C=C171)C(=O)N/C172=CC=C(C=C172)C(=O)N/C173=CC=C(C=C173)C(=O)N/C174=CC=C(C=C174)C(=O)N/C175=CC=C(C=C175)C(=O)N/C176=CC=C(C=C176)C(=O)N/C177=CC=C(C=C177)C(=O)N/C178=CC=C(C=C178)C(=O)N/C179=CC=C(C=C179)C(=O)N/C180=CC=C(C=C180)C(=O)N/C181=CC=C(C=C181)C(=O)N/C182=CC=C(C=C182)C(=O)N/C183=CC=C(C=C183)C(=O)N/C184=CC=C(C=C184)C(=O)N/C185=CC=C(C=C185)C(=O)N/C186=CC=C(C=C186)C(=O)N/C187=CC=C(C=C187)C(=O)N/C188=CC=C(C=C188)C(=O)N/C189=CC=C(C=C189)C(=O)N/C190=CC=C(C=C190)C(=O)N/C191=CC=C(C=C191)C(=O)N/C192=CC=C(C=C192)C(=O)N/C193=CC=C(C=C193)C(=O)N/C194=CC=C(C=C194)C(=O)N/C195=CC=C(C=C195)C(=O)N/C196=CC=C(C=C196)C(=O)N/C197=CC=C(C=C197)C(=O)N/C198=CC=C(C=C198)C(=O)N/C199=CC=C(C=C199)C(=O)N/C200=CC=C(C=C200)C(=O)N/C201=CC=C(C=C201)C(=O)N/C202=CC=C(C=C202)C(=O)N/C203=CC=C(C=C203)C(=O)N/C204=CC=C(C=C204)C(=O)N/C205=CC=C(C=C205)C(=O)N/C206=CC=C(C=C206)C(=O)N/C207=CC=C(C=C207)C(=O)N/C208=CC=C(C=C208)C(=O)N/C209=CC=C(C=C209)C(=O)N/C210=CC=C(C=C210)C(=O)N/C211=CC=C(C=C211)C(=O)N/C212=CC=C(C=C212)C(=O)N/C213=CC=C(C=C213)C(=O)N/C214=CC=C(C=C214)C(=O)N/C215=CC=C(C=C215)C(=O)N/C216=CC=C(C=C216)C(=O)N/C217=CC=C(C=C217)C(=O)N/C218=CC=C(C=C218)C(=O)N/C219=CC=C(C=C219)C(=O)N/C220=CC=C(C=C220)C(=O)N/C221=CC=C(C=C221)C(=O)N/C222=CC=C(C=C222)C(=O)N/C223=CC=C(C=C223)C(=O)N/C224=CC=C(C=C224)C(=O)N/C225=CC=C(C=C225)C(=O)N/C226

N'-(2,3-dimethoxybenzylidene)-2-(2-(4-(4-(1-(2-(2-(2,3-dimethoxybenzylidene)hydrazinyl)-2-oxoethyl)-1H-benzo[d]imidazol-2-yl)-2-oxopyrrolidin-1-yl)phenyl)-1H-benzo[d]imidazol-1-yl)acetohydrazide 24e

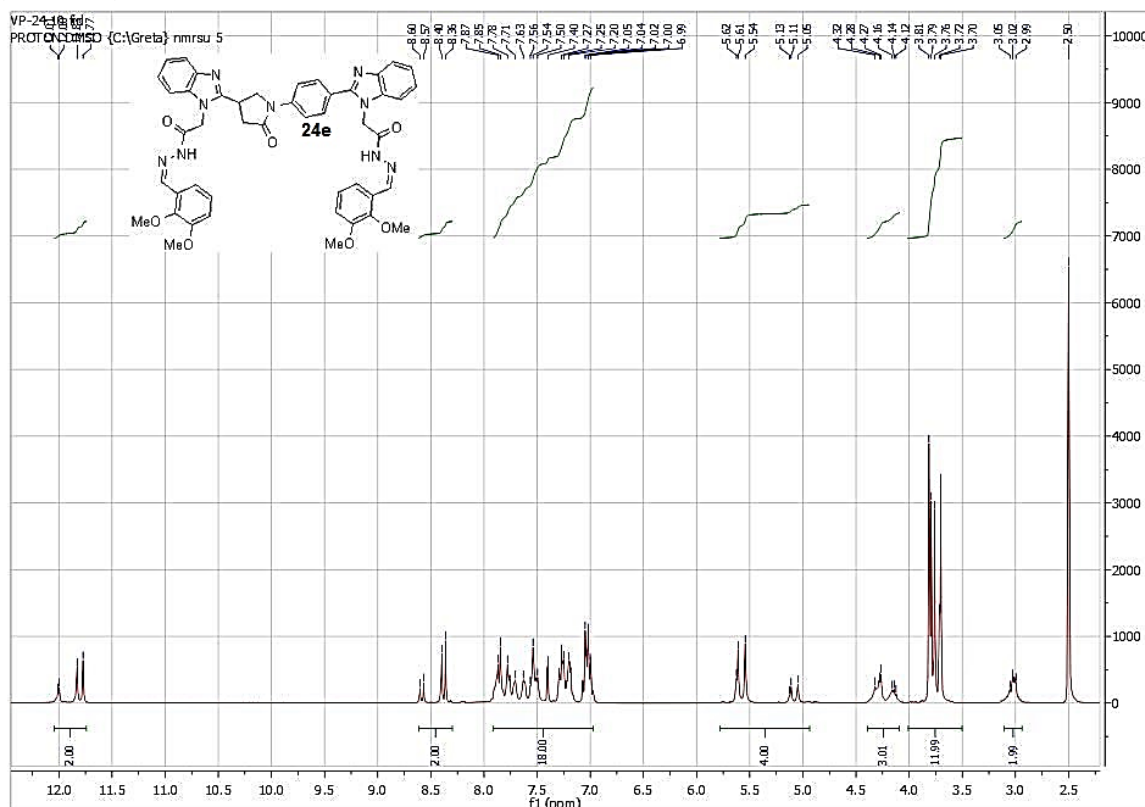


Figure S49: ^1H NMR of compound **24e**

Supplementary table 1

Bacteria strains used in the biological evaluation

Organism	Strain number	Source
<i>Staphylococcus aureus</i>	ATCC 9144	ATCC ¹
<i>Listeria monocytogenes</i>	ATCC 7644	ATCC ¹
<i>Bacillus cereus</i>	ATCC 11778	ATCC ¹
<i>Escherichia coli</i>	ATCC 8739	ATCC ¹
<i>Pseudomonas aeruginosa</i>	NCTC 6750	NCTC ²
<i>Salmonella enteritidis</i>	ATCC 13076	ATCC ¹

^{1.} American Type Culture Collection.

^{2.} National Collection of Type Cultures.