

Supporting Information

Figure S1. ESIMS spectrum of **1**

Figure S2. ^1H -NMR spectrum (400 MHz) of **1** in $\text{C}_5\text{D}_5\text{N}$

Figure S3. ^{13}C -NMR spectrum (100 MHz) of **1** in $\text{C}_5\text{D}_5\text{N}$

Figure S4. HSQC spectrum of **1** in $\text{C}_5\text{D}_5\text{N}$

Figure S5. HMBC spectrum of **1** in $\text{C}_5\text{D}_5\text{N}$

Figure S6. HPLC analysis the purity of compound **1**

Figure S7. ESIMS spectrum of **2**

Figure S8. ^1H -NMR spectrum (400 MHz) of **2** in $\text{C}_5\text{D}_5\text{N}$

Figure S9. ^{13}C -NMR spectrum (100 MHz) of **2** in $\text{C}_5\text{D}_5\text{N}$

Figure S10. HSQC spectrum of **2** in $\text{C}_5\text{D}_5\text{N}$

Figure S11. HMBC spectrum of **2** in $\text{C}_5\text{D}_5\text{N}$

Figure S12. HPLC analysis the purity of compound **2**

Figure S13. ^1H -NMR spectrum (400 MHz) of **6** in CDCl_3

Figure S14. ^{13}C -NMR spectrum (100 MHz) of **6** in CDCl_3

Figure S15. ^1H -NMR spectrum (400 MHz) of (*R*)-3-hydroxy- γ -butyrolactone in CDCl_3

Figure S16. ^{13}C -NMR spectrum (100 MHz) of (*R*)-3-hydroxy- γ -butyrolactone in CDCl_3

Table S1. Orthogonal experiment to determine the optimal enzymatic reaction conditions of **1**.

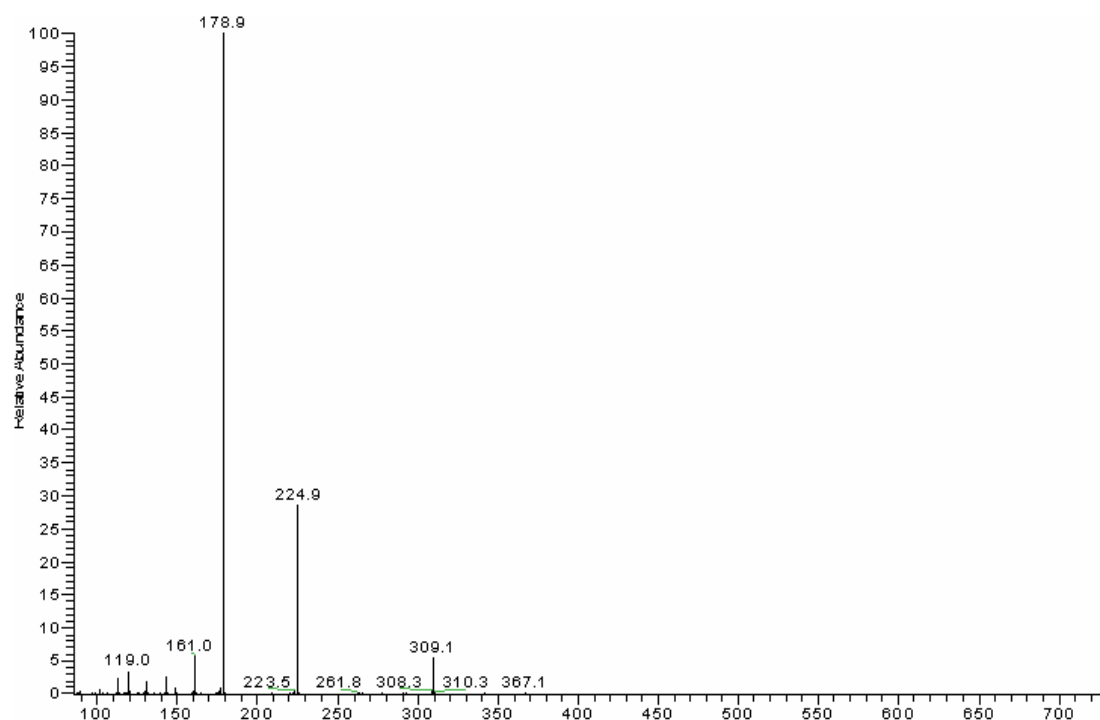
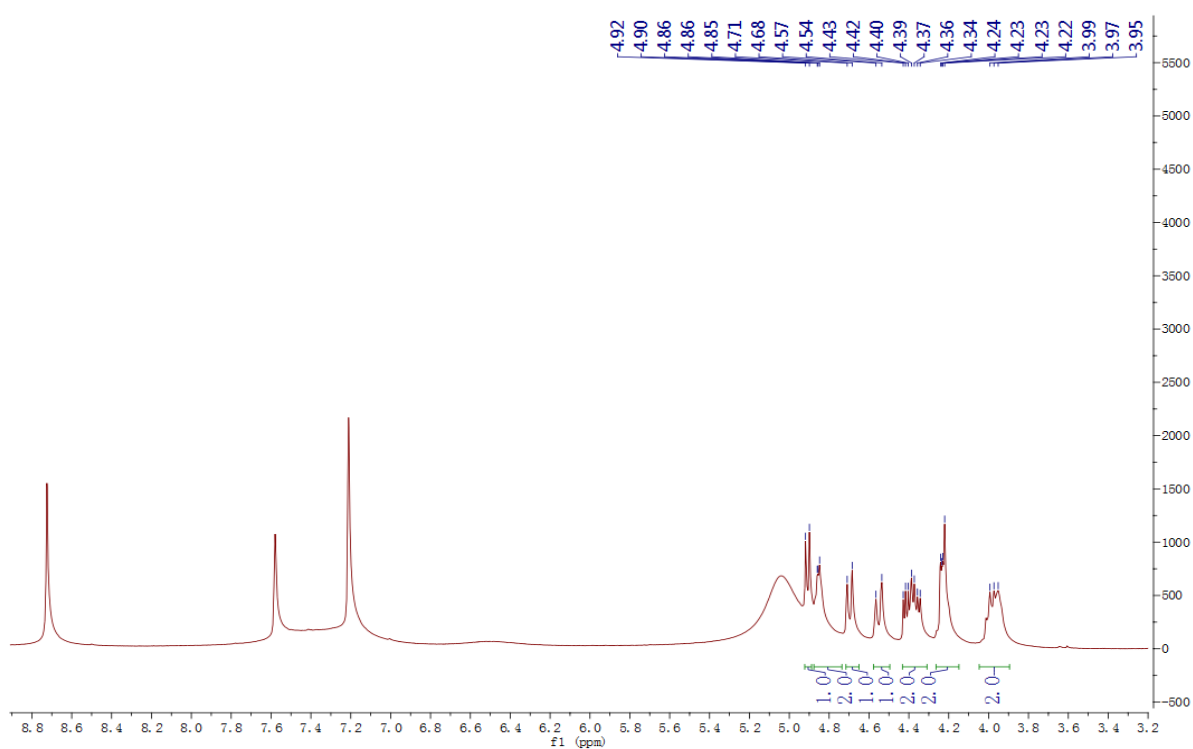
Figure S1. ESIMS spectrum of **1**.**Figure S2.** ^1H -NMR spectrum (400 MHz) of **1** in $\text{C}_5\text{D}_5\text{N}$.

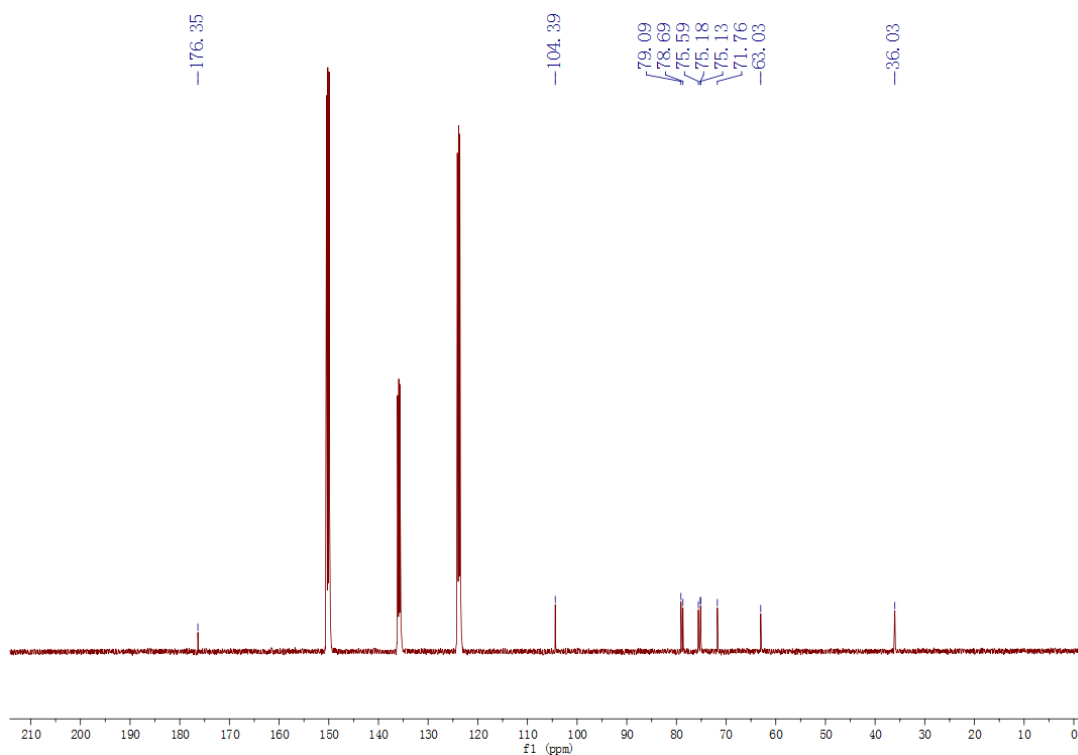
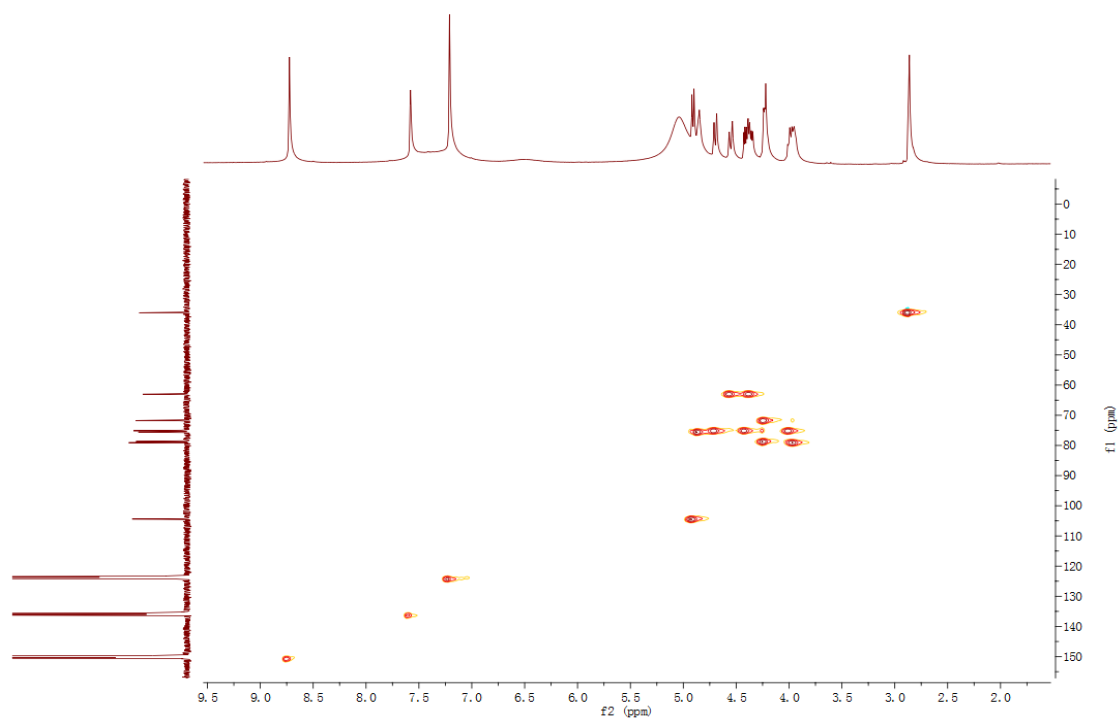
Figure S3. ^{13}C -NMR spectrum (100 MHz) of **1** in $\text{C}_5\text{D}_5\text{N}$.**Figure S4.** HSQC spectrum of **1** in $\text{C}_5\text{D}_5\text{N}$.

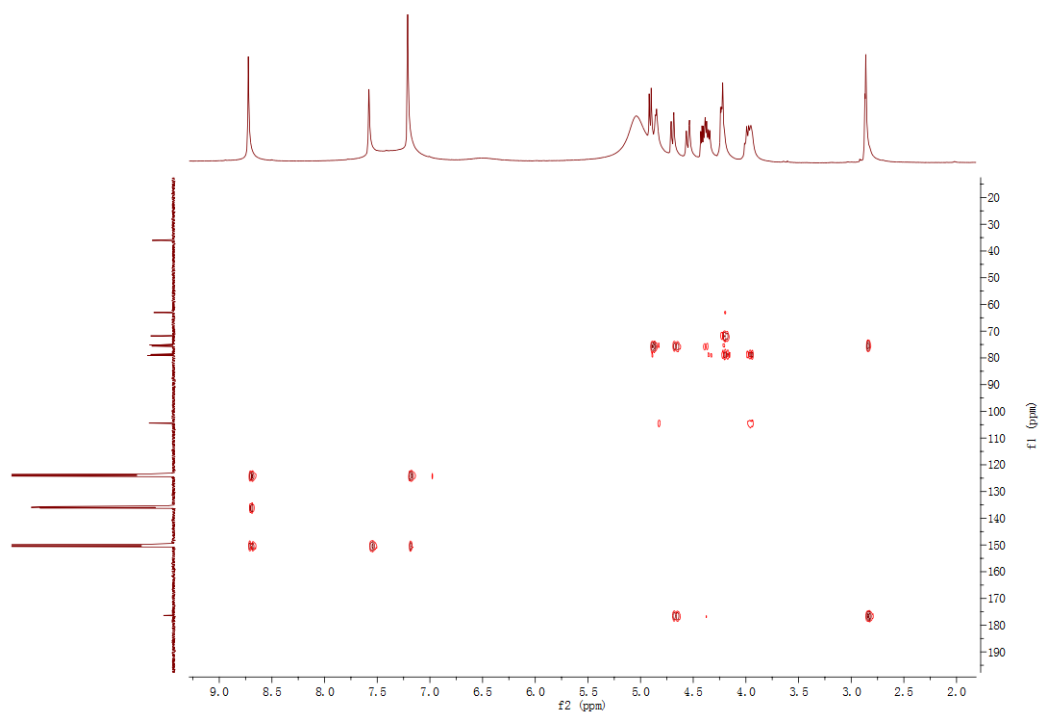
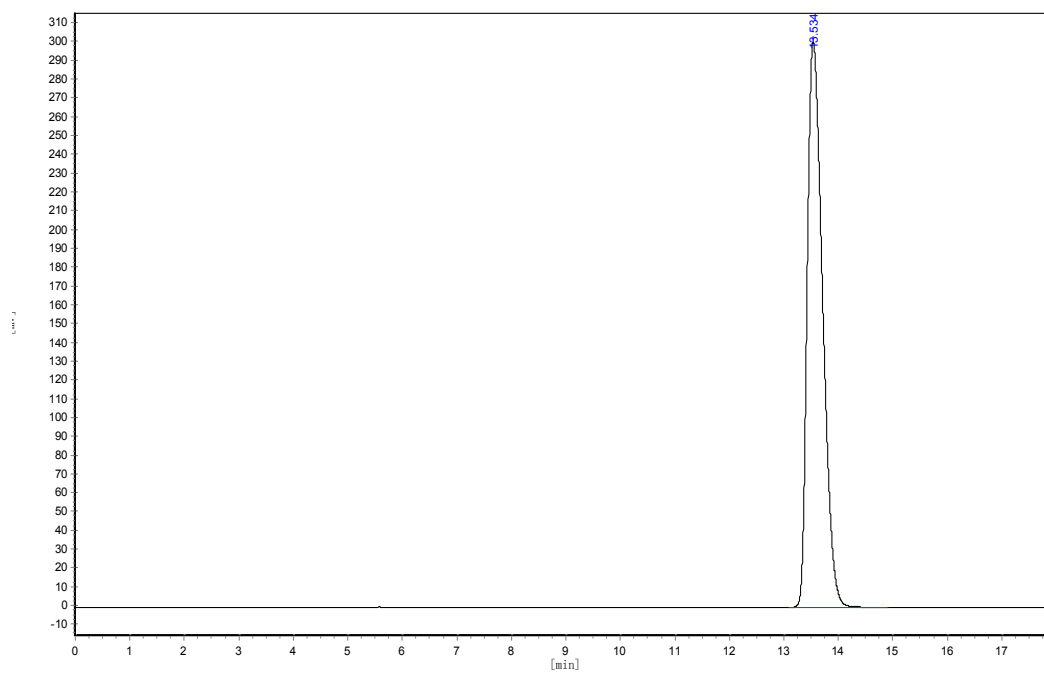
Figure S5. HMBC spectrum of **1** in C₅D₅N.**Figure S6.** HPLC analysis the purity of compound **1**.

Figure S7. ESIMS spectrum of **2**.

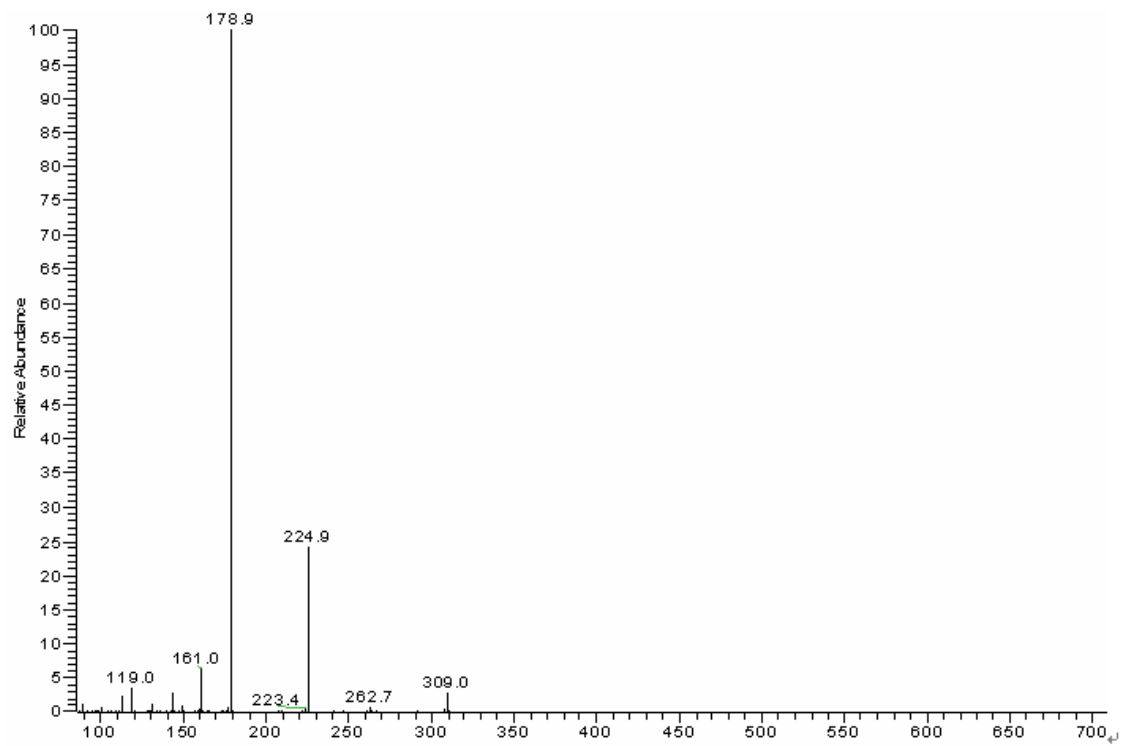


Figure S8. ^1H -NMR spectrum (400 MHz) of **2** in $\text{C}_5\text{D}_5\text{N}$.

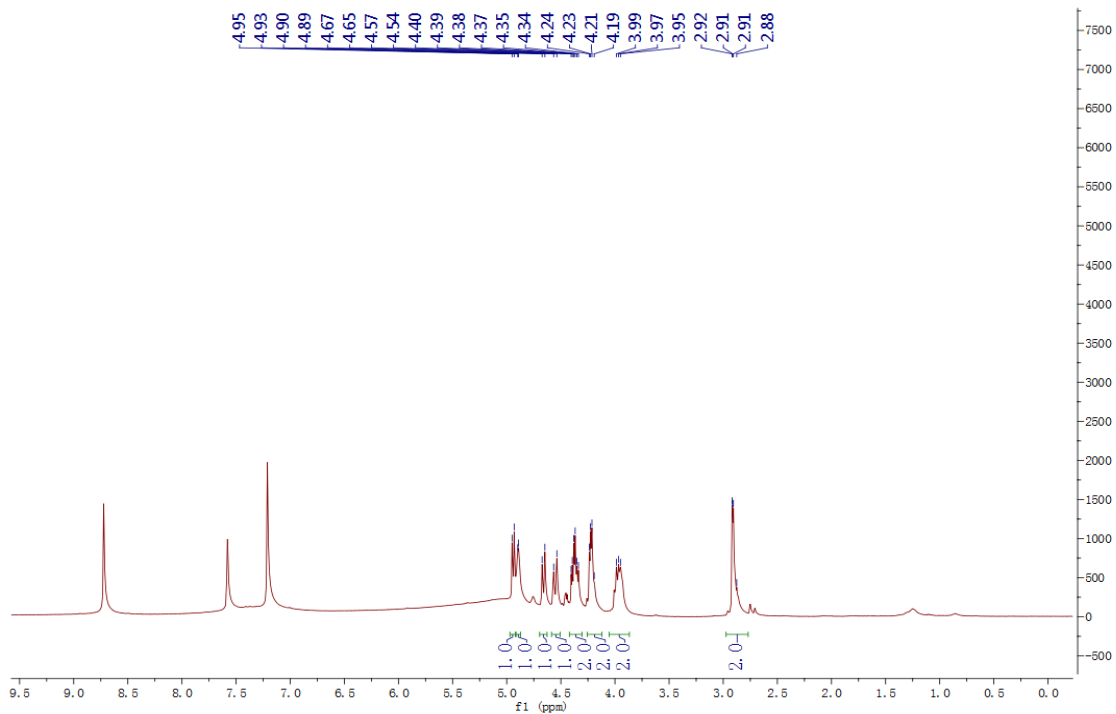


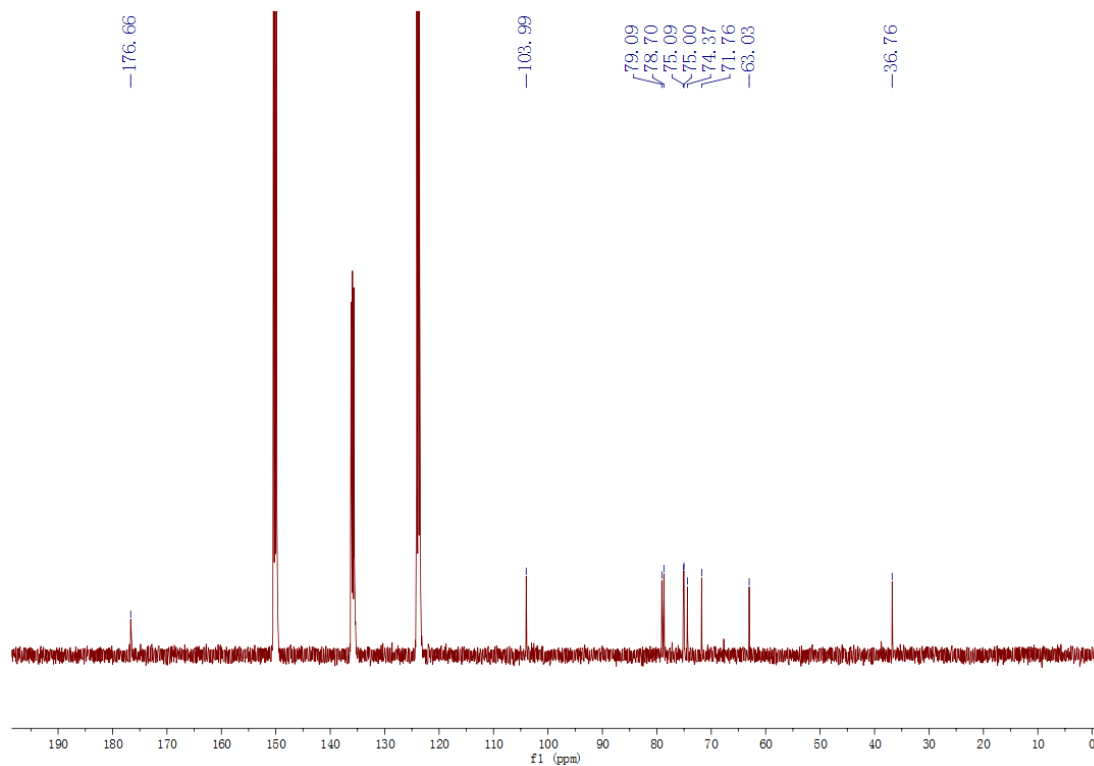
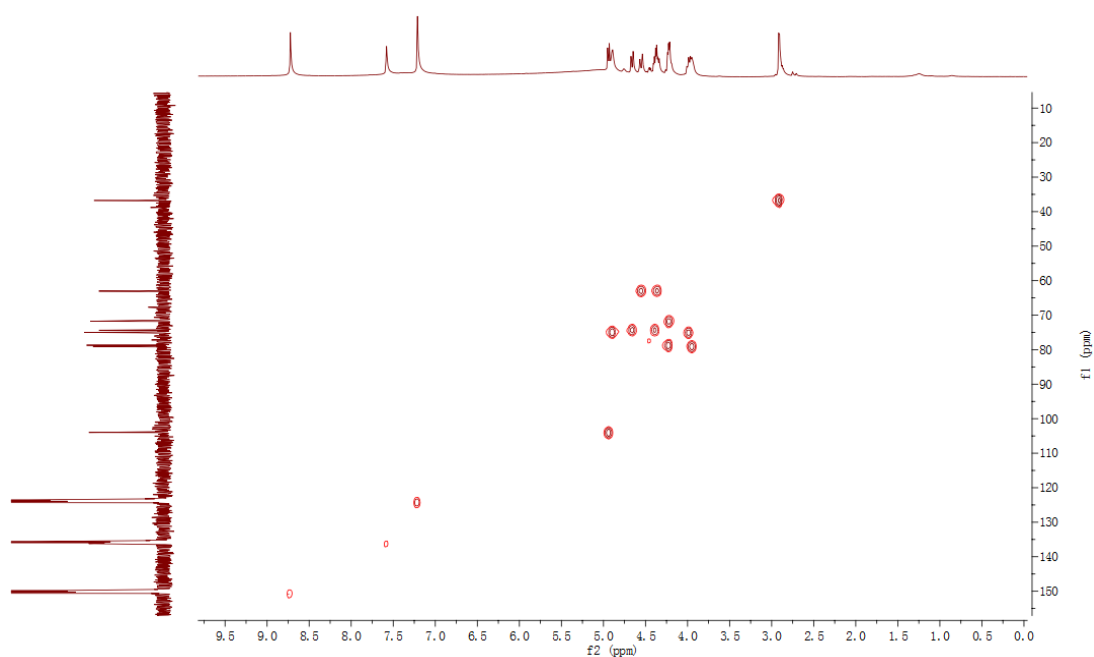
Figure S9. ^{13}C -NMR spectrum (100 MHz) of **2** in $\text{C}_5\text{D}_5\text{N}$.**Figure S10.** HSQC spectrum of **2** in CDCl_3 .

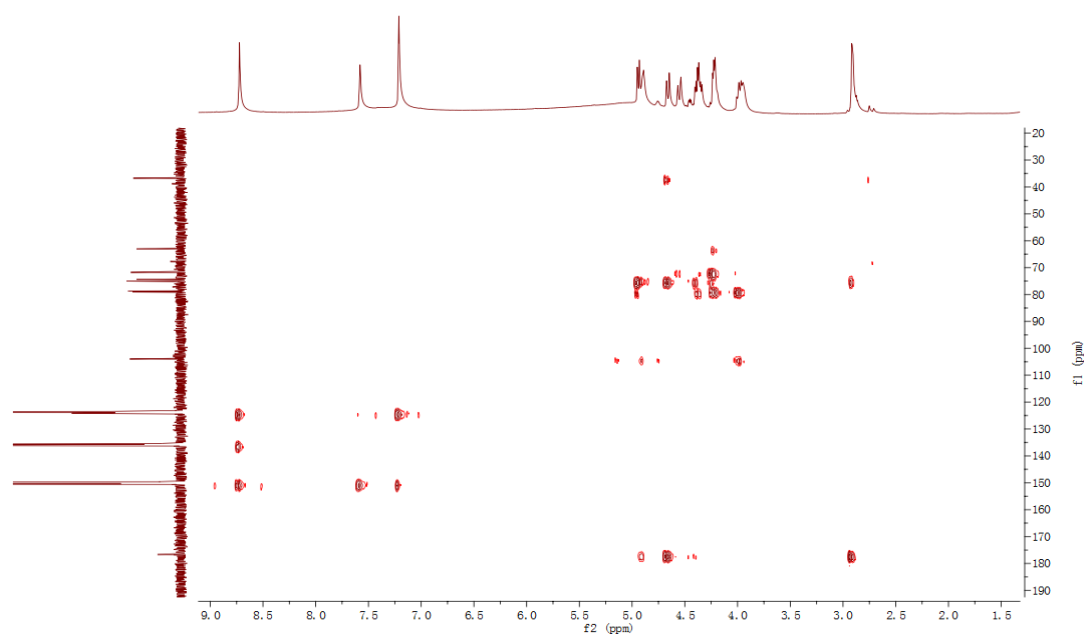
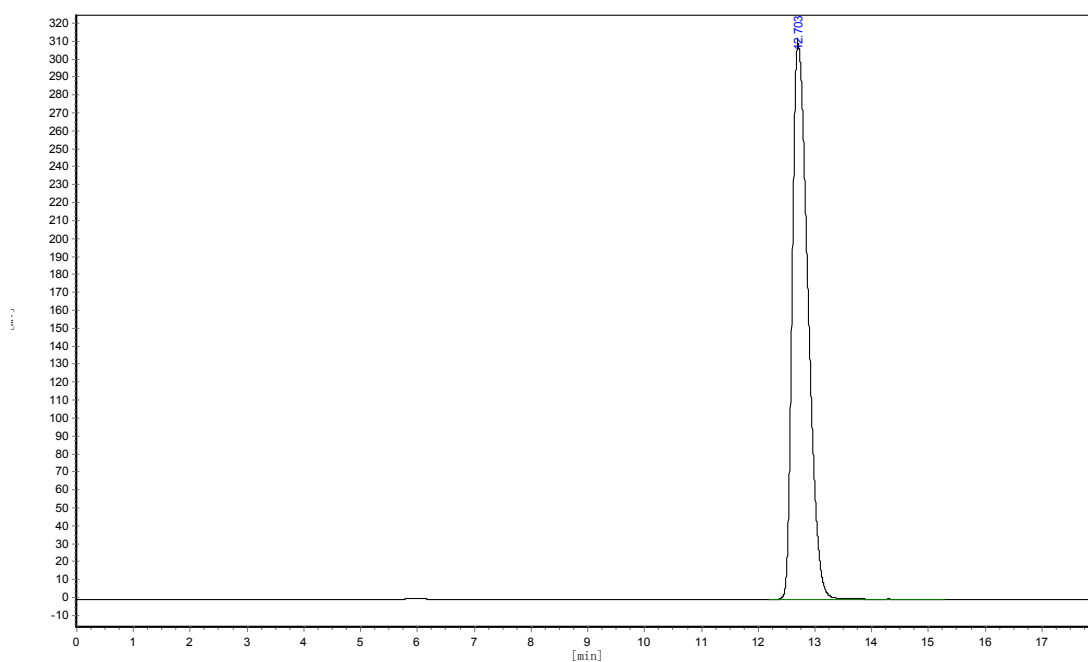
Figure S11. HMBC spectrum of **2** in C₅D₅N.**Figure S12.** HPLC analysis the purity of **2**.

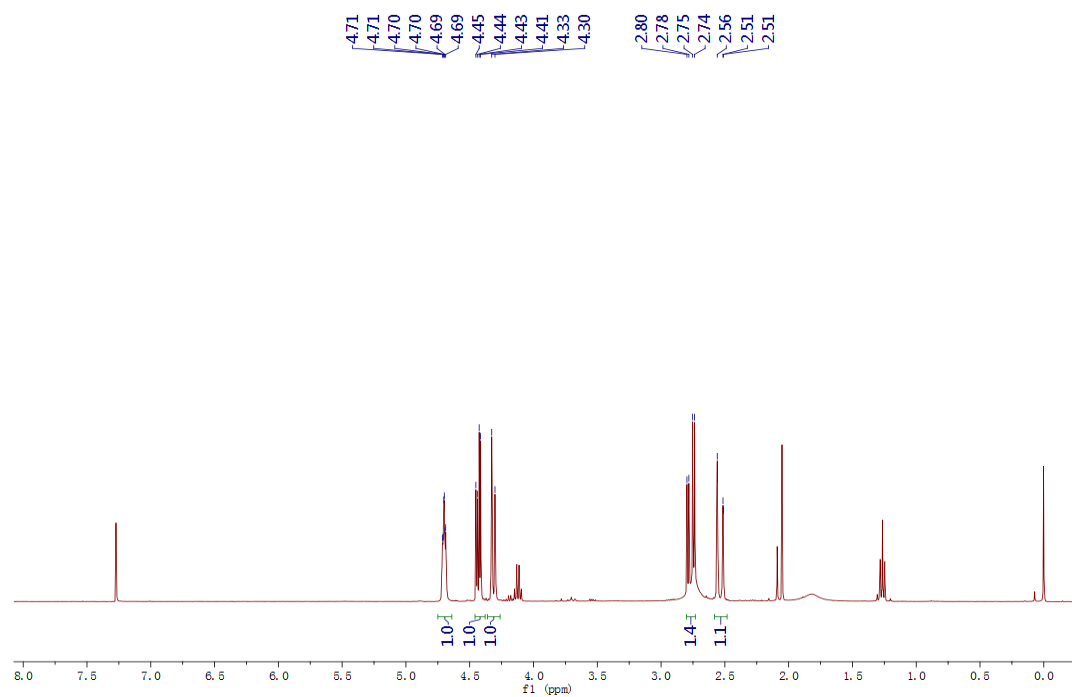
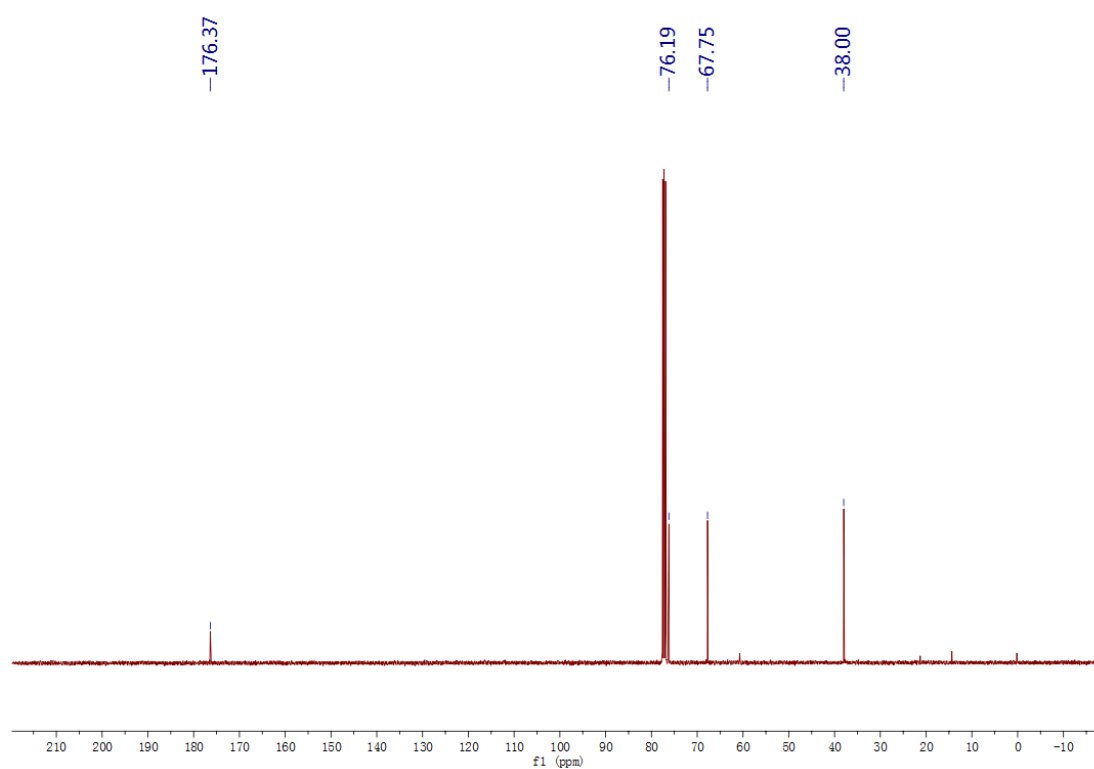
Figure S13. ^1H -NMR spectrum (400 MHz) of **6** in CDCl_3 .**Figure S14.** ^{13}C -NMR spectrum (100 MHz) of **6** in CDCl_3 .

Figure S15. ^1H -NMR spectrum (400 MHz) of (*R*)-3-hydroxy- γ -butyrolactone in CDCl_3 .

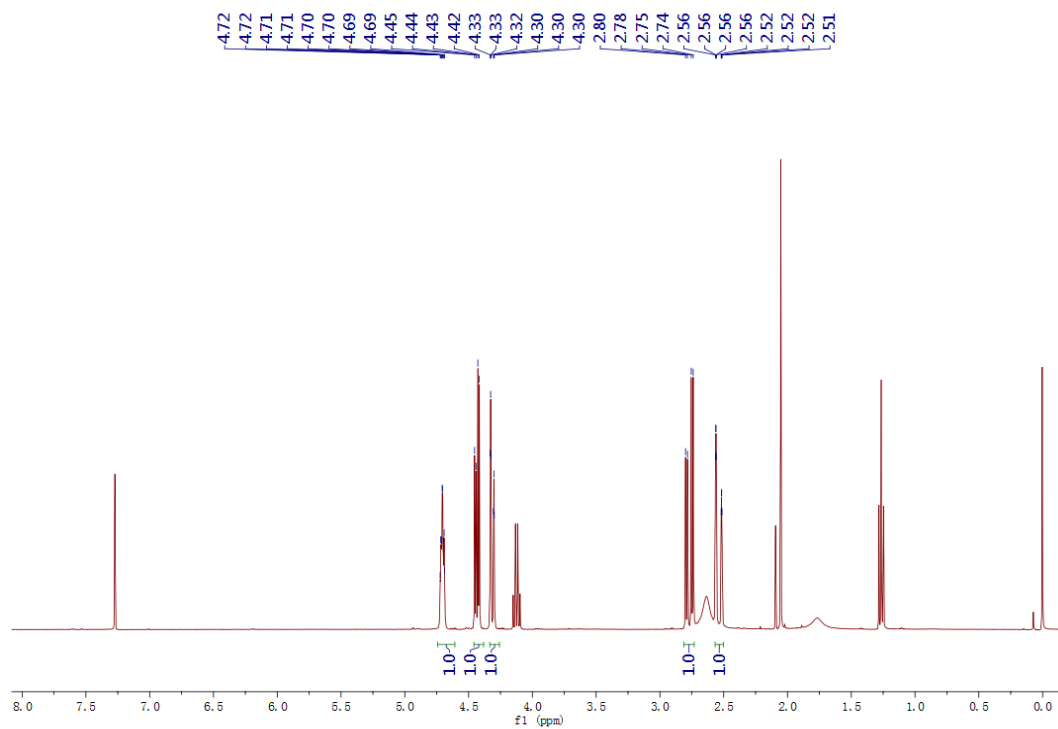


Figure S16. ^{13}C -NMR spectrum (100 MHz) of (*R*)-3-hydroxy- γ -butyrolactone in CDCl_3 .

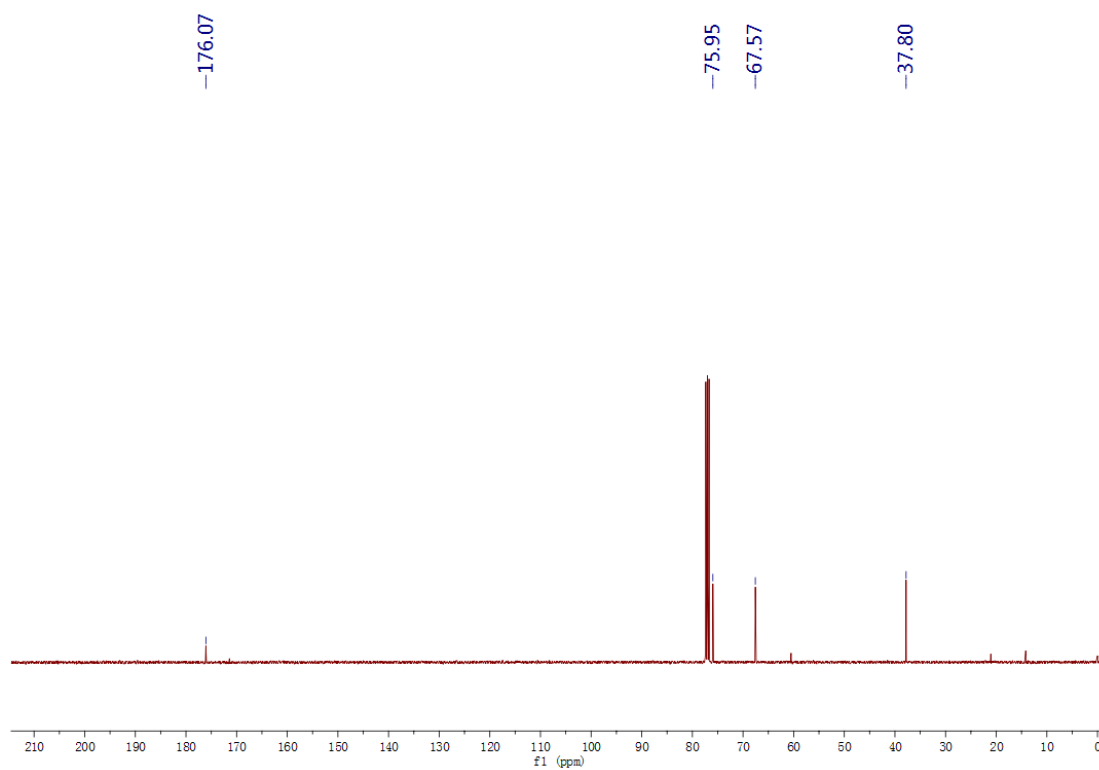


Table S1. Orthogonal experiment to determine the optimal enzymatic reaction conditions of **1**.

Effect Factor	Enzyme Dosage (mg)	Lactone Equivalents	Reaction Time (h)	Concentration of 1 (mg/mL)	Yield (%)
1	4	7	32	7.6	11.5
2	4	8	44	9.4	14.2
3	4	9	56	10.6	16.1
4	4	10	68	11.2	16.9
5	5	7	44	8.8	13.3
6	5	8	32	9.0	13.6
7	5	9	68	11.4	17.2
8	5	10	56	11.2	16.9
9	6	7	56	8.2	12.4
10	6	8	68	9.2	13.9
11	6	9	32	9.2	13.9
12	6	10	44	10.8	16.4
13	7	7	68	8.6	13.0
14	7	8	56	9.7	14.7
15	7	9	44	9.8	14.8
16	7	10	32	10.7	16.2
k1	9.723	8.315	9.165		
k2	10.119	9.338	9.717		
k3	9.376	10.262	9.923		
k4	9.701	11.003	8.877		
R	0.743	2.688	1.239		

k_i ($i = 1, 2, 3, 4$): Mean concentration of **1** at case i level of corresponding factor; R: Range, namely $k_{i_{\max}} - k_{i_{\min}}$.