A Derivative of Piperlongumine and Ligustrazine as a Potential Thioredoxin Reductase Inhibitor in Drug-resistant Hepatocellular Carcinoma

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Supporting Information

1. ^{1}H NMR spectrum for compound **4**, **8**, and **9**……S2
2. ^{1}H NMR and ^{13}C NMR spectrum for compound **6** ……S3
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6. UV analysis of compounds **6** and **11**……S7

1. ^{1}H NMR spectrum for compound 4, 8, and 9

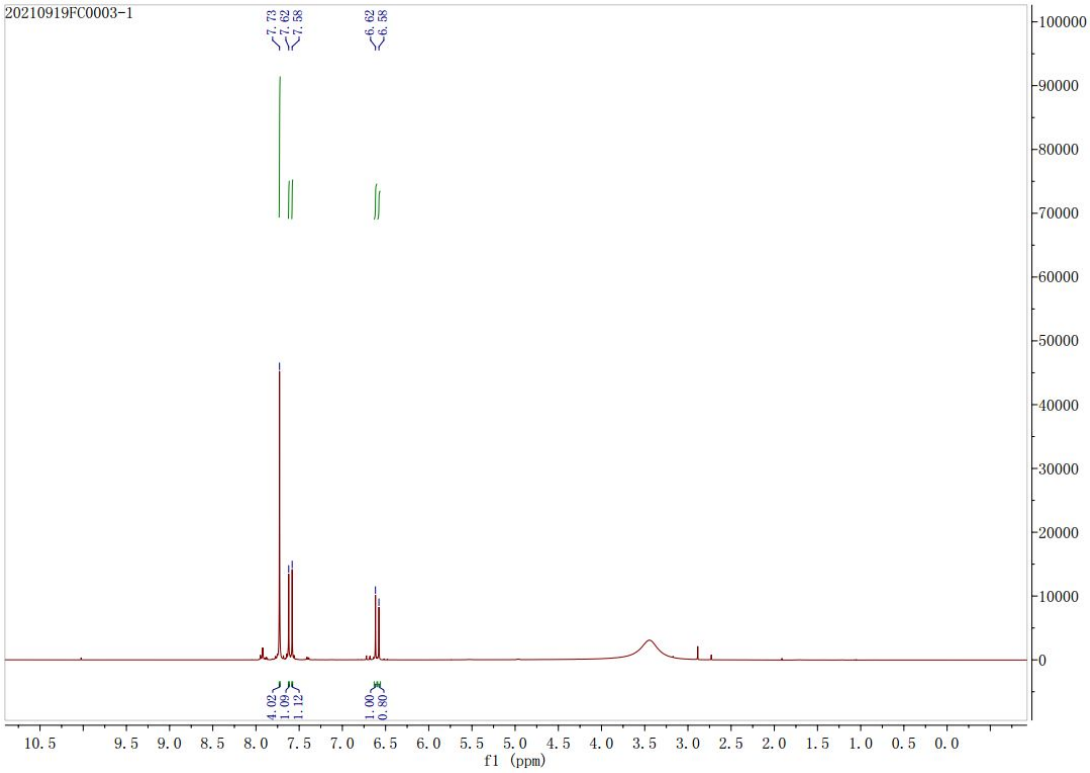

Figure S1. ^{1}H NMR spectrum of compound **4**

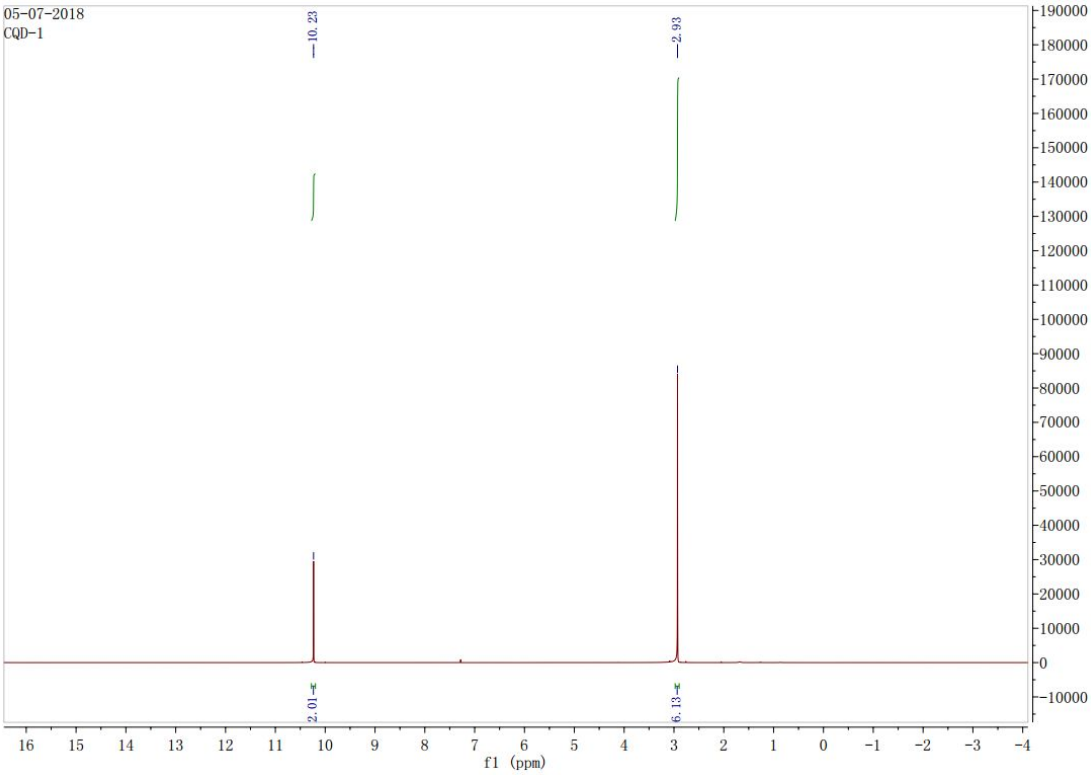

Figure S2. ^{1}H NMR spectrum of compound **8**

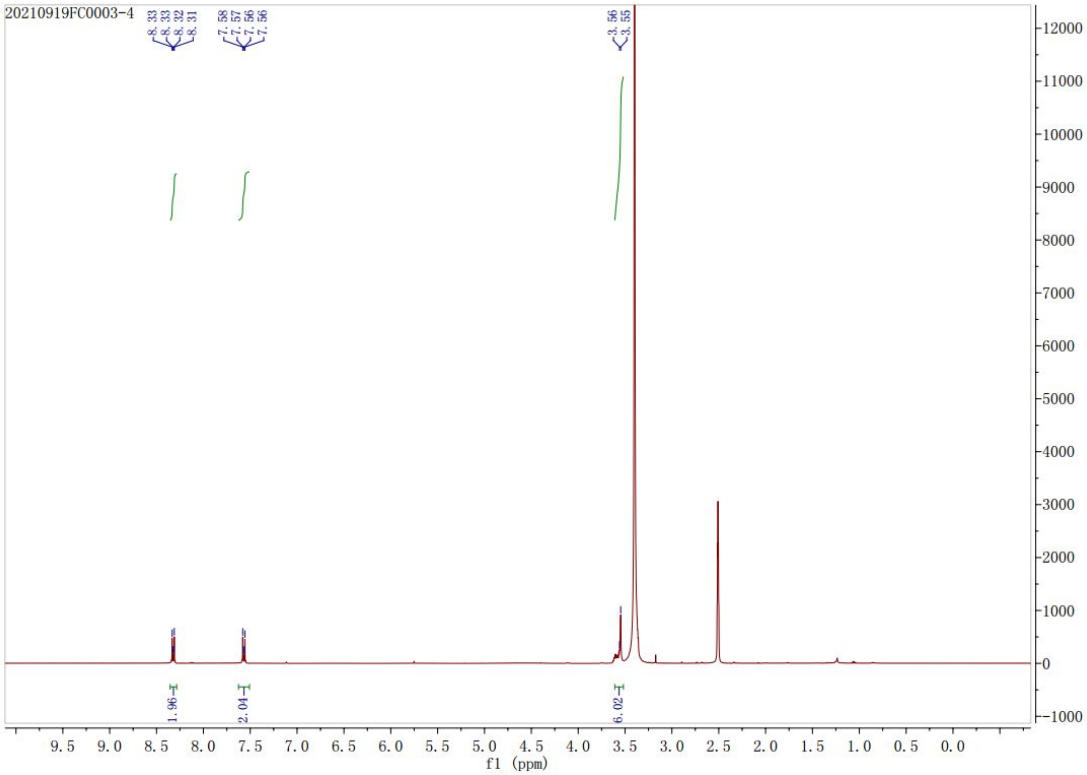

Figure S3. ^{1}H NMR spectrum of compound **9**

2. ^{1}H NMR and ^{13}C NMR spectrum for compound 6

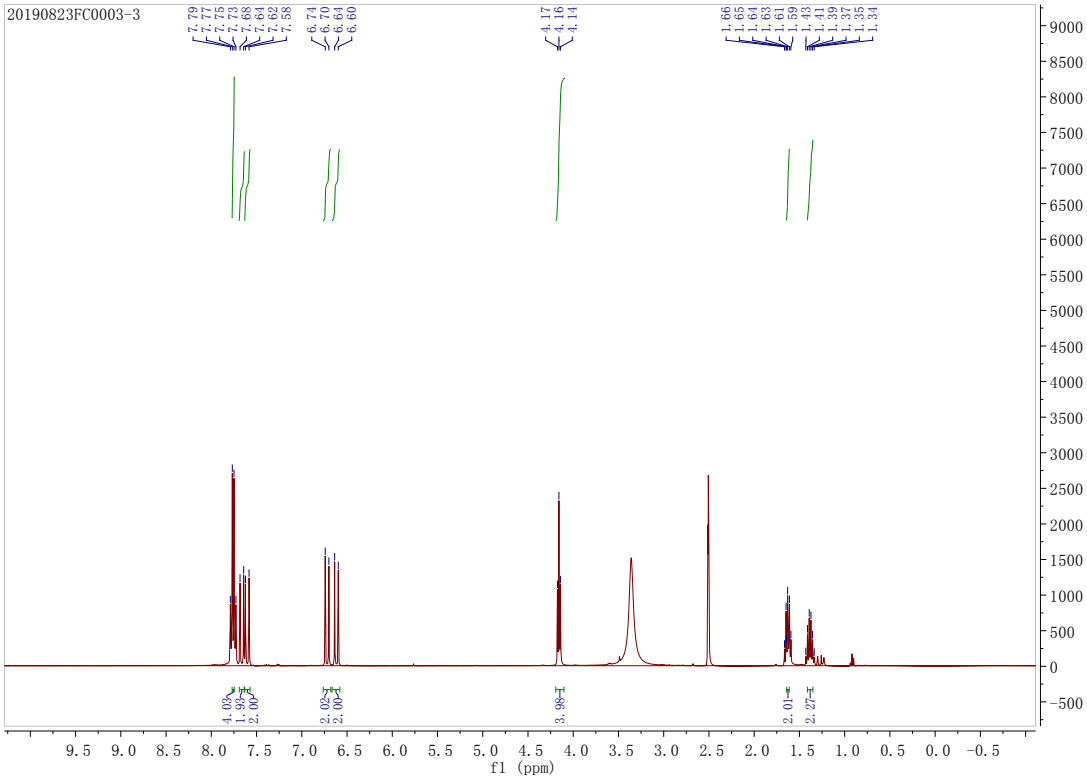

Figure S4. ^{1}H NMR spectrum of the target compound **6**

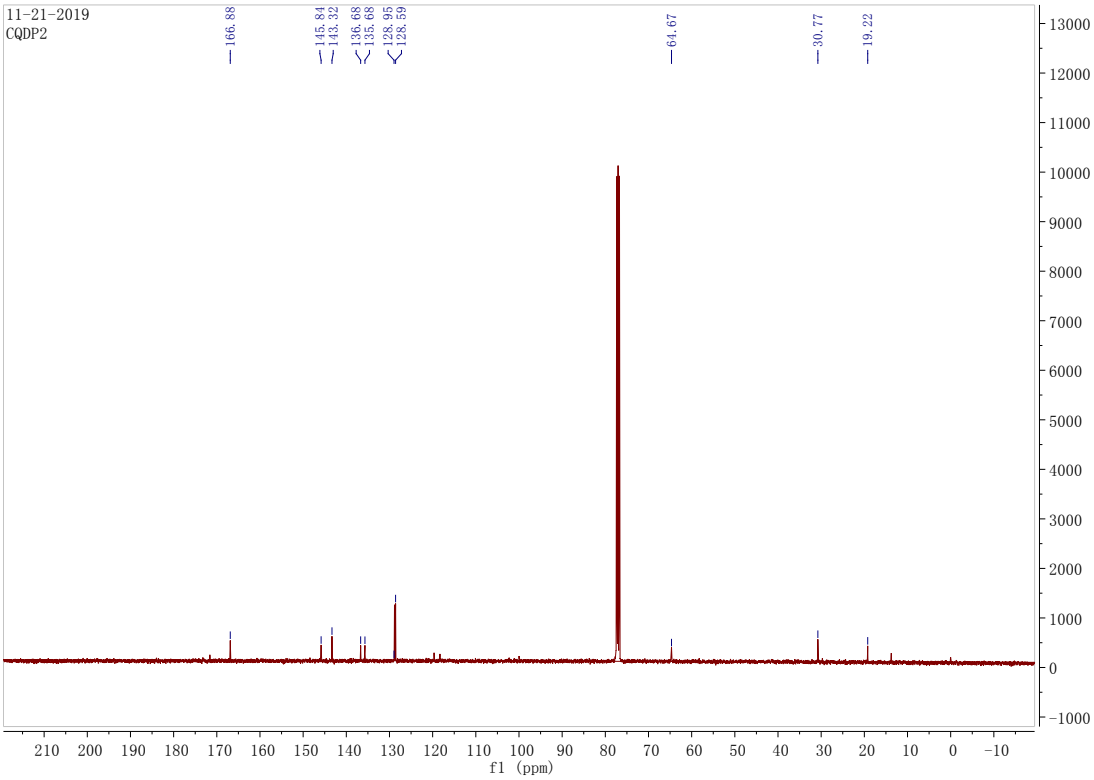

Figure S5. ^{13}C NMR spectrum of the target compound **6**

3. ^{1}H NMR and ^{13}C NMR spectrum for compound 11

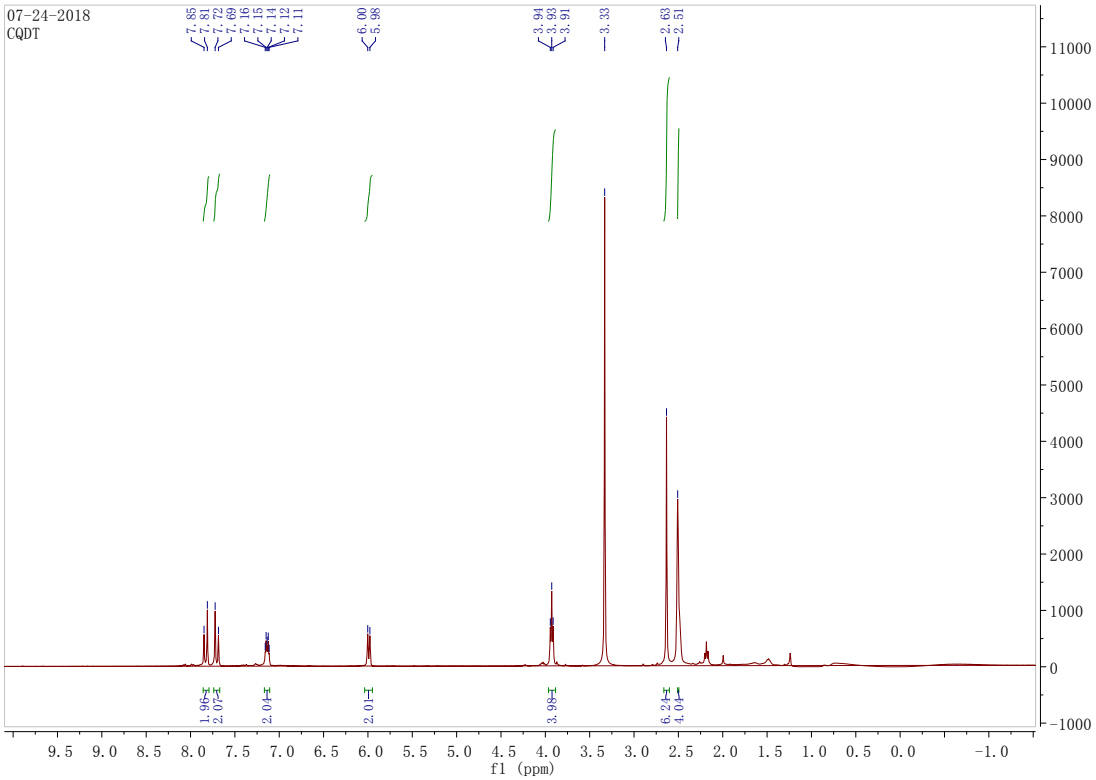

Figure S6. ^{1}H NMR spectrum of the target compound **11**

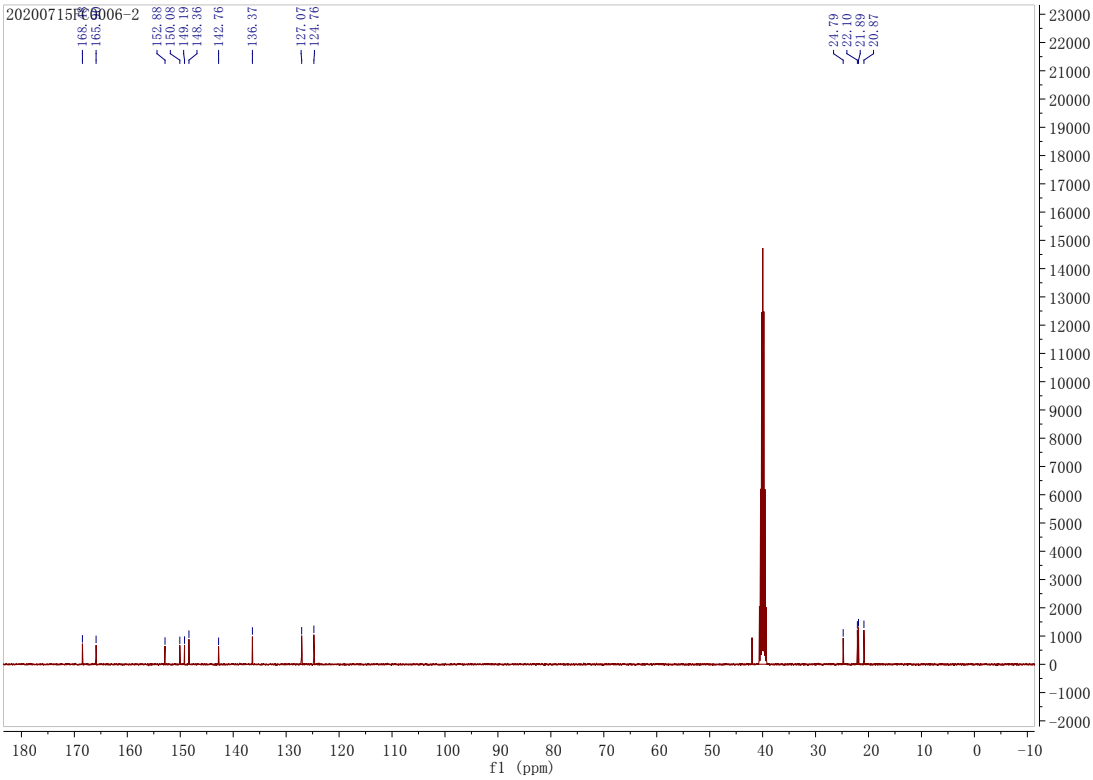

Figure S7. ^{13}C NMR spectrum of the target compound **11**

4. HPLC analysis of compounds 6 and 11.

Method: 75% methanol aqueous solution, flow rate =1 ml/min, Agilent Eclipse Plus-C18 4.6*250 mm, 5 μm, temp 25 °C, wavelength 254 nm.

Compound **6**: Purity 98.2%.

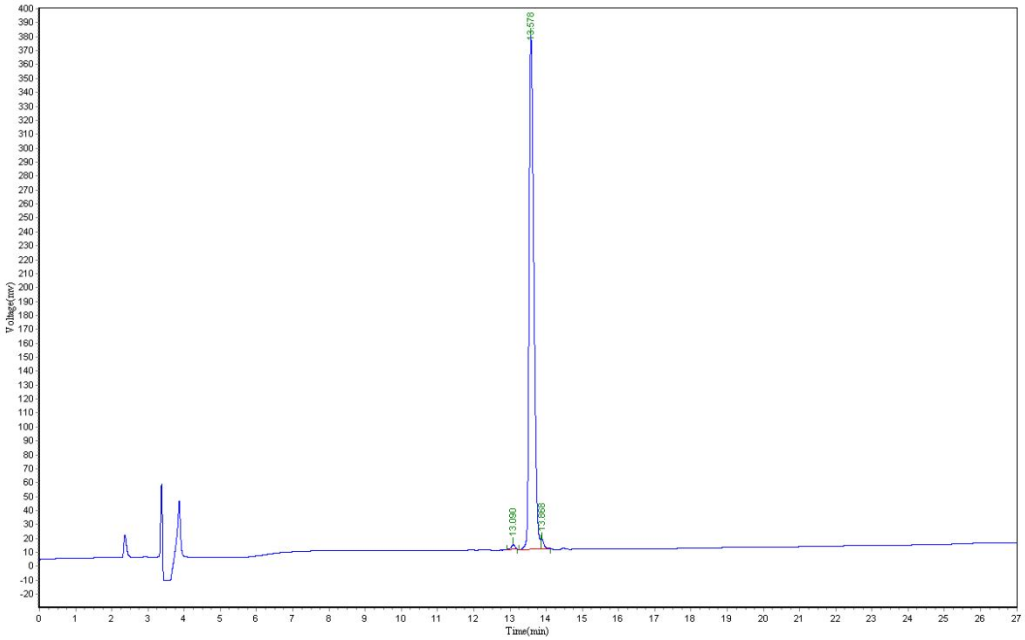

Figure S8. HPLC analysis of compound **6**

Compound **11**: Purity 96.6%.

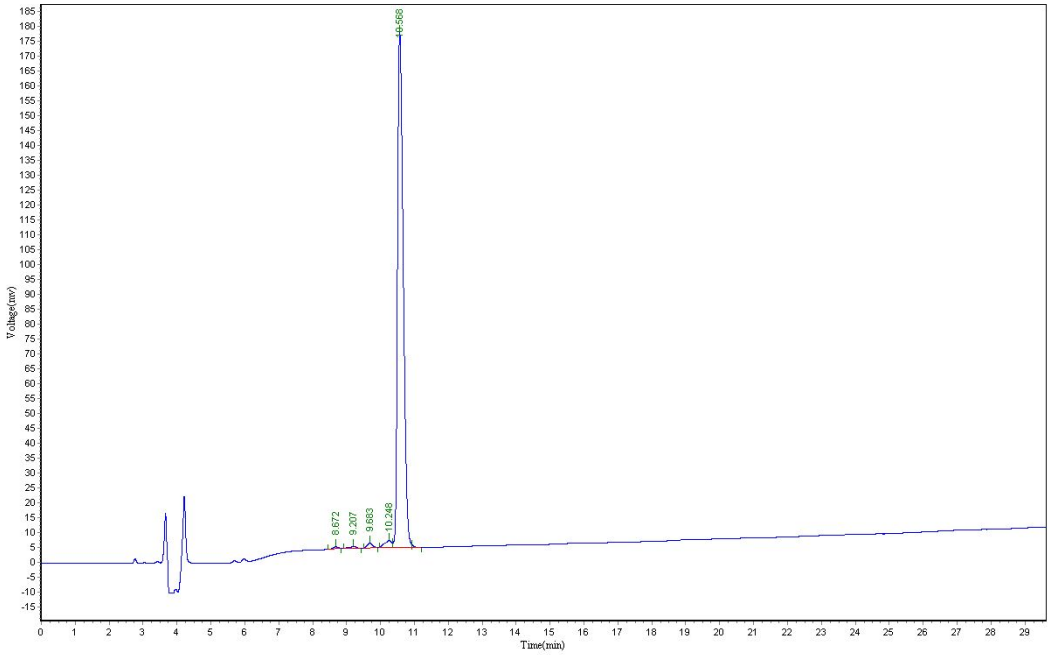

Figure S9. HPLC analysis of compound **11**

5. IR analysis of compounds 6 and 11.

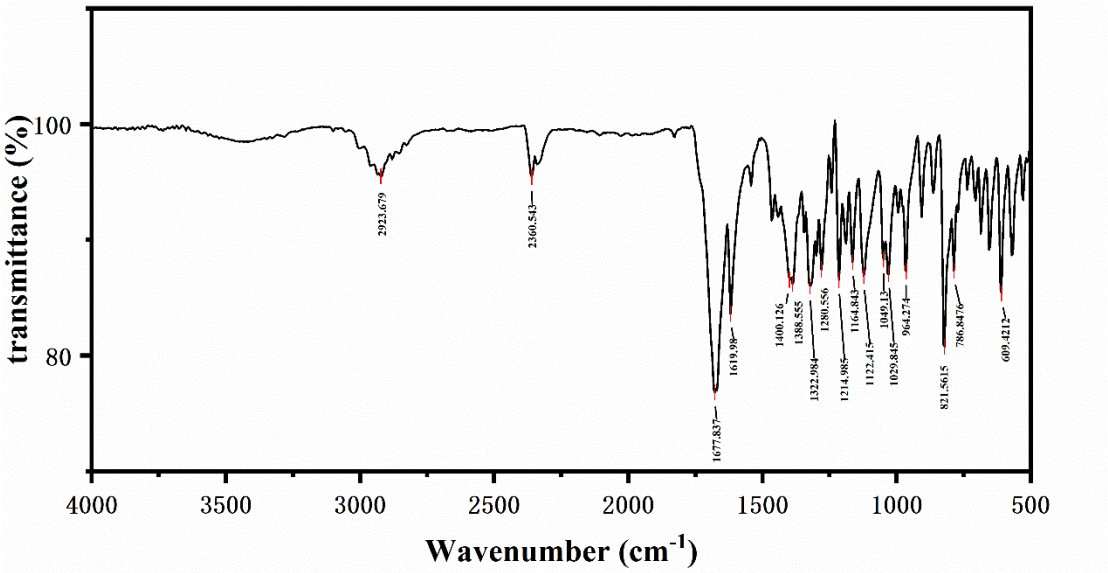

Figure S10. IR spectrum of the target compound **6**

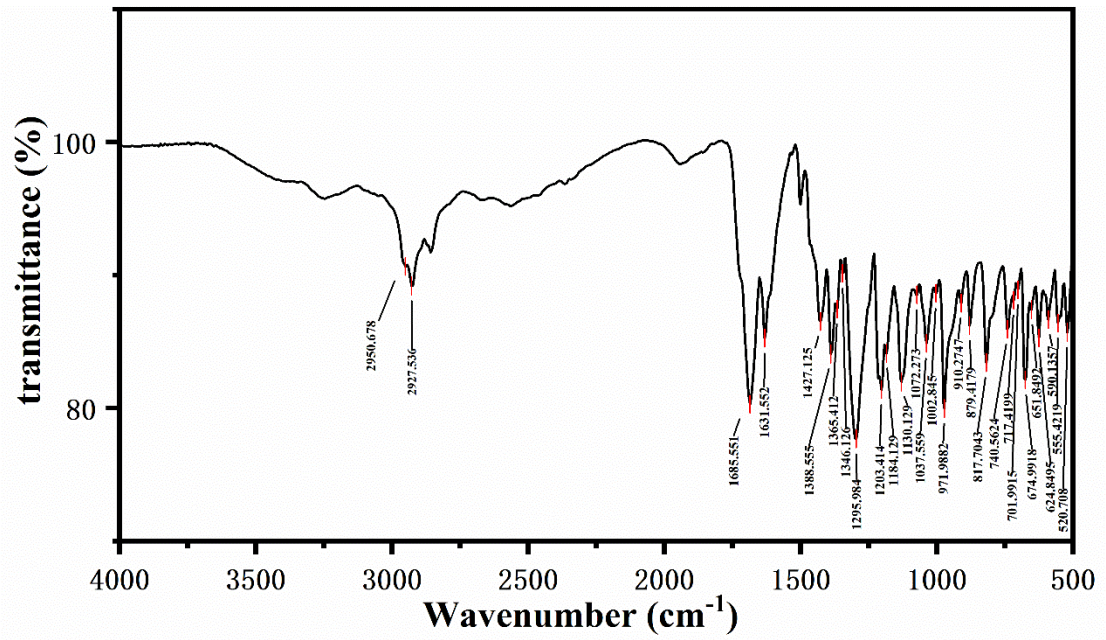

Figure S11. IR spectrum of the target compound **11**

6. UV analysis of compounds 6 and 11.

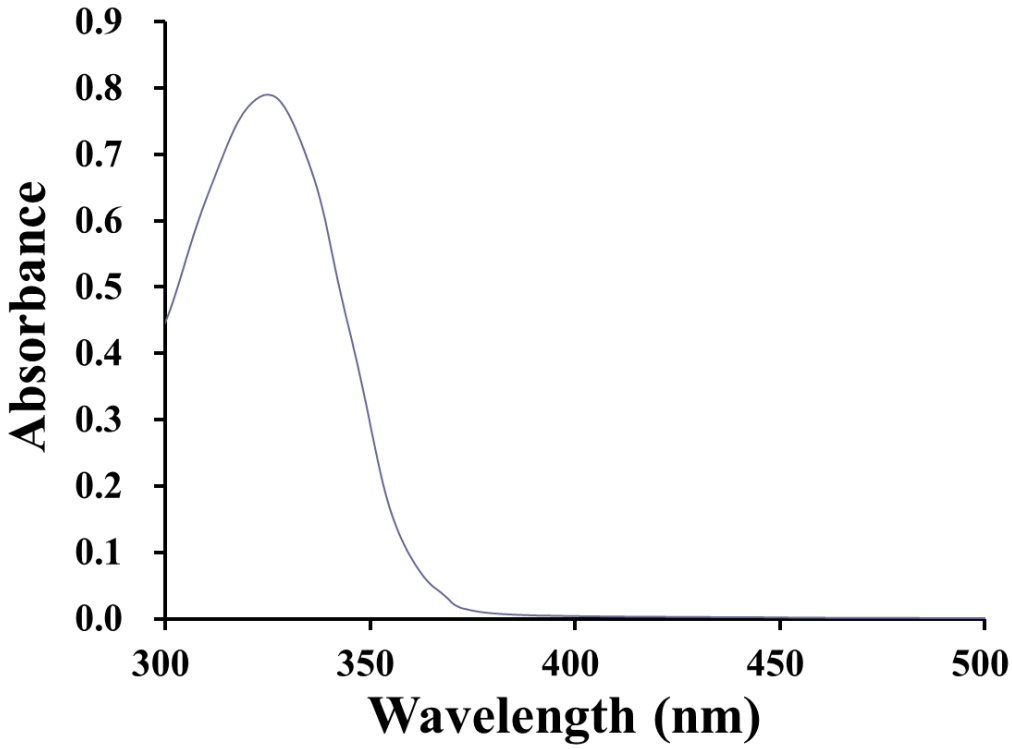

Figure S12. UV spectrum of the target compound **6**

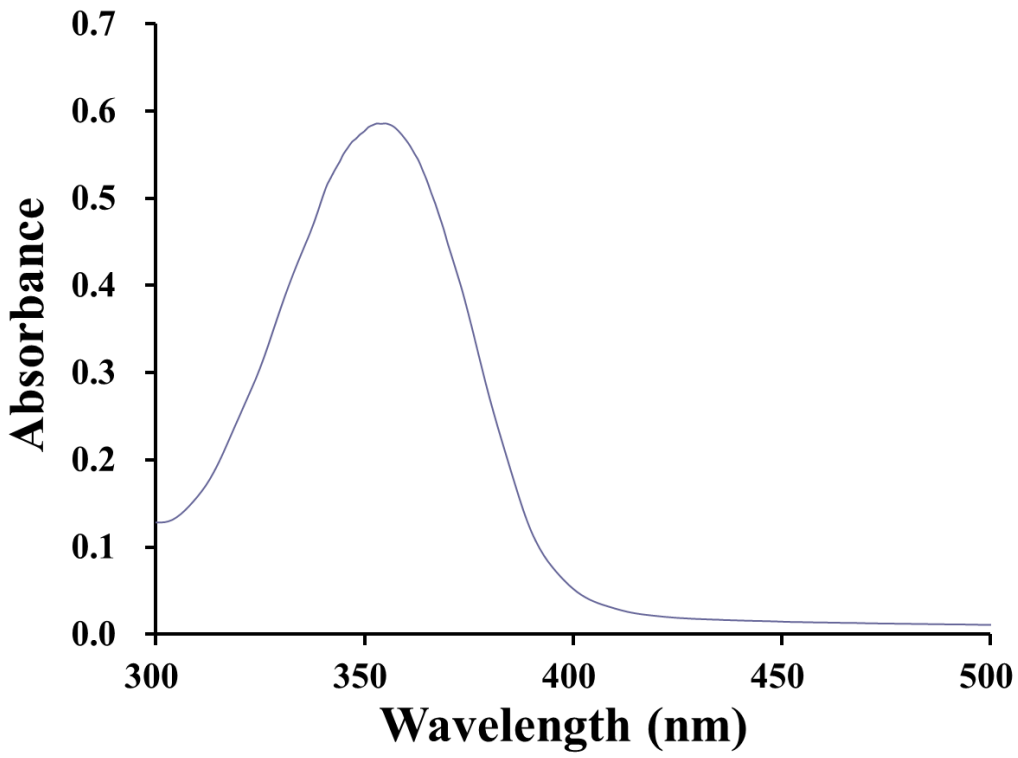

Figure S13. UV spectrum of the target compound **11**