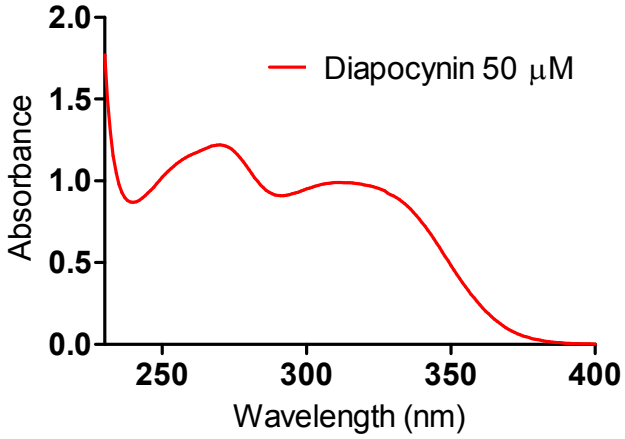
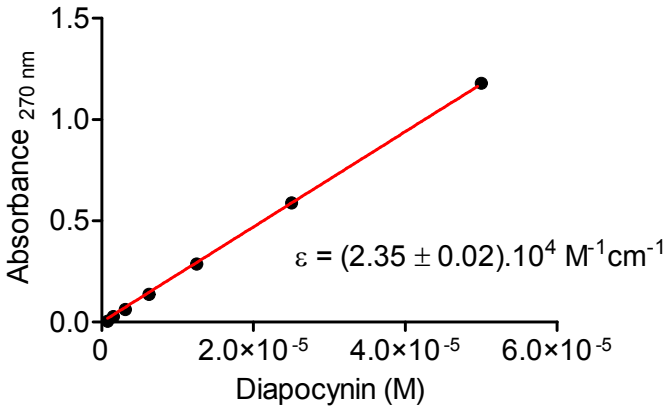
Electronic Supplementary Material (ESI) for RSC Advances.

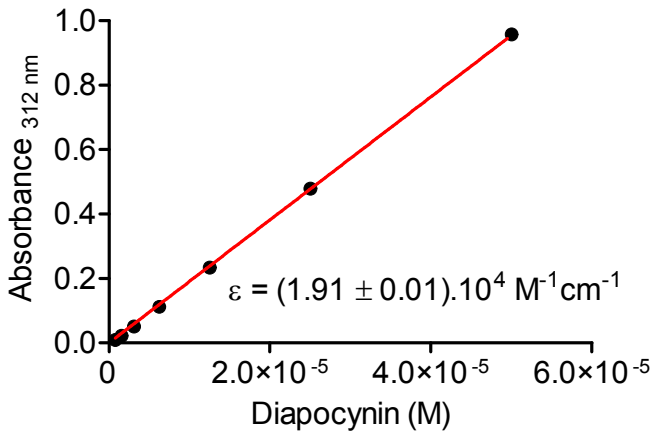

# Supporting Information

## Molar Absorption Coefficient of Diapocynin

Absorption spectrum and determination of molar absorption coefficient of diapocynin in 0.05 mM phosphate buffer, pH 7.0

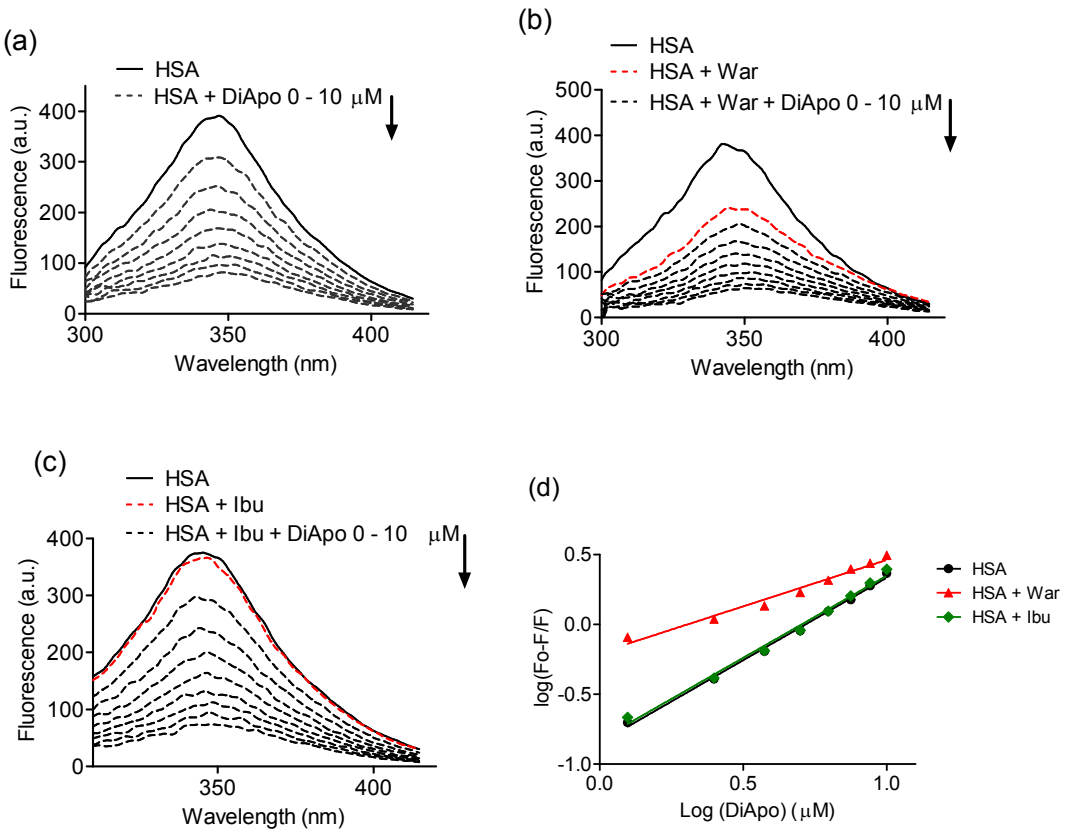


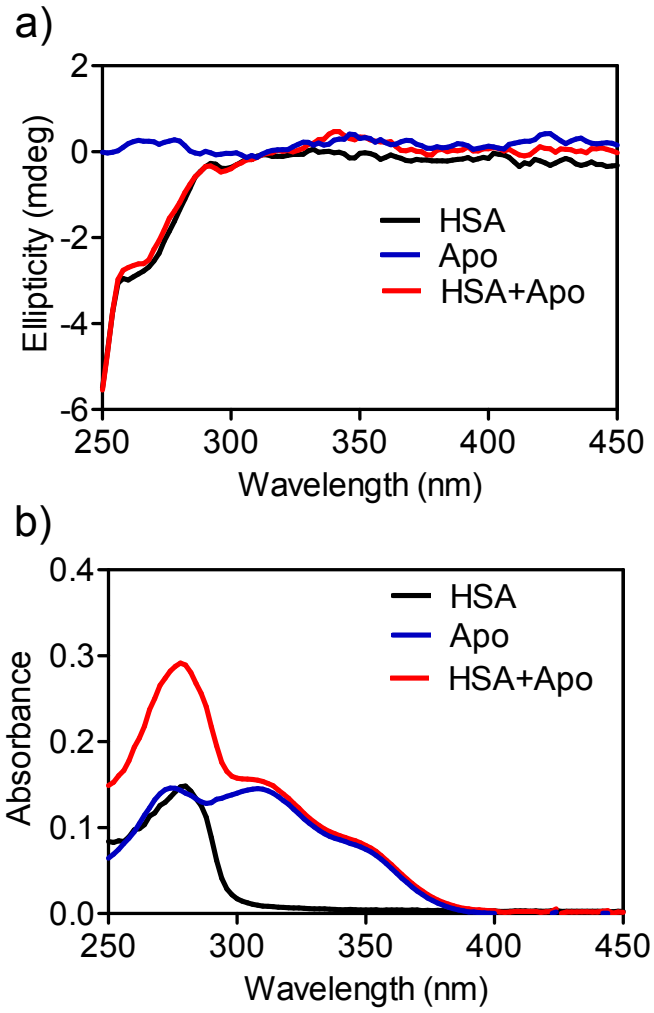
**Number of Binding Sites**

Quenching of the intrinsic fluorescence of HSA (5 μM; $\lambda_{ex}$ = 280 nm) by diapocynin in the absence **(a)** or presence of 5 μM warfarin **(b)** or 5 μM ibuprofen **(c)**. The experiments were performed in 0.05 M phosphate buffer, pH 7.0 at 25°C. The determinations of the binding constants **(d)** were performed by fitting the data in the double logarithm equation: log [(F0-F)/F] = log Ka + n.log [Q]. The results are the average and SD of experiments performed in triplicate. The binding constants (Ka) and stoichiometry of the binding (n) were: warfarin + diapocynin (6.27 x $10^5$ $mol^{-1}$.L, n = 0.66); ibuprofen + diapocynin (1.49 x $10^5$ $mol^{-1}$.L, n = 1.18); only diapocynin (1.42x $10^5$ $mol^{-1}$.L, n = 1.17).



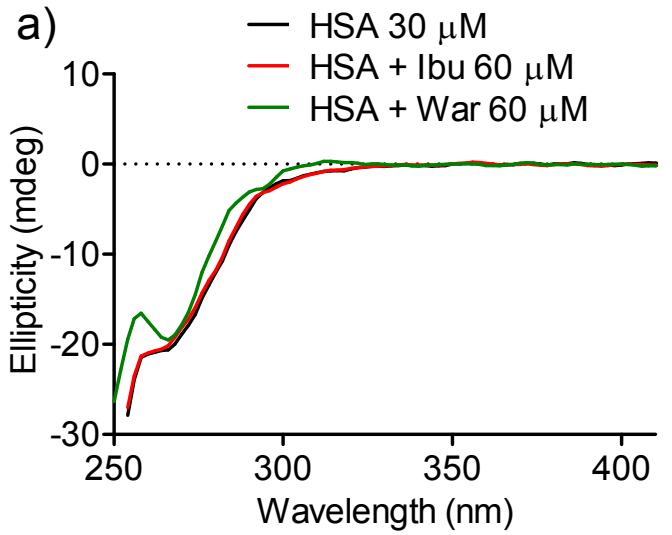
**Absence of Induced Ellipticity for Apocynin**

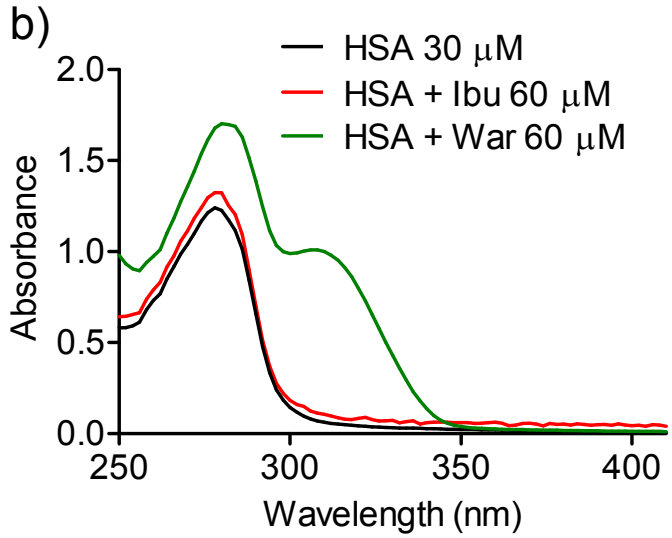
The binding of apocynin with HSA did not provoke the generation of an induced circular dichroism signal. **(a)** Near-UV-CD and **(b)** UV-Vis spectra of HSA in the presence or absence of apocynin (Apo). The mixtures consisted of 30 μM HSA and 30 μM apocynin in 0.05 M phosphate buffer, pH 7.0 at 25°C.



**Absence of Induced Ellipticity for Warfarin and Ibuprofen**

The binding of warfarin and ibuprofen with HSA did not provoke the generation of an induced circular dichroism signal. **(a)** Near-UV-CD and **(b)** UV-Vis spectra of HSA in the presence or absence of warfarin (War) or ibuprofen (Ibu). The mixtures consisted of 30 μM HSA and 30 μM ligands in 0.05 M phosphate buffer, pH 7.0 at 25°C.



**Cartesian coordinates of the *syn-aS* conformer.**

| Atom | X | Y | Z |
|---|---|---|---|
| C | -1.462416 | -1.002983 | 0.519662 |
| C | -0.737174 | 0.057761 | -0.019818 |
| C | -1.432232 | 1.105077 | -0.623767 |
| C | -2.837561 | 1.093448 | -0.655056 |
| C | -3.546329 | 0.041448 | -0.105855 |
| C | -2.851739 | -1.024949 | 0.483748 |
| C | 0.745291 | 0.064166 | 0.018713 |
| C | 1.432256 | 1.116597 | 0.615099 |
| C | 2.840900 | 1.111860 | 0.650715 |
| C | 3.553205 | 0.063916 | 0.110211 |
| C | 2.866501 | -1.008393 | -0.477664 |
| C | 1.478385 | -0.998798 | -0.516610 |
| O | 0.757635 | 2.128366 | 1.191998 |
| O | 3.371506 | 2.207492 | 1.267085 |
| C | 4.782402 | 2.274405 | 1.370918 |
| C | 3.678943 | -2.124831 | -1.048875 |
| O | 4.888752 | -2.094151 | -1.004063 |
| O | -0.761982 | 2.114530 | -1.208638 |
| O | -3.377269 | 2.183854 | -1.276817 |
| C | -4.786541 | 2.260883 | -1.360287 |
| C | -3.562312 | -2.192616 | 1.089107 |
| C | -5.076985 | -2.196106 | 1.086398 |
| C | 2.955273 | -3.292262 | -1.682752 |
| O | -2.944876 | -3.115064 | 1.570283 |
| H | 5.005094 | 3.204507 | 1.888210 |
| H | 5.167678 | 1.428751 | 1.947300 |
| H | 5.243527 | 2.283319 | 0.379387 |
| H | 1.402589 | 2.755780 | 1.542421 |
| H | 3.693904 | -4.007293 | -2.037852 |
| H | 2.294161 | -3.773522 | -0.958382 |
| H | 2.340404 | -2.952891 | -2.519652 |
| H | 0.931016 | -1.812180 | -0.978514 |
| H | 4.634798 | 0.030866 | 0.124752 |
| H | -4.627458 | 0.040345 | -0.136773 |
| H | -0.942738 | -1.825541 | 0.997449 |
| H | -1.406618 | 2.744806 | -1.553860 |
| H | -5.011056 | 3.189163 | -1.880171 |
| H | -5.189376 | 1.416558 | -1.927662 |
| H | -5.234246 | 2.282644 | -0.362229 |
| H | -5.459126 | -2.164914 | 0.063078 |
| H | -5.421972 | -3.104280 | 1.575279 |
| H | -5.465065 | -1.323227 | 1.616744 |

**Cartesian coordinates of the *anti-aS* conformer.**

| Atom | X | Y | Z |
|---|---|---|---|
| C | 1.560067 | -0.947025 | 0.447803 |
| C | 0.732243 | 0.068503 | -0.035084 |
| C | 1.328594 | 1.238376 | -0.505713 |
| C | 2.727449 | 1.379246 | -0.493663 |
| C | 3.533650 | 0.366109 | -0.013276 |
| C | 2.941487 | -0.811553 | 0.466928 |
| C | -0.744753 | -0.077505 | -0.037755 |
| C | -1.338717 | -1.237507 | -0.527474 |
| C | -2.741318 | -1.382357 | -0.510266 |
| C | -3.544481 | -0.381769 | -0.012065 |
| C | -2.954085 | 0.791887 | 0.480698 |
| C | -1.574547 | 0.932605 | 0.462861 |
| O | -0.583709 | -2.232067 | -1.038024 |
| O | -3.169096 | -2.570128 | -1.028460 |
| C | -4.566517 | -2.798315 | -1.059395 |
| C | -3.859726 | 1.856911 | 1.007502 |
| O | -5.060718 | 1.701131 | 1.011818 |
| O | 0.573160 | 2.249252 | -0.991460 |
| O | 3.158233 | 2.575944 | -0.995529 |
| C | 4.554114 | 2.789719 | -1.070798 |
| C | 3.760945 | -1.939831 | 1.009350 |
| C | 5.269493 | -1.800630 | 1.006295 |
| C | -3.240830 | 3.133950 | 1.531787 |
| O | 3.235303 | -2.938470 | 1.443132 |
| H | -4.703861 | -3.781743 | -1.502529 |
| H | -4.982625 | -2.786482 | -0.048251 |
| H | -5.067818 | -2.043256 | -1.671332 |
| H | -1.175943 | -2.936666 | -1.330607 |
| H | -4.038155 | 3.795492 | 1.862820 |
| H | -2.570417 | 2.918763 | 2.367060 |
| H | -2.653260 | 3.622675 | 0.751152 |
| H | -1.109046 | 1.834591 | 0.837757 |
| H | -4.623399 | -0.462362 | 0.013571 |
| H | 4.608902 | 0.482685 | -0.007523 |
| H | 1.127121 | -1.867239 | 0.818548 |
| H | 1.169781 | 2.941024 | -1.304947 |
| H | 4.688457 | 3.777010 | -1.506403 |
| H | 5.005340 | 2.764664 | -0.074464 |
| H | 5.027680 | 2.038338 | -1.709666 |
| H | 5.575561 | -0.946658 | 1.615886 |
| H | 5.702067 | -2.711506 | 1.413755 |
| H | 5.641023 | -1.639795 | -0.008523 |

**Cartesian coordinates of the *anti-aR* conformer.**

| Atom | X | Y | Z |
|---|---|---|---|
| C | 1.560083 | -0.947000 | -0.447786 |
| C | 0.732241 | 0.068524 | 0.035080 |
| C | 1.328571 | 1.238417 | 0.505683 |
| C | 2.727424 | 1.379311 | 0.493630 |
| C | 3.533643 | 0.366179 | 0.013265 |
| C | 2.941500 | -0.811504 | -0.466915 |
| C | -0.744752 | -0.077511 | 0.037755 |
| C | -1.338694 | -1.237514 | 0.527499 |
| C | -2.741292 | -1.382390 | 0.510295 |
| C | -3.544474 | -0.381827 | 0.012074 |
| C | -2.954100 | 0.791829 | -0.480714 |
| C | -1.574565 | 0.932574 | -0.462882 |
| O | -0.583666 | -2.232049 | 1.038067 |
| O | -3.169047 | -2.570158 | 1.028515 |
| C | -4.566464 | -2.798371 | 1.059456 |
| C | -3.859762 | 1.856826 | -1.007539 |
| O | -5.060750 | 1.701023 | -1.011849 |
| O | 0.573120 | 2.249290 | 0.991410 |
| O | 3.158186 | 2.576028 | 0.995471 |
| C | 4.554063 | 2.789833 | 1.070730 |
| C | 3.760977 | -1.939778 | -1.009313 |
| C | 5.269523 | -1.800553 | -1.006258 |
| C | -3.240890 | 3.133864 | -1.531853 |
| O | 3.235352 | -2.938434 | -1.443079 |
| H | -4.703789 | -3.781792 | 1.502610 |
| H | -5.067778 | -2.043308 | 1.671377 |
| H | -4.982573 | -2.786567 | 0.048312 |
| H | -1.175888 | -2.936653 | 1.330666 |
| H | -4.038227 | 3.795383 | -1.862901 |
| H | -2.653331 | 3.622618 | -0.751226 |
| H | -2.570471 | 2.918672 | -2.367118 |
| H | -1.109081 | 1.834560 | -0.837796 |
| H | -4.623390 | -0.462441 | -0.013559 |
| H | 4.608893 | 0.482774 | 0.007508 |
| H | 1.127152 | -1.867229 | -0.818511 |
| H | 1.169730 | 2.941079 | 1.304883 |
| H | 4.688388 | 3.777135 | 1.506312 |
| H | 5.027647 | 2.038475 | 1.709613 |
| H | 5.005286 | 2.764764 | 0.074395 |
| H | 5.575578 | -0.946591 | -1.615868 |
| H | 5.641047 | -1.639688 | 0.008558 |
| H | 5.702113 | -2.711432 | -1.413696 |

**Cartesian coordinates of the *syn-aR* conformer.**

| Atom | X | Y | Z |
|---|---|---|---|
| C | -1.462401 | -1.002909 | -0.519896 |
| C | -0.737153 | 0.057842 | 0.019551 |
| C | -1.432215 | 1.105225 | 0.623365 |
| C | -2.837542 | 1.093646 | 0.654551 |
| C | -3.546312 | 0.041618 | 0.105428 |
| C | -2.851729 | -1.024840 | -0.484024 |
| C | 0.745306 | 0.064201 | -0.018813 |
| C | 1.432340 | 1.116614 | -0.615151 |
| C | 2.840966 | 1.111871 | -0.650610 |
| C | 3.553184 | 0.063917 | -0.110001 |
| C | 2.866409 | -1.008383 | 0.477803 |
| C | 1.478299 | -0.998767 | 0.516605 |
| O | 0.757783 | 2.128410 | -1.192145 |
| O | 3.371609 | 2.207494 | -1.266963 |
| C | 4.782495 | 2.274286 | -1.370994 |
| C | 3.678816 | -2.124774 | 1.049132 |
| O | 4.888632 | -2.093988 | 1.004651 |
| O | -0.761987 | 2.114758 | 1.208187 |
| O | -3.377253 | 2.184145 | 1.276135 |
| C | -4.786492 | 2.260499 | 1.360721 |
| C | -3.562268 | -2.192539 | -1.089331 |
| C | -5.076924 | -2.196164 | -1.086170 |
| C | 2.955022 | -3.292254 | 1.682746 |
| O | -2.944851 | -3.114837 | -1.570824 |
| H | 5.005173 | 3.204308 | -1.888430 |
| H | 5.243766 | 2.283280 | -0.379529 |
| H | 5.167620 | 1.428520 | -1.947319 |
| H | 1.402814 | 2.755809 | -1.542500 |
| H | 3.693533 | -4.007463 | 2.037751 |
| H | 2.340216 | -2.952920 | 2.519714 |
| H | 2.293840 | -3.773271 | 0.958281 |
| H | 0.930846 | -1.812120 | 0.978469 |
| H | 4.634776 | 0.030861 | -0.124426 |
| H | -4.627449 | 0.040579 | 0.136264 |
| H | -0.942713 | -1.825506 | -0.997601 |
| H | -1.406688 | 2.745004 | 1.553388 |
| H | -5.011025 | 3.188587 | 1.880937 |
| H | -5.234999 | 2.282224 | 0.363019 |
| H | -5.188455 | 1.415855 | 1.928247 |
| H | -5.458835 | -2.164166 | -0.062794 |
| H | -5.465095 | -1.323680 | -1.617121 |
| H | -5.422037 | -3.104684 | -1.574324 |

**Cartesian coordinates of the Transition State (TS).**

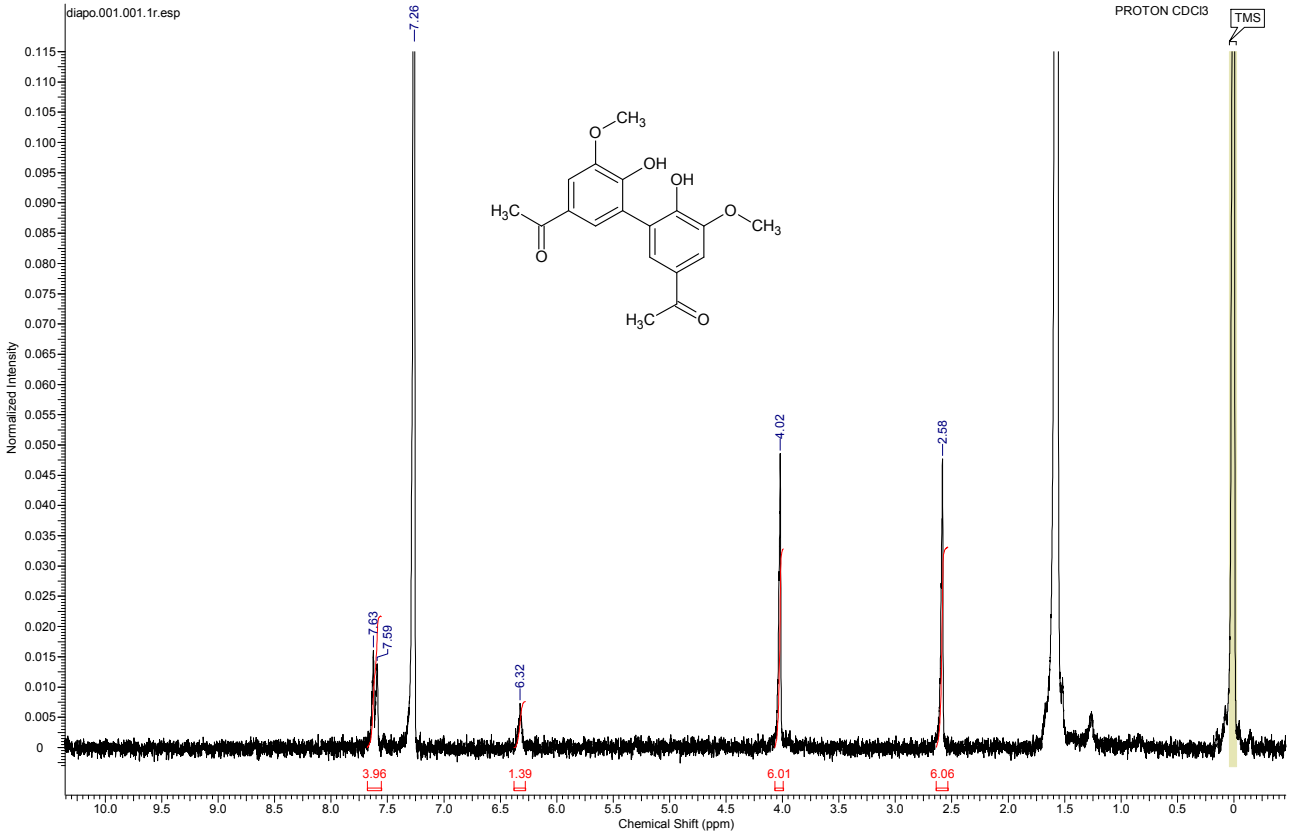
| Atom | X | Y | Z |
|---|---|---|---|
| C | -1.529733 | -0.747877 | -0.789299 |
| C | -0.742159 | 0.051382 | 0.042711 |
| C | -1.381117 | 0.970742 | 0.883960 |
| C | -2.789262 | 1.080729 | 0.879538 |
| C | -3.557279 | 0.281449 | 0.047178 |
| C | -2.925474 | -0.647889 | -0.803380 |
| C | 0.747754 | -0.056814 | 0.041144 |
| C | 1.386915 | -1.007095 | 0.843054 |
| C | 2.797490 | -1.119343 | 0.829375 |
| C | 3.560203 | -0.289631 | 0.030163 |
| C | 2.929000 | 0.676313 | -0.778861 |
| C | 1.534746 | 0.779049 | -0.761358 |
| O | 0.660400 | -1.830062 | 1.638471 |
| O | 3.268489 | -2.101773 | 1.666702 |
| C | 4.674753 | -2.300872 | 1.733126 |
| C | 3.799018 | 1.547128 | -1.620161 |
| O | 5.017072 | 1.421094 | -1.602990 |
| O | -0.651925 | 1.764849 | 1.706460 |
| O | -3.260452 | 2.028656 | 1.758525 |
| C | -4.664597 | 2.211205 | 1.860598 |
| C | -3.690428 | -1.535996 | -1.726853 |
| C | -5.211160 | -1.449594 | -1.738939 |
| C | 3.150380 | 2.601517 | -2.504776 |
| O | -3.115719 | -2.323239 | -2.465984 |
| H | 4.830955 | -3.115357 | 2.442322 |
| H | 5.080424 | -2.582574 | 0.753732 |
| H | 5.184979 | -1.398129 | 2.090845 |
| H | 1.295910 | -2.406183 | 2.101138 |
| H | 3.935982 | 3.136703 | -3.040898 |
| H | 2.464980 | 2.144057 | -3.228076 |
| H | 2.568204 | 3.313935 | -1.908329 |
| H | 1.029881 | 1.515601 | -1.377330 |
| H | 4.641630 | -0.349136 | -0.003343 |
| H | -4.636651 | 0.373544 | 0.051735 |
| H | -1.061478 | -1.471169 | -1.448034 |
| H | -1.285210 | 2.311052 | 2.206460 |
| H | -4.815076 | 2.990470 | 2.609528 |
| H | -5.093443 | 2.536757 | 0.904170 |
| H | -5.161980 | 1.289093 | 2.187313 |
| H | -5.549689 | -0.442967 | -2.013065 |
| H | -5.593387 | -2.166838 | -2.467177 |
| H | -5.629669 | -1.680028 | -0.751683 |

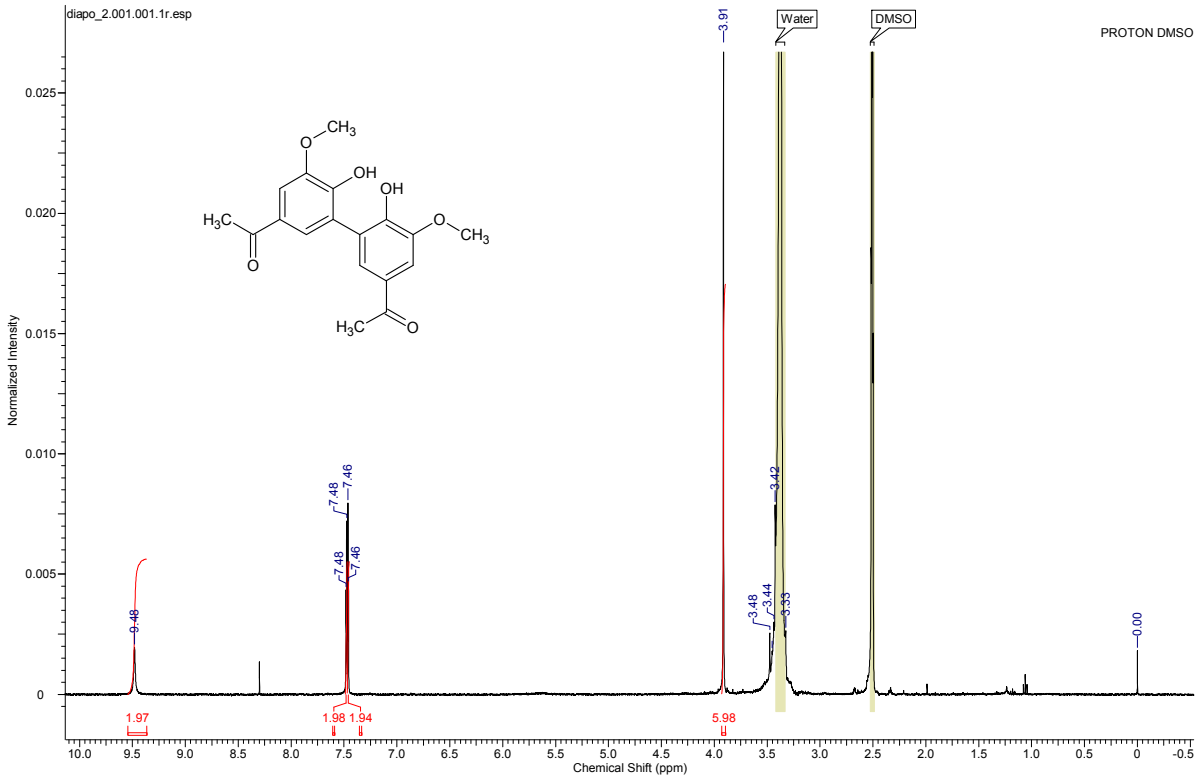
Thermodynamic parameters (atomic unit) to the four conformers (***syn-aS, anti-aS, anti-aR*** *and* ***syn-aR***) and to the transition state (**TS**).

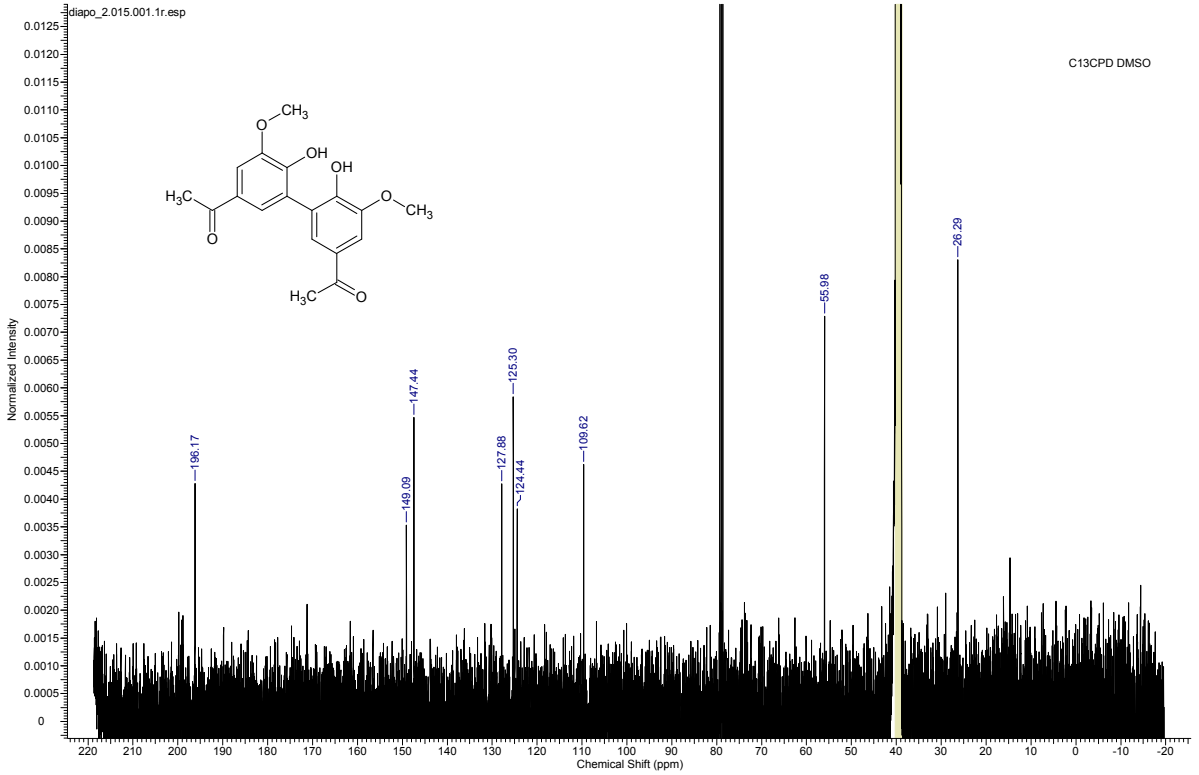
| Conformer | ZPE | Thermal Correction to | | |
|---|---|---|---|---|
| | | Energy | Enthalpy | Gibbs Free Energy |
| ***syn-aS*** | 0.3329 | 0.3564 | 0.3573 | 0.2791 |
| ***anti-aS*** | 0.3335 | 0.3568 | 0.3578 | 0.2804 |
| ***anti-aR*** | 0.3335 | 0.3568 | 0.3578 | 0.2804 |
| ***syn-aR*** | 0.3329 | 0.3564 | 0.3573 | 0.2791 |
| **TS** [(a)] | 0.3309 | 0.3538 | 0.3547 | 0.2786 |

[(a)] $\nu_I$ = -18.51 $cm^{-1}$. The normal mode of vibration associated with this frequency corresponds to the torsional movement of the dihedral angle. This angle appears between the phenyl rings.

# NMR spectra of diapocynin ($CDCl_3$ and DMSO-$D_6$ solutions)




diapo_2.001.001.1r.esp
PROTON DMSO
Water
DMSO
3.91
9.48
7.48
7.46
7.48
7.46
3.48
3.44
3.42
3.33
0.00
1.97
1.98
1.94
5.98
Normalized Intensity
Chemical Shift (ppm)


diapo_2.015.001.1r.esp
C13CPD DMSO
196.17
149.09
147.44
127.88
125.30
124.44
109.62
55.98
26.29
Normalized Intensity
Chemical Shift (ppm)

# MS and MS/MS spectra of diapocynin