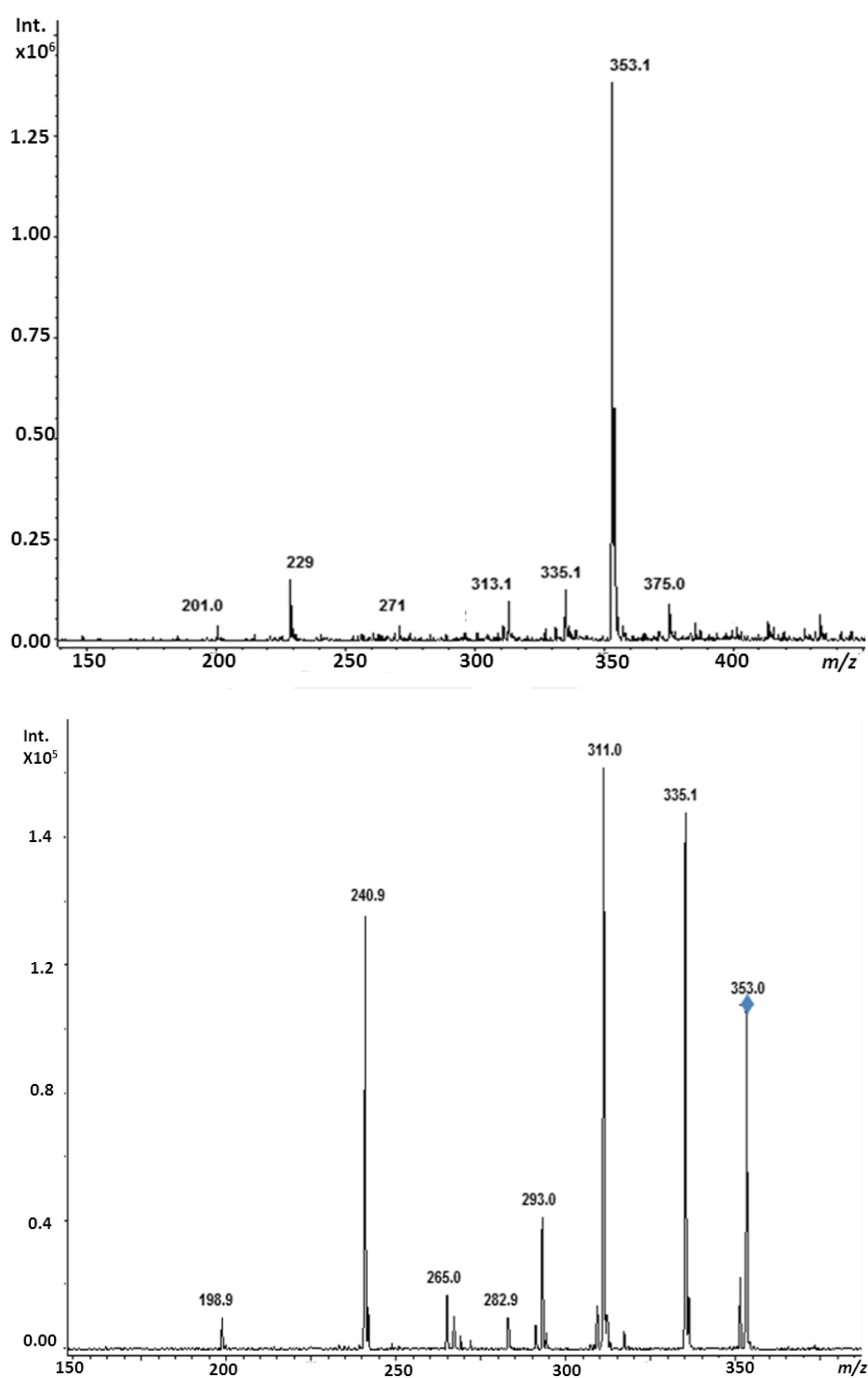


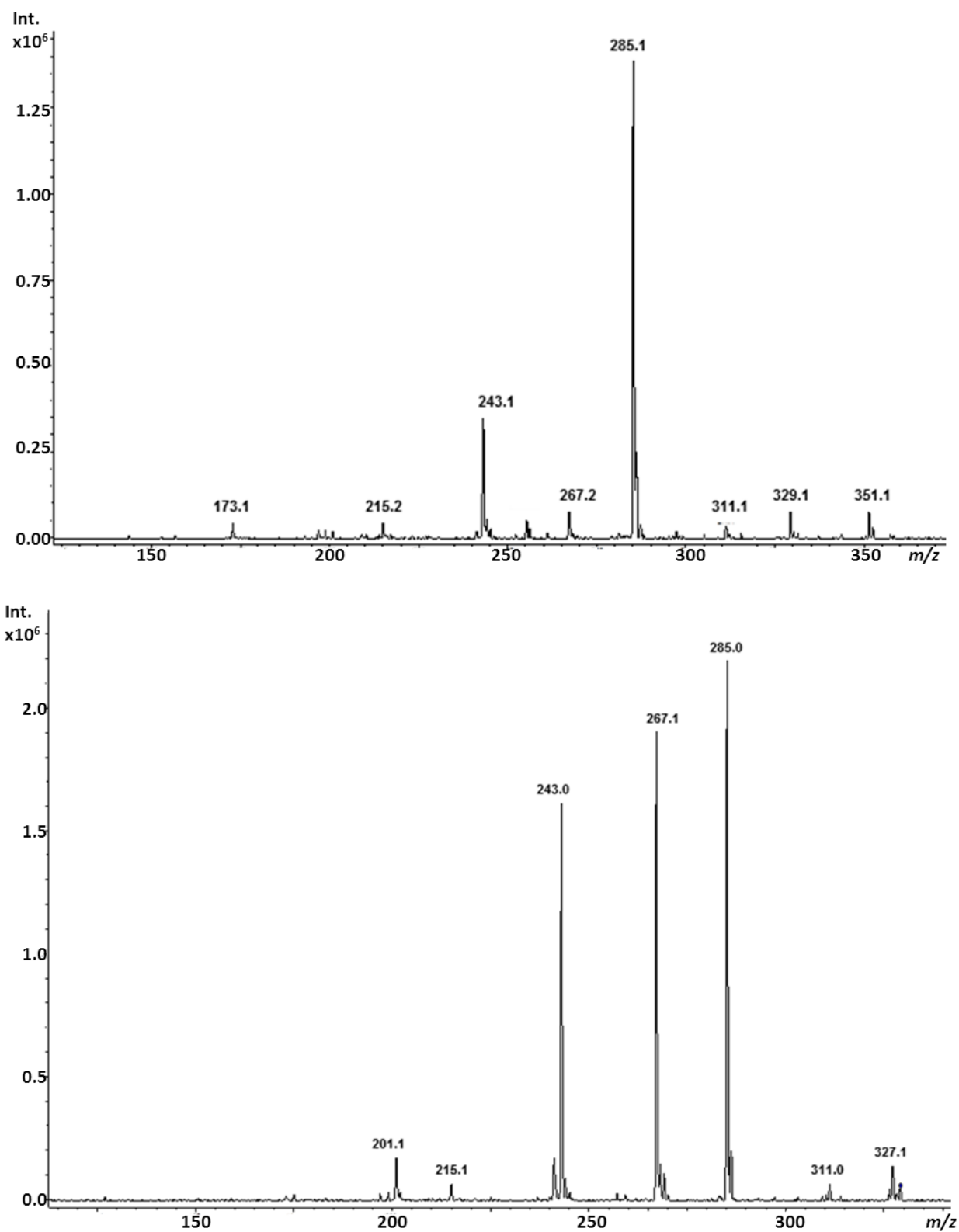
## Supplementary Information

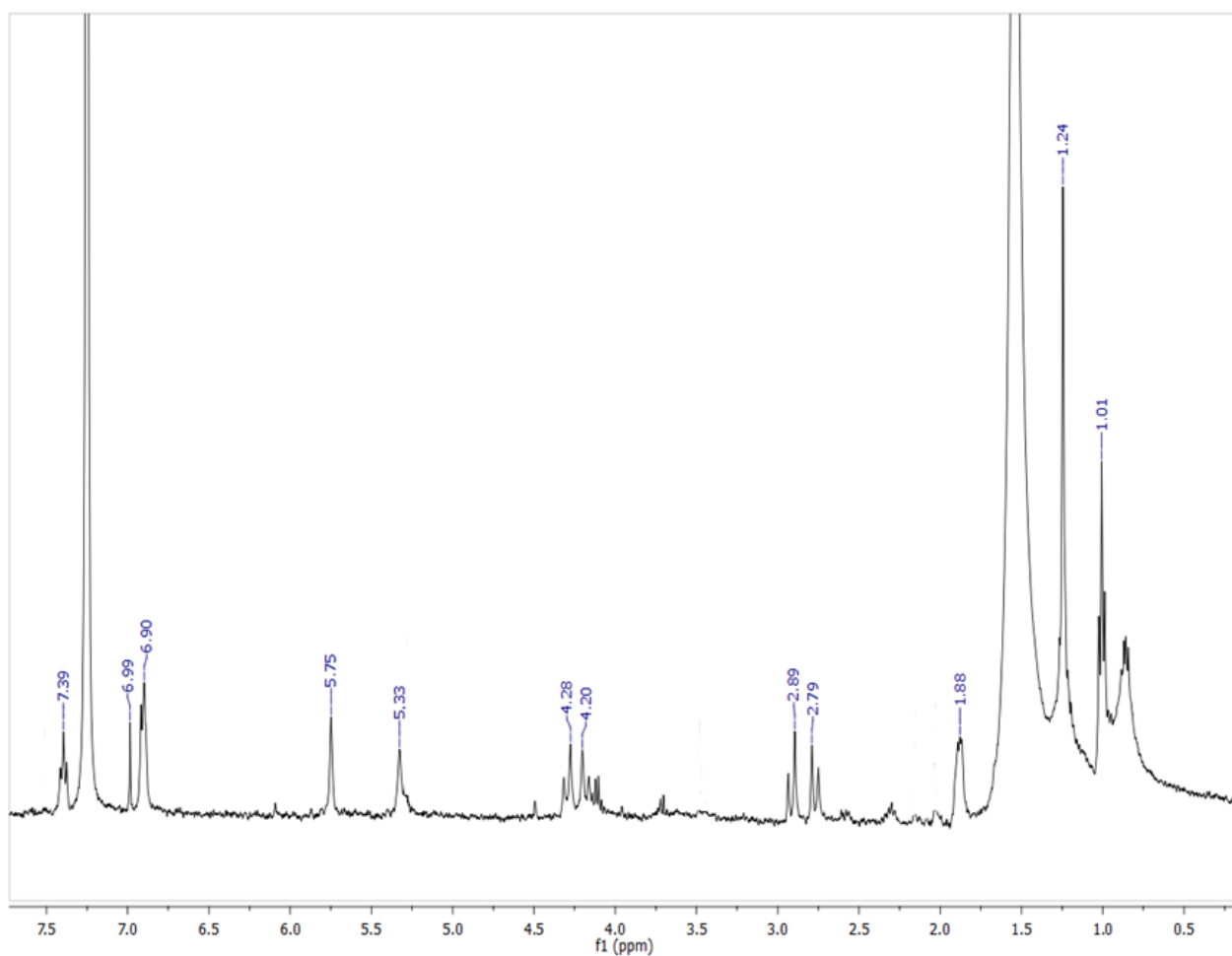
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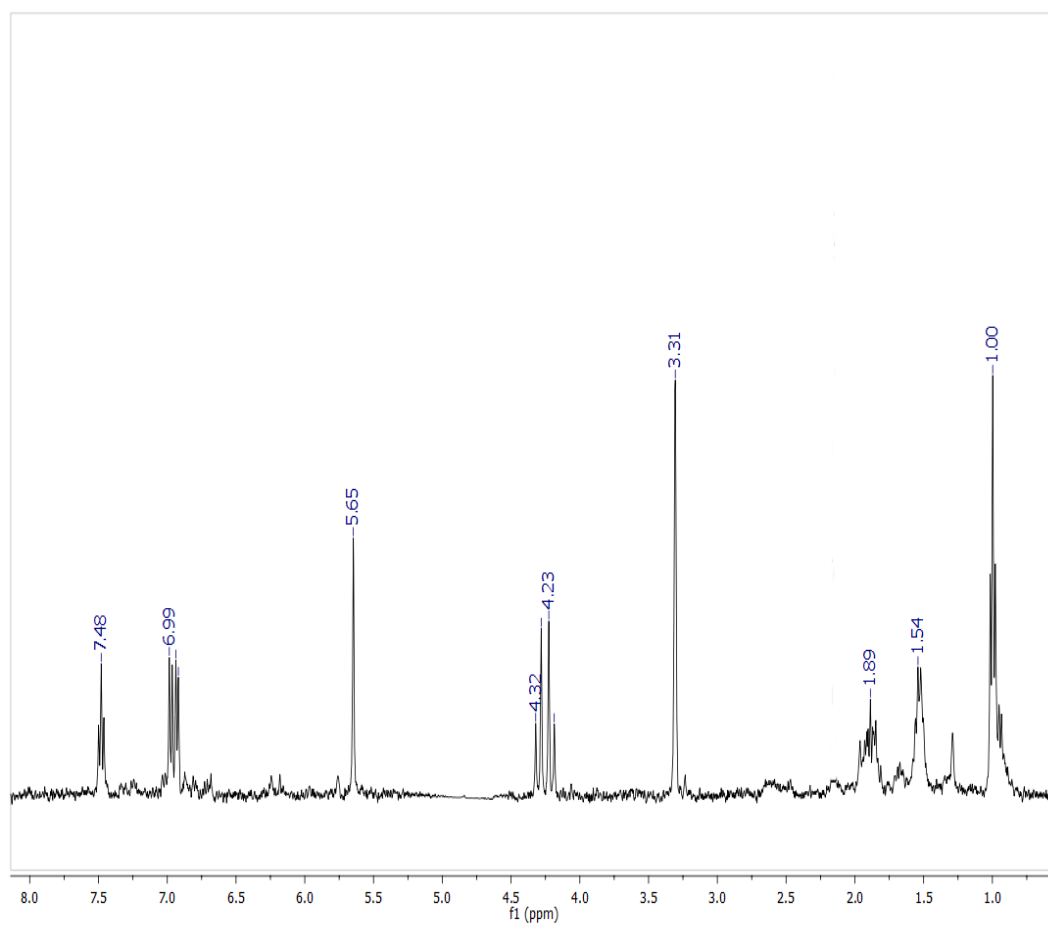
**Figure S1.** ESI (+) MS (top) and fragmentation MS/MS spectra on  $m/z$  353  $[M + Na]^+$  (bottom) of compound **13**.

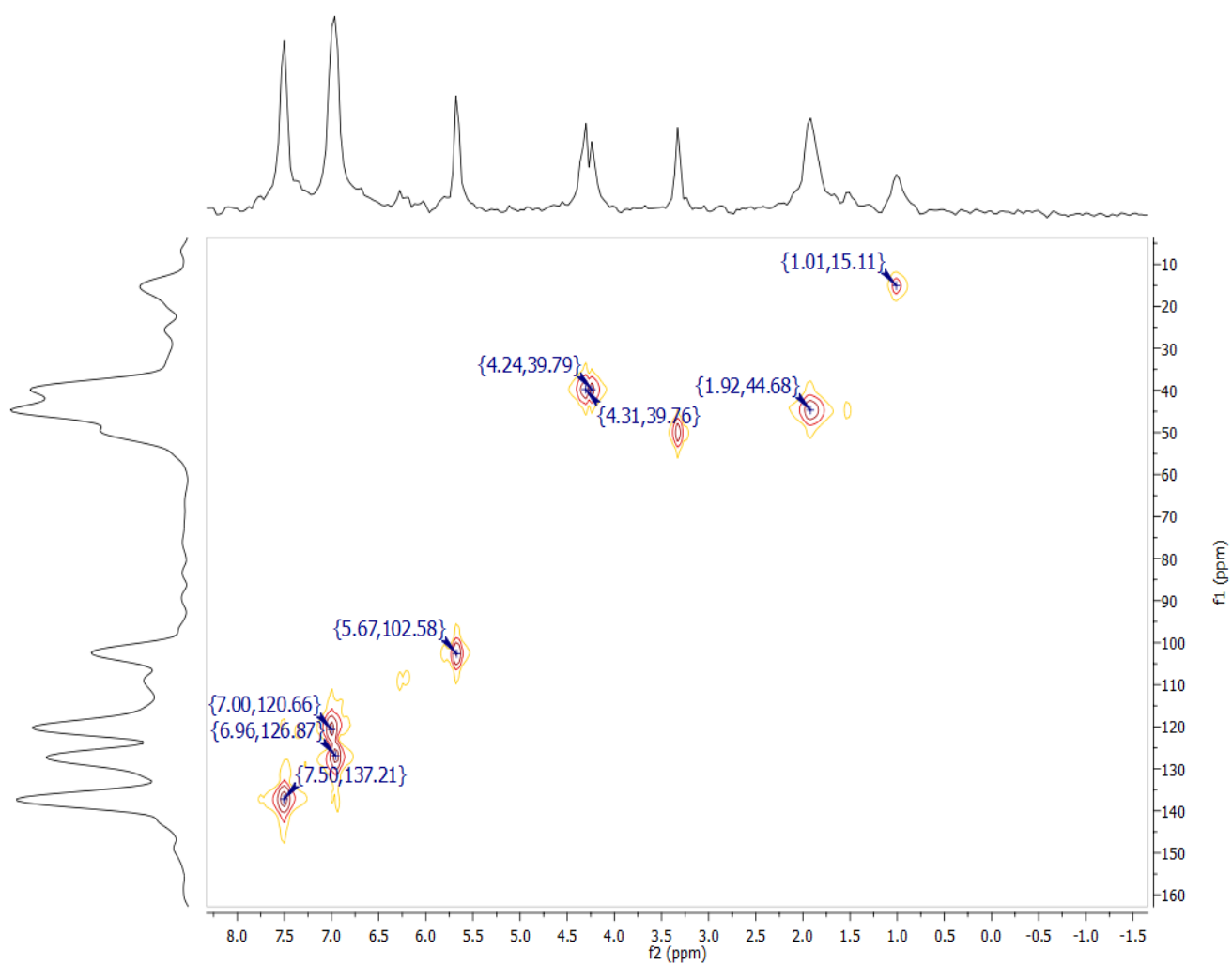


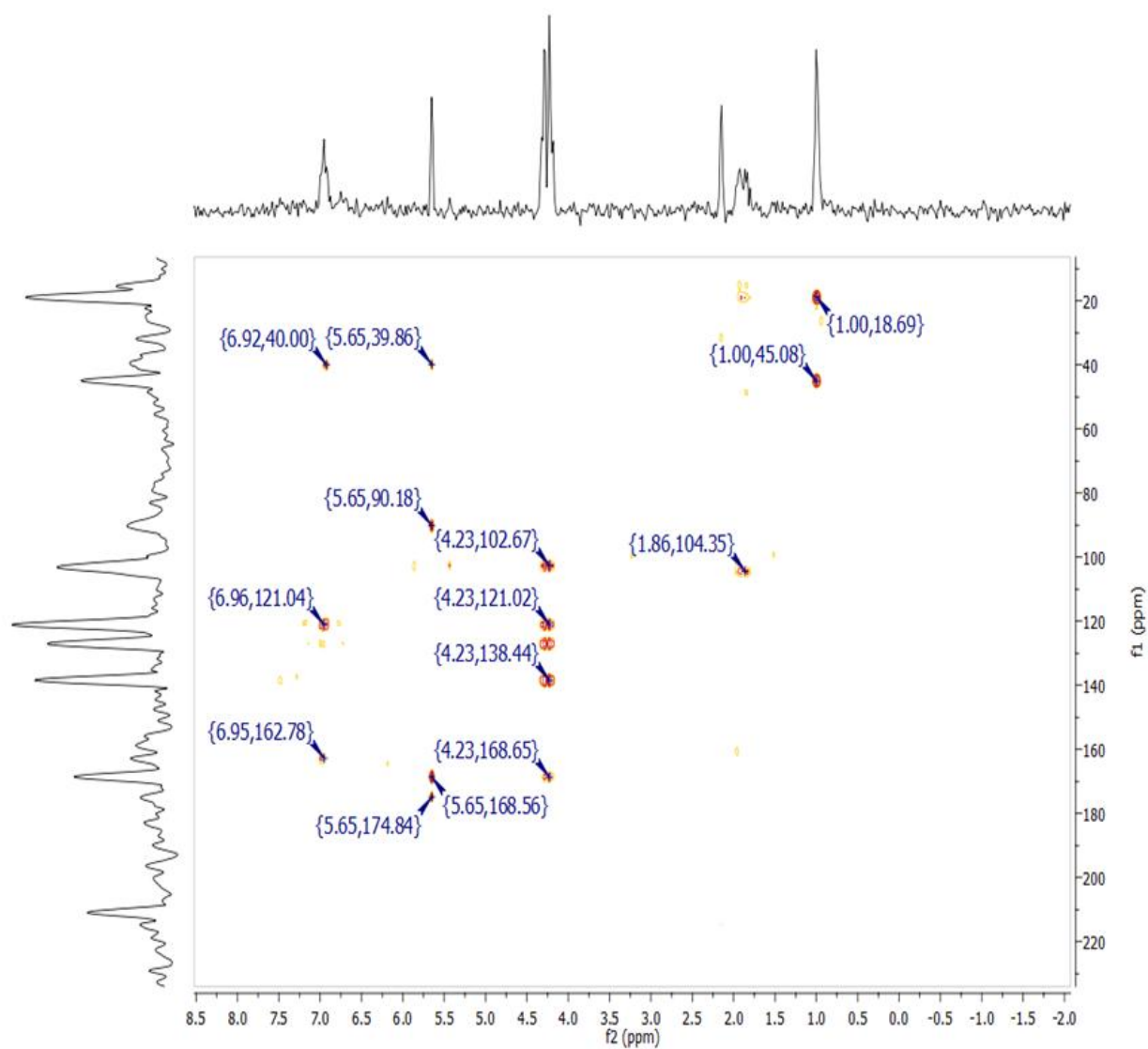
**Figure S2.** ESI (−) MS (top) and MS/MS spectra on  $m/z$  329  $[M - H]^-$  (bottom ) of compound **13**.



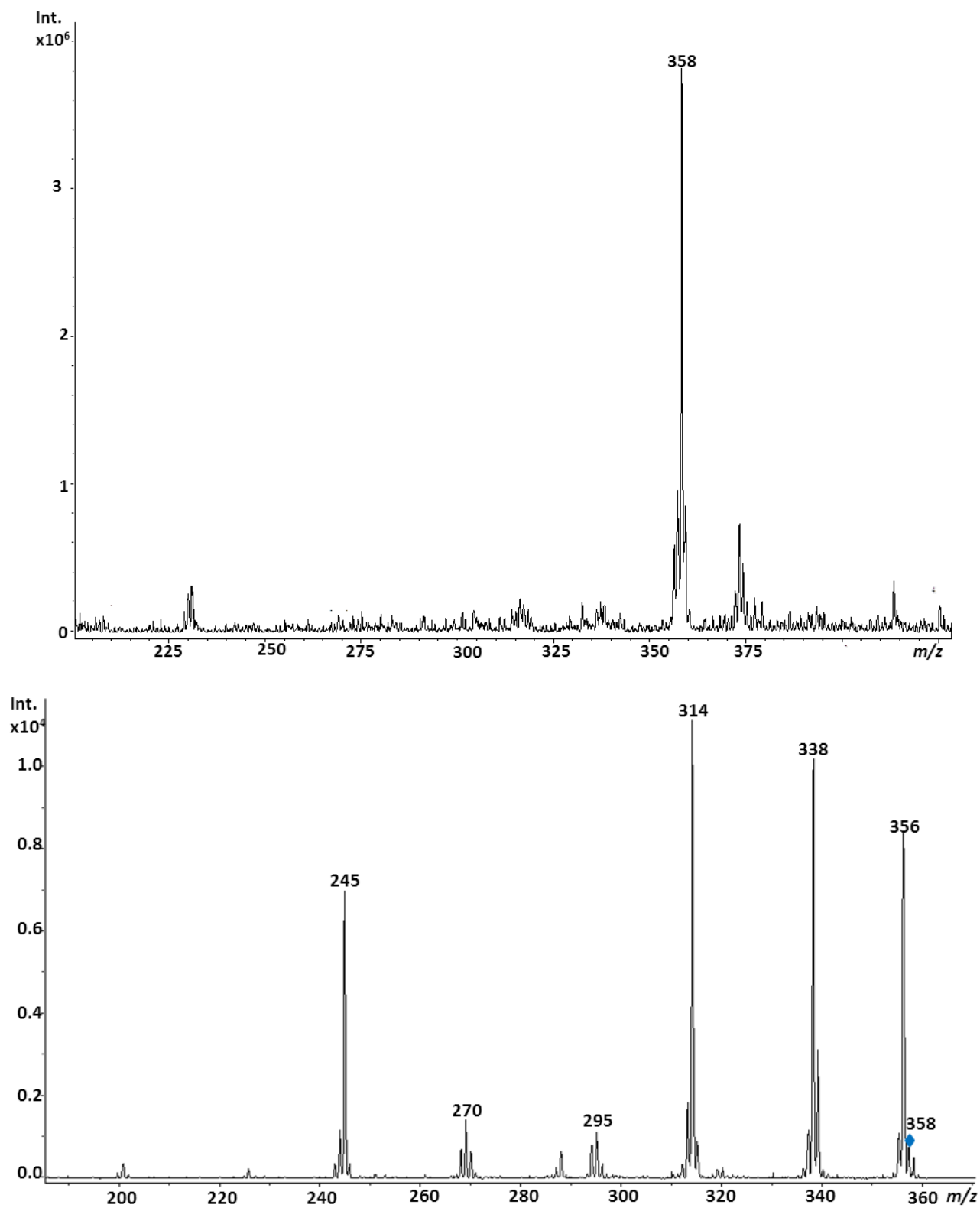
**Figure S3.**  $^1\text{H}$ -NMR spectrum of **13** (400 MHz, in  $\text{CDCl}_3$ ).

**Figure S4.**  $^1\text{H}$ -NMR spectrum of **13** (400 MHz, in  $\text{CD}_3\text{OD}$ ).

**Figure S5.** HSQC spectrum of **13** in CD<sub>3</sub>OD.

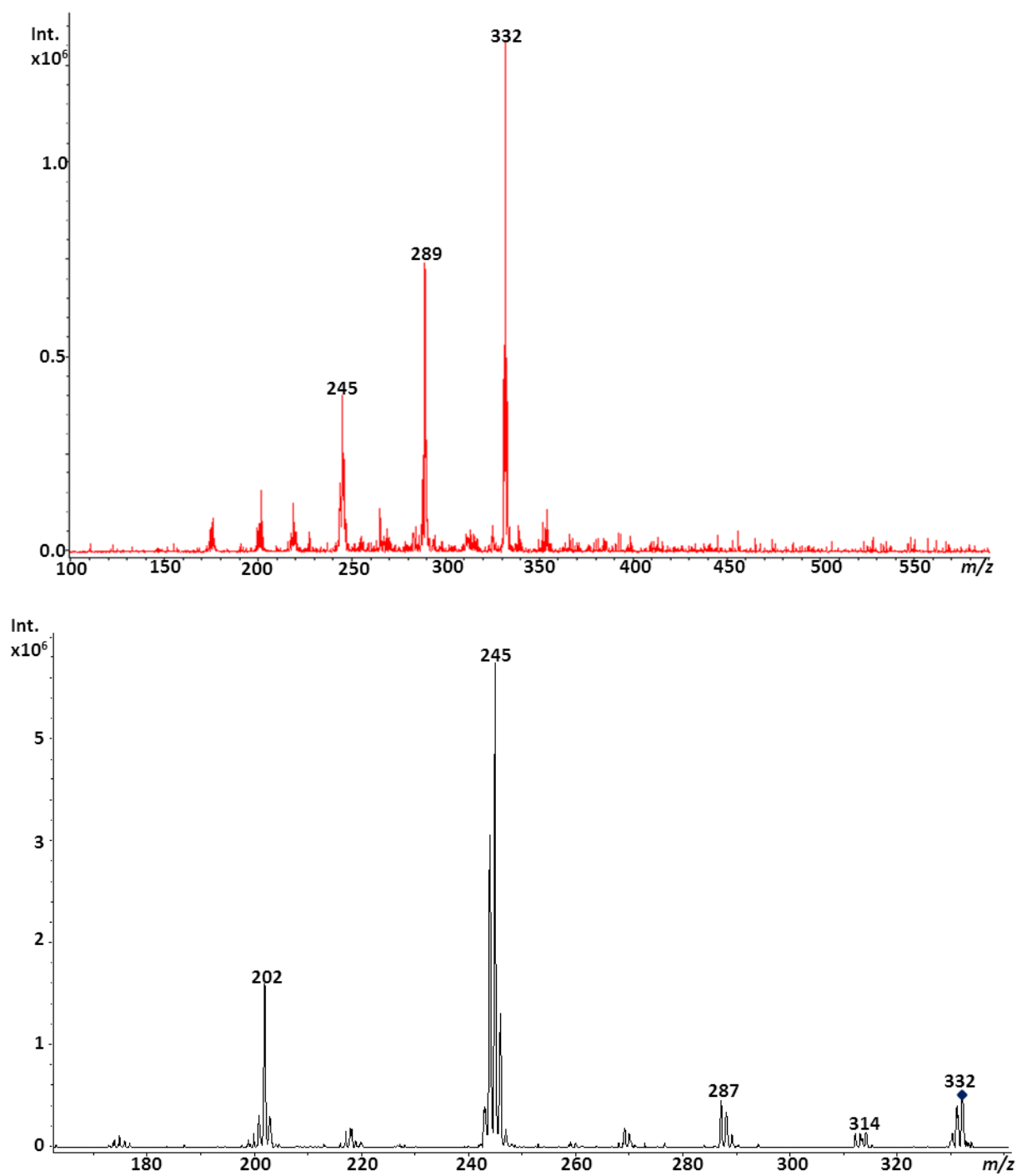
**Figure S6.** HMBC spectrum of **13** in CD<sub>3</sub>OD.

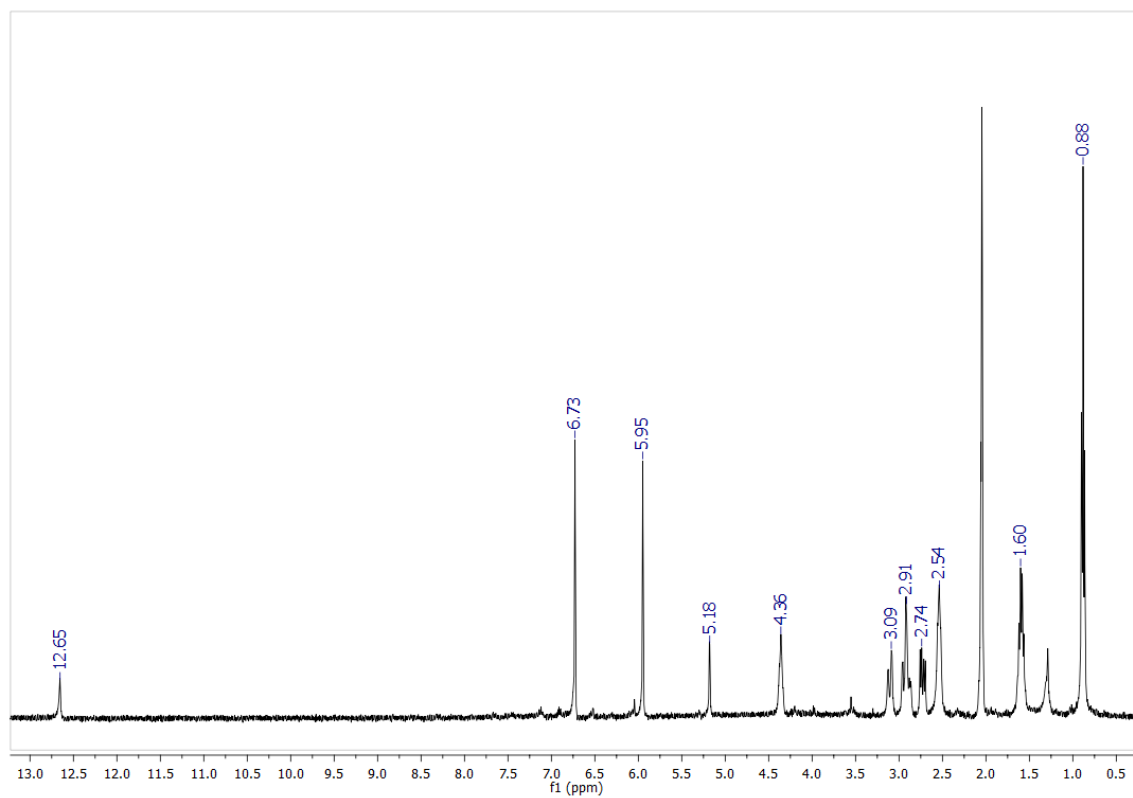
**Figure S7.** ESI (+) MS and MS/MS spectra on  $m/z$  358  $[M + Na]^+$  of deuterated **13** from a  $CD_3OD$  solution.

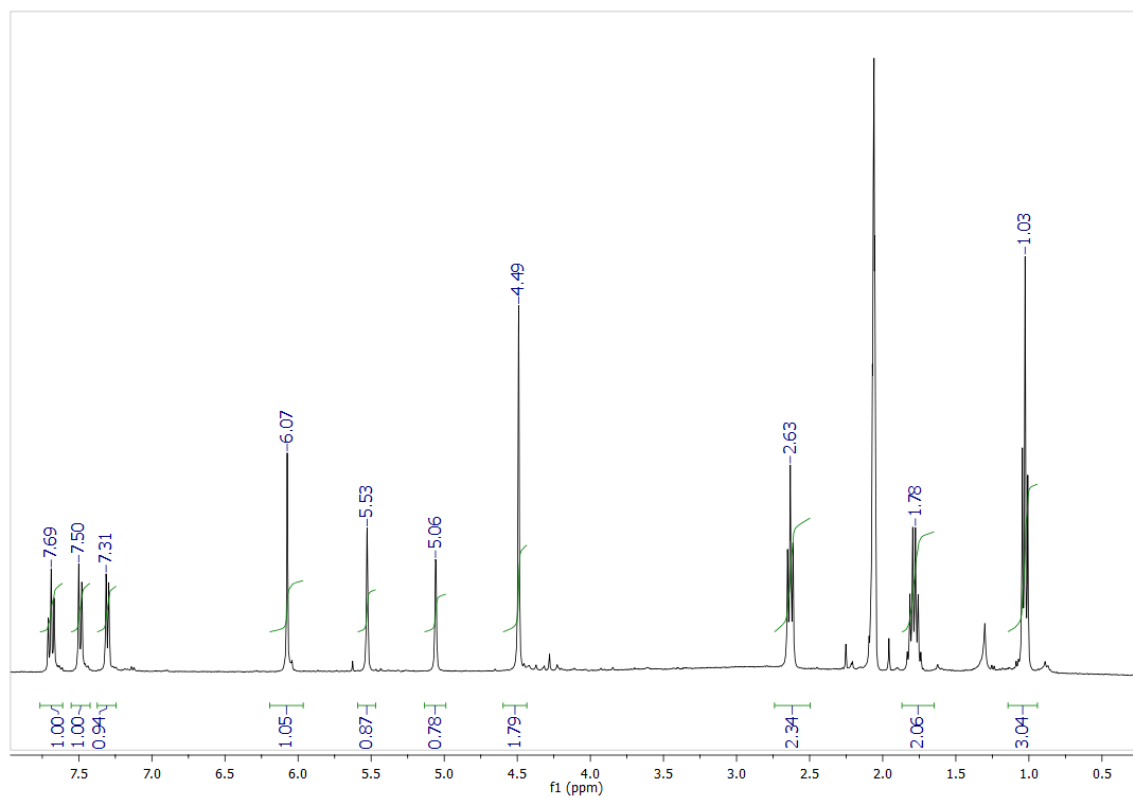


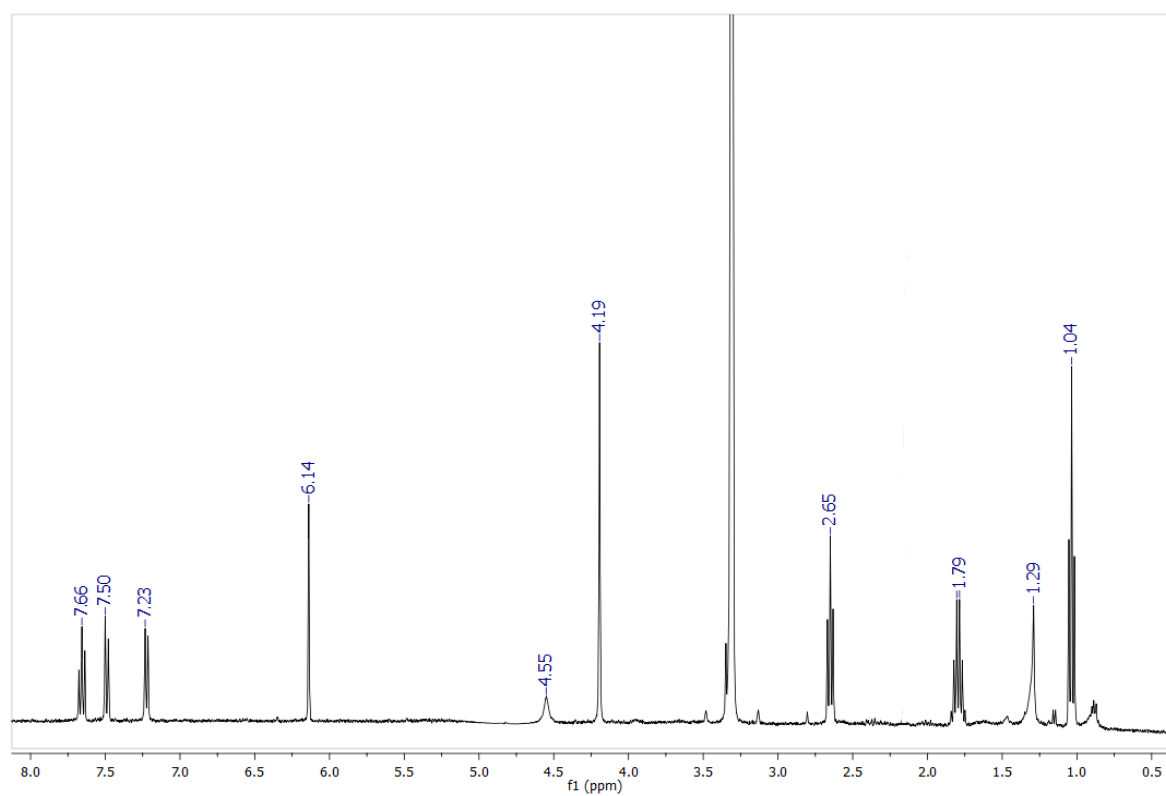


**Figure S8.** ESI (–) MS and MS/MS spectra on  $m/z$  332  $[M - H]^-$  of deuterated **13** from a  $CD_3OD$  solution.

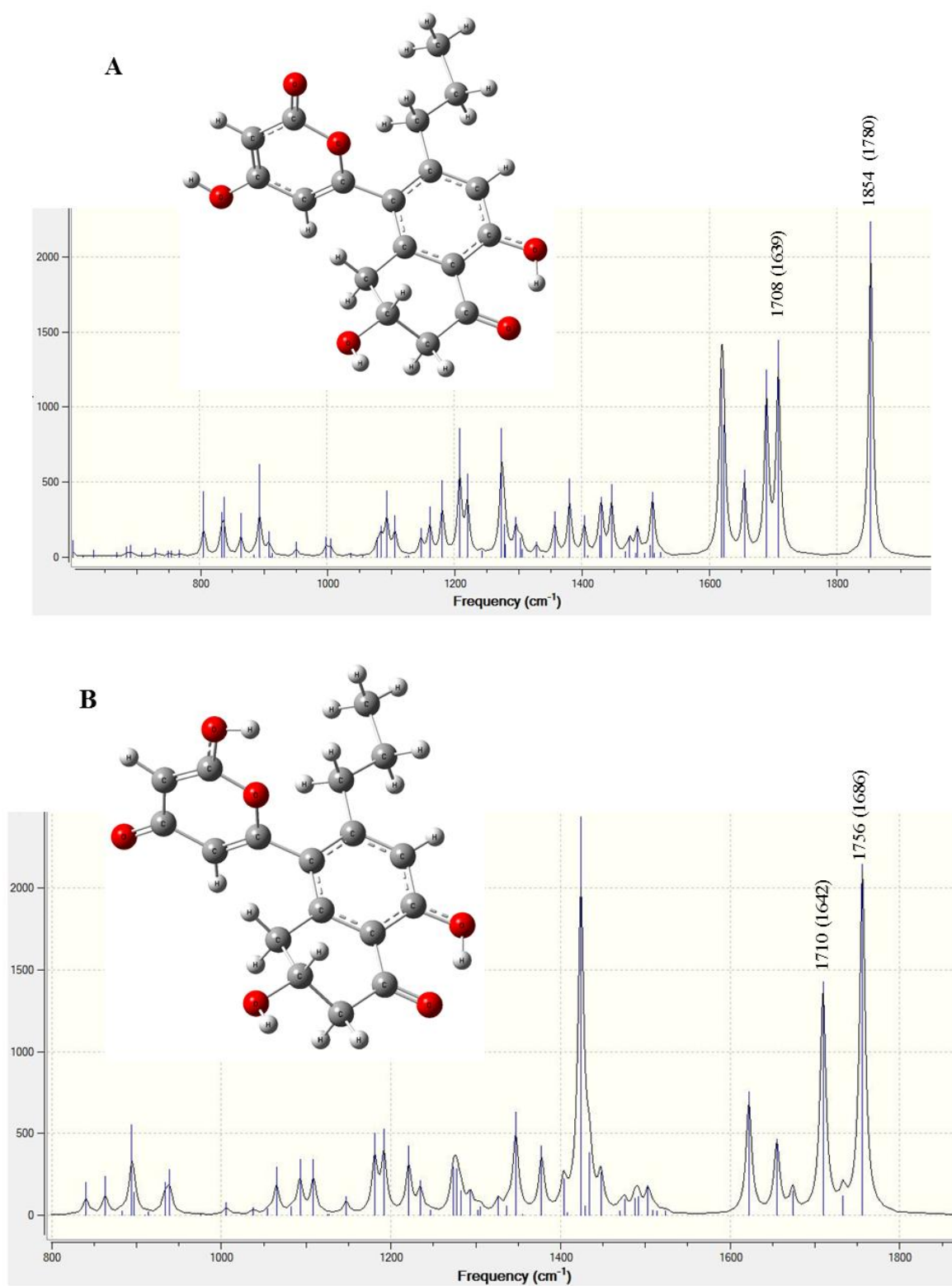


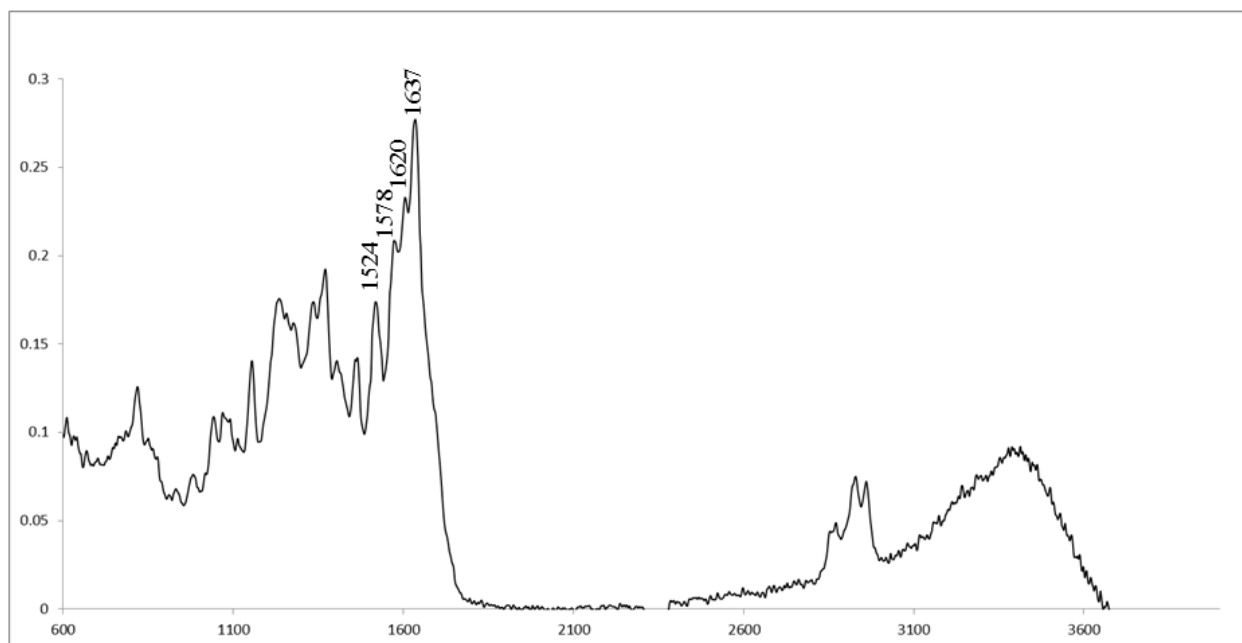
**Figure S9.**  $^1\text{H}$ -NMR spectrum of **7** (400 MHz, in acetone- $d_6$ ).

**Figure S10.**  $^1\text{H}$ -NMR spectrum of **9** (400 MHz, in acetone- $d_6$ ).

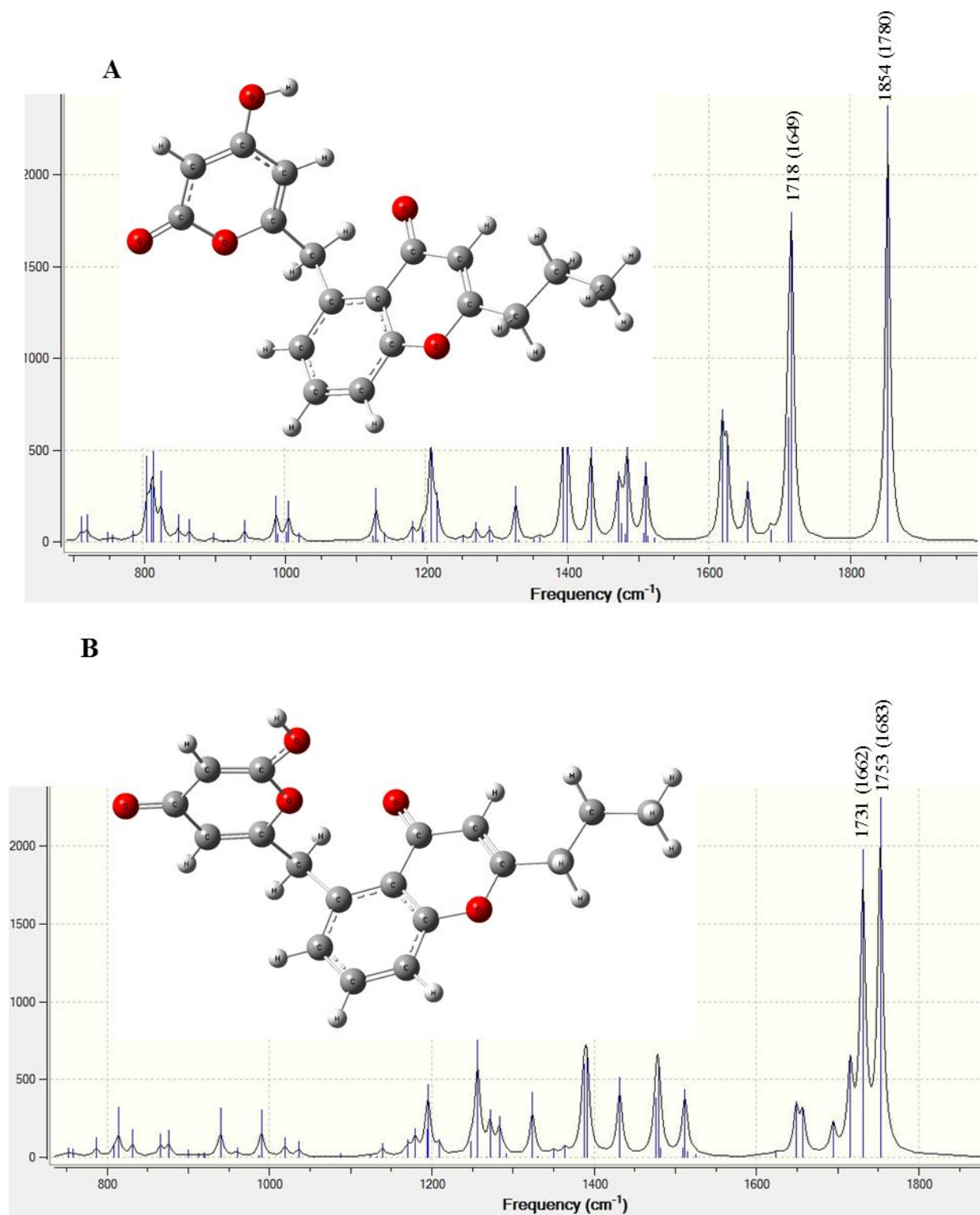
**Figure S11.**  $^1\text{H}$ -NMR spectrum of **11** (400 MHz, in  $\text{CD}_3\text{OD}$ ).

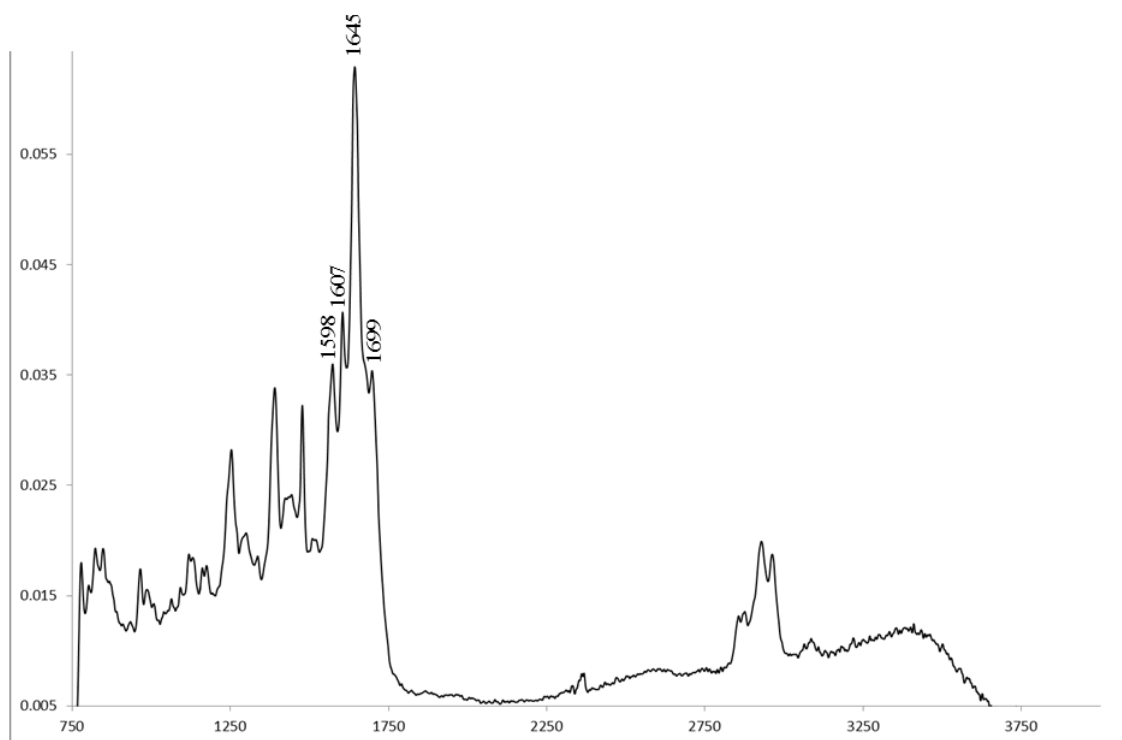
**Figure S12.** DFTcalculated IR spectra of 4-hydroxy  $\alpha$ -pyrone form (A) and 2-hydroxy  $\gamma$ -pyroneform (B) of the compound 7.



**Figure S13.** Experimental FT-IR spectrum of compound 7.

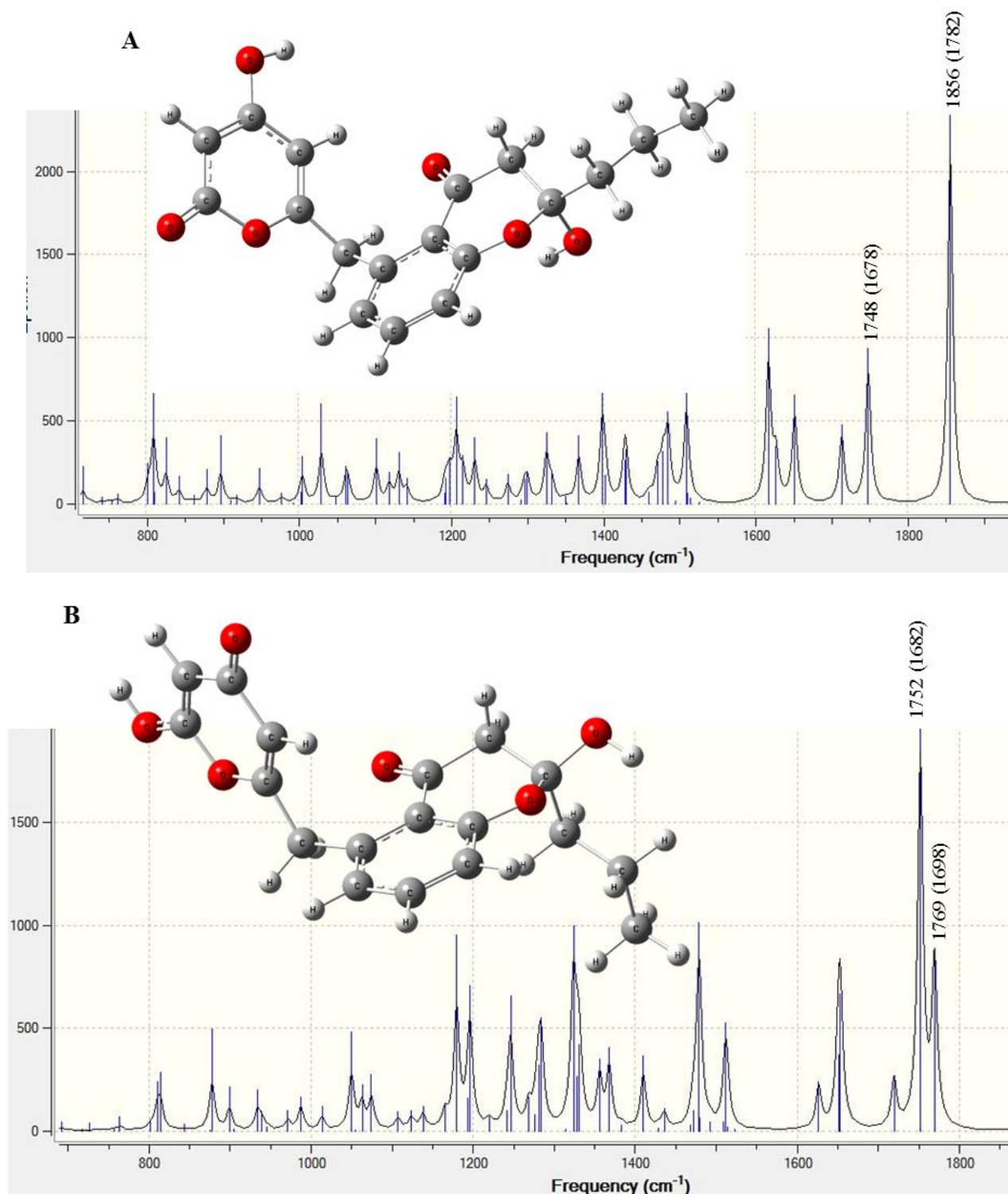
**Figure S14.** DFT calculated IR spectra of the compound **9** in 4-hydroxy  $\alpha$ -pyrone form (A) and 2-hydroxy  $\gamma$ -pyroneform (B).

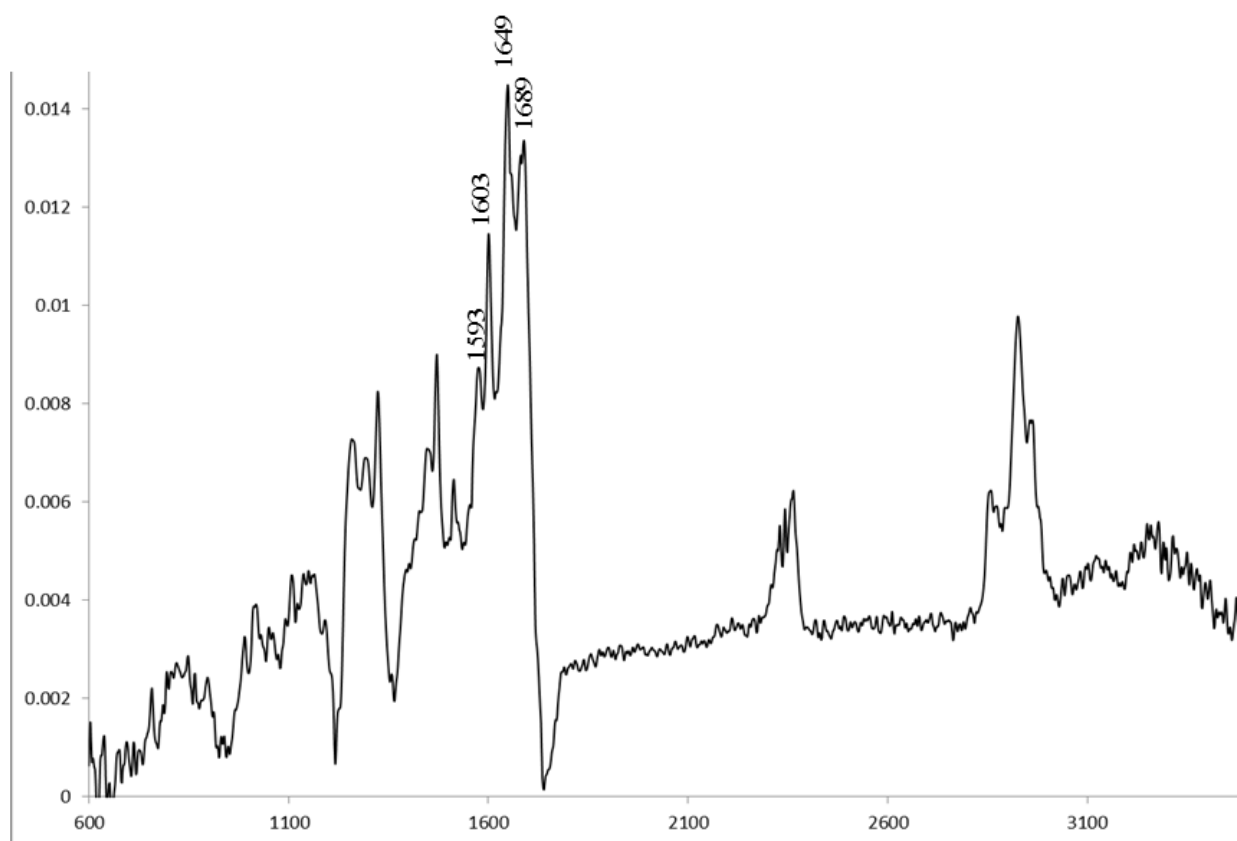


**Figure S15.** Experimental FT-IR spectrum of compound **9**.



**Figure S16.** DFT calculated IR spectra of the compound **13** in 4-hydroxy  $\alpha$ -pyrone form (A) and 2-hydroxy  $\gamma$ -pyrone form (B).



**Figure S17.** Experimental FT-IR spectrum of compound **13**.**Table S1.** Antibacterial activities at 100  $\mu$ L/well of compounds **9**, **11** and **13**.

Compounds	Inhibition Zone $\pm$ SD (mm)				
	<i>E. coli</i> ATCC 25922	<i>S. aureus</i> ATCC 25923	<i>MRSA</i> ATCC 43300	<i>B. subtilis</i> ATCC 6633	<i>P. aeruginosa</i> ATCC 27853
<b>9</b>	-	-	08.34 $\pm$ 1.04	-	11.07 $\pm$ 1.23
<b>11</b>	08.08 $\pm$ 0.41	-	08.27 $\pm$ 0.38	-	07.61 $\pm$ 0.71
<b>13</b>	12.44 $\pm$ 0.84	-	15.033 $\pm$ 0.57	-	13.56 $\pm$ 0.84
Vancomycin (30 $\mu$ g/disc)	ND	20.05 $\pm$ 0.60	ND	ND	ND
Erythromycin(15 $\mu$ g/disc)	ND	25.26 $\pm$ 0.64	14.63 $\pm$ 0.27	ND	ND
Gentamicin (10 $\mu$ g/disc)	23.37 $\pm$ 0.5	25.78 $\pm$ 0.30	ND	ND	18.88 $\pm$ 0.27

-: No activity observed; ND: not determined.