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APPENDICES

APPENDIX A

A.1 Calculation of molar absorptivity of polymer; ϵ

$$X \text{ ppm} = \frac{X \times 10^{-3}}{\text{Molecular weight (polymeric unit)}} \text{ moles of polymer/ 1000 mL}$$

By plotting a graph between absorbance (at λ_{max}) and concentrations (X) of each polymer samples, a linear relationship was obtained with its slope represented the molar absorptivity (ϵ) of the polymer.

A.2 Calculation percentage of penetration

$$A = \epsilon bc$$

Where A is absorbance

b is the cell path length (1 cm)

c is the concentration of the absorbing species in mol per litre

Molar absorptivity (ϵ) of trimethylcurcumin is $62,241 \text{ M}^{-1}\text{cm}^{-1}$.

$$\begin{aligned} c_{\text{tri}} &= \frac{A}{62241} \\ &= X \text{ mole/lit} \end{aligned}$$

Receptor volume is 13 mL, and molecular weight of trimethylcurcumin is 410.38:

$$\text{Weight of penetrated trimethylcurcumin} = \frac{X \times 13 \times 410.38}{1000}$$

Weight of initial trimethylcurcumin is 0.005 g:

$$\text{Percent penetration} = \frac{\text{Weight of penetrated trimethylcurcumin} \times 100}{\text{Weight of initial trimethylcurcumin}}$$

A.3 Degree of polymerization of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2methoxyphenyl) succinate (curcumin oligomer)

The weight average molecular weight (Mw) of curcumin oligomer obtained by gel permeation chromatography technique (GPC) was 1255.

The average degree of polymerization was calculated by the following equation:

$$\text{Average degree of polymerization} = \frac{\text{Mw of polymer}}{\text{Mw of monomeric unit}}$$

$$\begin{aligned} \text{Since Mw of monomeric unit was 450.44, therefore, the average degree of} \\ \text{polymerization of this compound} &= \frac{1255}{450.44} \\ &= 2.78 \end{aligned}$$

Structures of synthesized curcumin oligomer can therefore, be expressed as follows:

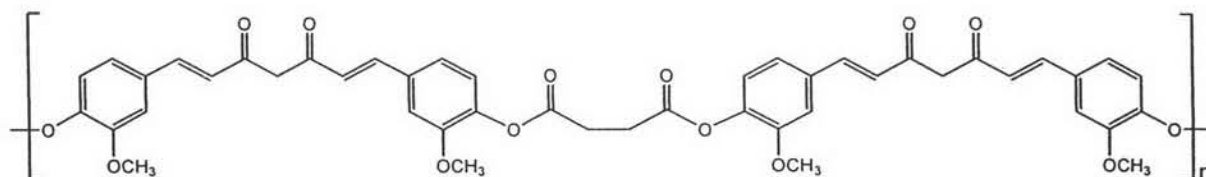


Figure A.3.1 Structure of curcumin oligomer.

APPENDIX B

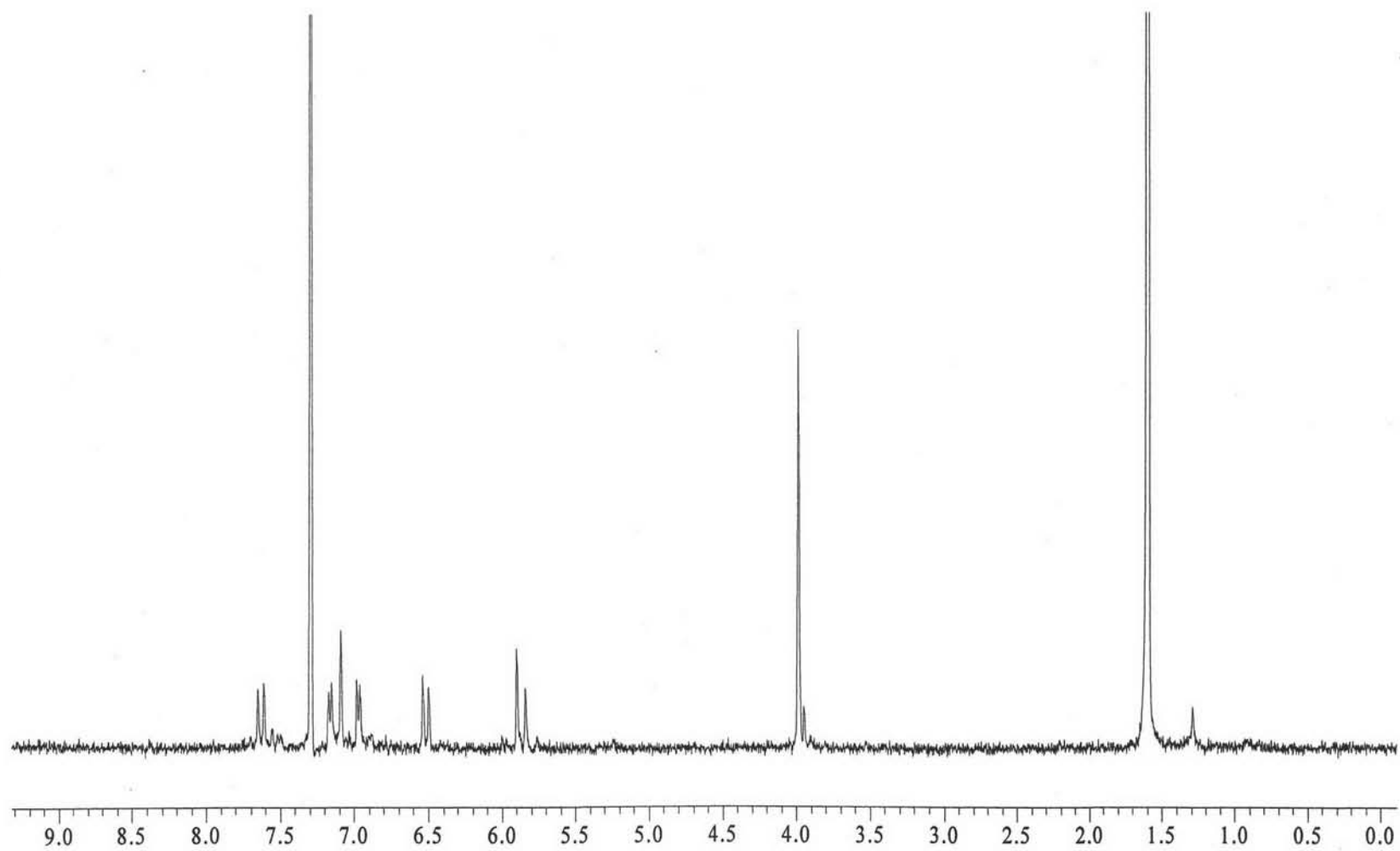


Figure B.1 ¹H-NMR spectrum of 1,7-bis[4-hydroxy-3-methoxyphenyl]-1,6-heptadiene-3,5-dione (**curcumin**).

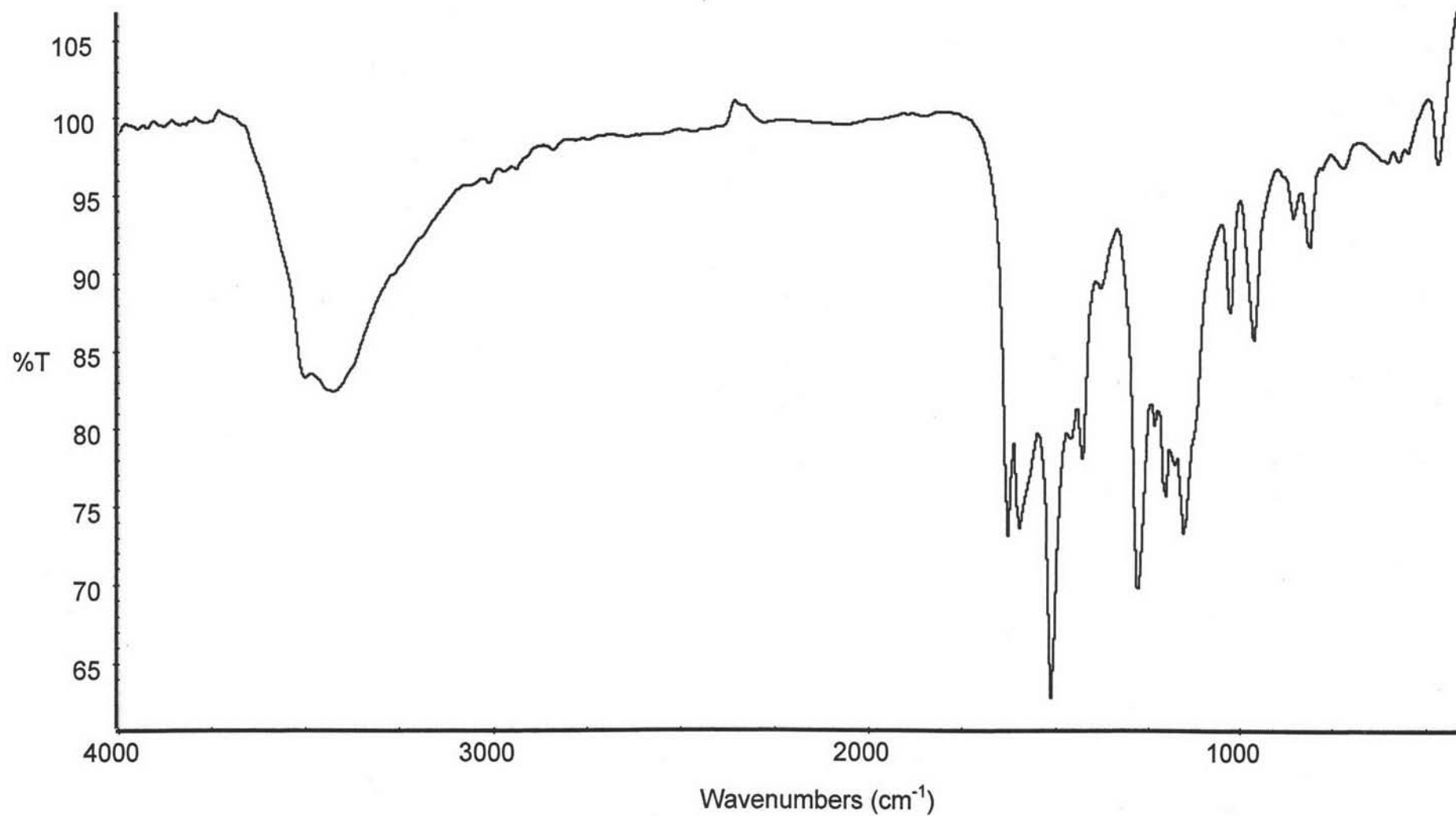


Figure B.2 IR spectrum of 1,7-bis[4-hydroxy-3-methoxyphenyl]-1,6-heptadiene-3,5-dione (**curcumin**).

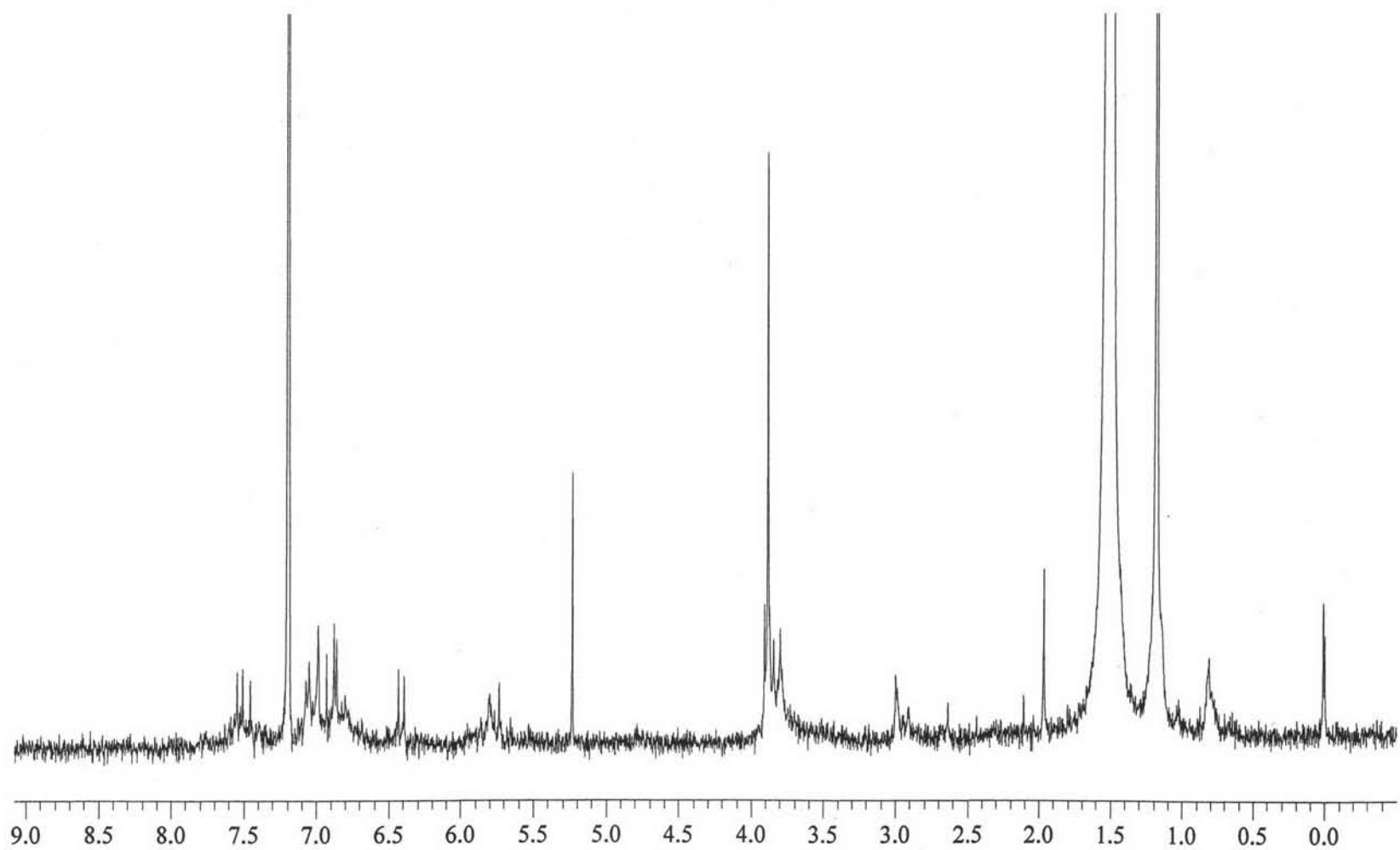


Figure B.3 ^1H -NMR spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (curcumin oligomer).

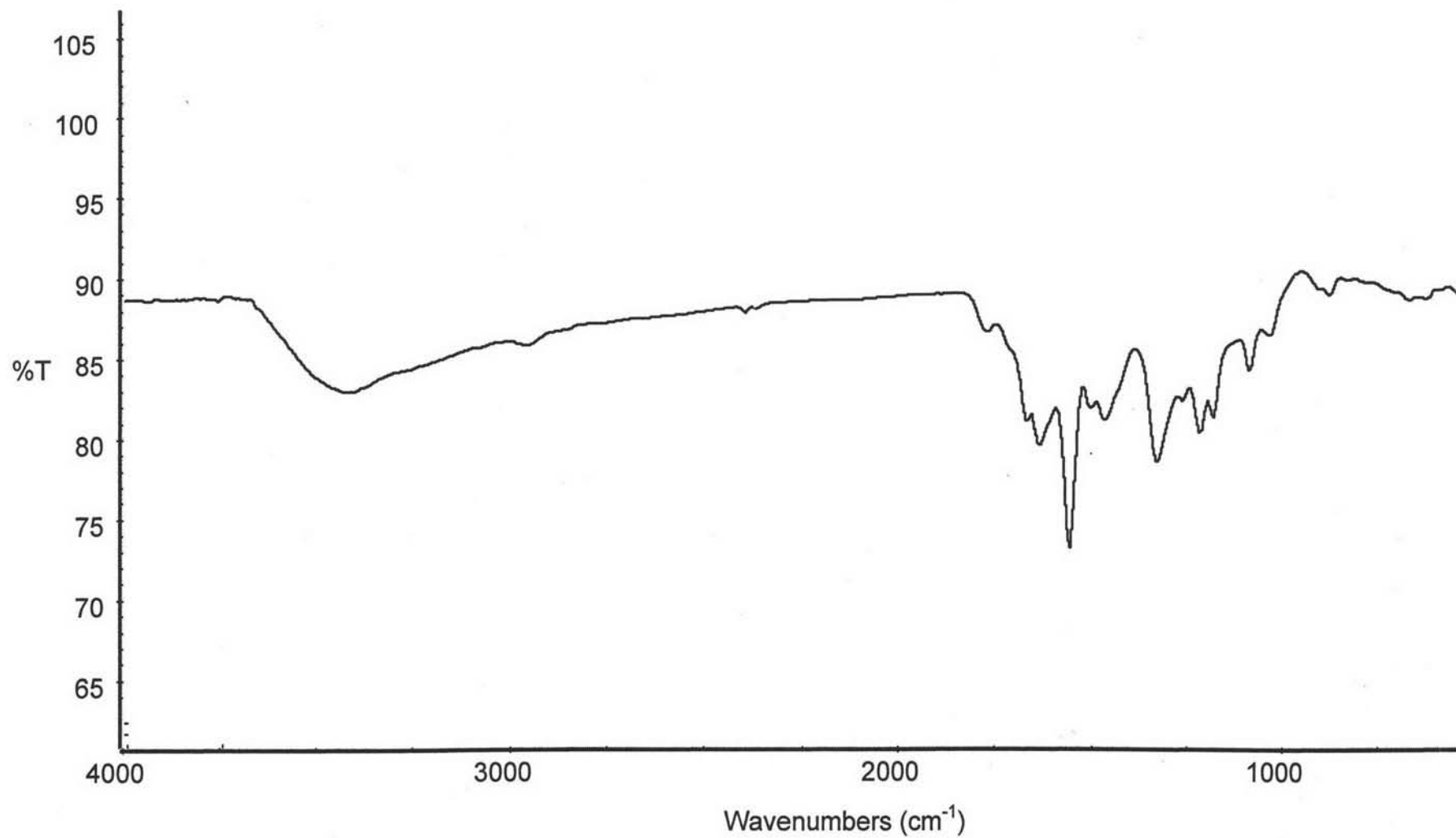


Figure B.4 IR spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (curcumin oligomer).

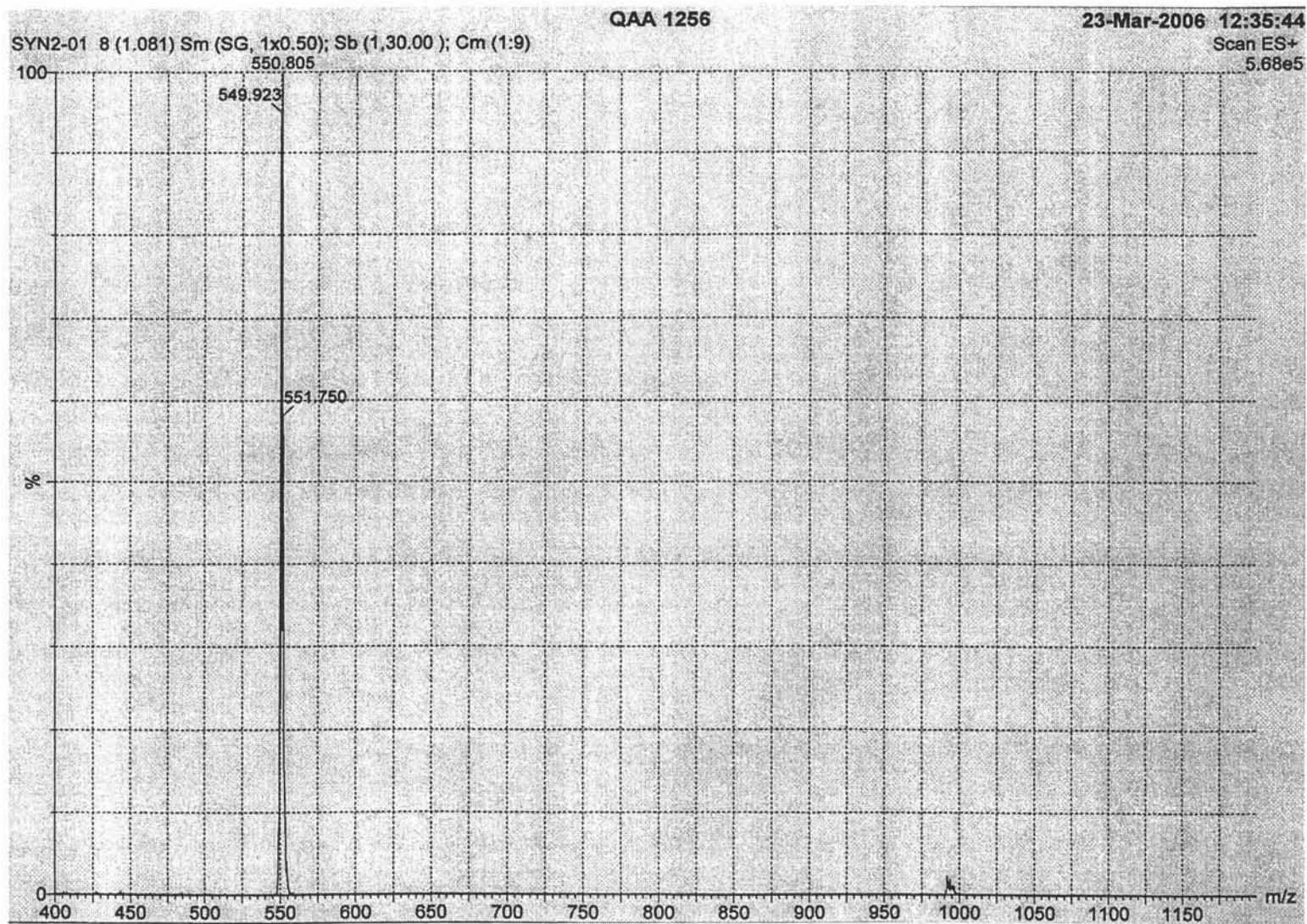


Figure B.5 ESI-MS spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2methoxyphenyl) succinate (curcumin oligomer).

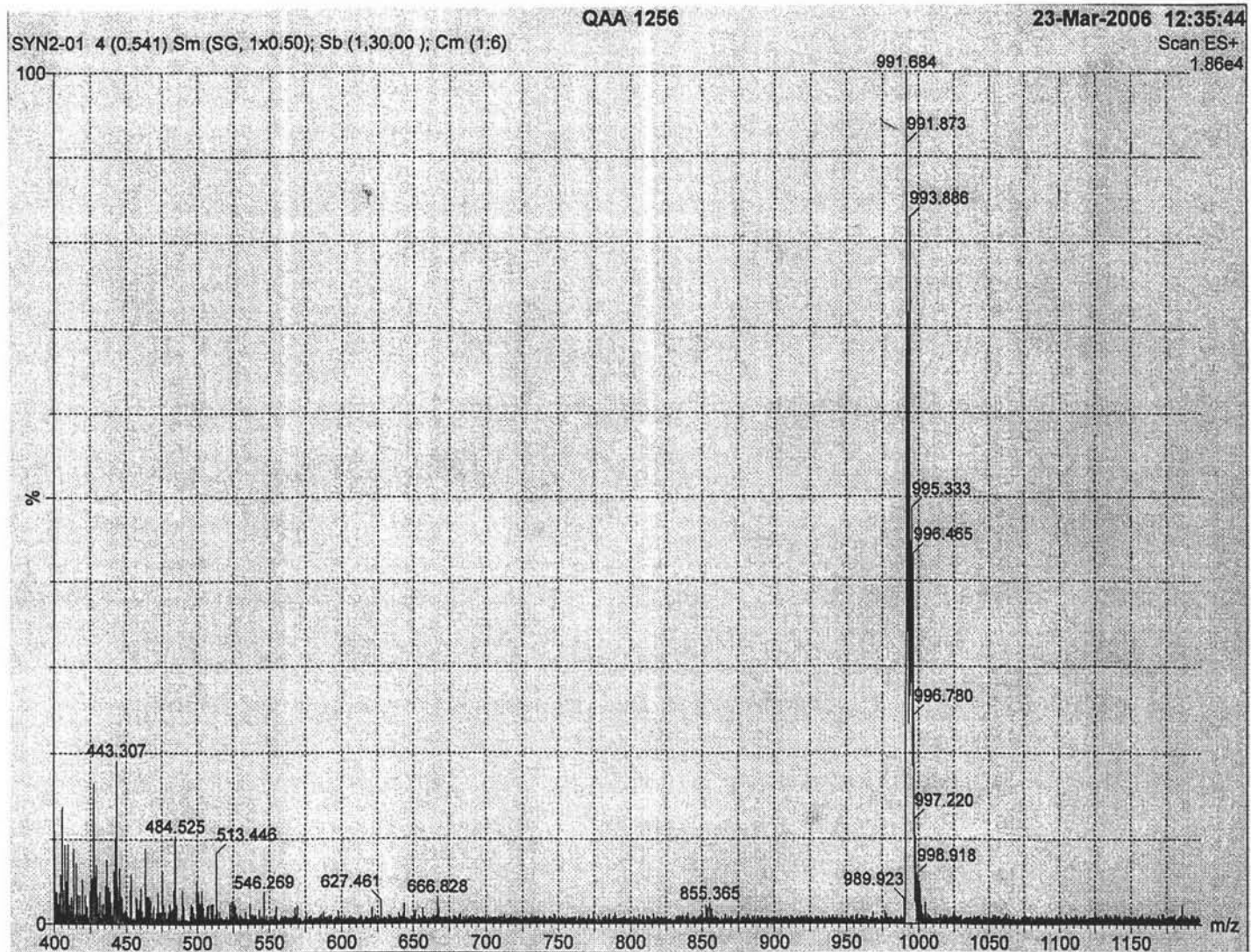


Figure B.5 ESI-MS spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2methoxyphenyl) succinate (curcumin oligomer).

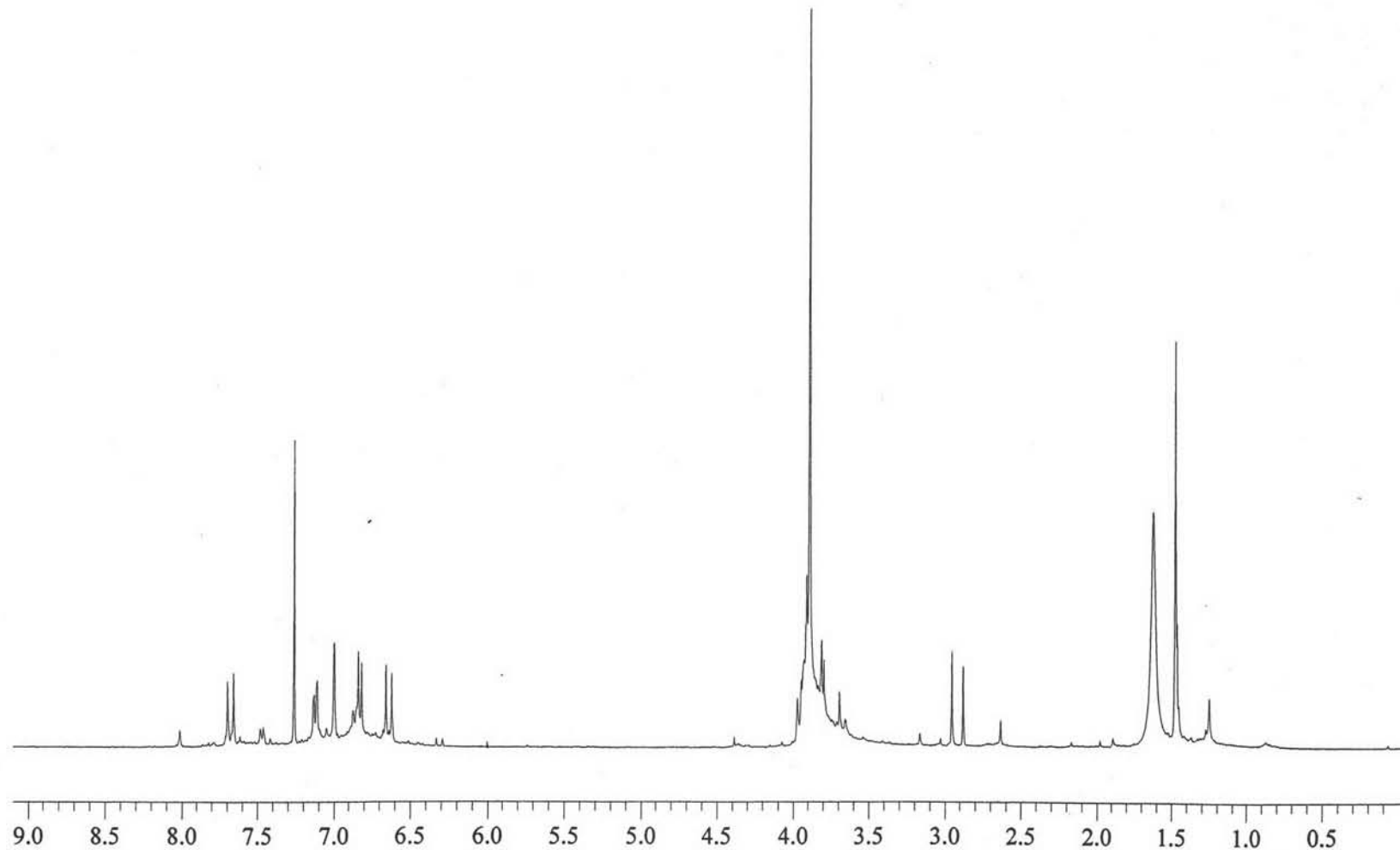


Figure B.6 ¹H-NMR spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-4-methyl-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (MCO)₂.

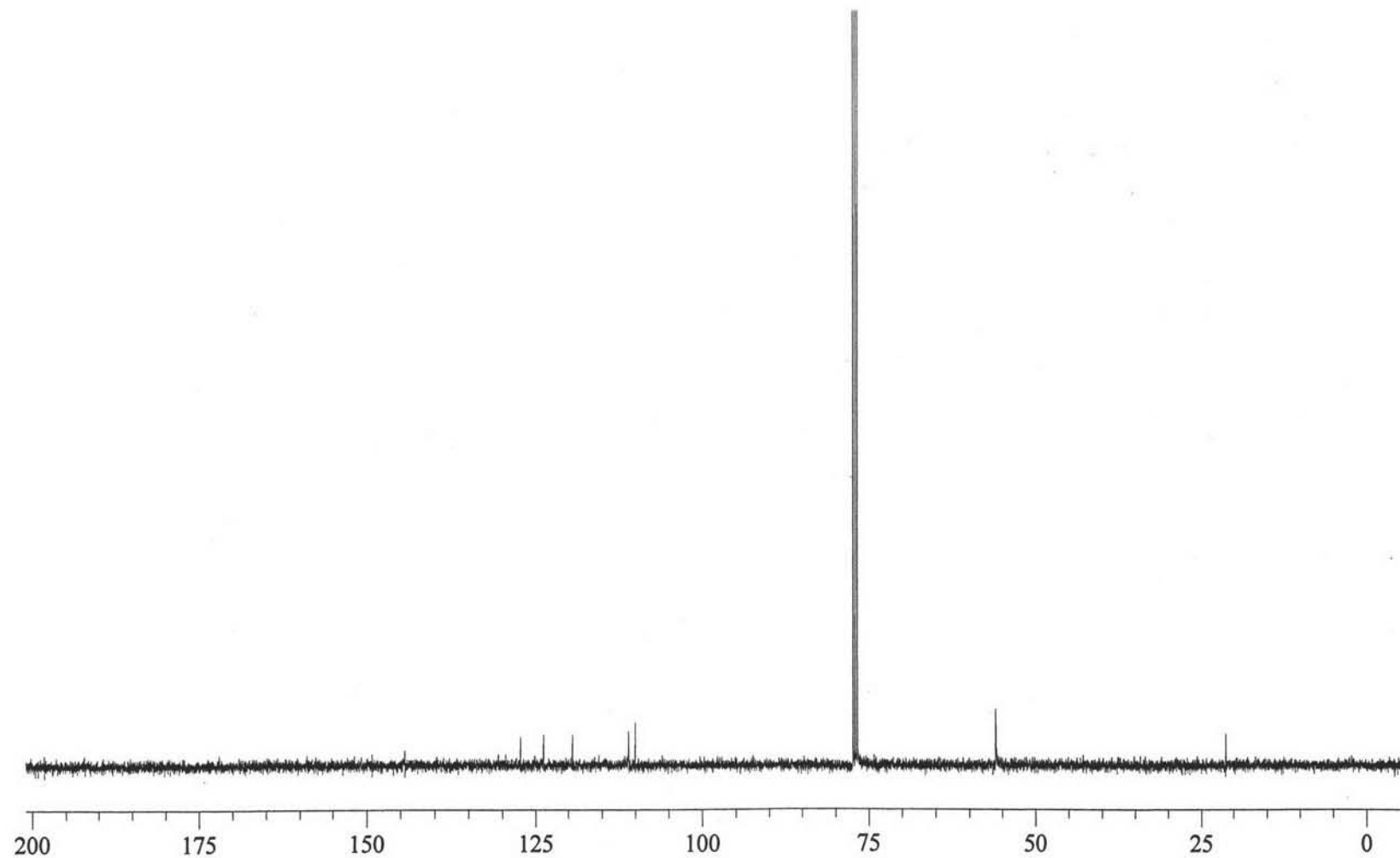


Figure B.7 ^{13}C -NMR spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-4-methyl-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate
(MCO)₂

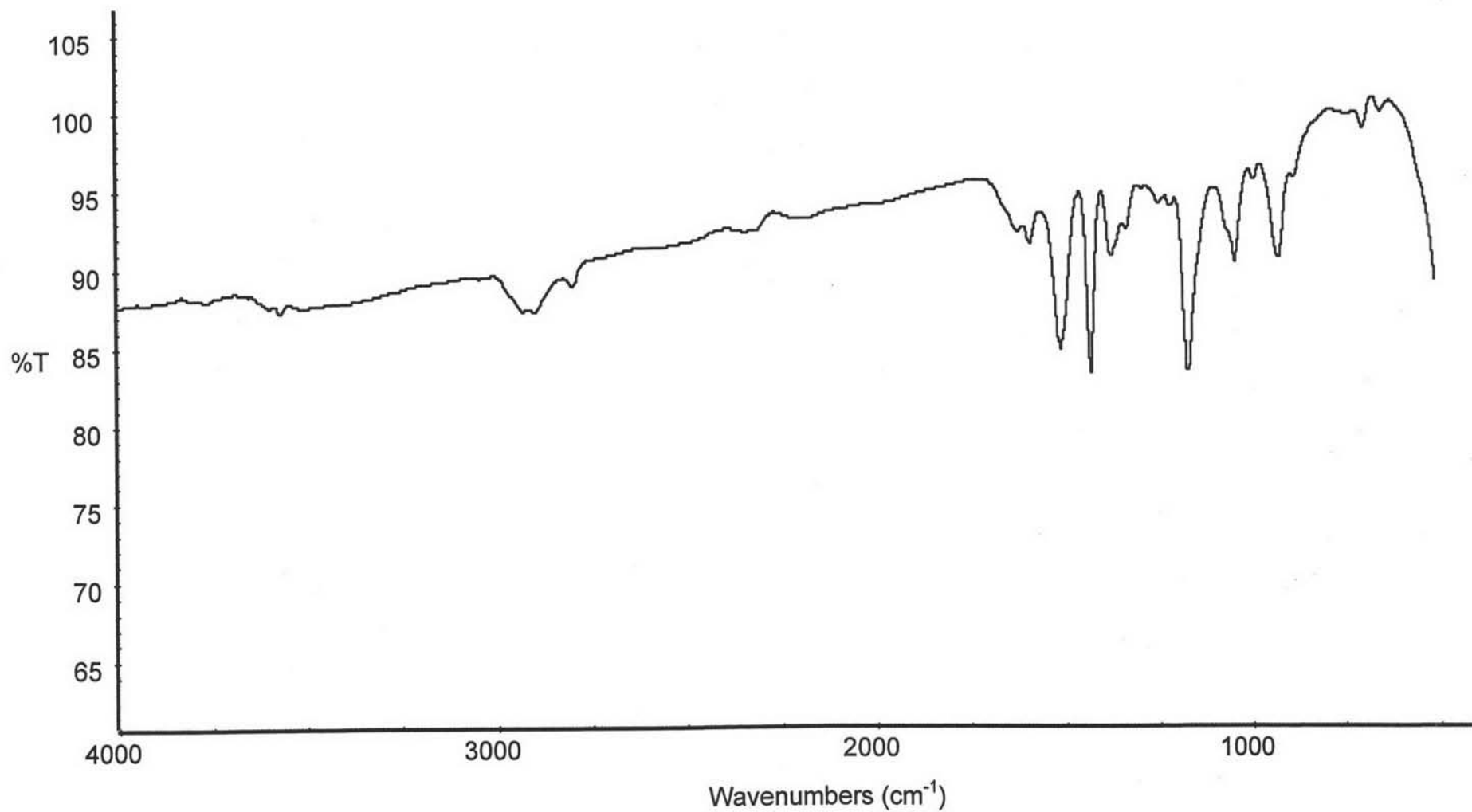


Figure B.8 IR spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-4-methyl-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (MCO)₂

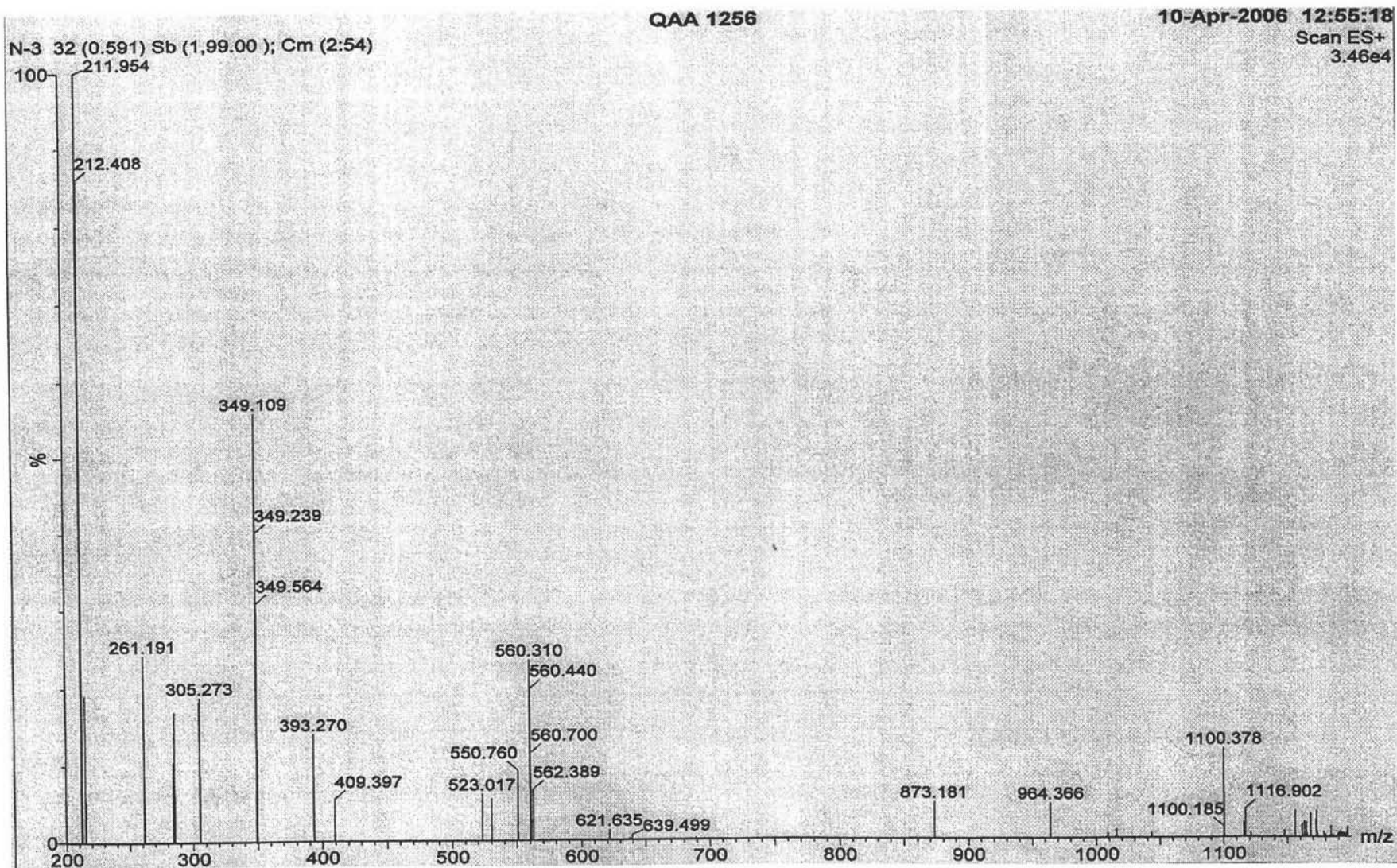


Figure B.9 ESI-MS spectrum of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-4-methyl-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (MCO)₂

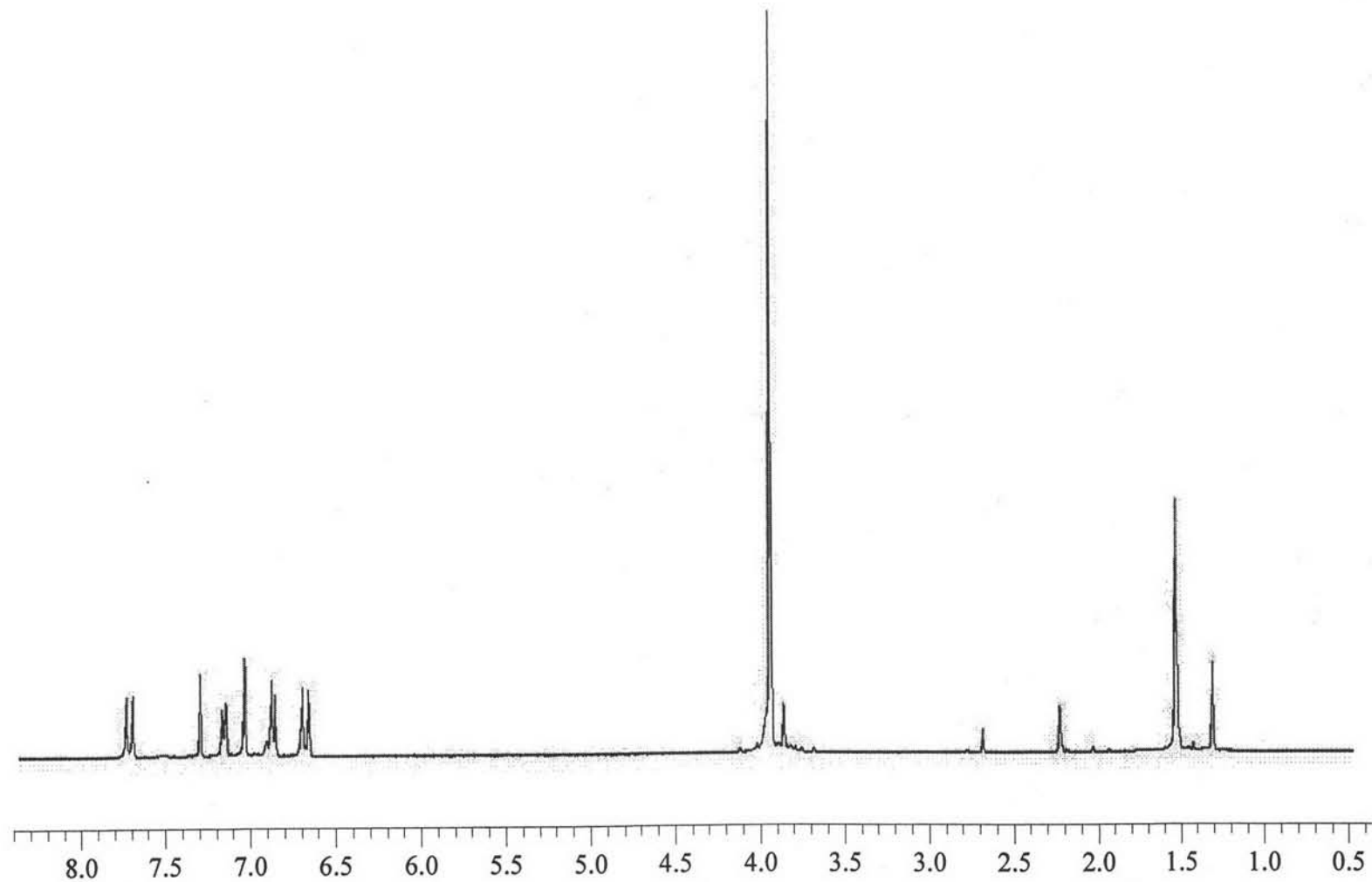


Figure B.10 $^1\text{H-NMR}$ spectrum of 1,7-bis-(4-hydroxy-3-methoxy-phenyl)-4-methyl-1,6-heptadiene-3,5-dione (trimethylcurcumin, **TMC**).

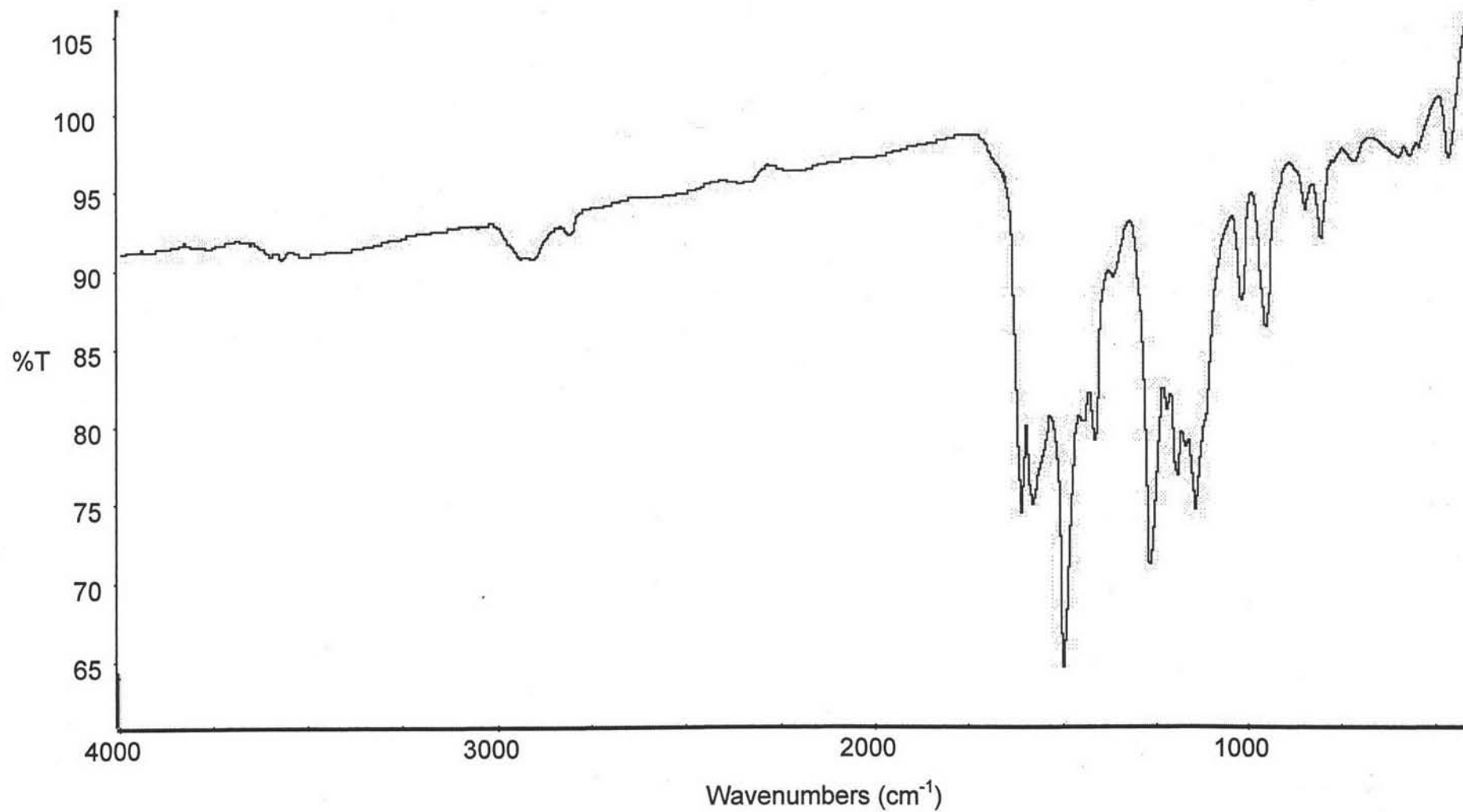


Figure B.11 IR spectrum of 1,7-bis-(4-hydroxy-3-methoxy-phenyl)-4-methyl-1,6-heptadiene-3,5-dione (trimethylcurcumin, TMC).

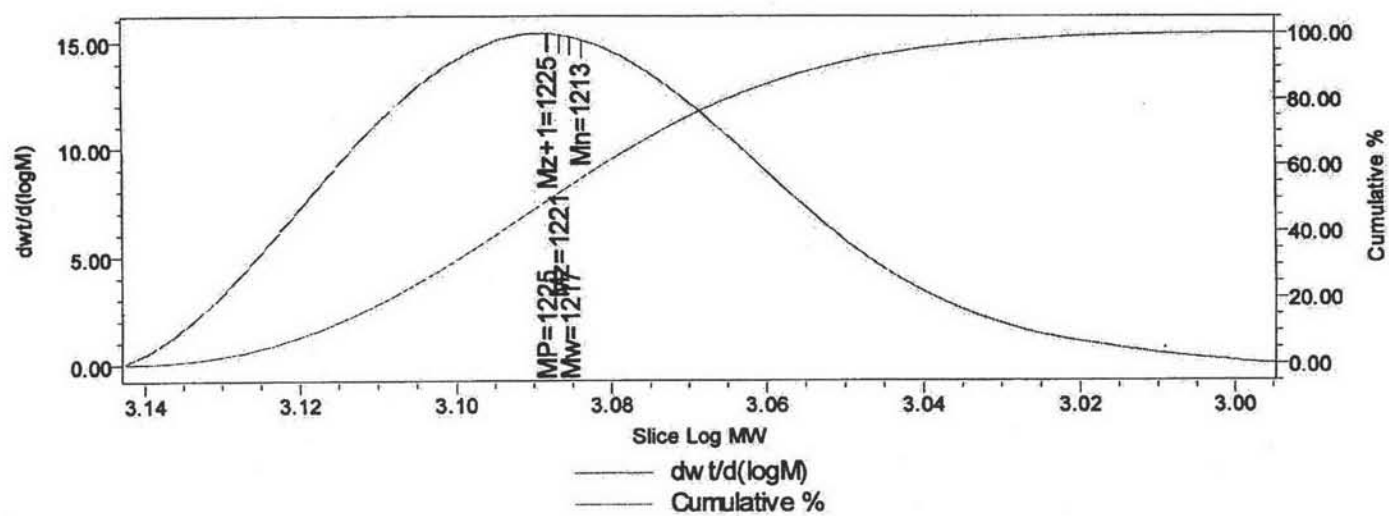


Figure B.12 GPC of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (**curcumin oligomer**).

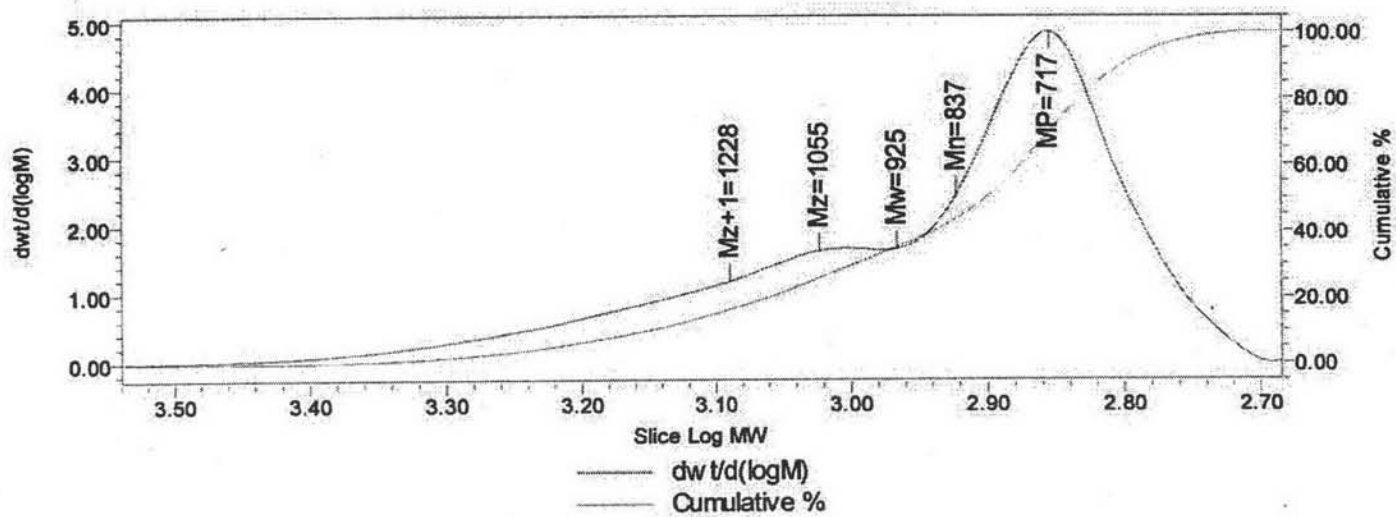


Figure B.13 GPC of bis(4-((1E,6E)-7-(3,4-dimethoxyphenyl)-4-methyl-3,5-dioxohepta-1,6-dienyl)-2-methoxyphenyl) succinate (MCO).

VITA

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