

Supplementary Material

Synthesis of poly-functionalized pyrazoles under Vilsmeier-Haack reaction conditions

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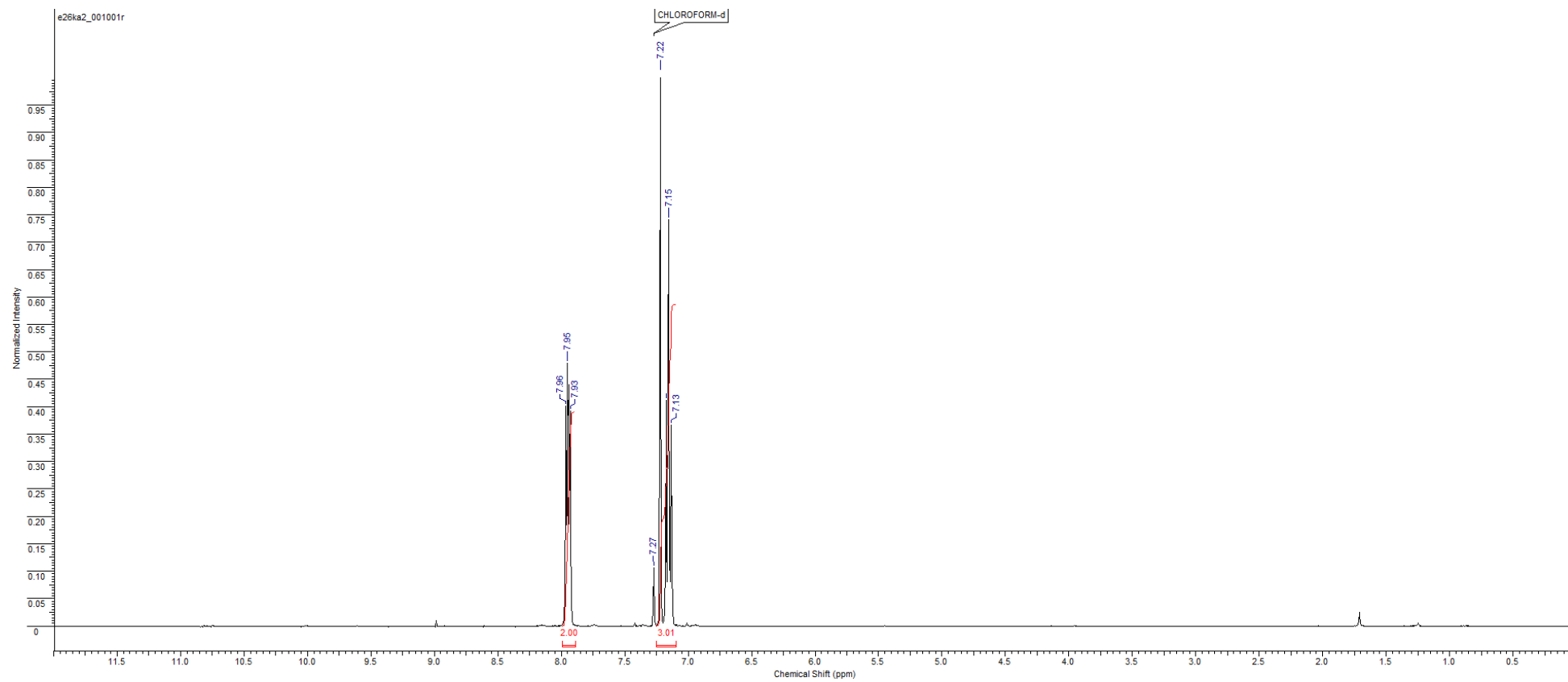
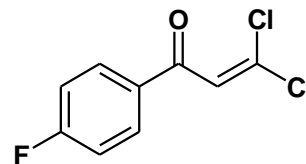
¹ H and ¹³ C NMR spectra of compounds.....	S2
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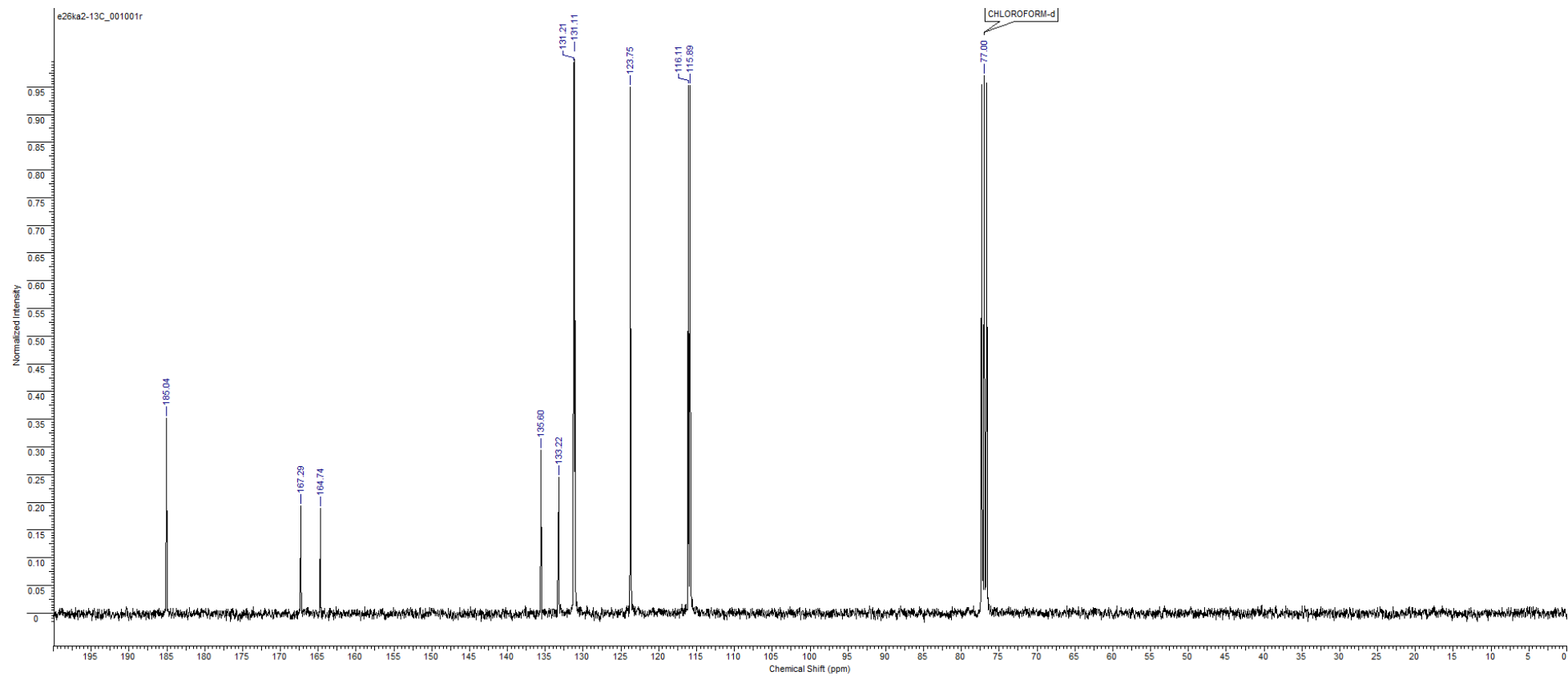
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3

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5 ^1H NMR

6

7 ^{13}C NMR

8

9

10

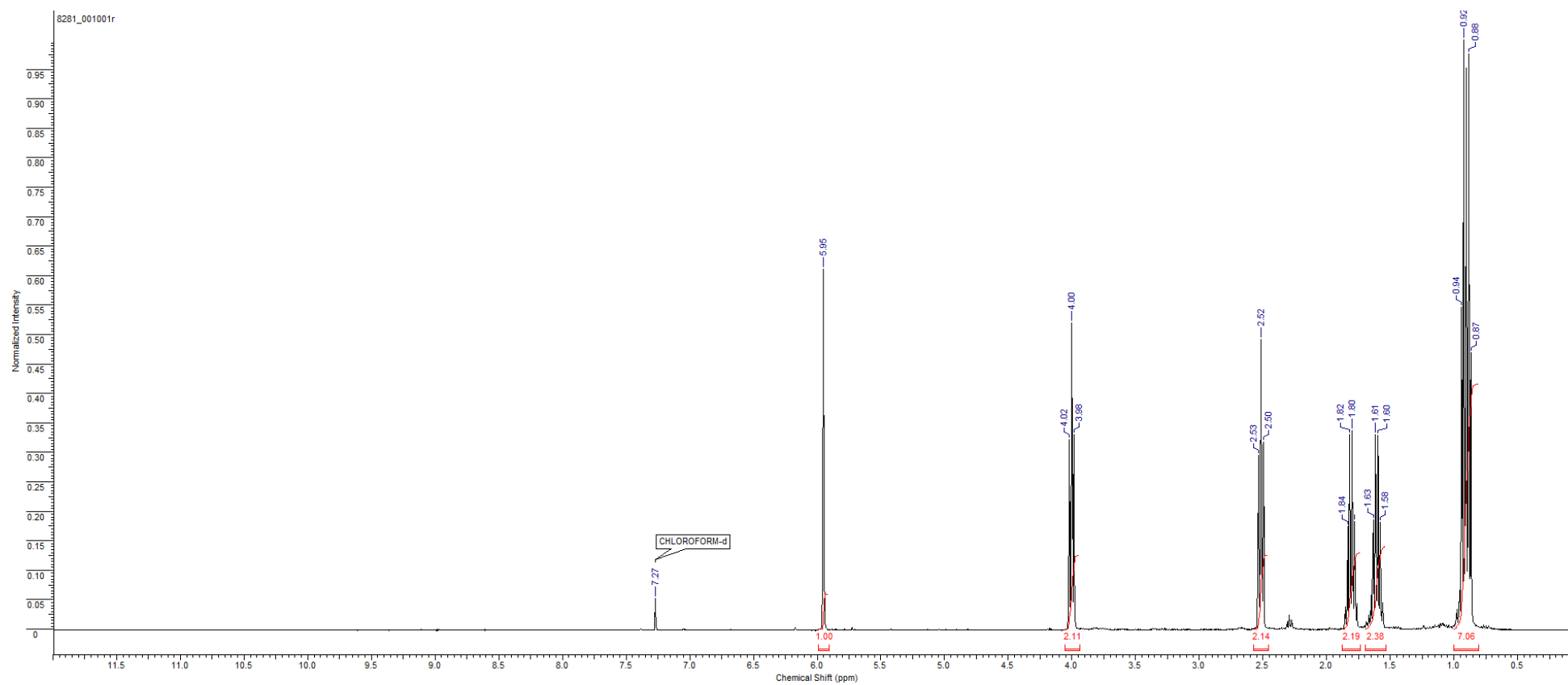
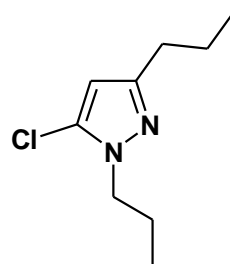
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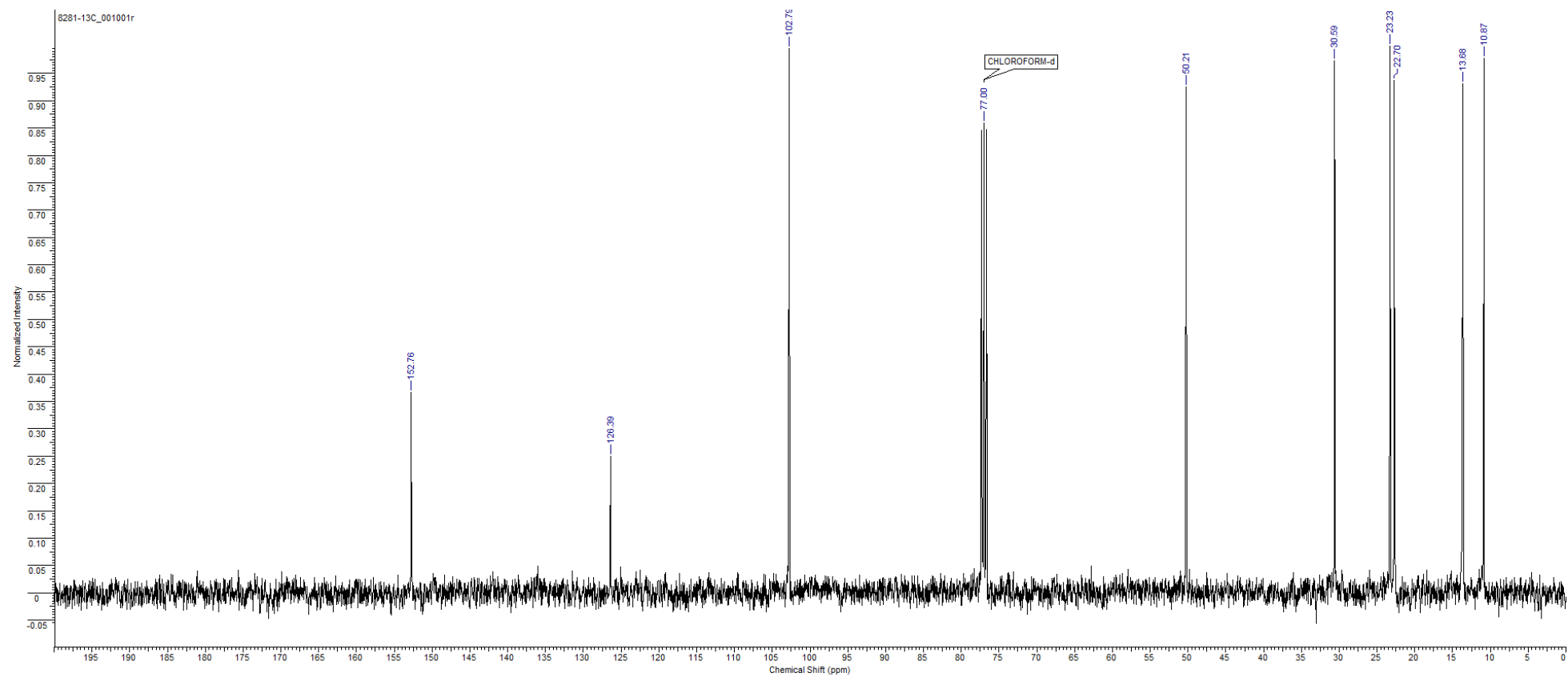
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16 ^1H NMR

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18 ^{13}C NMR

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20

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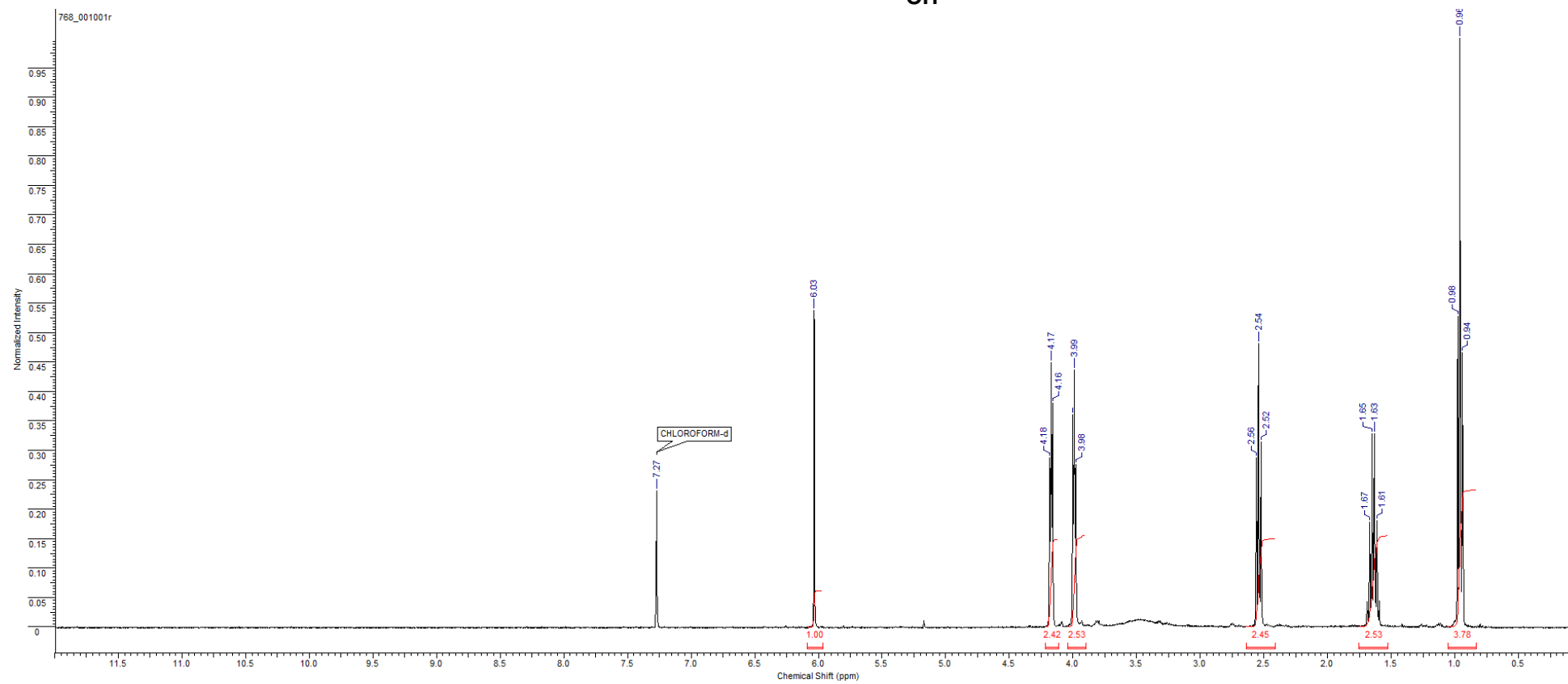
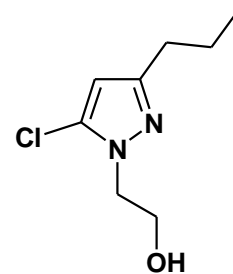
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23 2-(5-chloro-3-propyl-1H-pyrazol-1-yl)ethanol 1c

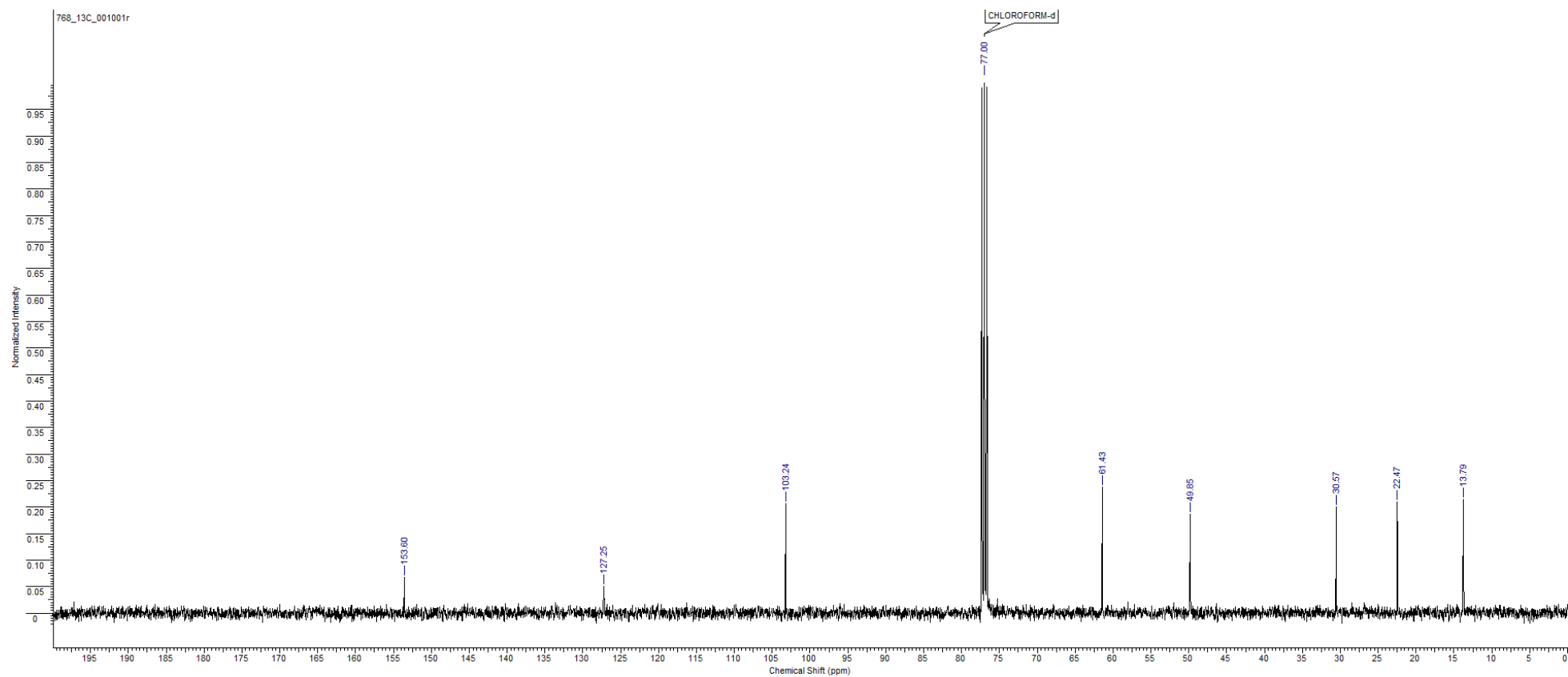
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27 ^1H NMR

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29 ^{13}C NMR

30

31

32

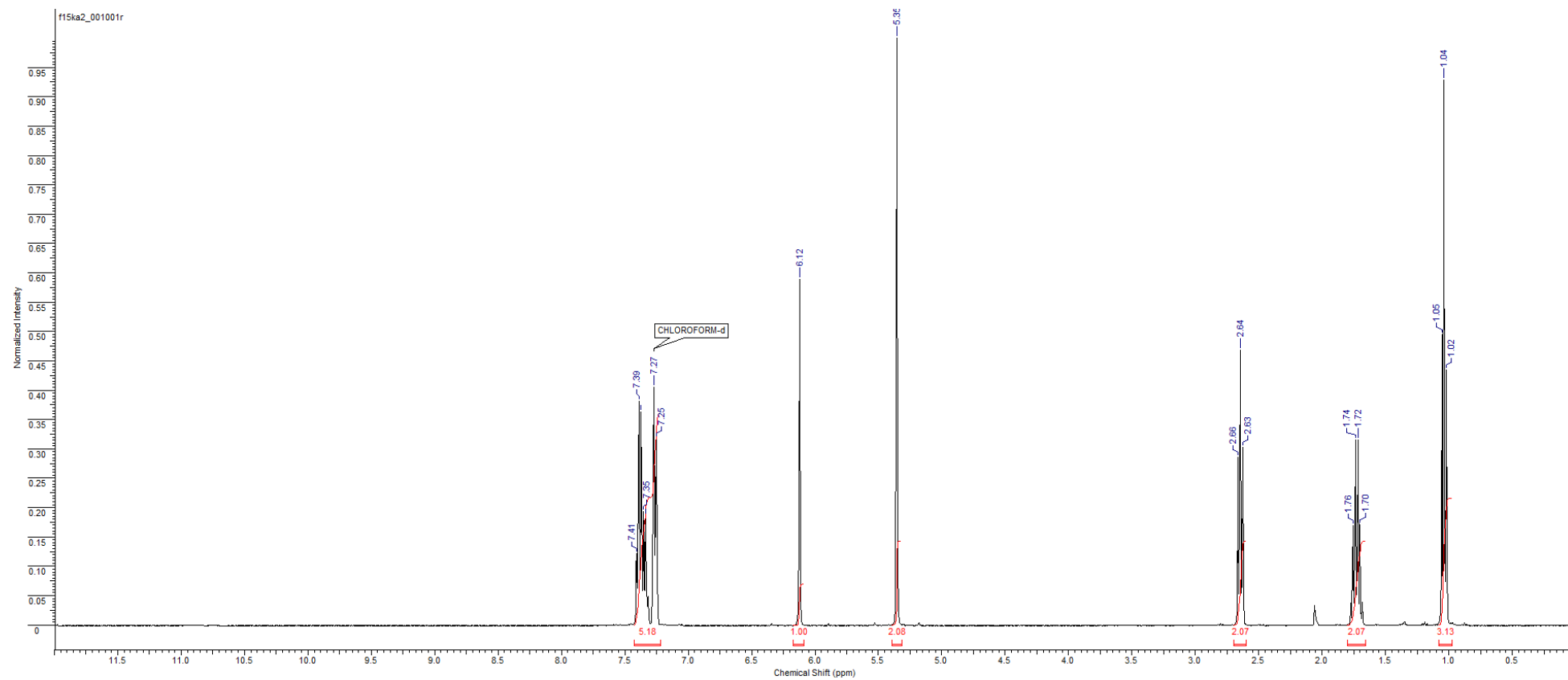
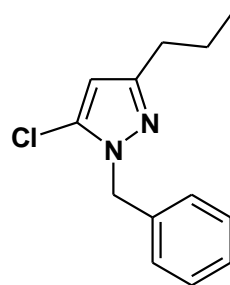
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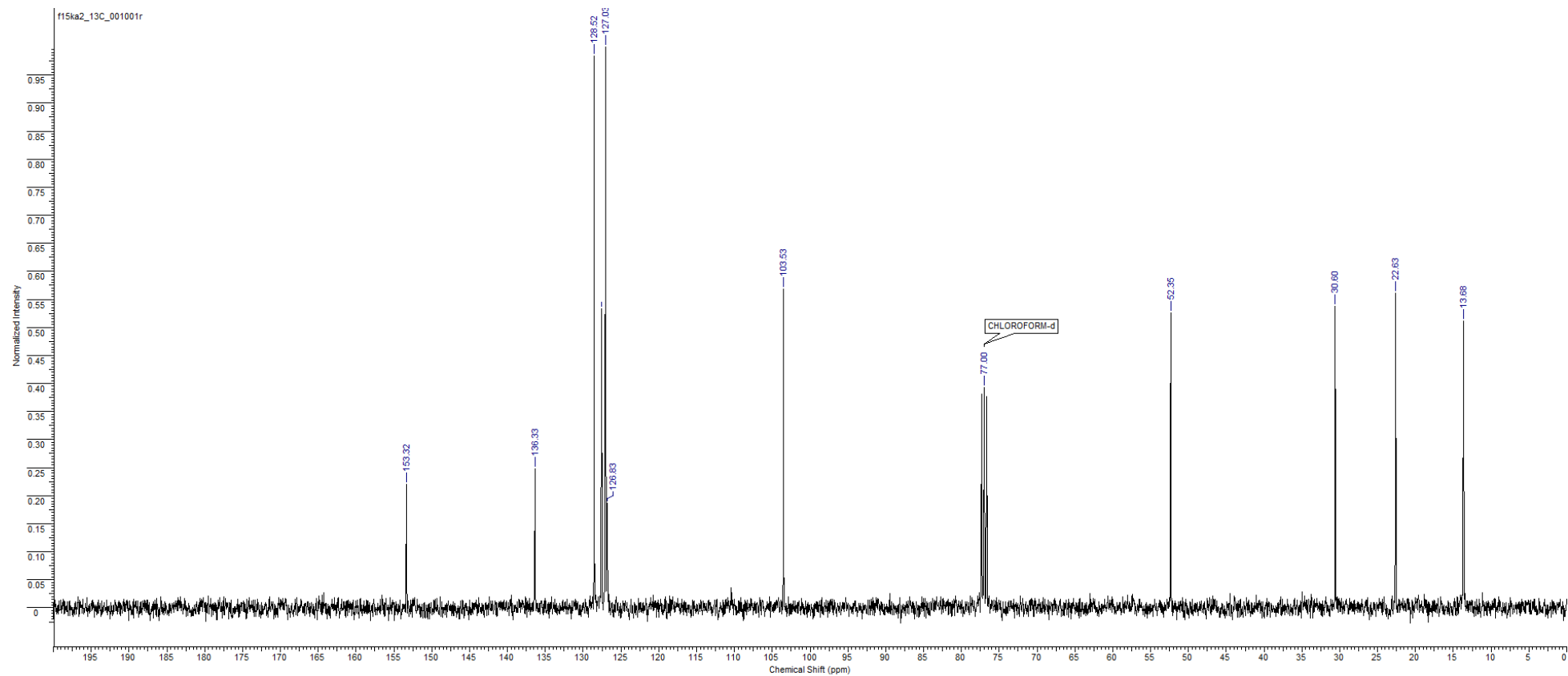
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38 ^1H NMR

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40 ^{13}C NMR

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42

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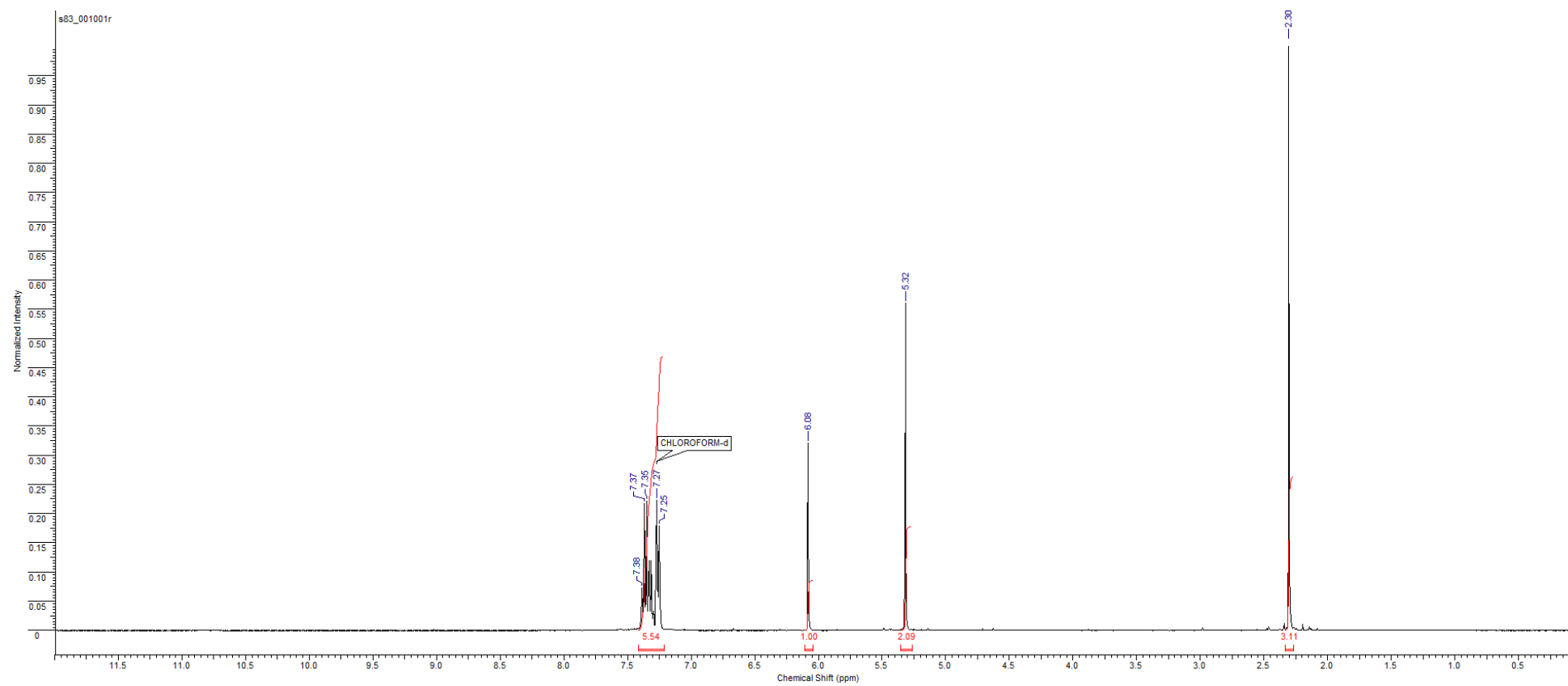
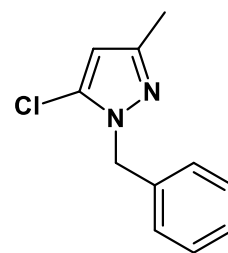
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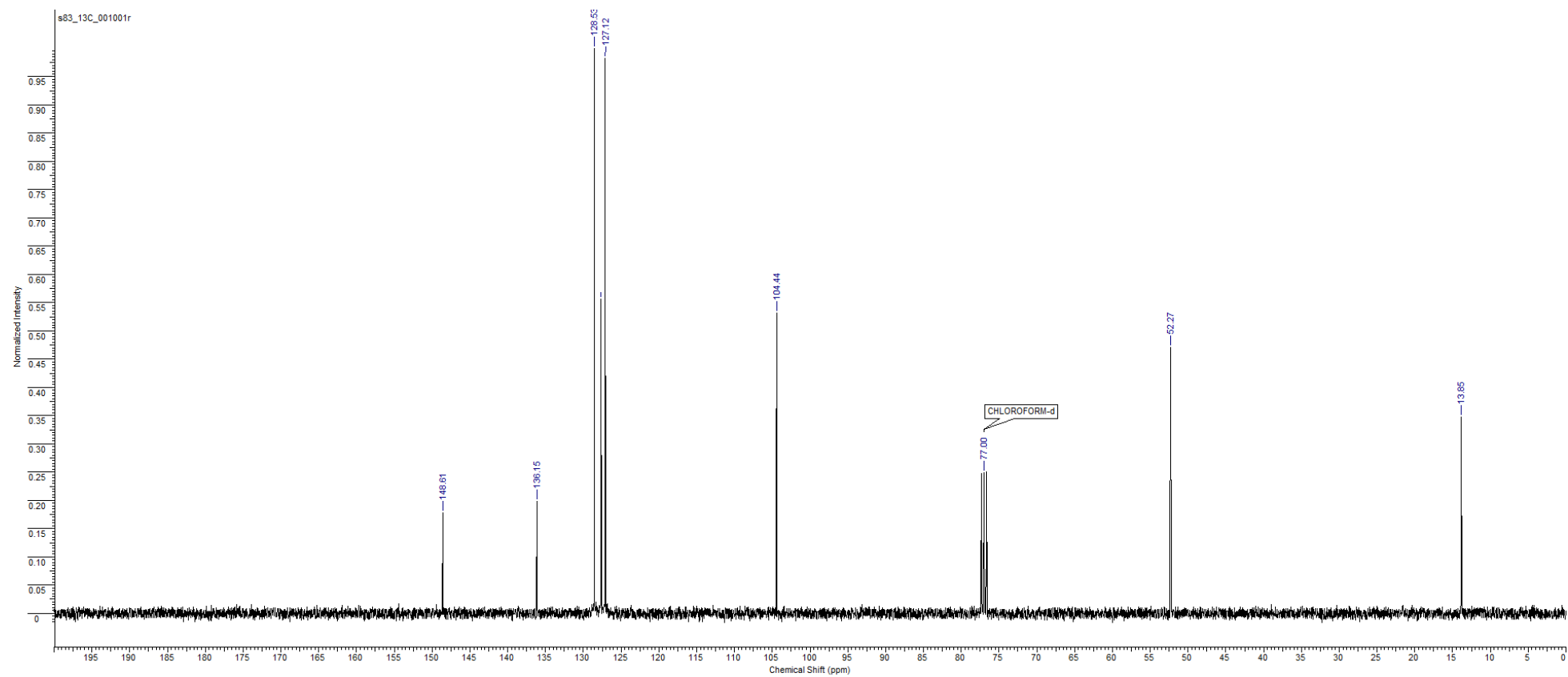
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49 ¹H NMR

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51 ^{13}C NMR

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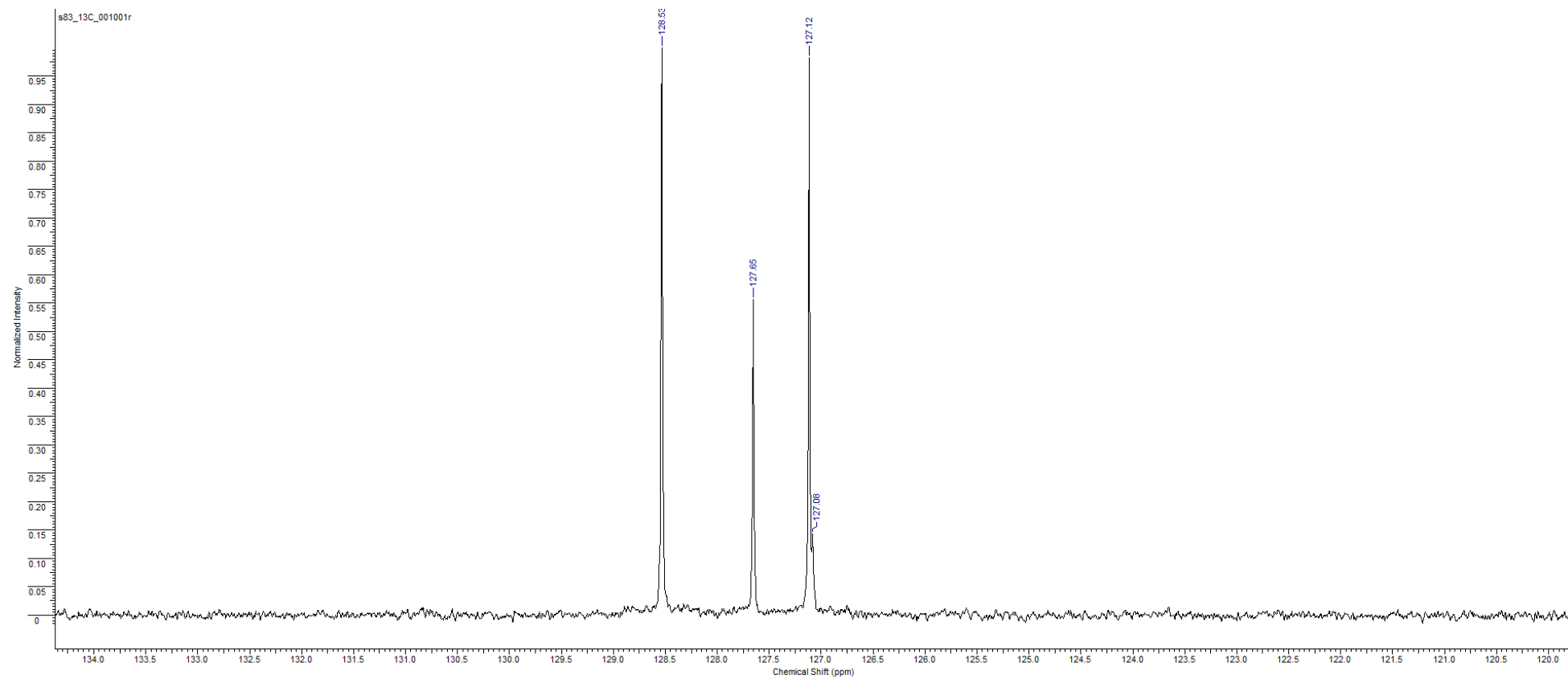
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58 ^{13}C NMR

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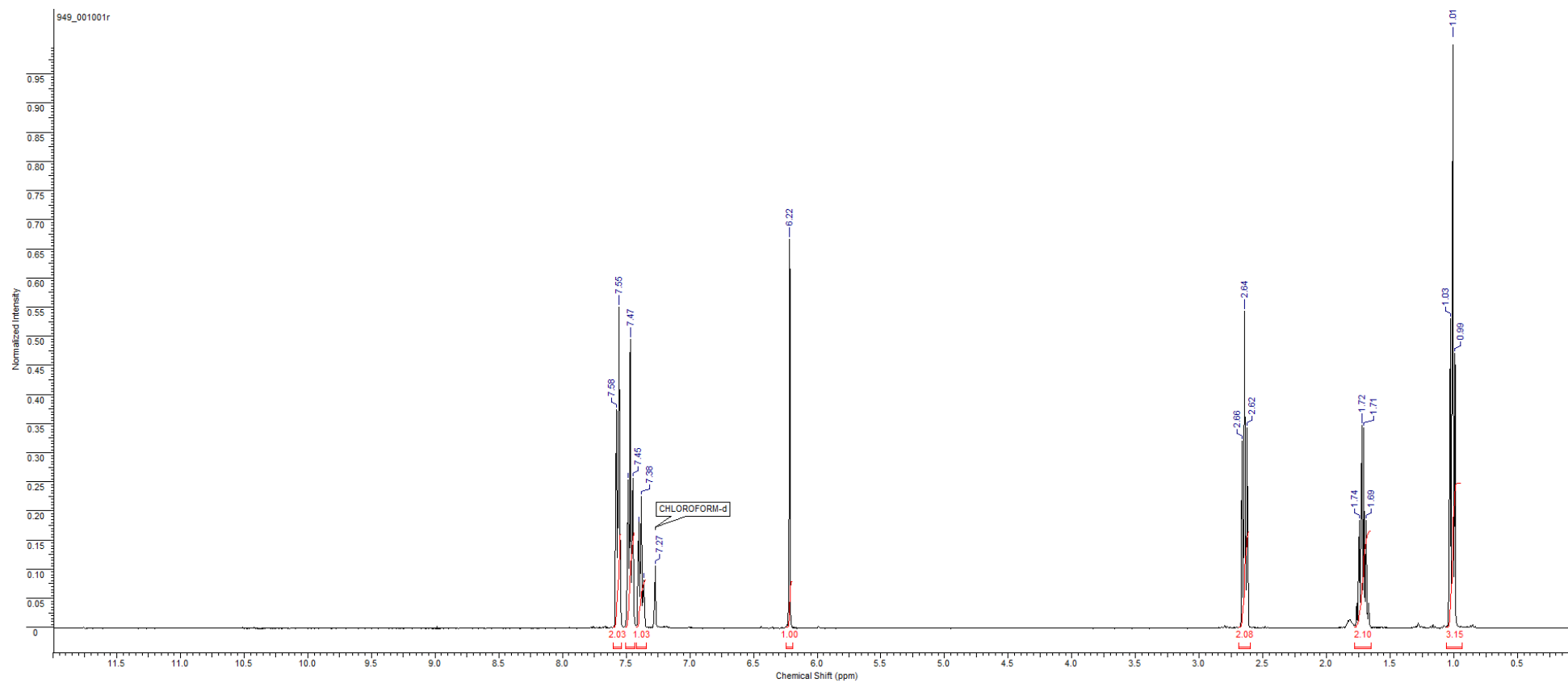
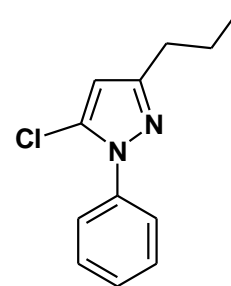
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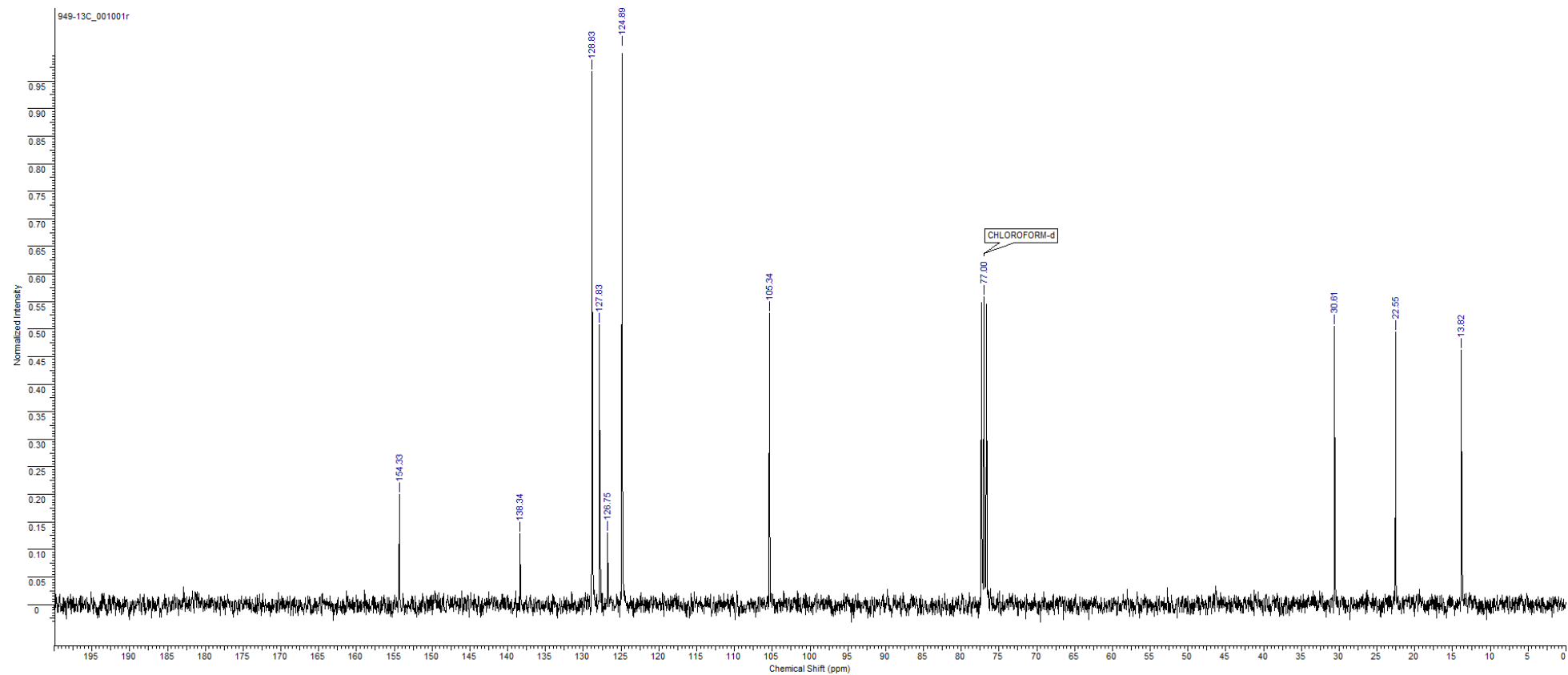
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65 $^1\text{H NMR}$ 

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67 ¹³C NMR



68

69

70

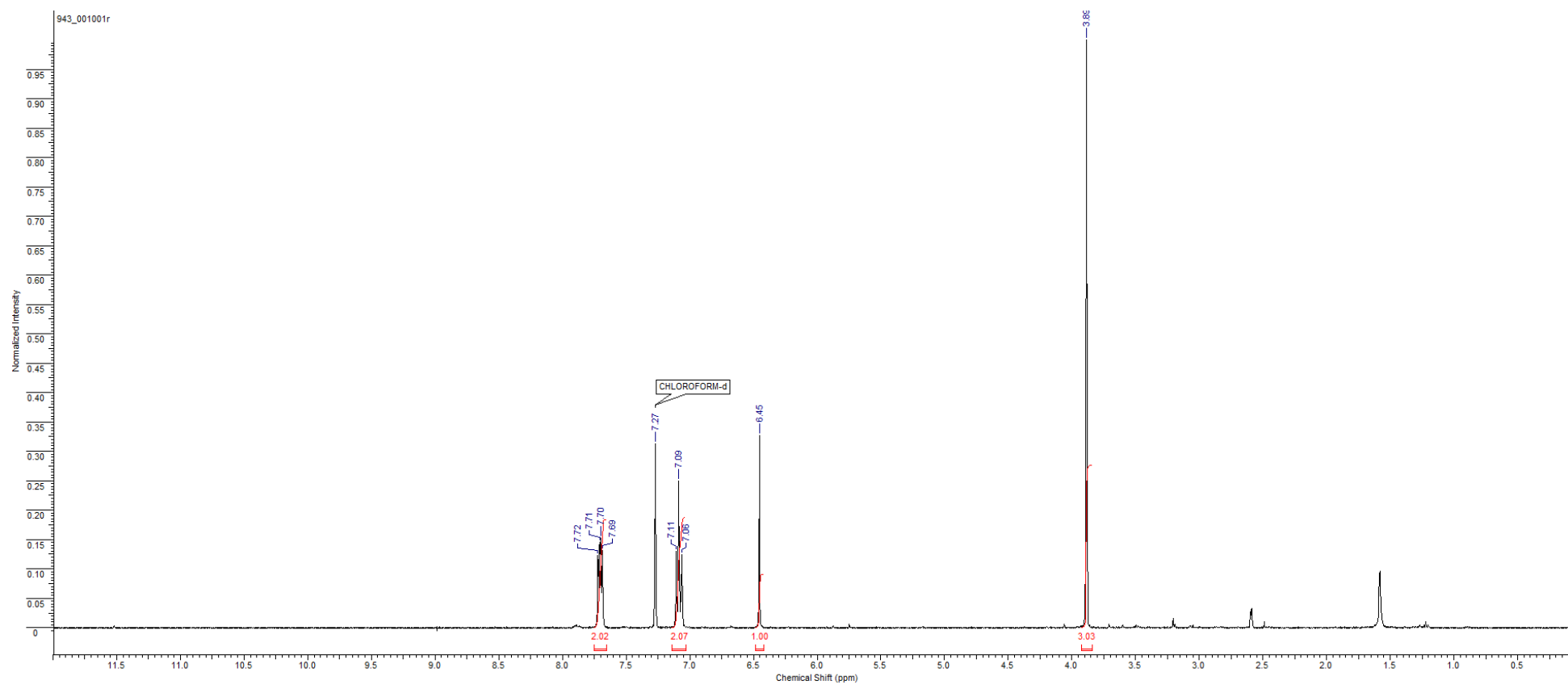
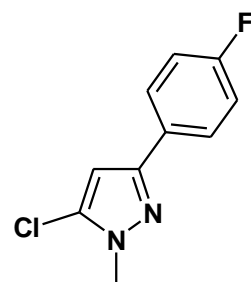
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72 5-chloro-3-(4-fluorophenyl)-1-methyl-1H-pyrazole 1k

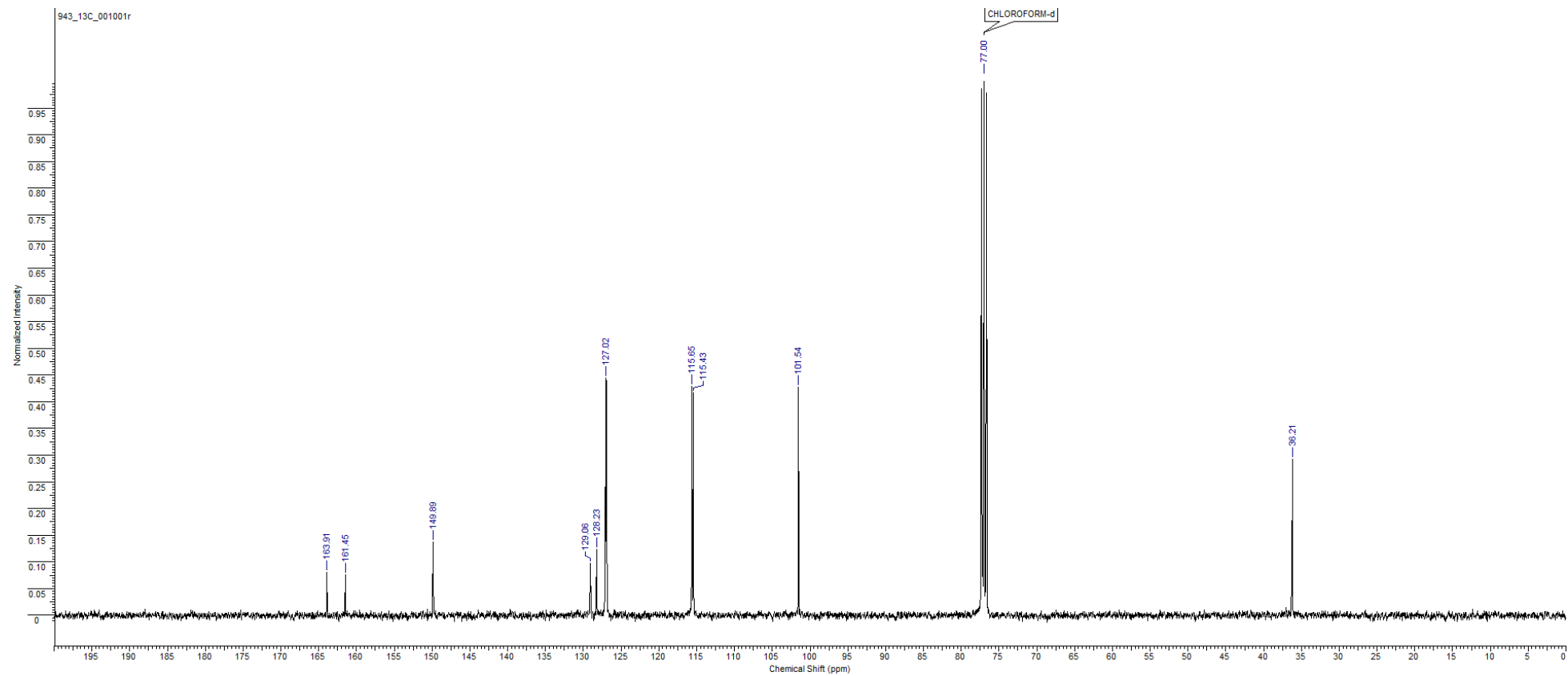
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75

76 ¹H NMR

77

78 ^{13}C NMR

79

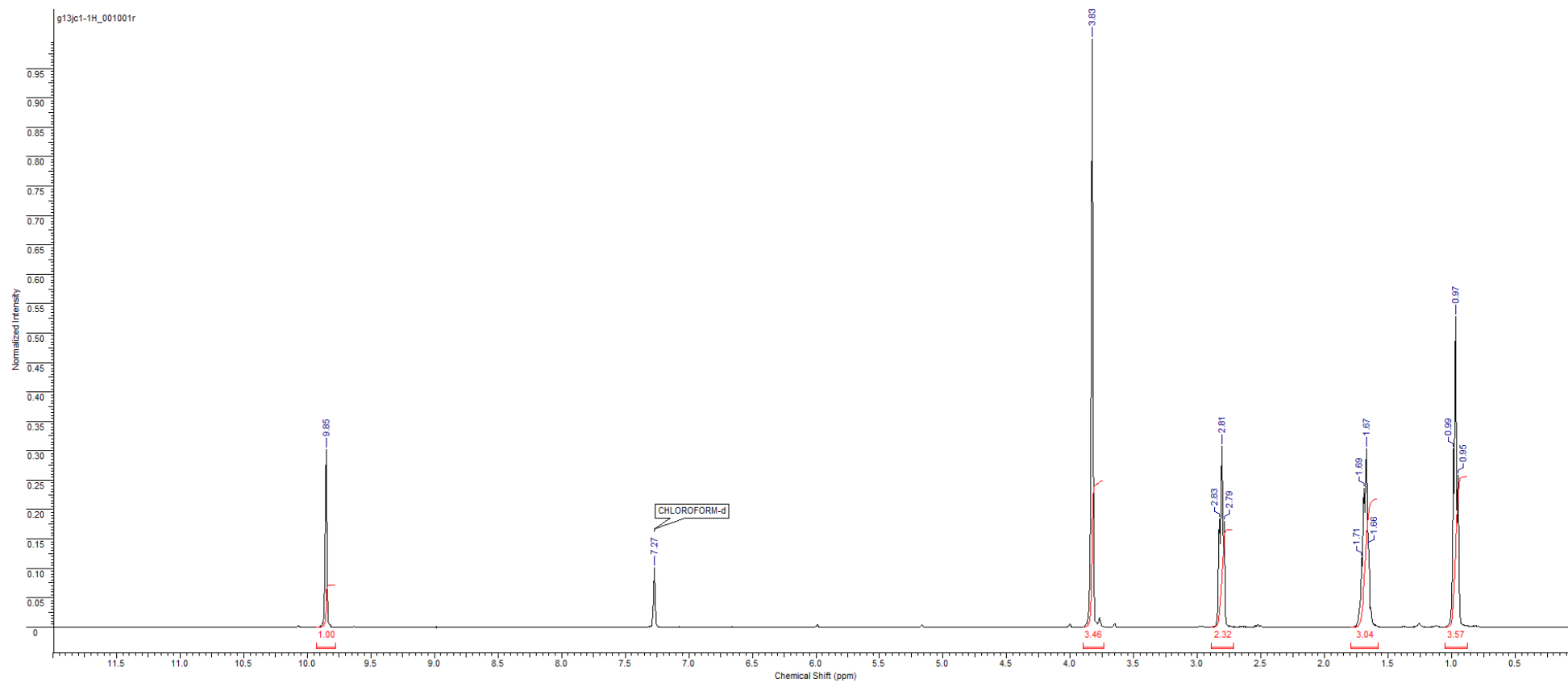
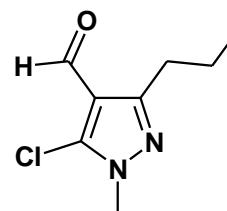
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81 *5-chloro-1-methyl-3-propyl-1H-pyrazole-4-carbaldehyde 2a*

82

83

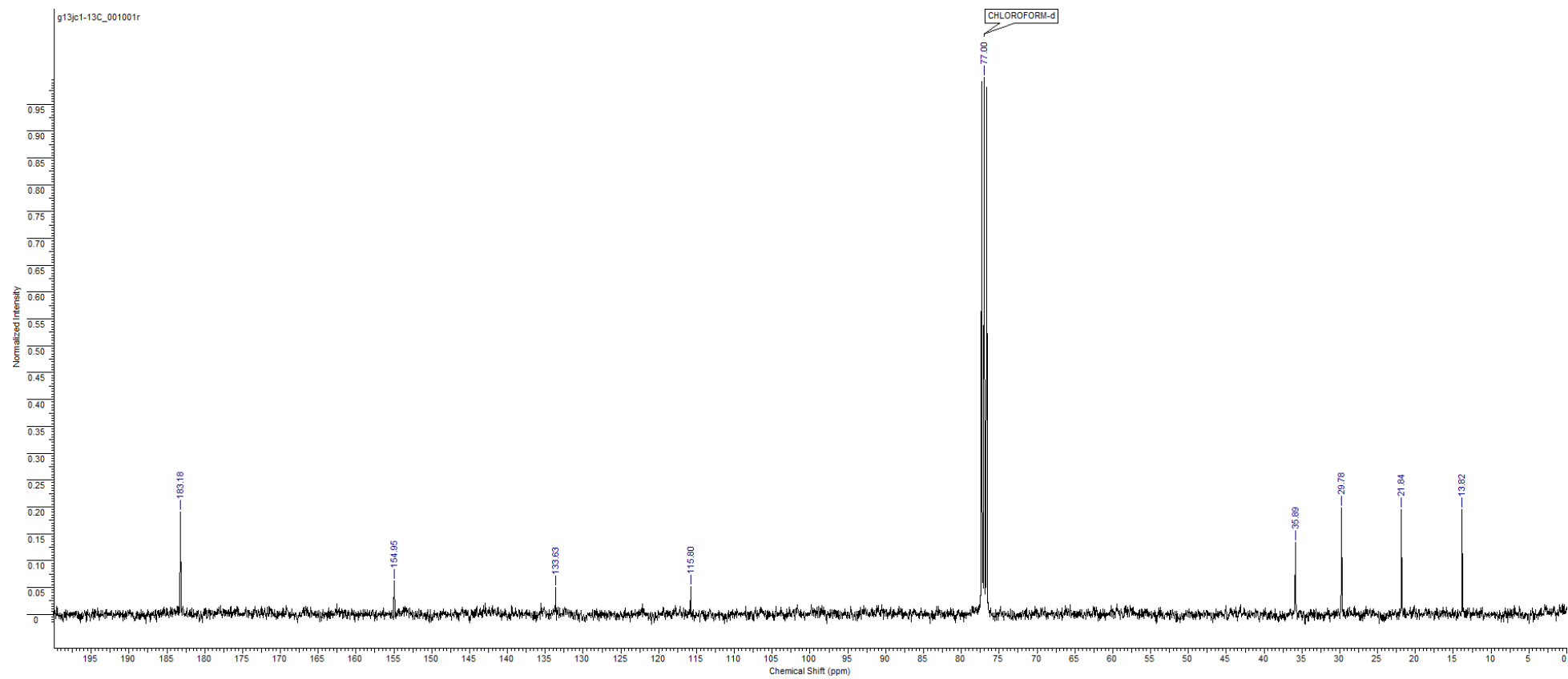
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85 ¹H NMR

86

87 ^{13}C NMR

88



89

90

91

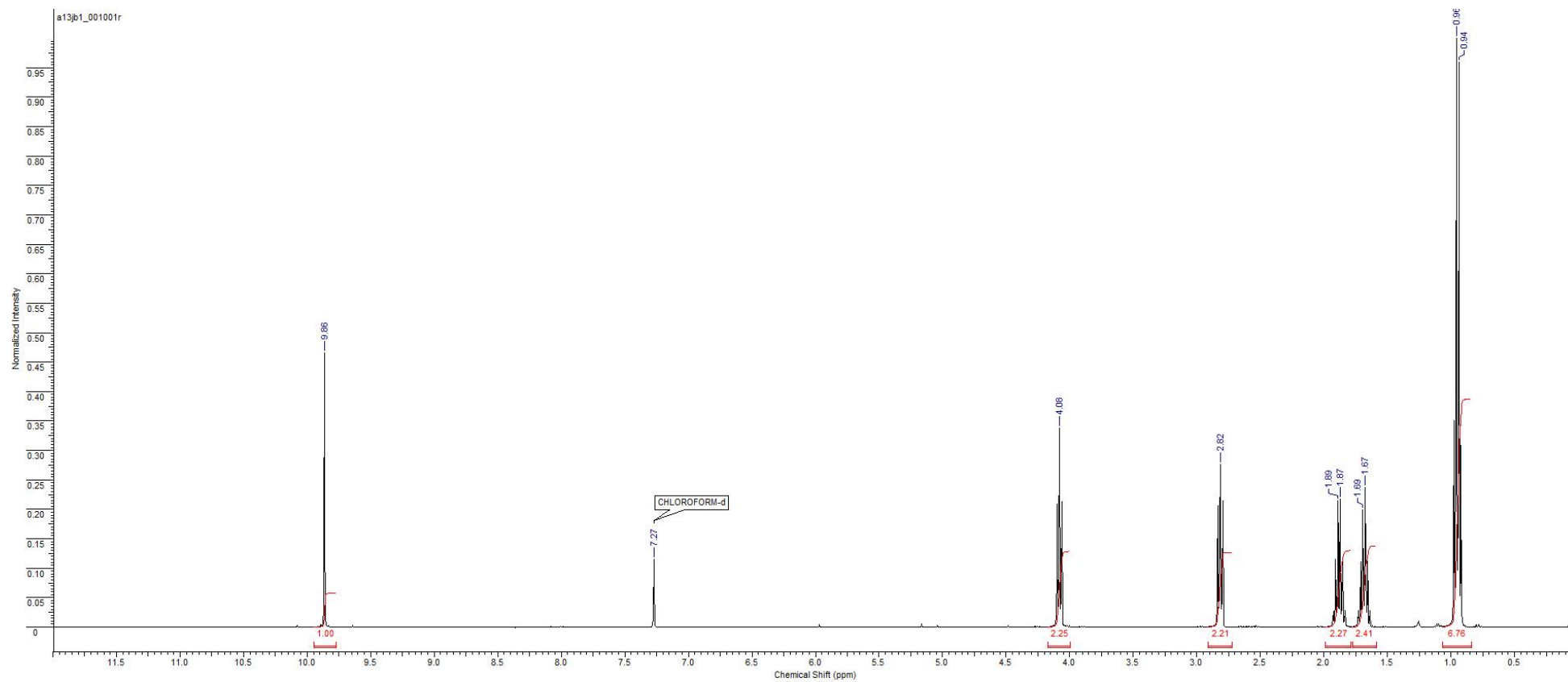
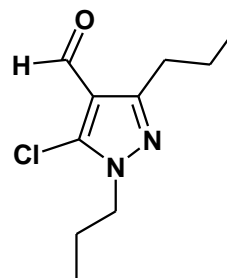
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94

95 ^1H NMR

96

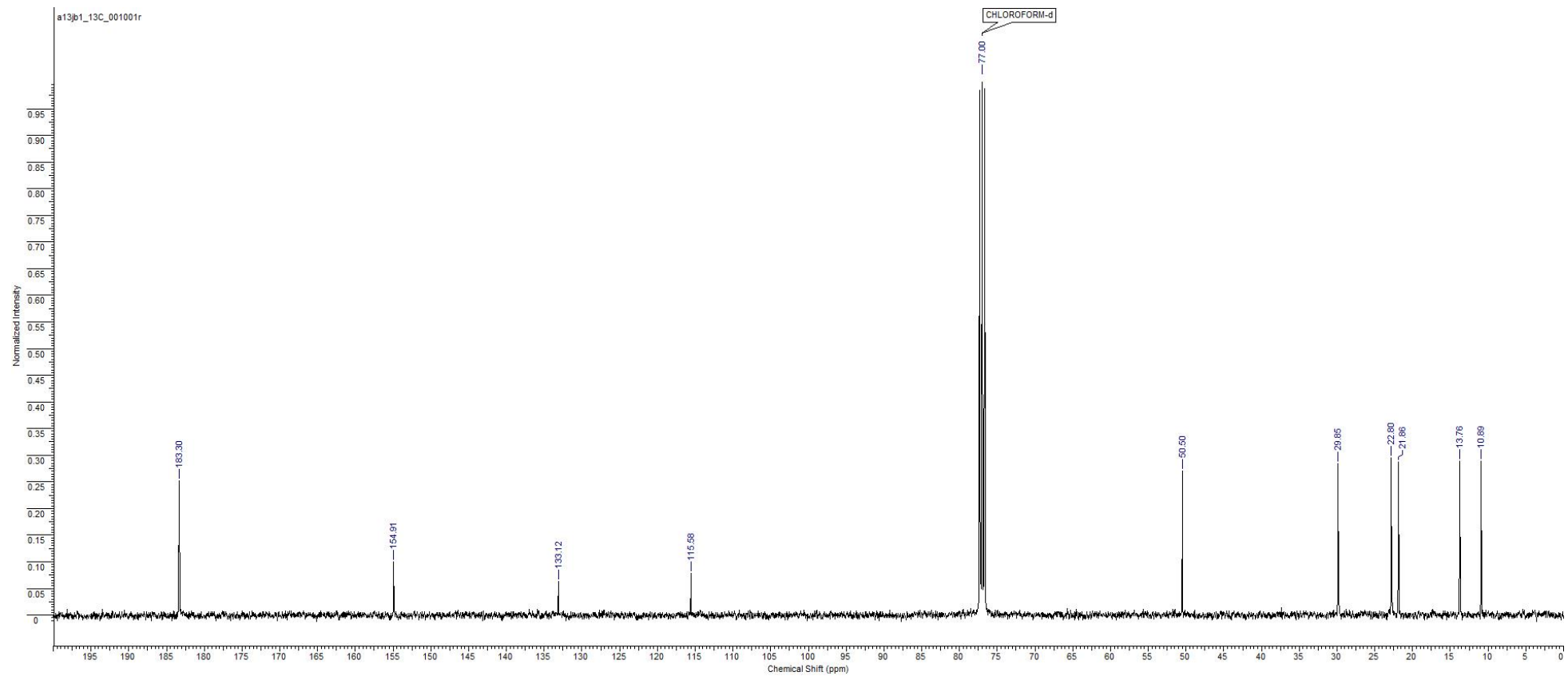


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98

99 ^{13}C NMR

100



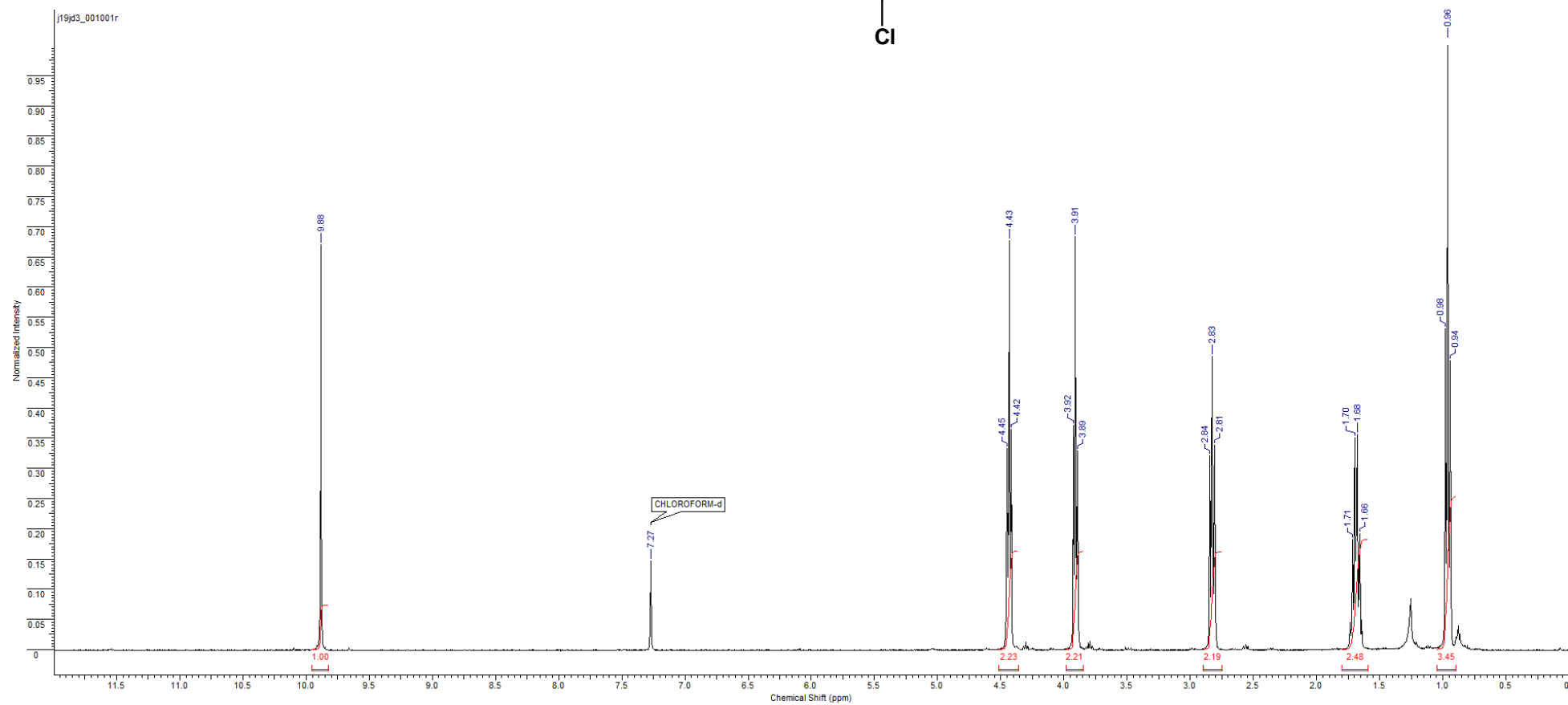
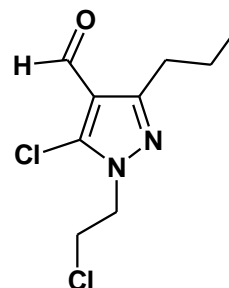
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103 *5-chloro-1-(2-chloroethyl)-3-propyl-1H-pyrazole-4-carbaldehyde 2c*

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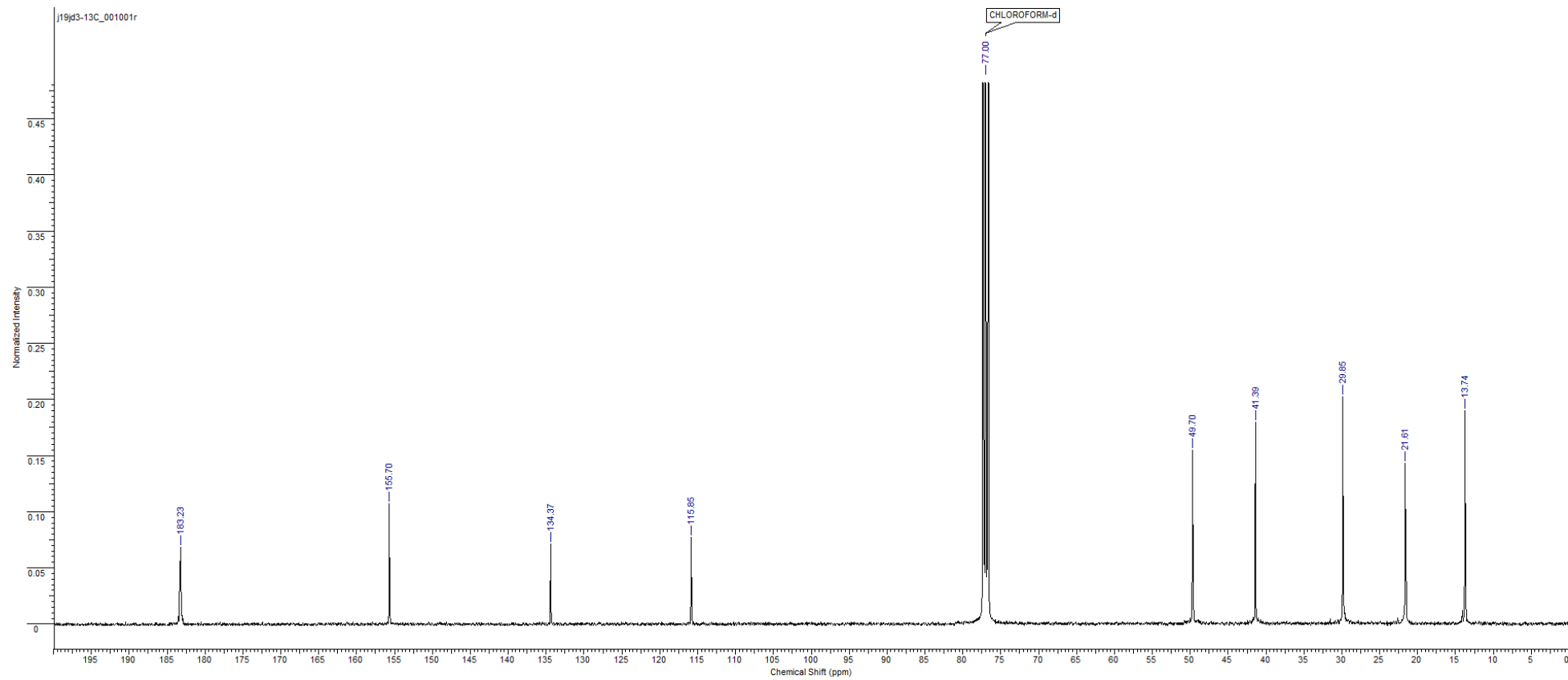
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106 $^1\text{H NMR}$ 

107

108

109

110 ^{13}C NMR

111

112

113

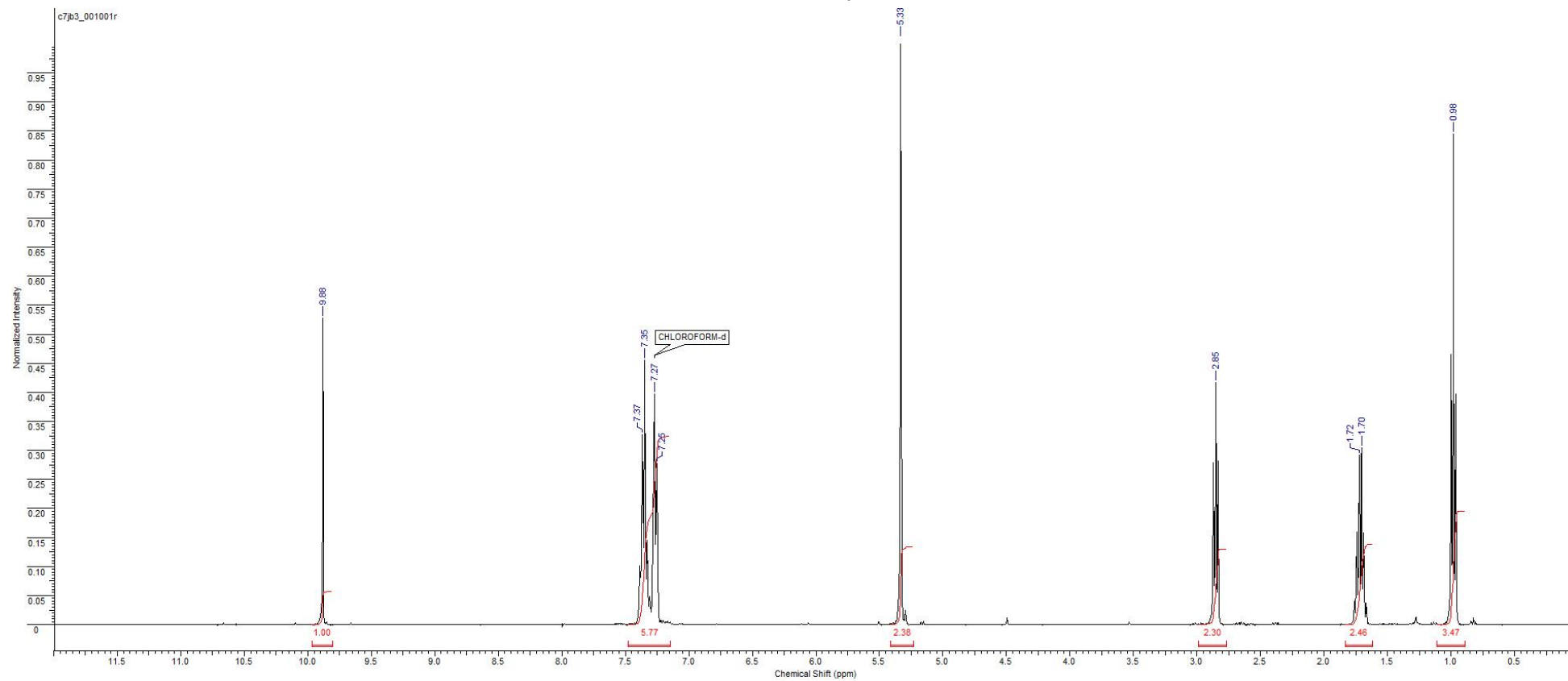
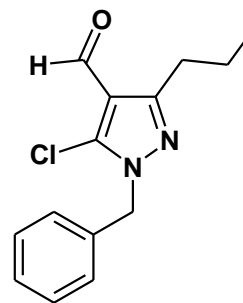
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116 ^1H NMR

117

118

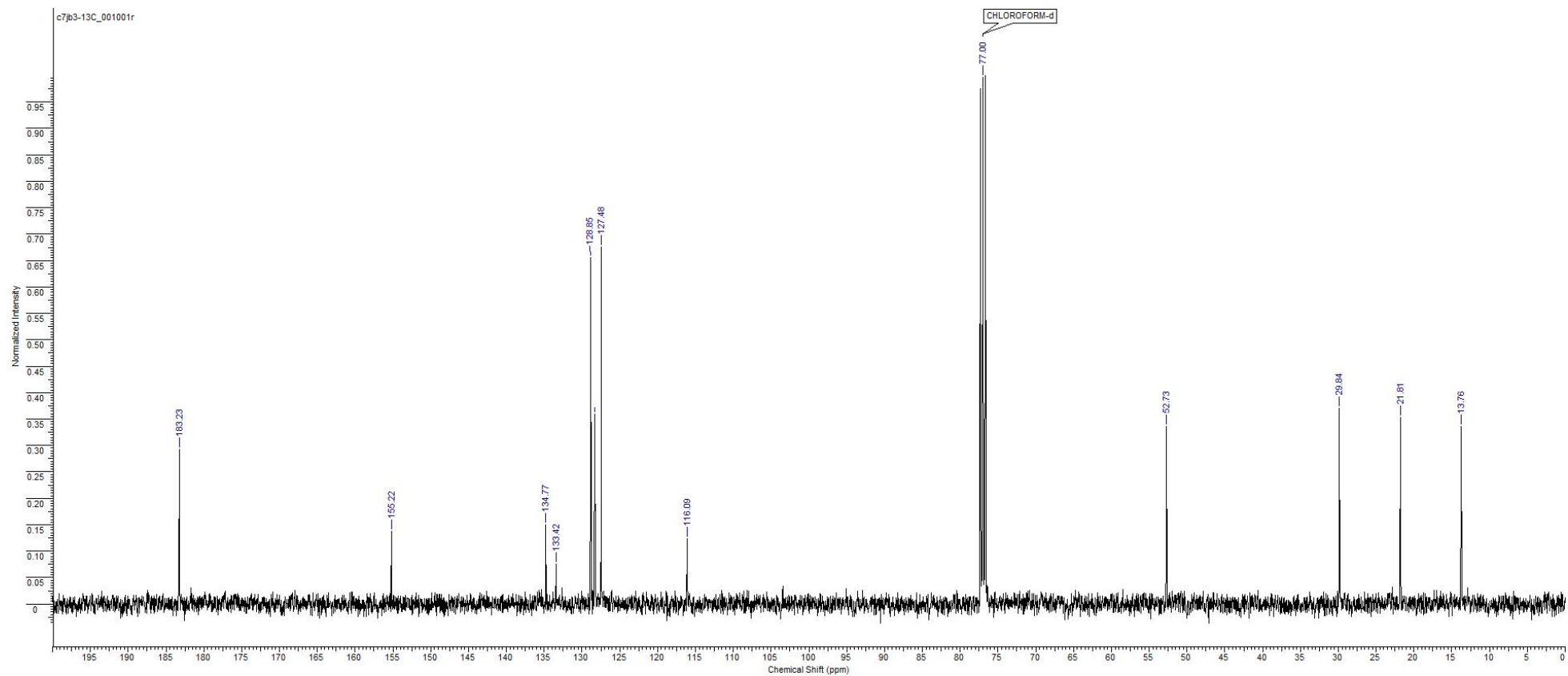


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120

121 ^{13}C NMR

122



123

124

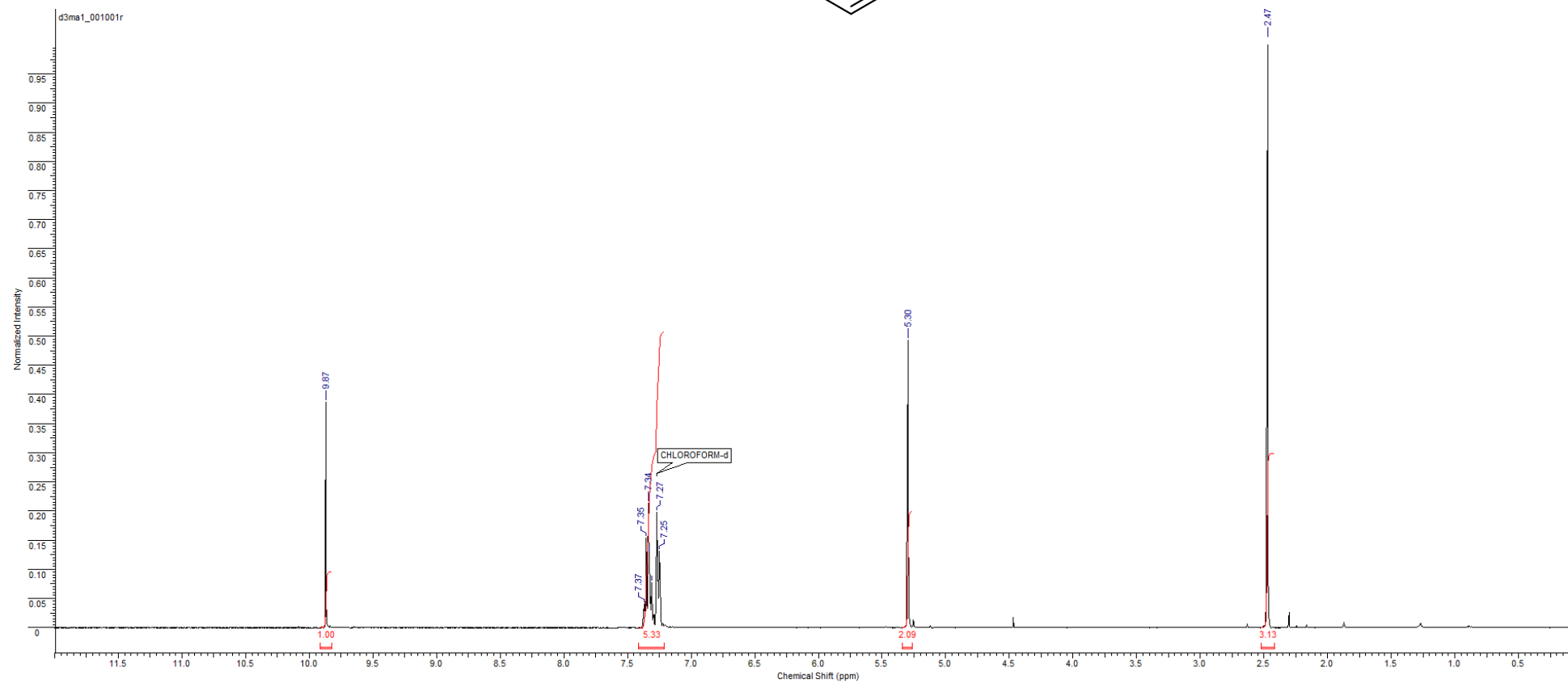
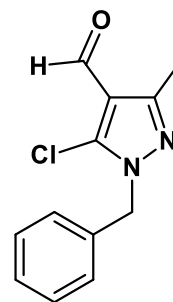
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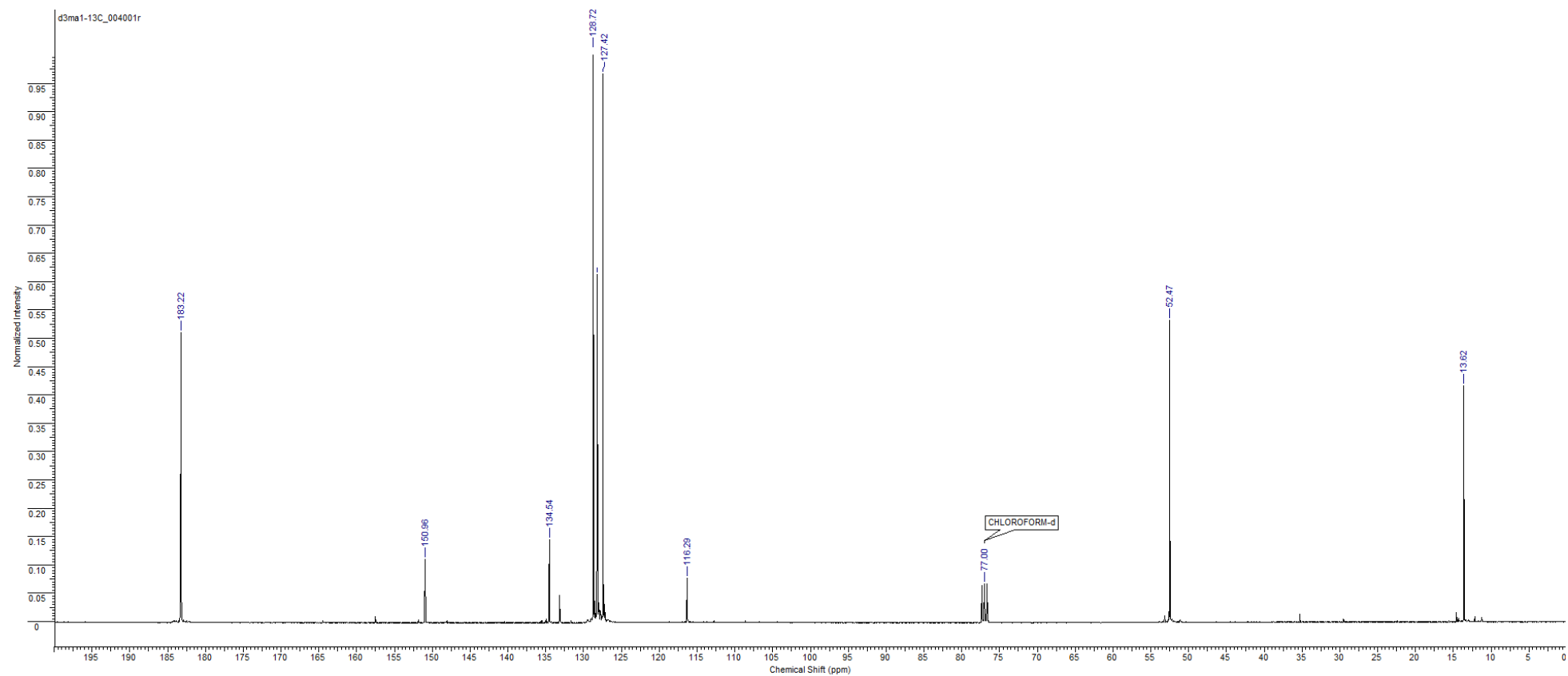
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128 $^1\text{H NMR}$

129



130

131 ^{13}C NMR

132

133

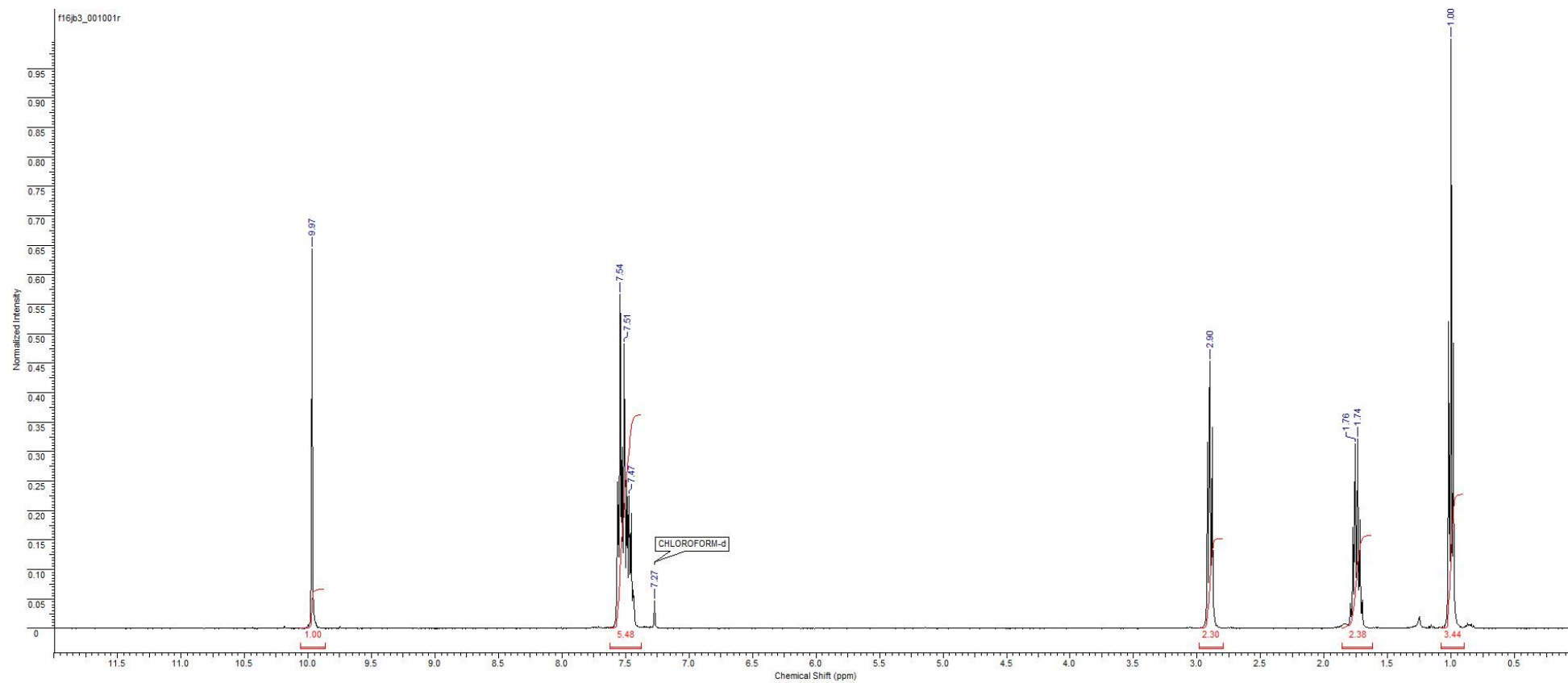
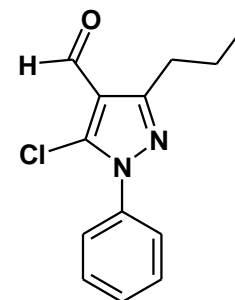
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136

137 ^1H NMR

138

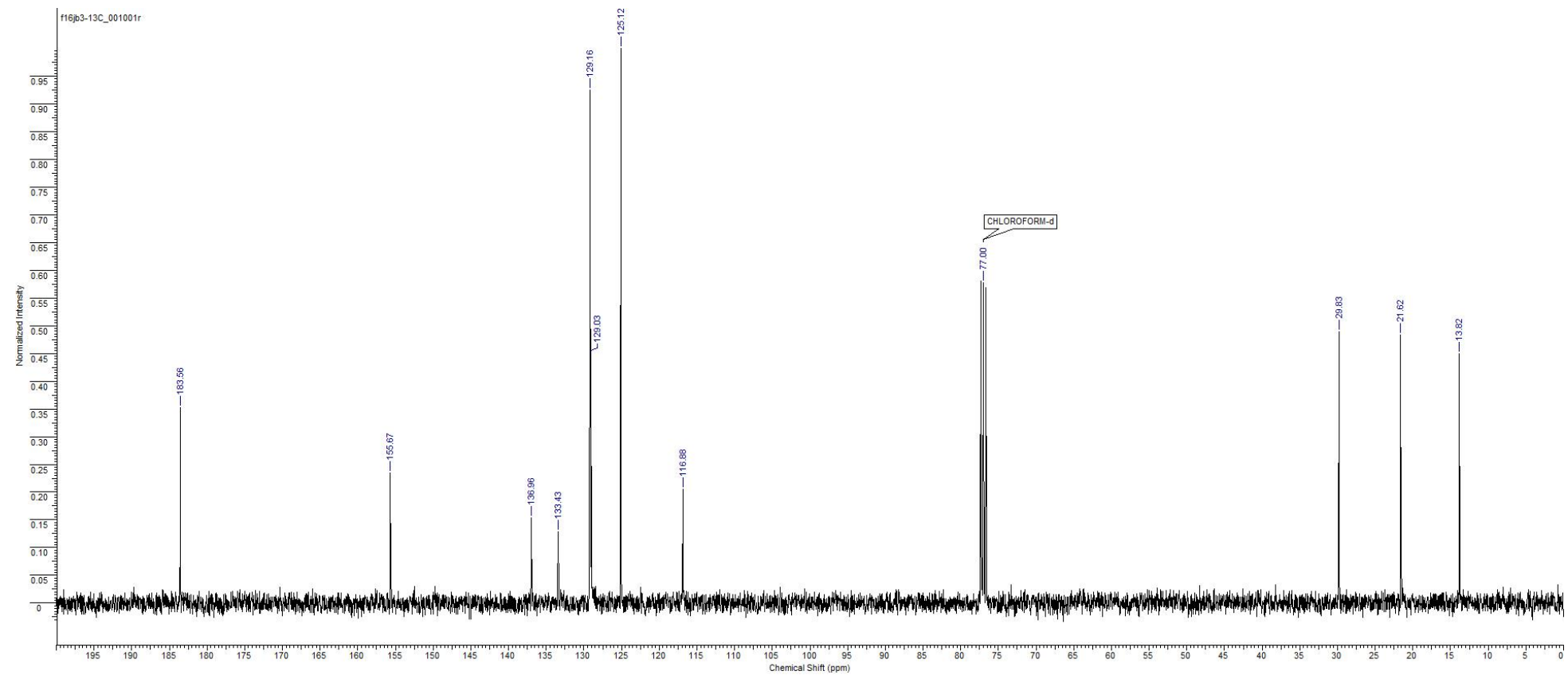


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140

141 ^{13}C NMR

142



143

144

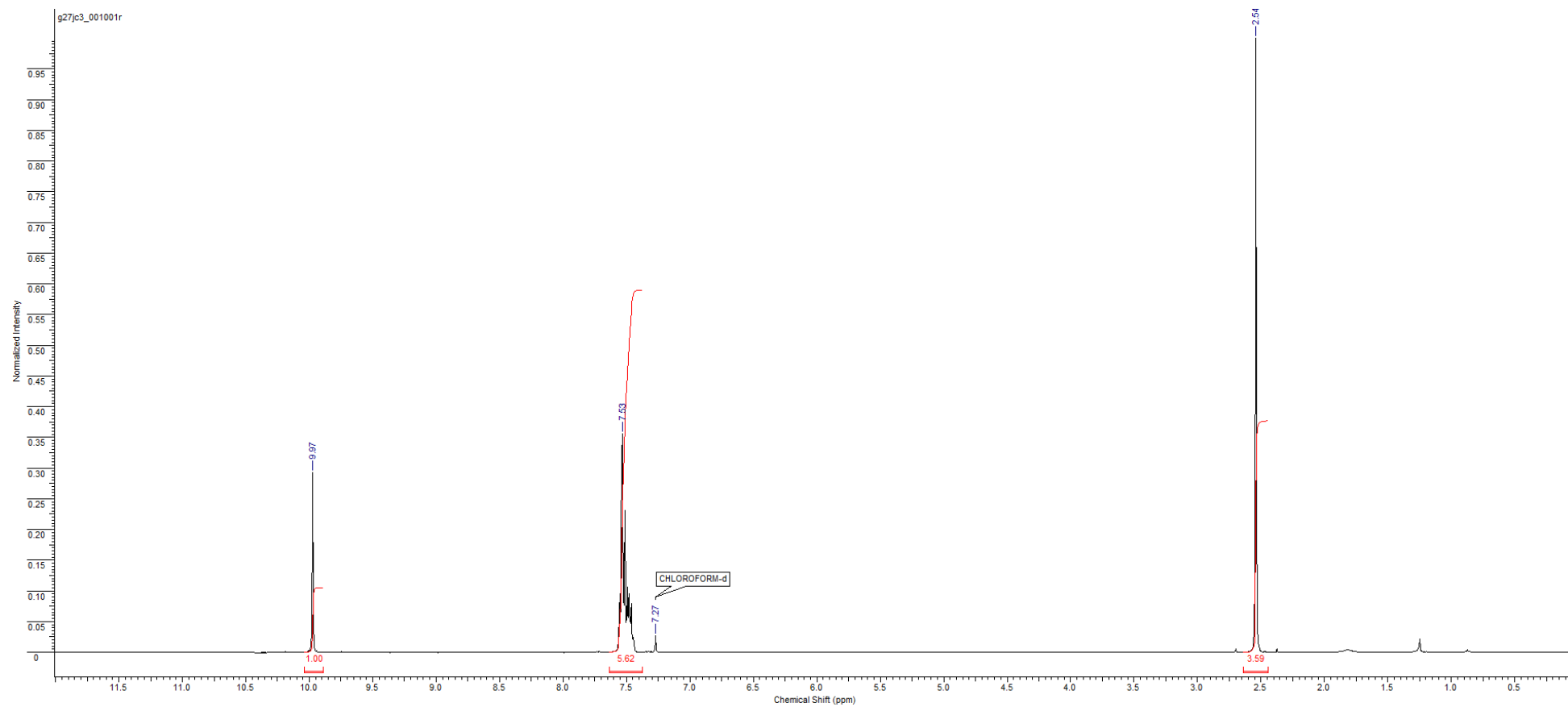
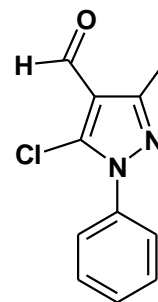
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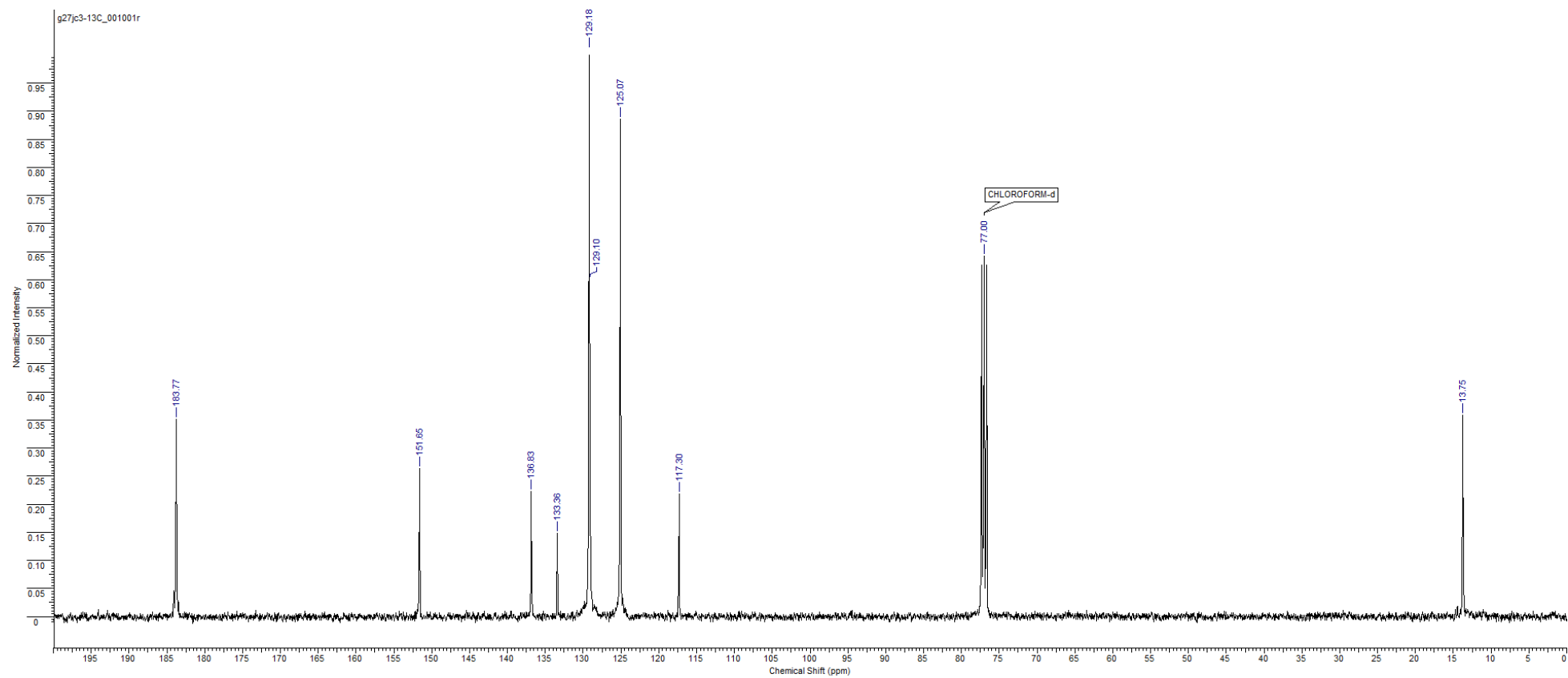
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148 $^1\text{H NMR}$

149



150

151 ^{13}C NMR

152

153

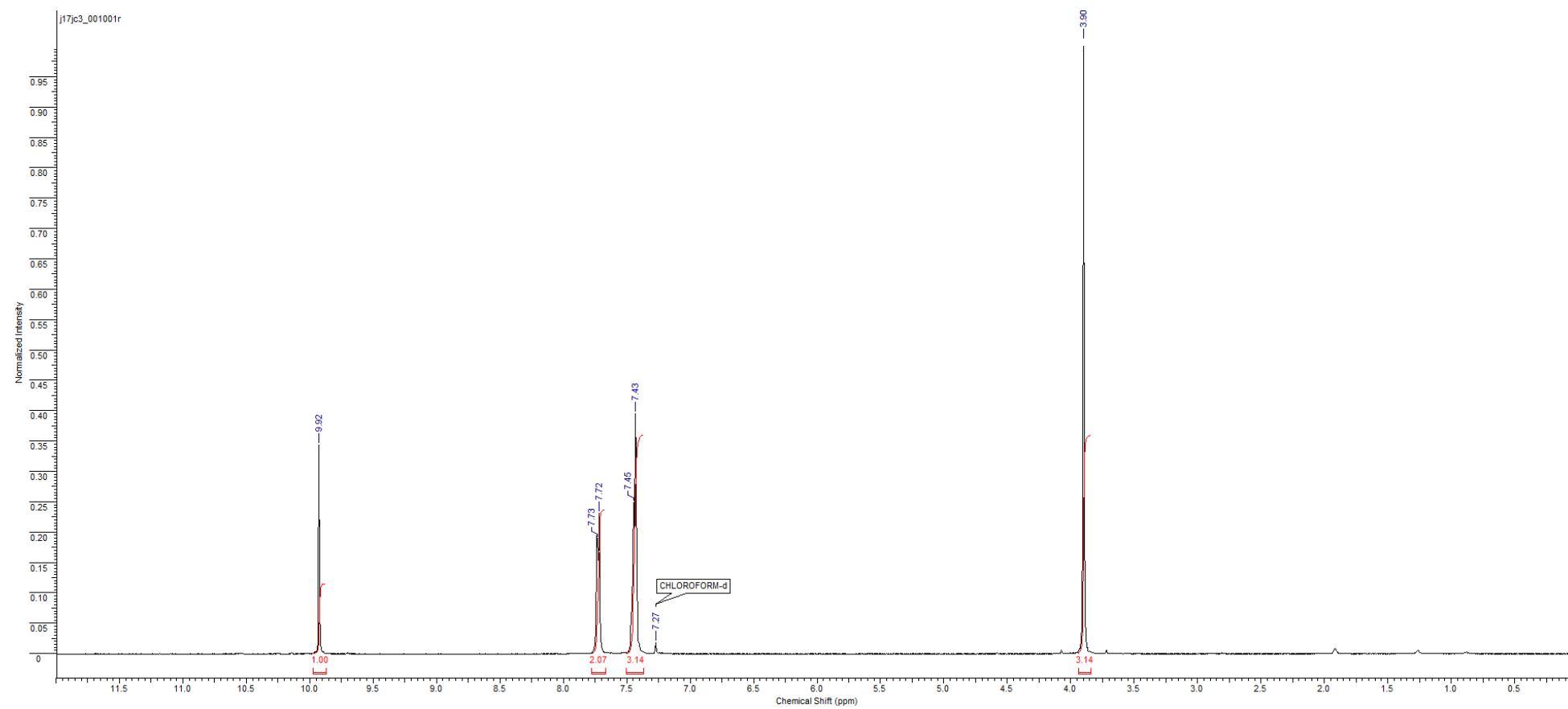
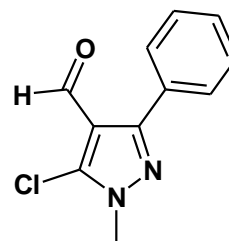
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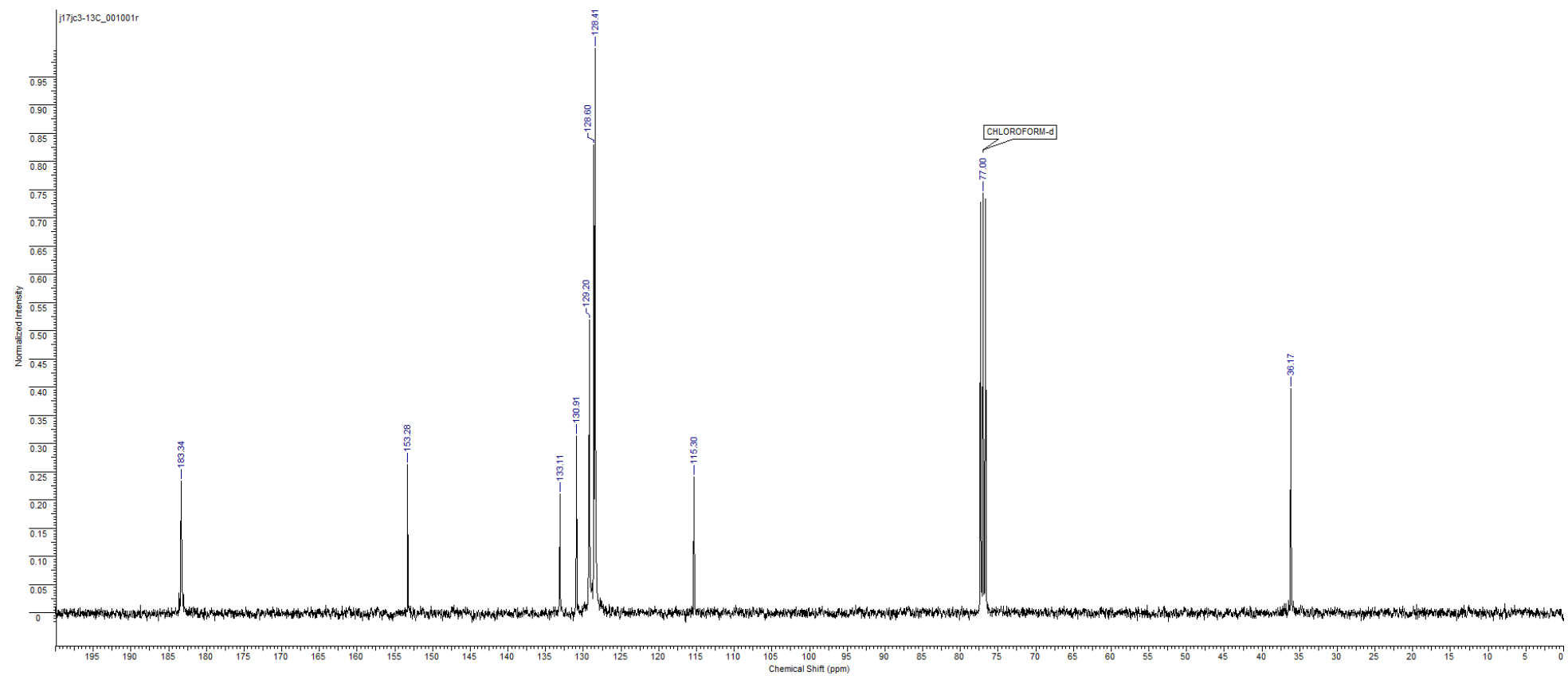
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157

158

159 ¹H NMR

160

161 ^{13}C NMR

162

163

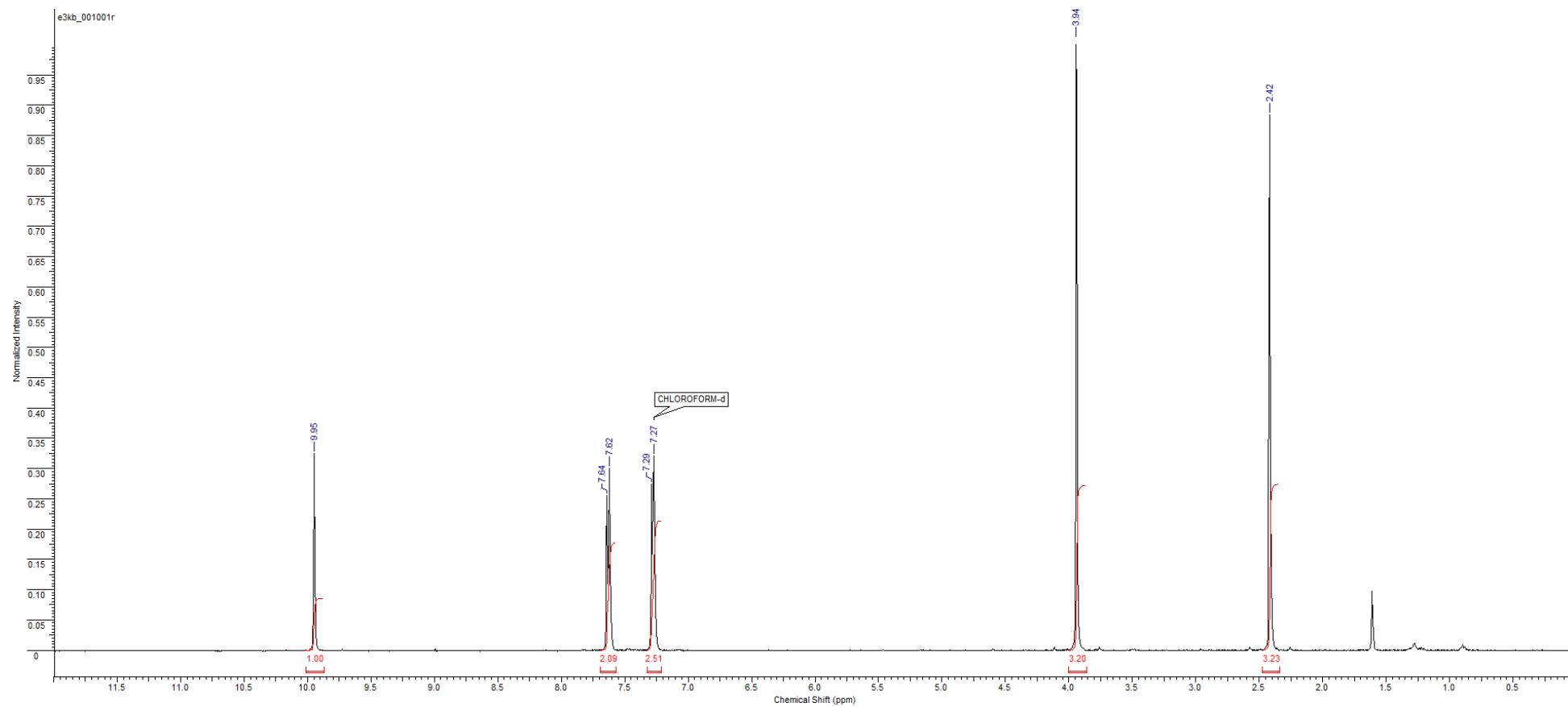
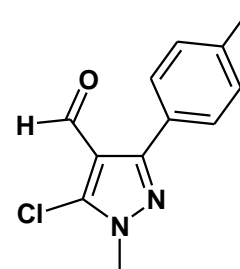
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165 *5-chloro-1-methyl-3-(4-methylphenyl)-1H-pyrazole-4-carbaldehyde 2i*

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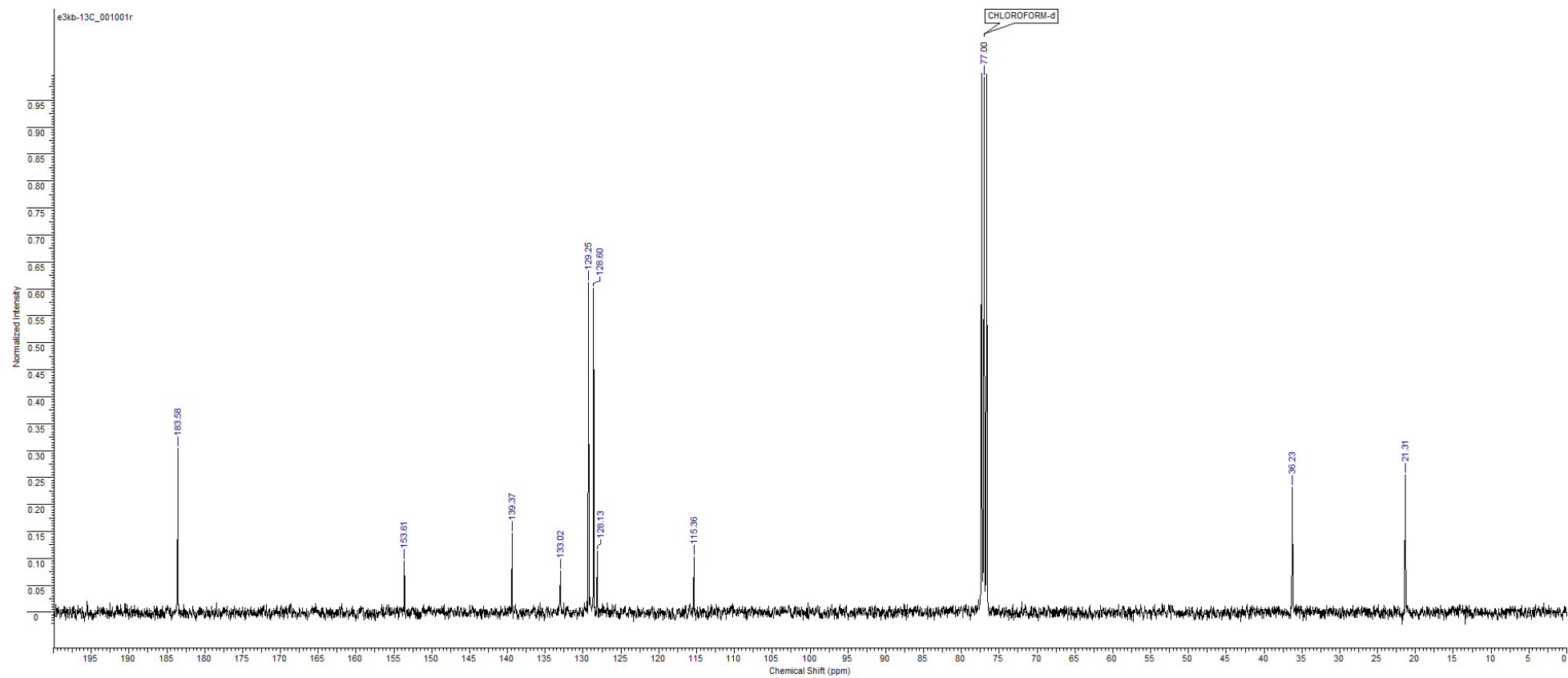
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169 ^1H NMR

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172 ^{13}C NMR

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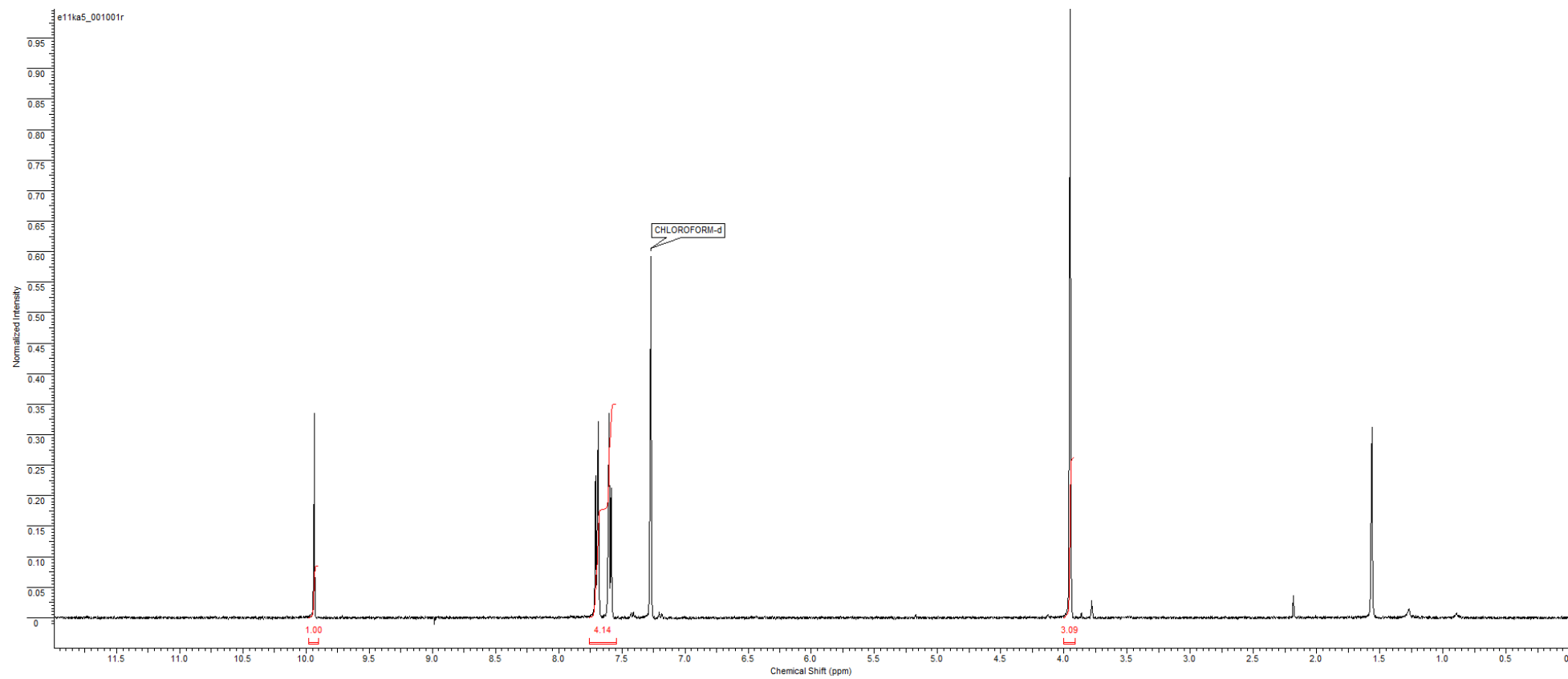
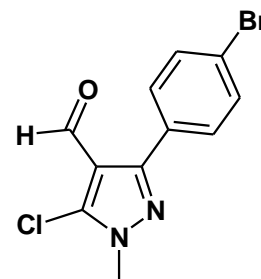
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176 3-(4-bromophenyl)-5-chloro-1-methyl-1H-pyrazole-4-carbaldehyde 2j

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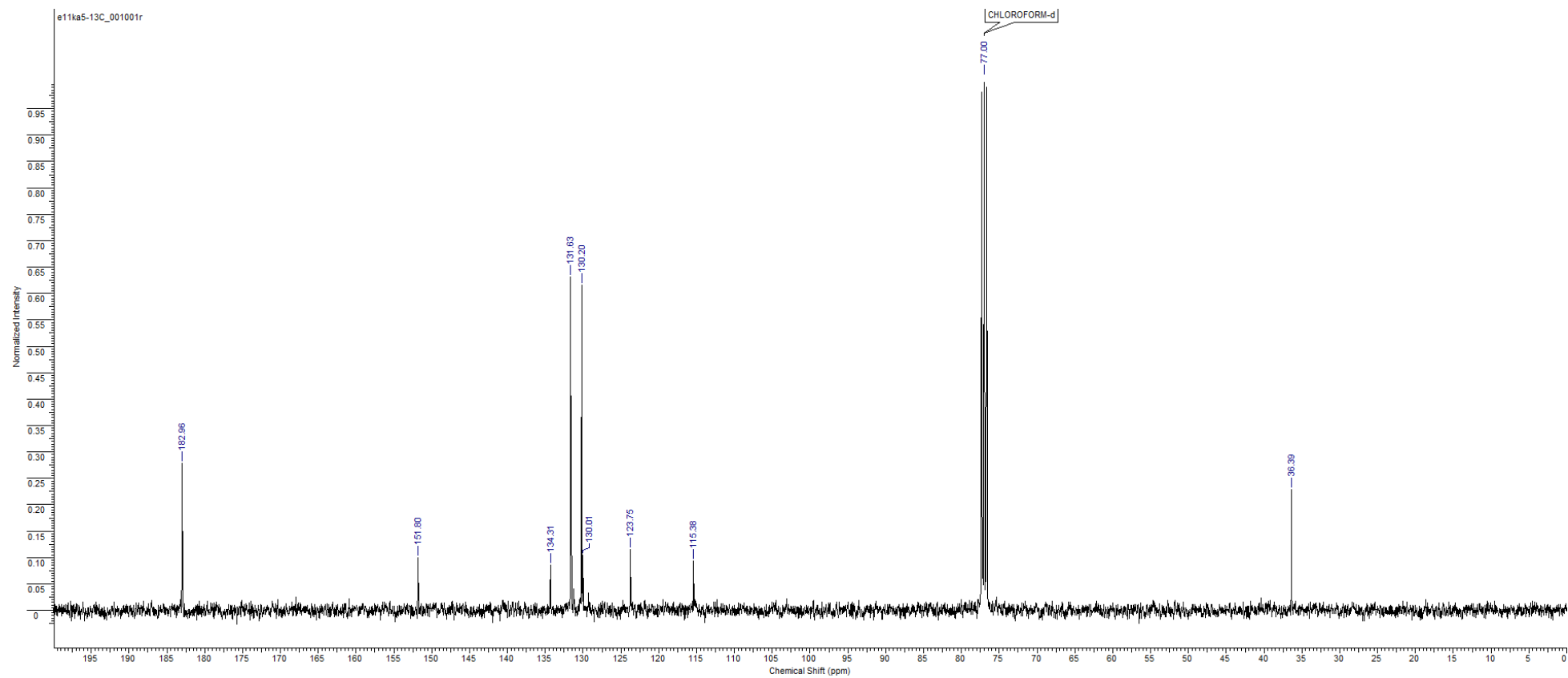
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180 ¹H NMR

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183 ^{13}C NMR

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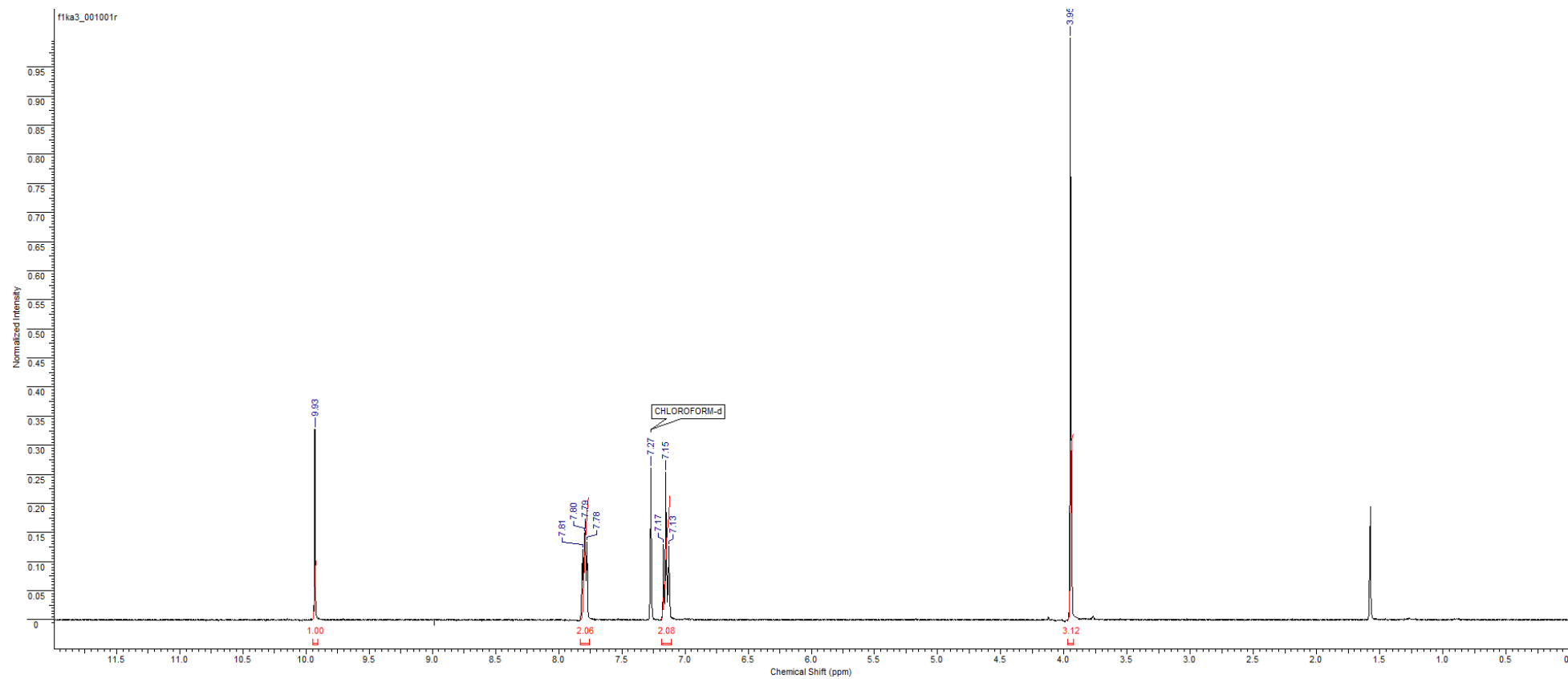
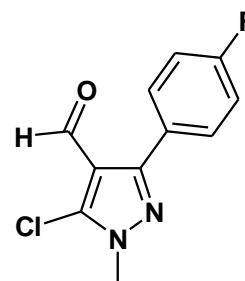
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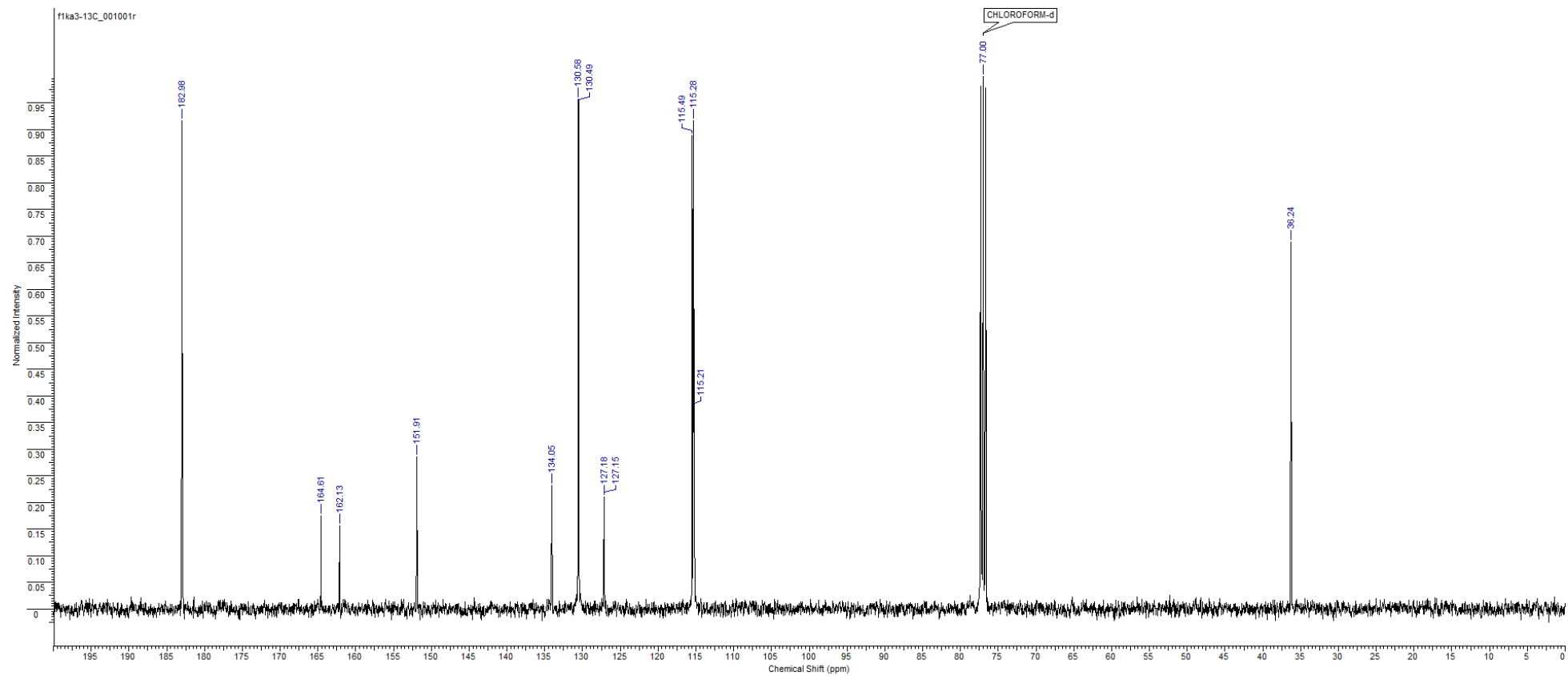
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194 ^{13}C NMR

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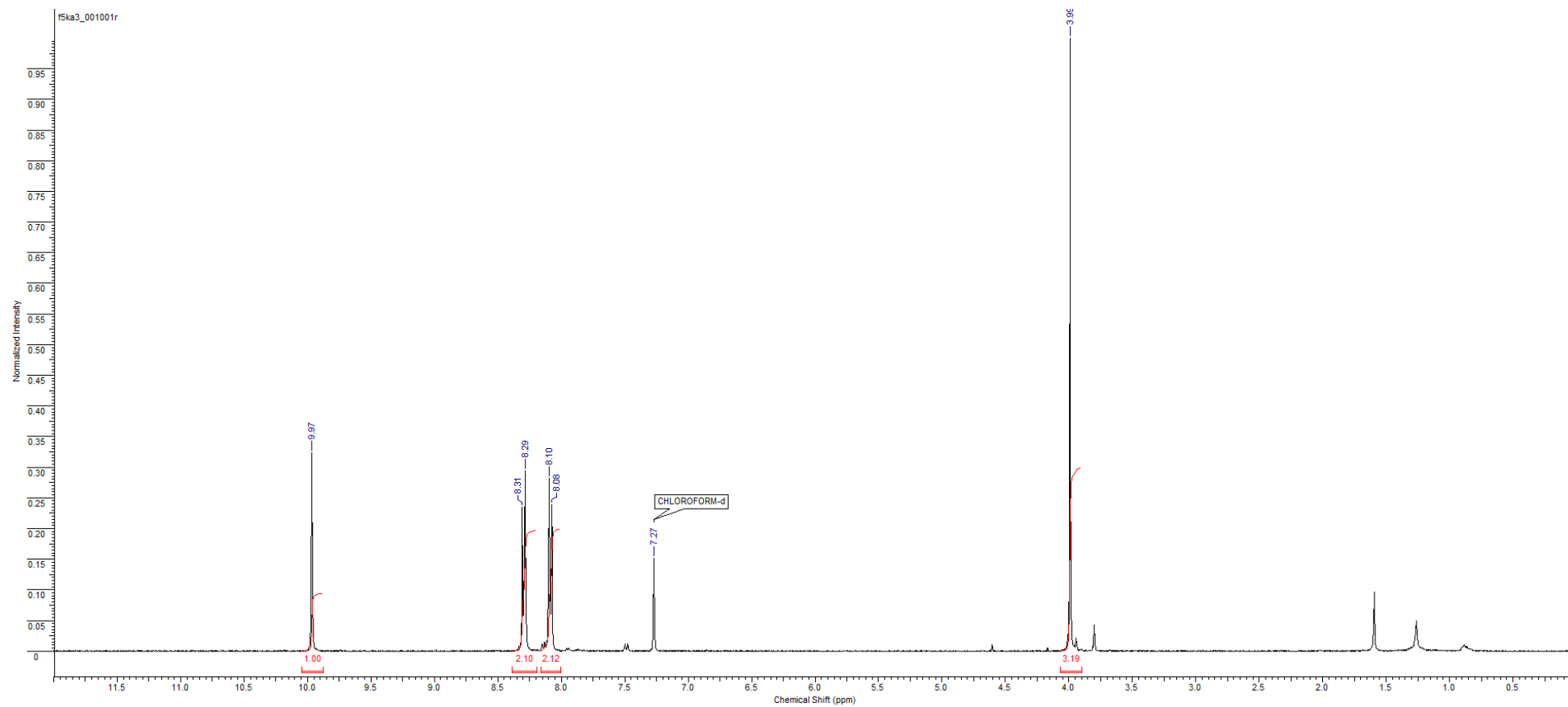
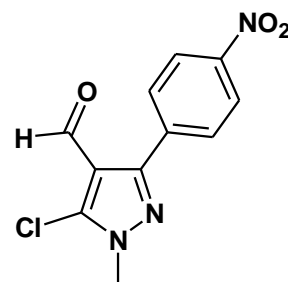
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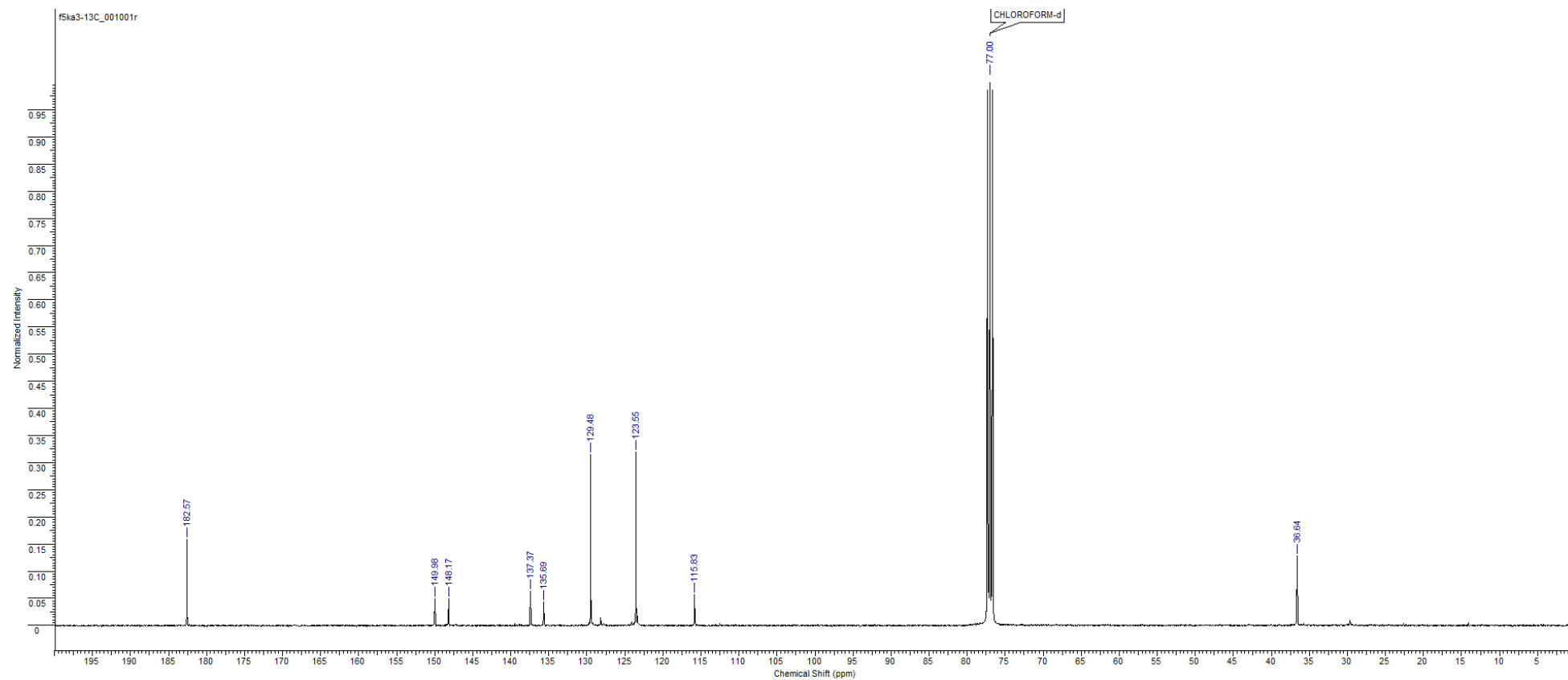
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203 ^1H NMR

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206 ¹³C NMR



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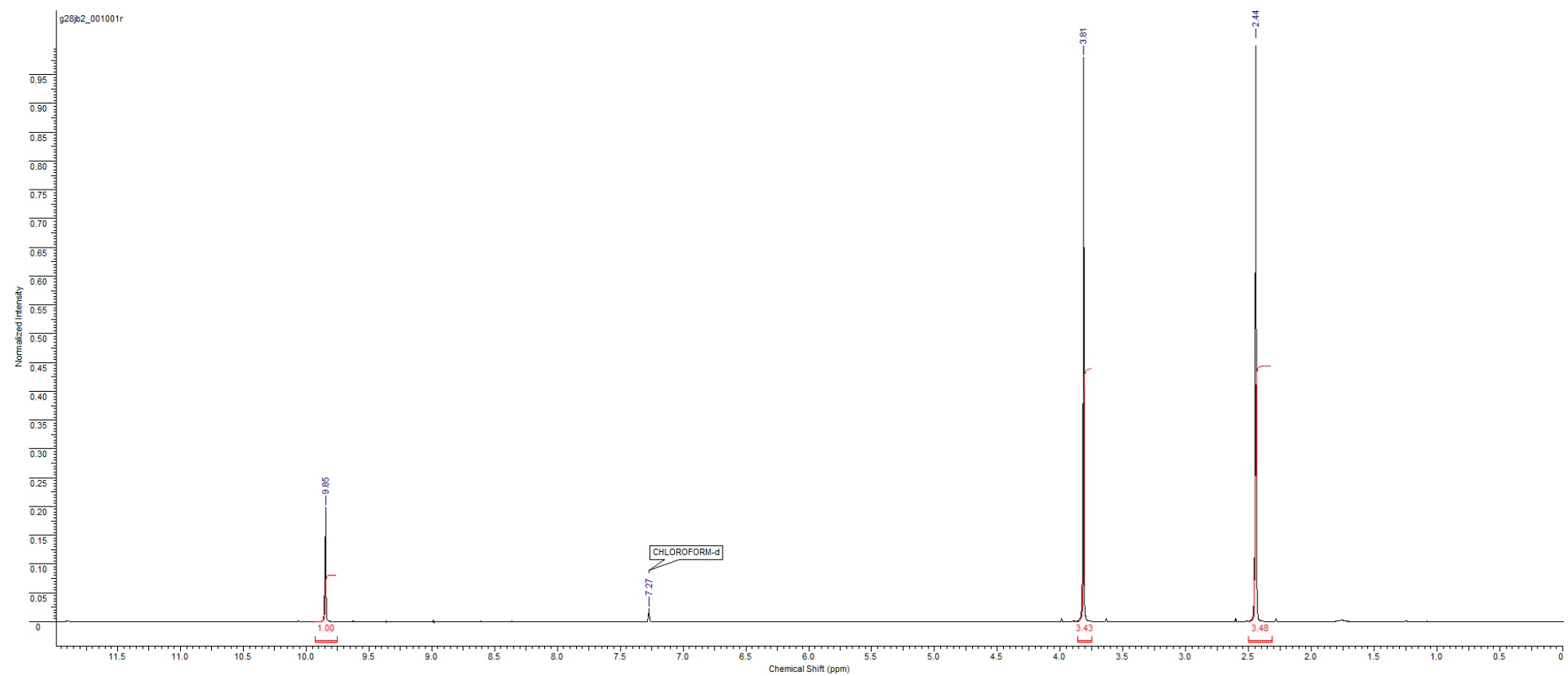
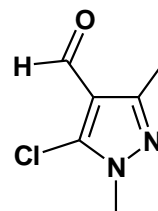
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213 ^1H NMR

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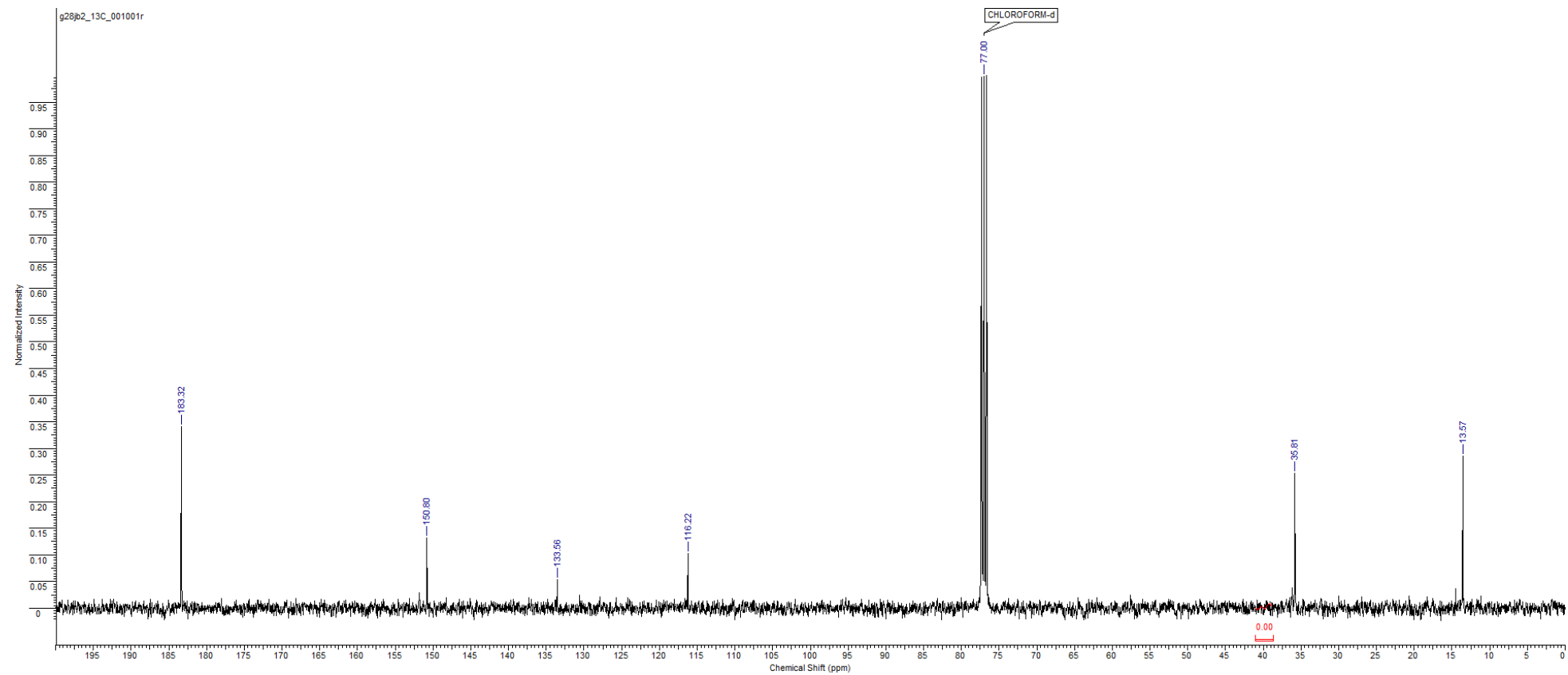


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217 ^{13}C NMR

218



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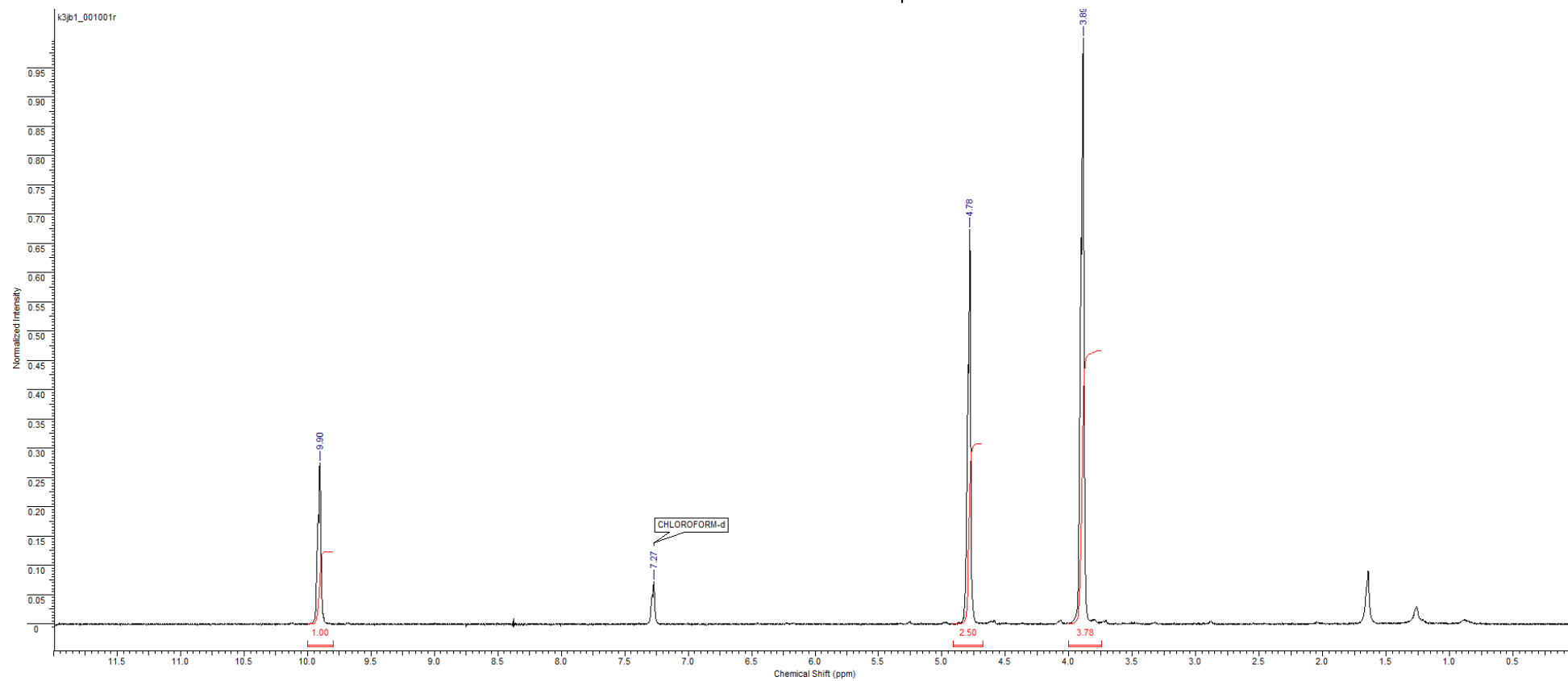
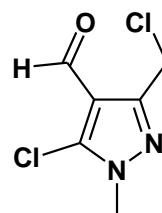
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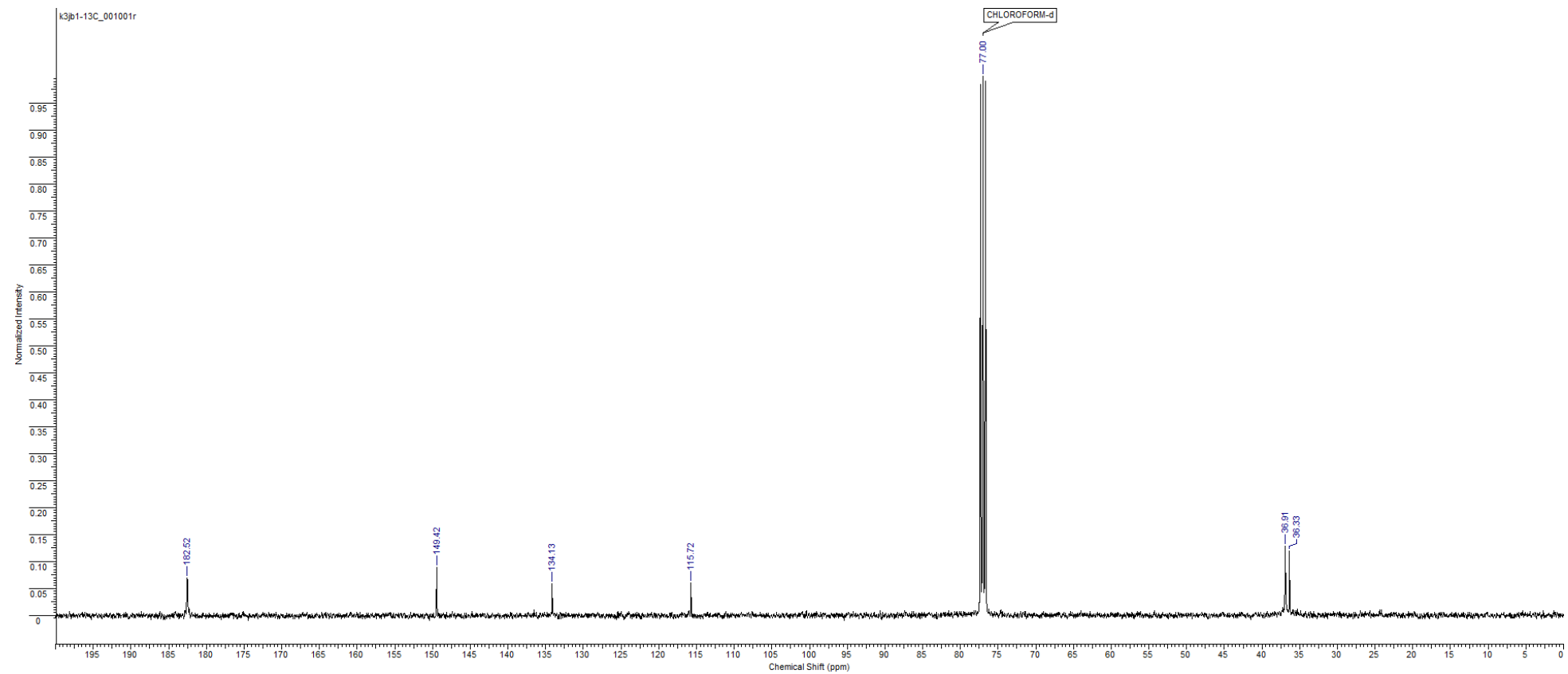
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225 $^1\text{H NMR}$ 

226

227

228

229 ^{13}C NMR

230

231

232

233 Mixture of 5-chloro-3-(1-chloroethyl)-1-methyl-1H-pyrazole-4-carbaldehyde **2o** and 5-chloro-3-ethenyl-1-methyl-1H-pyrazole-4-carbaldehyde **4**

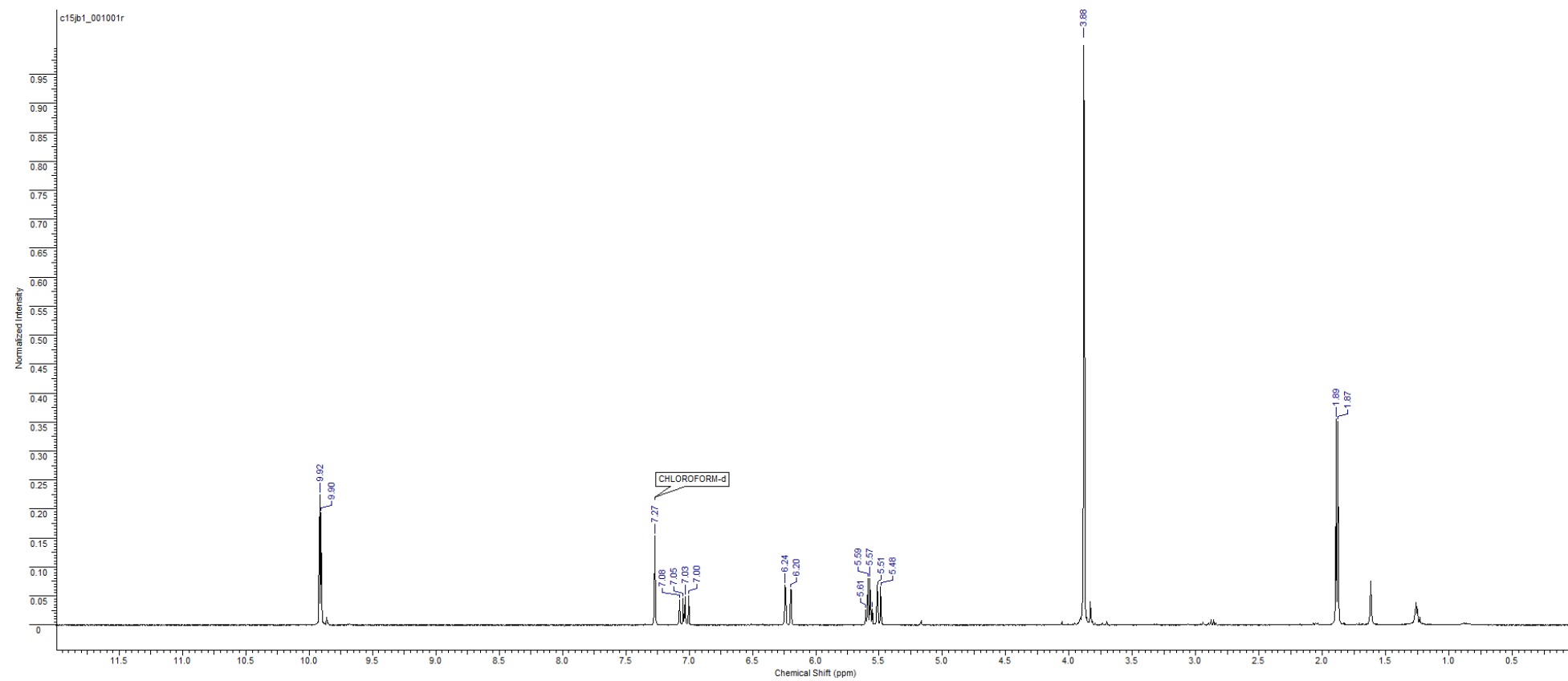
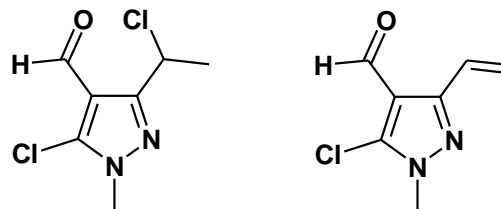
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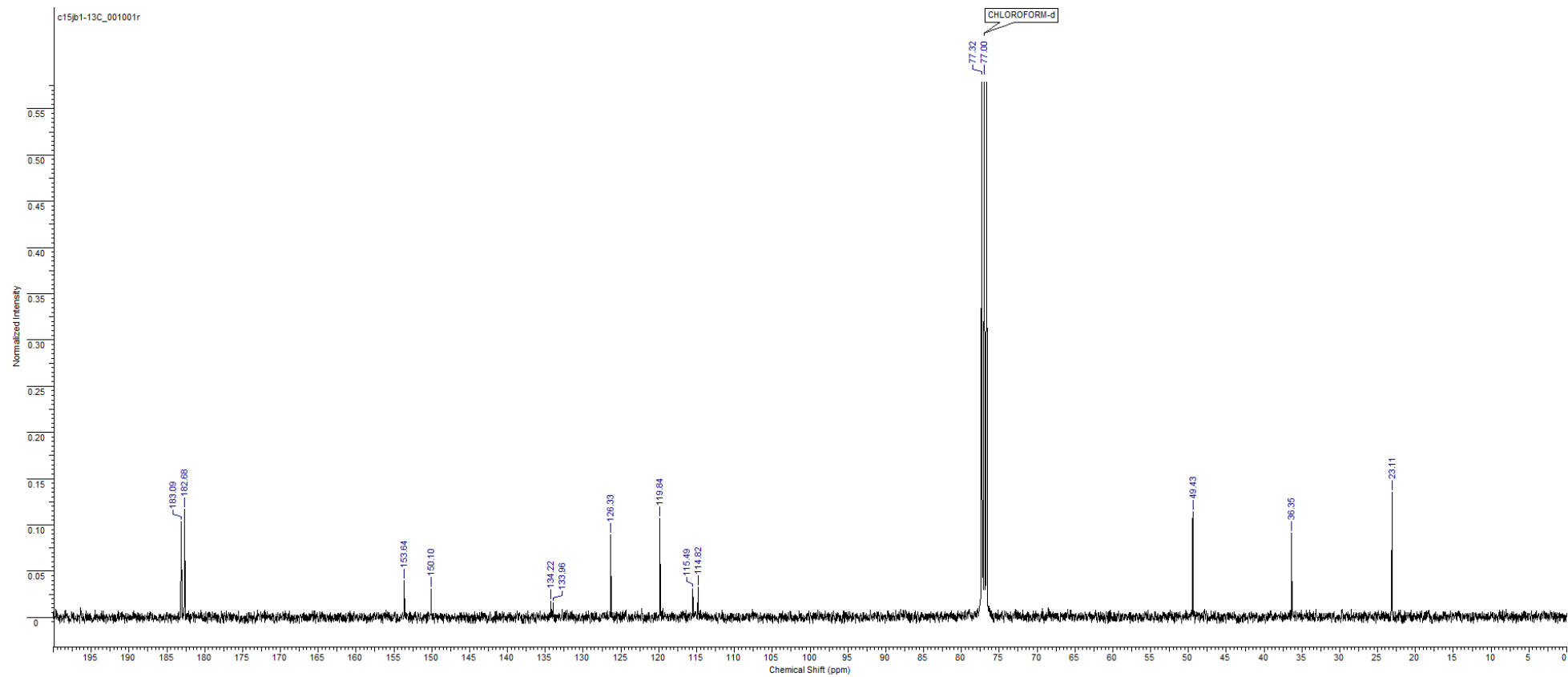
238 ¹H NMR



239

240

241

242 ^{13}C NMR

243

244

245

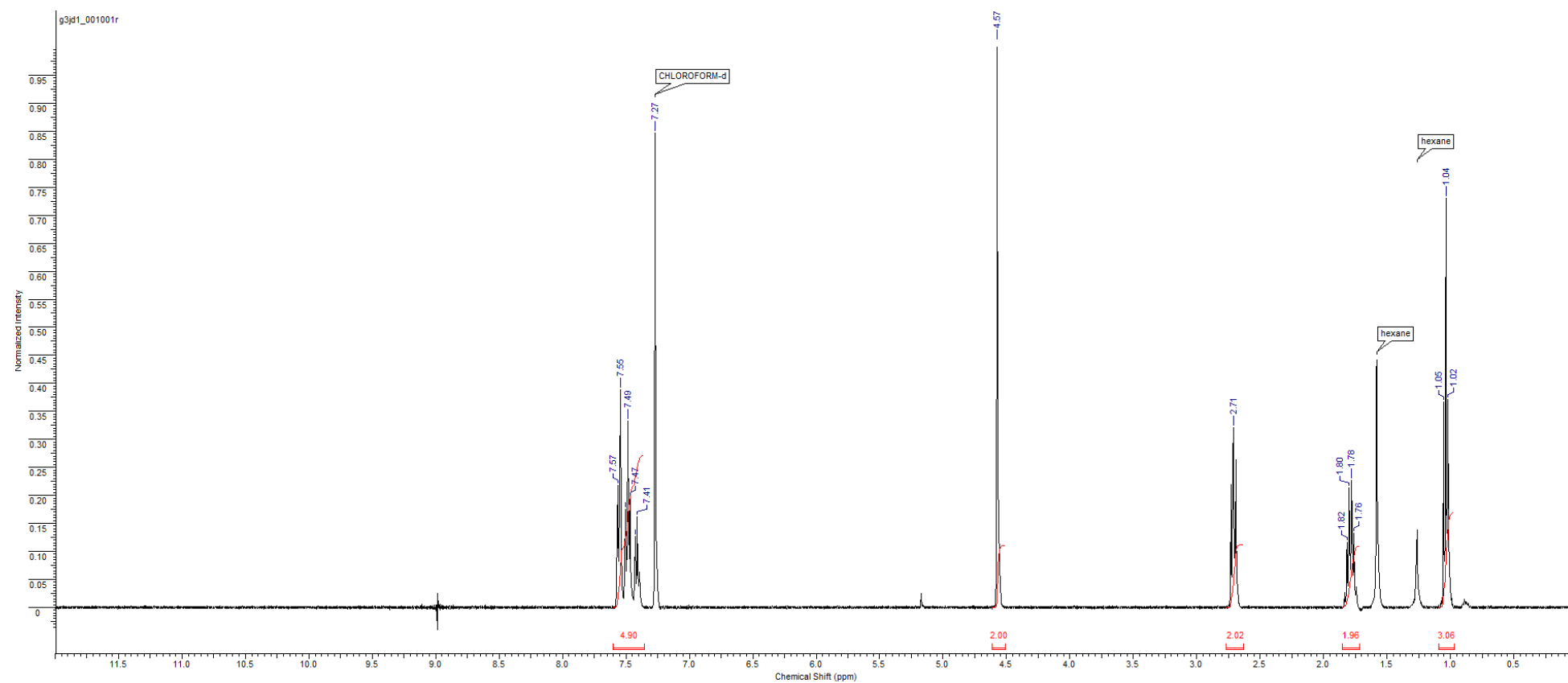
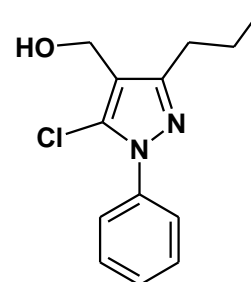
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248

249 ^1H NMR

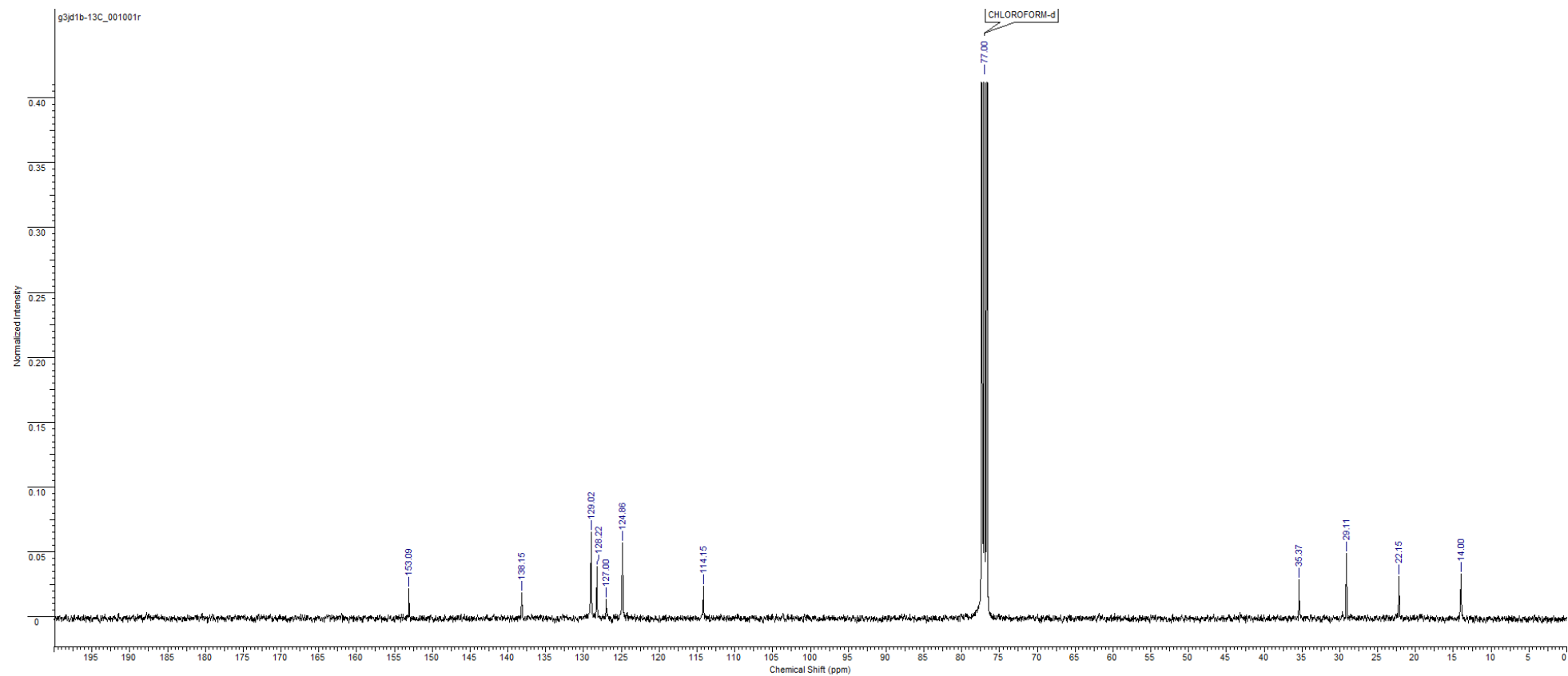
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253 ¹³C NMR



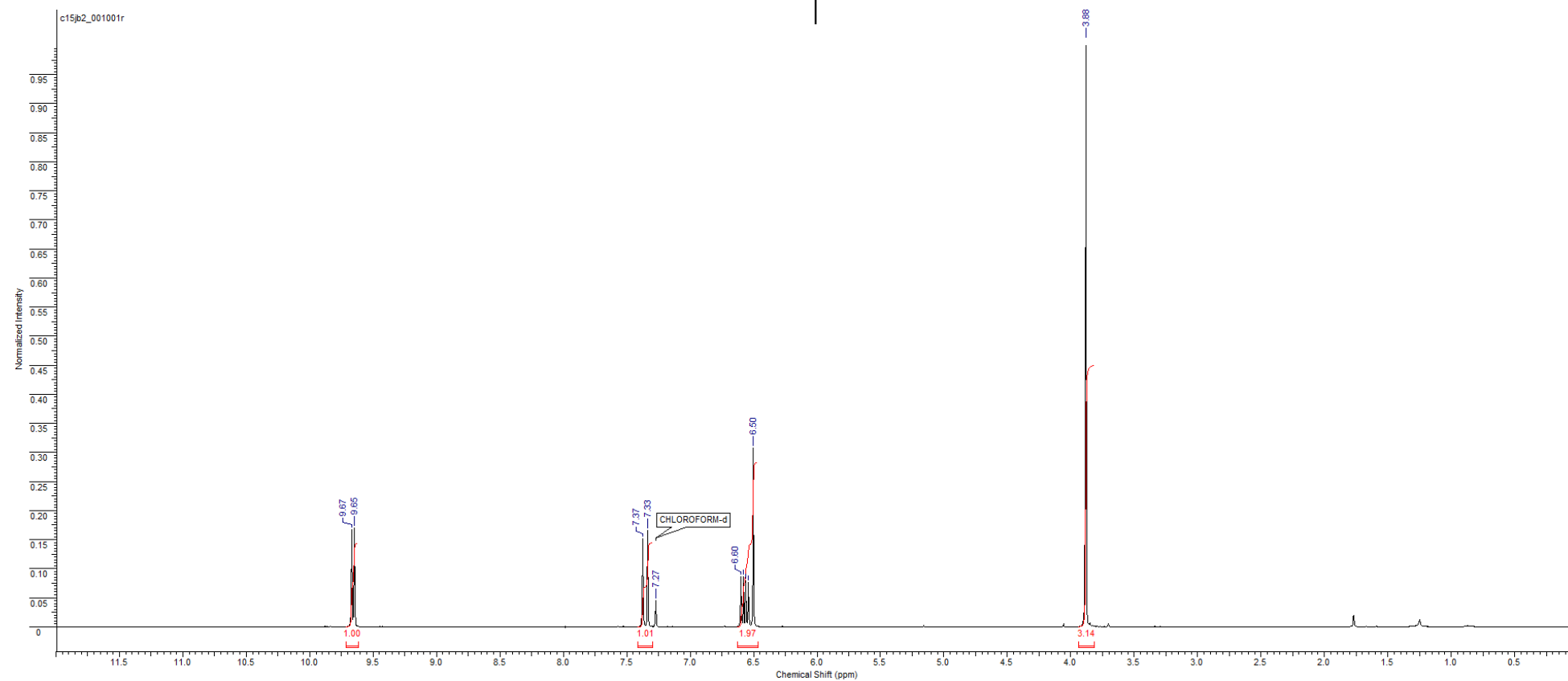
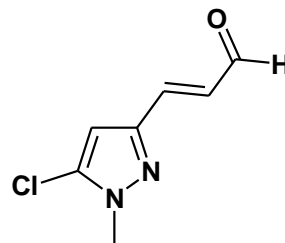
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255

256 (2E)-3-(5-chloro-1-methyl-1H-pyrazol-3-yl)prop-2-enal 5

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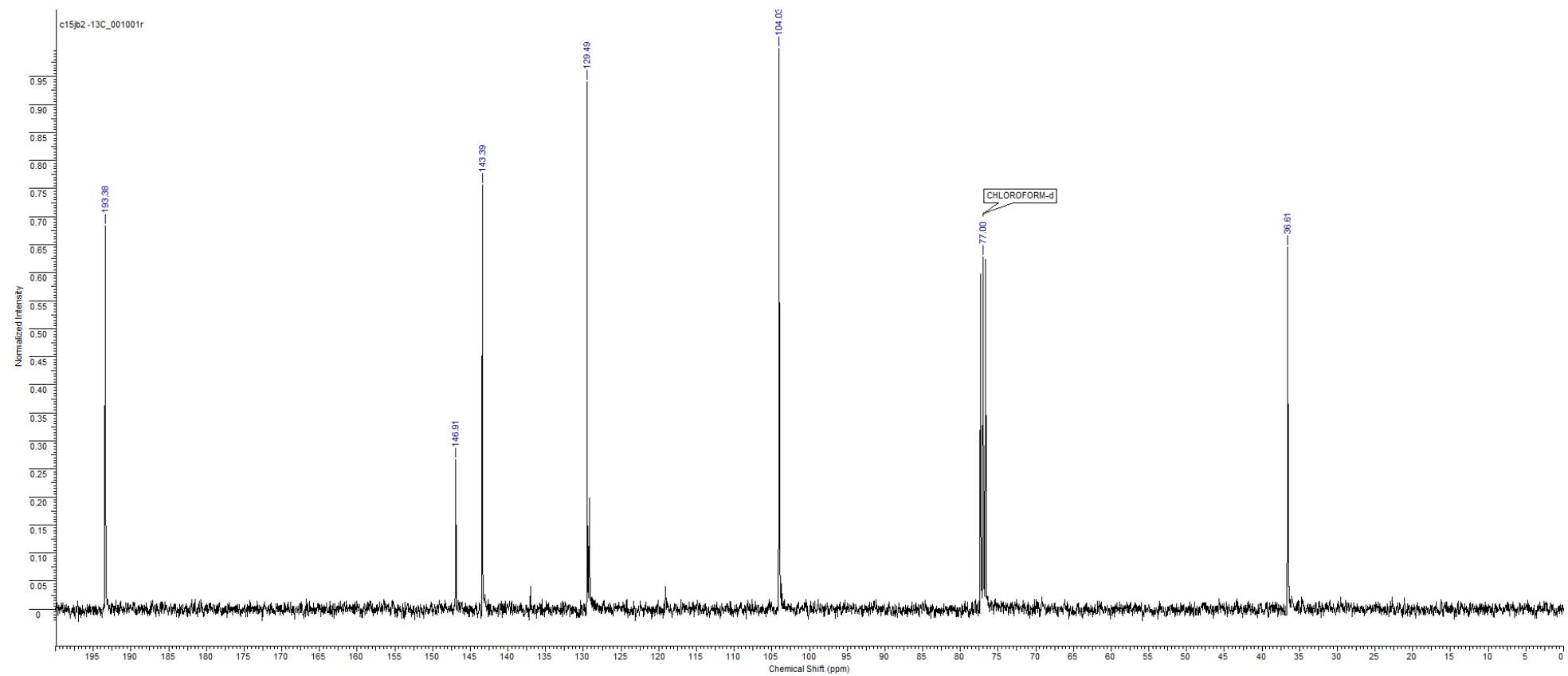
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259 ¹H NMR

260

261

262

263 ^{13}C NMR

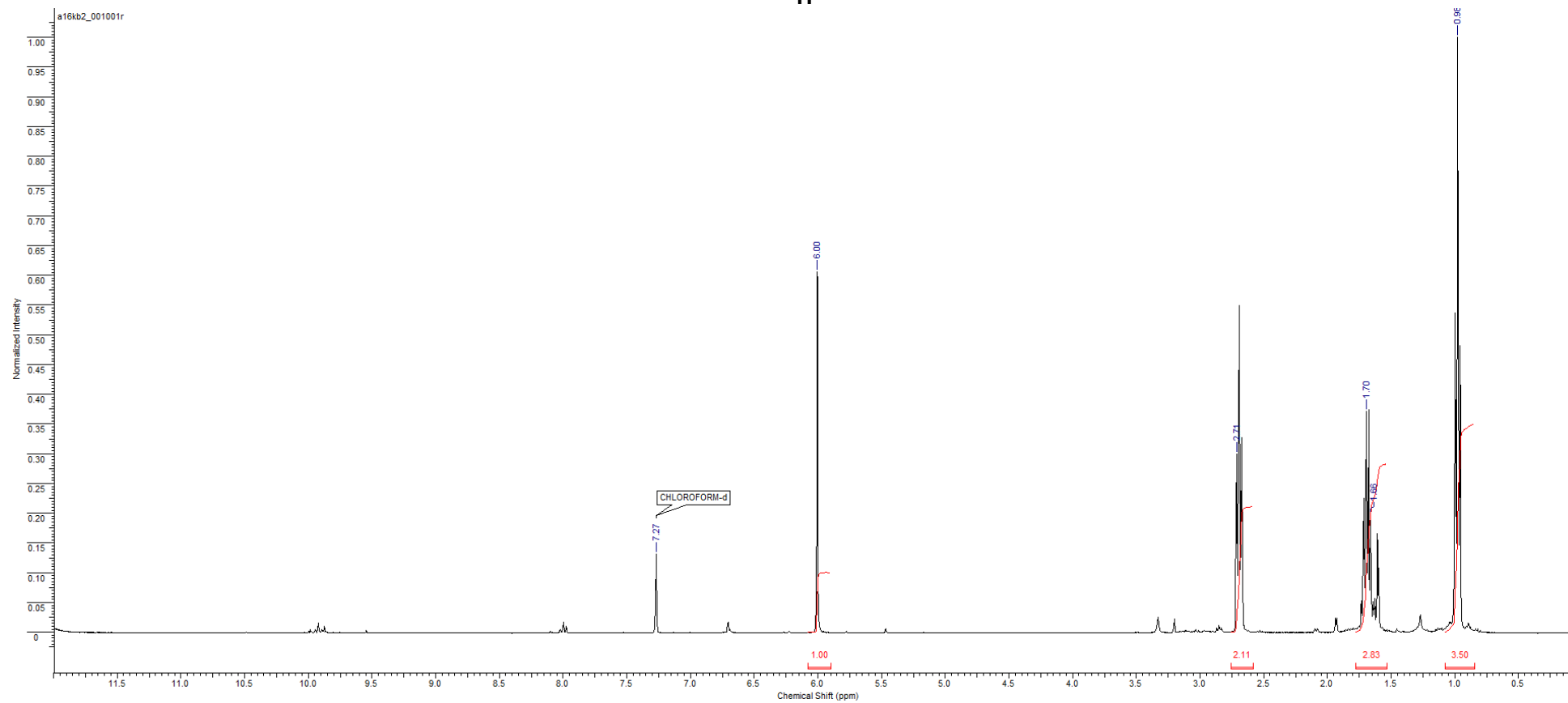
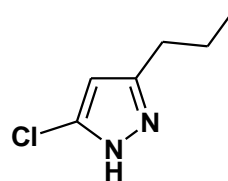
264

265

266

267 5(3)-Chloro-3(5)-propyl-1H-pyrazole 6

268

269 ¹H NMR

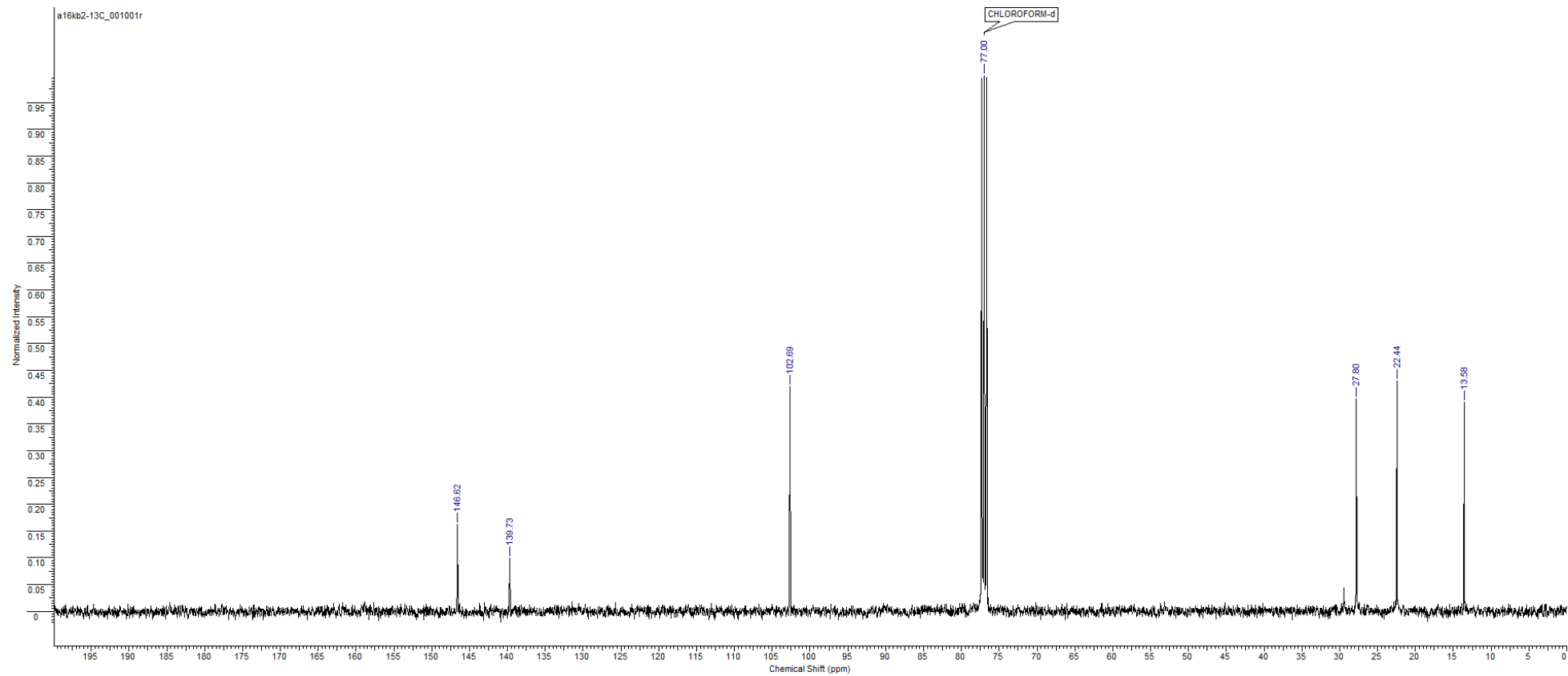
270

271

272

273

274 ¹³C NMR



275

276

277