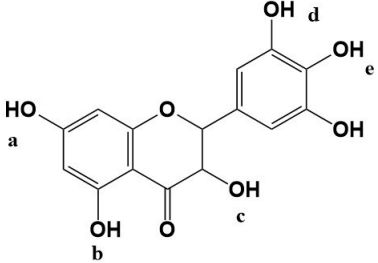
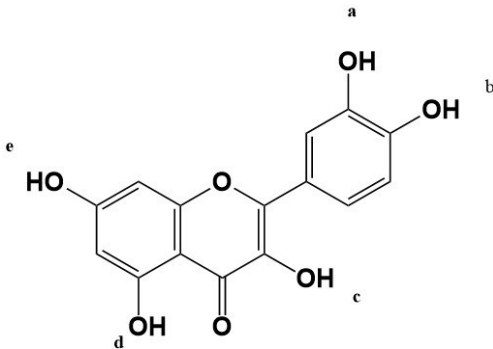
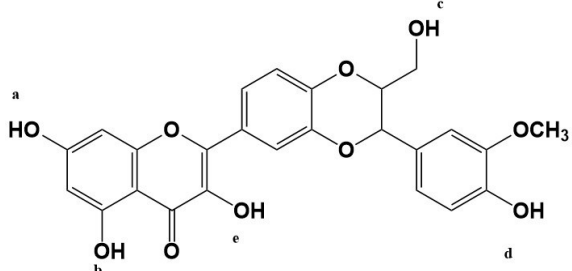
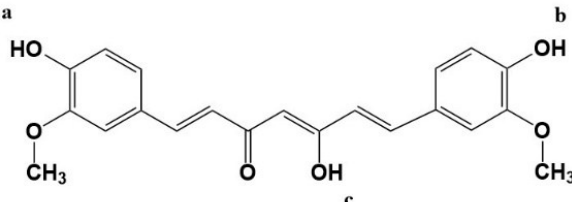
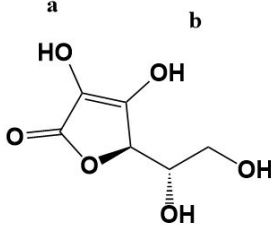
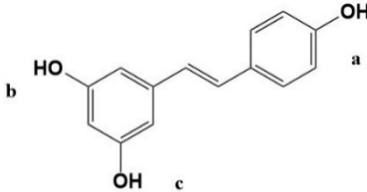
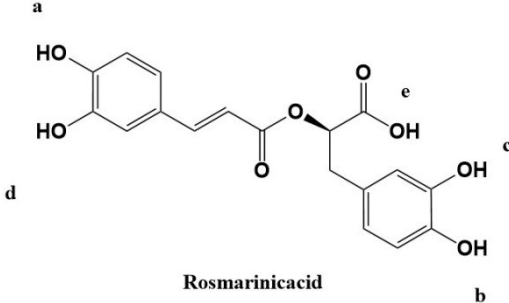
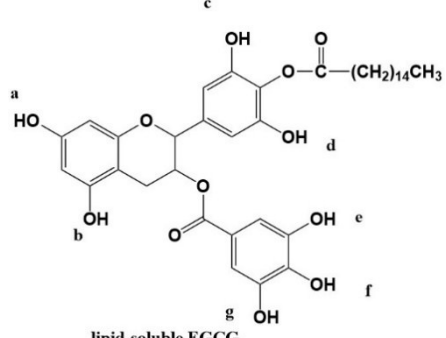
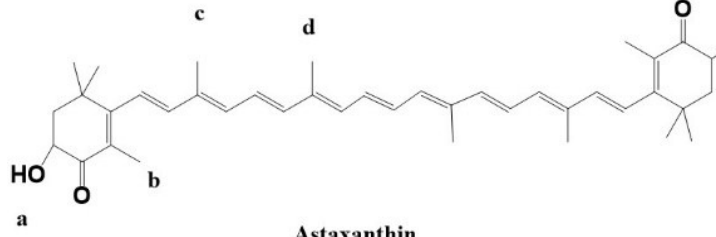
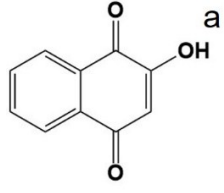


Supporting Information

Table S1. Molecular structure of 18 natural phenolic antioxidants and the free energies of dissociation of ArO-H bonds at different positions.

Number	Molecular Structure and the corresponding position	Dissociation positions	ΔG^{298K} (kJ/mol)
1	 <p style="text-align: center;">Dihydromyricetin</p>	a b c d e	362.01 404.86 413.34 355.00 315.15
2	 <p style="text-align: center;">Quercetin</p>	a b c d e	353.46 315.37 410.77 407.54 366.16
3	 <p style="text-align: center;">Silymarin</p>	a b c d e	367.55 387.77 407.15 348.61 421.55
4	 <p style="text-align: center;">Curcumin</p>	a b c	328.46 328.77 404.00

5		a b	325.38 357.35
Demethoxycurcumin			
6		a*2	360.37
Bilemethoxycurcumin			
7		a	304.48
α-tocopherol			
8		a	312.73
β-tocopherol			
9		a	315.12
γ-tocopherol			
10		a	329.74
δ-tocopherol			

11	 <p style="text-align: center;">vitamin C</p>	a b	328.54 322.46
12	 <p style="text-align: center;">Resveratrol</p>	a b c	327.08 349.94 350.30
13	 <p style="text-align: center;">Rosmarinic acid</p>	a b c d e	295.67 301.95 331.56 342.67 402.06
14	 <p style="text-align: center;">lipid-soluble EGCG</p>	a b c d e f g	353.78 327.34 329.69 321.54 304.29 261.51 329.86
15	 <p style="text-align: center;">Astaxanthin</p>	a*2 b*2 c*2 d*2	384.00 307.16 341.24 362.73
16	 <p style="text-align: center;">Lawsone</p>	a	355.32

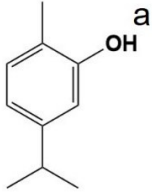
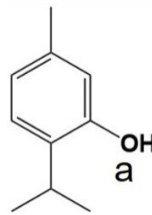
17	 Carvacrol	a	342.00
18	 Thymol	a	335.59

Table S2. Free energy of dissociation for hydrogen in NR.

Dissociation position ¹	a	b	c	d
$\Delta G^{298.15K}$ (kJ/mol)	347.42	437.21	357.91	354.29

¹the structure of NR at different dissociation position was seen in Fig. S1.

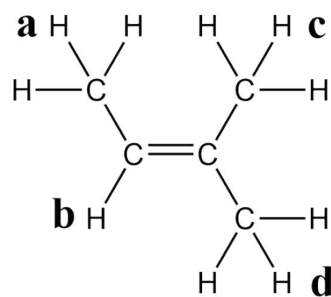


Figure S1. The dissociation positions of NR.

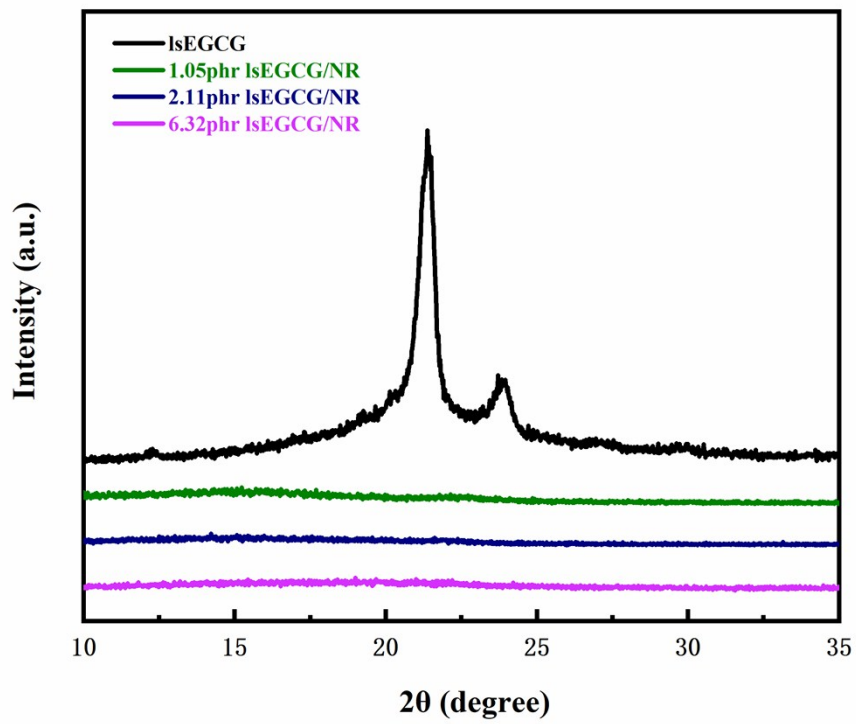


Figure S2. X-ray diffraction patterns of lsEGCG powder and lsEGCG/NR compounds with different contents.