Supplementary Information

A Predictive Journey Towards *trans*-Thioamides/Amides

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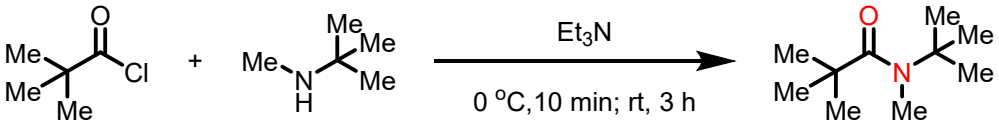
1. General Information

Commercially available chemicals were purchased from commercial suppliers and used as received, except when noted, without further purification. All reactions were performed in oven-dried or flame-dried glassware. TLC analysis was carried out on glass plates coated with silica gel 60 F254. The plates were visualized using a 254 nm ultraviolet lamp. Purification of products was performed by chromatography using silica gel (200-300 mesh). NMR spectra were measured on a Bruker spectrometer at 400 MHz for ^{1}H spectra and 101 MHz for ^{13}C spectra. For ^{1}H NMR, tetramethylsilane (TMS) ($\delta = 0$) in $CDCl_3$ was used as an internal standard. For ^{13}C NMR, $CDCl_3$ ($\delta = 77.0$) was used as an internal standard. The following abbreviations were used: s = singlet, d = doublet, t = triplet, m = multiplet, and br = broad. All coupling constants (J) are reported in Hertz (Hz). High resolution mass spectra were acquired on a Q-Exactive Focus Hybrid Quadrupole-Orbitrap Mass Spectrometer (Thermo Fisher). X-ray data were collected at 100 K using Bruker D8 VENTURE diffractometer with Ga Kα radiation. ^{1}H NMR and ^{13}C NMR data are given for all compounds in the Supporting Information for characterization purposes.

2. Experimental Procedures and Characterization Data



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***N*-(*tert*-Butyl)-*N*-Methylpivalamide,** colorless oil. Pivaloyl chloride (1.0 equiv, 3 mmol, 360.0 mg) was added dropwise to an ice-cooled stirred solution of *N*-Methyl-*tert*-butylamine (1.25 equiv, 3.75 mmol, 261.3 mg) and triethylamine (1.25 equiv, 3.75 mmol, 379.5 mg) in CH_2Cl_2 (10 mL). After 10 min at 0 ℃, the solution was stirred at room temperature for 3 h. The reaction was quenched with 1N HCl (10 mL), extracted with CH_2Cl_2 (3×10 mL). The combined organic layers were dried over anhydrous $MgSO_4$ and the solvent was removed under reduced pressure. The crude mixture purified by column chromatography on silica gel, eluting with petroleum ether/ethyl acetate (20:1) to give the amide. Yield 78% (400 mg). The sample for x-ray crystallographic analysis was obtained by slow evaporation from CH_2Cl_2/hexane at -18 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 2.92 (s, 3H), 1.36 (s, 9H), 1.26 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 179.9, 56.9, 40.5, 32.7, 28.9, 27.8. HRMS (ESI/Q-TOF) m/z: $[M+H]^+$ Calcd for $C_{10}H_{21}NO^+$:172.1696; Found:172.1690.

3. Crystallographic Studies

Crystal Structure of 22.

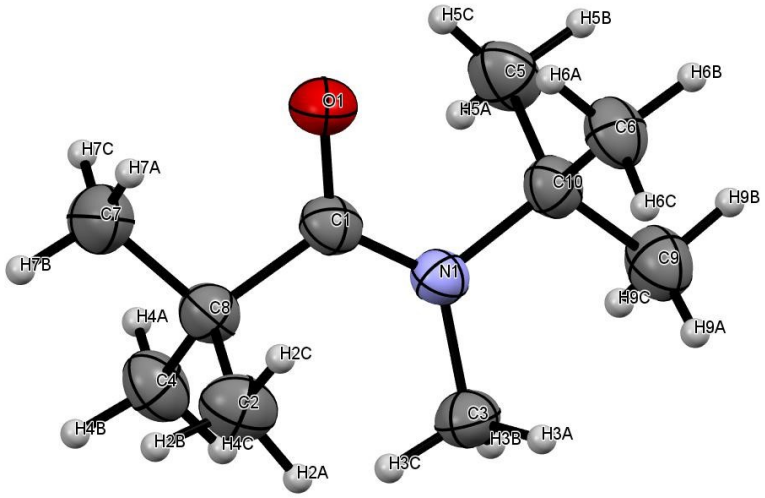

Figure S1. Crystal structure of **22** *(50% ellipsoids)*. (Crystallographic data has been deposited with the Cambridge Crystallographic Data Center as supplementary publication no. CCDC 2166745.)

Table S1. Crystal Data and Structure Refinement Summary for **22**.

Crystal data

$C_{10}H_{21}NO$	$F(000) = 384$
$M_r = 171.28$	$D_x = 1.060$ Mg m^{-3}
Orthorhombic, $Pca2_1$	Ga $K\alpha$ radiation, $\lambda = 1.34138$ Å
$a = 17.280$ (3) Å	Cell parameters from 5179 reflections
$b = 5.9478$ (9) Å	$\theta = 5.8–54.2°$
$c = 10.4426$ (17) Å	$\mu = 0.33$ mm^{-1}
$V = 1073.3$ (3) Å^3	$T = 121$ K
$Z = 4$	Block, colourless

Data collection

CCD diffractometer	$R_{int} = 0.049$
Absorption correction: multi-scan *SADABS2016*/2 (Bruker,2016/2) was used for absorption correction. wR^2(int) was 0.1316	$\theta_{max} = 54.2°$, $\theta_{min} = 5.8°$

before and 0.0846 after correction. The Ratio of minimum to maximum transmission is 0.5669. The λ/2 correction factor is Not present.	
T_{min} = 0.208, T_{max} = 0.367	h = -16→20
5708 measured reflections	k = -7→7
1814 independent reflections	l = -12→12
1714 reflections with $I > 2\sigma(I)$	

Refinement

Refinement on F^2	Hydrogen site location: inferred from neighbouring sites
Least-squares matrix: full	H-atom parameters constrained
$R[F^2 > 2\sigma(F^2)]$ = 0.050	$w = 1/[\sigma^2(F_o^2) + (0.0771P)^2 + 0.2076P]$ where $P = (F_o^2 + 2F_c^2)/3$
$wR(F^2)$ = 0.146	$(\Delta/\sigma)_{max} < 0.001$
S = 1.16	$\Delta\rangle_{max}$ = 0.16 e Å^{-3}
1814 reflections	$\Delta\rangle_{min}$ = -0.19 e Å^{-3}
117 parameters	Absolute structure: Refined as an inversion twin.
1 restraint	Absolute structure parameter: 0.4 (8)
Primary atom site location: dual	

Special details

Geometry. All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds involving l.s. planes.
Refinement. Refined as a 2-component inversion twin.

*Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å2) for (**22**)*

	x	y	z	U_{iso}*/U_{eq}
O1	0.04673 (12)	0.1050 (4)	0.5974 (3)	0.0532 (7)
N1	-0.00908 (14)	0.2551 (4)	0.7724 (3)	0.0374 (6)

C1	0.05255 (17)	0.2198 (5)	0.6949 (3)	0.0399 (7)
C2	0.1724 (2)	0.2216 (6)	0.8406 (4)	0.0530 (9)
H2A	0.145556	0.269634	0.918613	0.079*
H2B	0.226495	0.270299	0.844133	0.079*
H2C	0.170204	0.057432	0.833677	0.079*
C3	-0.00260 (19)	0.3460 (6)	0.9018 (3)	0.0451 (7)
H3A	-0.013574	0.227075	0.964177	0.068*
H3B	-0.039839	0.468761	0.912725	0.068*
H3C	0.049959	0.403096	0.915373	0.068*
C4	0.12709 (18)	0.5838 (5)	0.7343 (4)	0.0508 (9)
H4A	0.103000	0.644715	0.656719	0.076*
H4B	0.179052	0.647544	0.744158	0.076*
H4C	0.095553	0.623163	0.808979	0.076*
C5	-0.1109 (2)	0.2272 (6)	0.6049 (4)	0.0553 (9)
H5A	-0.110807	0.391795	0.600773	0.083*
H5B	-0.163141	0.171161	0.586840	0.083*
H5C	-0.074742	0.167122	0.541202	0.083*
C6	-0.08039 (18)	-0.1032 (5)	0.7481 (4)	0.0488 (8)
H6A	-0.042313	-0.158300	0.686009	0.073*
H6B	-0.130995	-0.170149	0.729658	0.073*
H6C	-0.064143	-0.145126	0.834752	0.073*
C7	0.1841 (2)	0.2772 (7)	0.6080 (4)	0.0564 (9)
H7A	0.191004	0.114278	0.599888	0.085*
H7B	0.234647	0.349020	0.619738	0.085*
H7C	0.159608	0.335906	0.530234	0.085*
C8	0.13284 (16)	0.3276 (5)	0.7233 (3)	0.0408 (7)
C9	-0.1484 (2)	0.2308 (6)	0.8311 (4)	0.0559 (9)
H9A	-0.135757	0.179918	0.917804	0.084*
H9B	-0.198562	0.168261	0.805373	0.084*
H9C	-0.151140	0.395412	0.829640	0.084*
C10	-0.08615 (15)	0.1516 (5)	0.7384 (3)	0.0397 (7)

4. ^{1}H and ^{13}C NMR Spectra

***N*-(*tert*-Butyl)-*N*-Methylpivalamide**

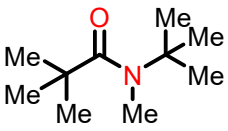

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Figure S2. ^{1}H NMR (400 MHz, $CDCl_3$) Spectrum of Compound **22.**

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Figure S3. ^{13}C NMR (101 MHz, $CDCl_3$) Spectrum of Compound **22.**

5. Computational data

COMPUTATIONAL DETAILS

All DFT calculations were performed with the Gaussian 16 set of programs.[i] The electronic configuration of the molecular systems was described with the hybrid GGA functional of Becke-Lee, Parr, and Yang (B3LYP),[ii] using the Ahlrichs basis set 6-311++G(d,p).[iii] Since corrections due to dispersion are essential to study the reactivity, we have included them through Grimme's GD3 method.[iv] The geometry optimizations were performed without symmetry constraints and the characterization of the local stationary points was carried out by analytical frequency calculations. These frequencies were used to calculate unscaled zero-point energies (ZPEs) as well as thermal corrections and entropy effects at 298.15 K and 1 atm. Solvent effects were included in the geometry optimizations with the Solvation Model based on Density (SMD)[v] using toluene as solvent.

(MULTI)LINEAR ANALYSES

Xyz coordinates and absolute energies (in a.u.) of all computed species by DFT have been included in a single separated file.xyz with capability to visualize with an browse that opens files with .xyz extension.

Figure S4 gives details about the Winkler-Dunitz analyses and its components.

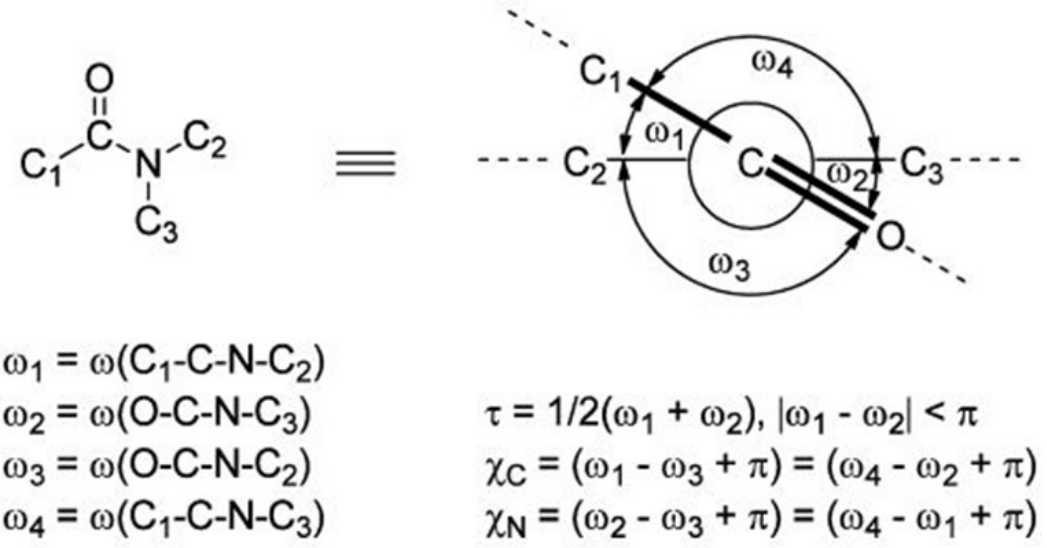

Figure S4. Winkler-Dunitz distortion parameters of amides bonds.

Multi/linear analyses

About the linear and multilinear analyses, we have studied the variables included in Table S1 for the 46 compounds (23 amides and 23 thioamides). We have checked all the possible combinations including from 1 to 7 descriptors (*i.e.* millions of combinations) in order to obtain multilinear models. Of course, when adding more descriptors, the R^2 value increases for sure, but then the significance of each variable is

even more important to be checked. The best fitted models are described below.

Table S1. All variables used for the multi/linear analyses.

Thioamides

	R	R'	R''	cis	TS	trans
1	Ph	Ph	Me	4.3	-73	171.6
2	$C(Me)=CH_2$	Ph	Me	-3.7	-71	-179.6
3	cyclopropyl	Ph	Me	0.3	-74	179.2
4	iPr	Ph	Me	0.0	-85	-179.8
5	t-Bu	Ph	Me	8.8	-78	-179.4
6	Me	Ph	Me	-0.3	-73	178.3
13	H	Ph	Me	2.1	-114	-180.0
14	NO_2	Ph	Me	1.4	73	-178.3
15	NMe_2	Ph	Me	-17.2	-79	146.5
16	OMe	Ph	Me	0.6	-73	-180.0
17	t-Bu	t-Bu	Me	-34.8	-64	-132.4
23	CF_3	Ph	Me	1.0	-70	178.3
24	$C(CF_3)_3$	Ph	Me	-18.6	-71	163.5
25	NPh_2	Ph	Me	-12.8	-76	162.8
26	NH_2	Ph	Me	0.1	-74	178.8
31	t-Bu	1-adamantyl	Me	-36.6	-72.9	-128.5
32	t-Bu	2-adamantyl	Me	-20.6	-74.0	143.3
33	iPr	1-adamantyl	Me	0.1	-69.7	155.4
34	iPr	2-adamantyl	Me	1.0	-66.9	182.3
39	t-Bu	1-adamantyl	Et	-42.5	-73.8	-120.7
40	t-Bu	2-adamantyl	Et	-2.2	-109.9	154.3
41	iPr	1-adamantyl	Et	-5.5	-35.4	170.4
42	iPr	2-adamantyl	Et	-2.9	-66.0	-174.6

Amides

	R	R'	R''	cis	TS	trans
7	Ph	Ph	Me	3.5	-71	167.9
8	$C(Me)=CH_2$	Ph	Me	-3.2	-70	-171.0
9	cyclopropyl	Ph	Me	0.0	-73	178.0
10	iPr	Ph	Me	0.0	-85	-176.6
11	t-Bu	Ph	Me	0.1	-79	-176.8
12	Me	Ph	Me	1.0	-72	-174.6
18	H	Ph	Me	0.0	-115	174.6
19	NO_2	Ph	Me	0.0	-109	176.2
20	NMe_2	Ph	Me	-11.2	-77	125.2
21	OMe	Ph	Me	0.0	-73	176.0
22	t-Bu	t-Bu	Me	27.3	-48	145.3
27	CF_3	Ph	Me	-0.4	-72	175.0
28	$C(CF_3)_3$	Ph	Me	-6.5	-73	165.7
29	NPh_2	Ph	Me	9.4	-69	-158.2
30	NH_2	Ph	Me	7.6	-73	173.1
35	t-Bu	1-adamantyl	Me	-28.8	-46.8	-144.1
36	t-Bu	2-adamantyl	Me	-4.5	-71.5	153.7
37	iPr	1-adamantyl	Me	0.0	-68.9	180.0
38	iPr	2-adamantyl	Me	-0.1	-72.2	171.3
43	t-Bu	1-adamantyl	Et	-35.1	-77.4	-145.6
44	t-Bu	2-adamantyl	Et	-0.3	-90.6	141.6
45	iPr	1-adamantyl	Et	-1.3	-54.5	177.4
46	iPr	2-adamantyl	Et	-0.4	-69.4	176.8

Thioamides cis

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
1	-172.9	-165.45	4.3	17.36	10.8	12.0	2.8	4.7	10.3	17.2
2	173.9	167.15	-3.7	-15.29	-9.5	10.5	-2.4	4.1	-9.2	15.3
3	-179.7	-178.96	0.3	1.08	0.7	0.8	0.0	0.1	0.8	1.3
4	180.0	180.0	0.0	-0.007	0.0	0.0	0.0	0.0	0.0	0.0
5	-169.1	-149.9	8.8	32.2	20.5	22.8	2.1	3.5	21.3	35.5
6	179.7	179.07	-0.3	-0.92	-0.6	0.7	0.0	0.0	-0.6	1.0
13	-176.9	-178.85	2.1	2.2	2.1	2.4	1.1	1.8	-0.9	1.5
14	-176.9	-177.58	1.4	4.21	2.8	3.1	1.8	3.0	1.1	1.8
15	162.7	134.66	-17.2	-45.42	-31.3	34.8	-0.1	0.1	-28.1	46.9
16	-179.2	-179.37	0.6	0.819	0.7	0.8	0.2	0.3	0.0	0.0
17	135.9	115.73	-34.8	-73.6	-54.2	60.2	-9.3	15.6	-29.5	49.1
23	-179.3	-177.37	1.0	2.41	1.7	1.9	-0.2	0.4	1.7	2.8
24	155.6	129.86	-18.6	-55.9	-37.3	41.4	-5.8	9.7	-31.6	52.6
25	165.1	153.61	-12.8	-28.57	-20.7	23.0	-2.2	3.6	-13.6	22.7
26	179.8	-178.79	0.1	0.9	0.5	0.6	-0.3	0.5	1.1	1.8
31	134.2	112.2	-36.6	-77.0	-56.8	63.1	-9.2	15.3	-31.2	52.0
32	155.6	139.8	-20.6	-44.0	-32.3	35.9	-3.8	6.3	-19.6	32.7
33	-179.9	-179.8	0.1	0.2	0.2	0.2	0.0	0.0	0.1	0.2
34	-179.8	-170.8	1.0	8.4	4.7	5.2	-0.8	1.3	8.2	13.6
39	129.7	100.0	-42.5	-87.8	-65.1	72.4	-7.8	13.0	-37.5	62.5
40	177.3	-179.6	-2.2	-0.1	-1.2	1.3	-0.5	0.8	2.6	4.3
41	173.1	166.8	-5.5	-14.5	-10.0	11.2	-1.4	2.3	-7.6	12.7
42	175.8	174.1	-2.9	-7.1	-5.0	5.6	-1.2	2.1	-2.9	4.9

Amides cis

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
7	-174.1	-157.93	3.5	24.53	14.0	15.6	2.5	4.1	18.6	31.0
8	173.8	159.31	-3.2	-23.73	-13.5	15.0	-3.0	5.1	-17.5	29.2
9	-178.5	-167.69	0.0	13.75	6.9	7.6	1.4	2.4	12.3	20.5
10	-180.0	179.99	0.0	0.009	0.0	0.0	0.0	0.0	0.0	0.0
11	-178.3	177.92	0.1	-3.91	-0.2	0.2	1.7	2.8	-2.2	3.6
12	-179.3	174.77	1.0	-5.5	-2.3	2.5	-0.3	0.5	-6.2	10.3
18	-180.0	179.99	0.0	-0.004	0.0	0.0	0.0	0.0	0.0	0.0
19	-180.0	179.95	0.0	0.04	0.0	0.0	0.1	0.2	0.0	0.0
20	168.1	137.12	-11.2	-43.61	-27.4	30.4	-0.7	1.2	-31.7	52.8
21	180.0	-179.98	0.0	-0.03	0.0	0.0	-0.1	0.1	0.0	0.0
22	-140.2	-122.04	27.3	70.44	48.9	54.3	12.5	20.8	30.6	51.0
27	-179.6	-172.74	-0.4	8.06	3.8	4.3	0.8	1.3	7.6	12.7
28	165.8	146.41	-6.5	-41.31	-23.9	26.6	-7.7	12.9	-27.1	45.2
29	-169.3	-148.19	9.4	33.07	21.2	23.6	1.3	2.1	22.4	37.4
30	-174.1	177.07	7.6	-4.64	1.5	1.7	-1.7	2.8	-10.6	17.6
35	138.7	119.0	-28.8	-73.6	-51.2	56.9	-12.6	21.0	-32.3	53.8
36	170.6	162.7	-4.5	-22.2	-13.4	14.8	-4.9	8.2	-12.8	21.4
37	-179.6	-177.5	0.0	2.9	1.4	1.6	0.4	0.6	2.5	4.1
38	-179.3	-167.8	-0.1	13.0	6.4	7.2	0.9	1.4	12.3	20.5
43	133.5	105.2	-35.1	-86.2	-60.6	67.4	-11.4	19.0	-39.7	66.1
44	-178.3	-172.6	-0.3	9.4	4.5	5.0	2.0	3.3	7.7	12.8
45	177.2	174.1	-1.3	-7.4	-4.3	4.8	-1.5	2.5	-4.6	7.7
46	-179.0	178.9	-0.4	179.0	0.0	0.0	1.4	2.4	-0.7	1.2

Thioamides trans

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
1	171.2	171.6	-6.9	-10.3	-8.6	9.6	-1.9	3.2	-1.4	2.4
2	176.2	-179.6	-1.1	-2.3	-1.7	1.9	-2.7	4.5	1.5	2.5
3	179.4	179.2	-0.7	-0.73	-0.7	0.8	0.1	0.1	-0.1	0.2
4	-178.7	-179.8	-1.6	3.19	0.8	0.9	3.0	5.0	1.9	3.1
5	177.9	-179.4	2.6	1.14	-0.7	0.8	-4.7	7.8	-2.0	3.4
6	-178.1	178.3	2.3	-2.16	0.1	0.1	-0.4	0.7	-4.0	6.7
13	180.0	-180.0	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0
14	175.4	-178.3	-3.7	0.84	-1.4	1.6	-0.9	1.5	5.4	9.1
15	159.6	146.5	-21.3	-32.62	-27.0	30.0	0.9	1.5	-12.2	20.4
16	-180.0	-180.0	0.0	0.007	0.0	0.0	0.0	0.0	0.0	0.0
17	-150.3	-132.4	29.2	48.19	38.7	43.0	0.6	1.0	18.4	30.7
23	-177.5	178.3	3.2	-2.36	0.4	0.4	-0.7	1.1	-4.8	8.1
24	169.8	163.5	-6.8	-19.96	-13.4	14.9	-3.4	5.7	-9.7	16.2
25	162.7	162.8	-16.5	-18.03	-17.3	19.2	-0.8	1.3	-0.8	1.3
26	-179.6	178.8	-0.6	-0.18	-0.4	0.5	1.1	1.8	-0.6	1.0
31	-148.4	-128.5	30.9	52.2	41.6	46.2	0.7	1.2	20.6	34.3
32	159.6	143.3	-22.3	-34.8	-28.6	31.8	1.9	3.1	-14.4	24.0
33	164.0	155.4	-15.5	-25.1	-20.3	22.5	-0.5	0.8	-9.1	15.1
34	169.2	182.3	-11.8	-16.7	-4.3	4.7	1.0	1.6	14.1	23.4
39	-148.3	-120.7	-148.3	61.3	45.5	50.6	-180.0	300.0	-152.4	254.0
40	166.0	154.3	-14.4	-25.3	-19.9	22.1	0.4	0.7	-11.3	18.8
41	170.3	170.4	-8.0	-11.3	-9.7	10.7	-1.8	2.9	-1.6	2.7
42	-170.2	-174.6	8.1	7.1	7.6	8.4	1.7	2.9	-2.7	4.5

Amides trans

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
7	170.5	167.9	-8.3	-13.26	-10.8	12.0	-1.2	2.0	-3.8	6.3
8	-171.7	-171.0	7.4	9.93	8.6	9.6	0.9	1.5	1.6	2.7
9	-177.0	178.0	2.8	-1.91	0.5	0.5	0.1	0.2	-4.9	8.1
10	174.5	-176.6	-3.9	1.76	-1.1	1.2	-1.6	2.7	7.3	12.1
11	177.2	-176.8	-3.6	3.91	0.2	0.2	0.8	1.3	6.8	11.3
12	176.4	-174.6	-3.7	5.51	0.9	1.0	0.1	0.1	9.1	15.2
18	-179.5	174.6	0.4	-5.36	-2.5	2.7	0.1	0.1	-5.9	9.8
19	-177.0	176.2	2.8	-3.55	-0.4	0.4	0.2	0.4	-6.5	10.9
20	147.5	125.2	-33.7	-53.69	-43.7	48.5	1.2	1.9	-21.2	35.3
21	-175.2	176.0	4.6	-3.89	0.4	0.4	0.2	0.3	-8.7	14.5
22	163.8	145.3	-12.0	-38.95	-25.5	28.3	-4.3	7.1	-22.7	37.9
27	-179.0	175.0	1.6	-5.58	-2.0	2.2	-0.6	0.9	-6.6	11.1
28	173.4	165.7	-3.3	-17.64	-10.5	11.6	-3.3	5.5	-11.0	18.3
29	-158.8	-158.2	21.7	21.31	21.5	23.9	-0.5	0.9	0.1	0.2
30	-176.1	173.1	1.6	-4.5	-1.5	1.6	2.4	3.9	-8.4	14.0
35	-162.9	-144.1	12.3	40.7	26.5	29.4	4.7	7.9	23.6	39.3
36	170.8	153.7	-6.9	-28.6	-17.7	19.7	-2.3	3.8	-19.4	32.3
37	180.0	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	174.6	171.3	-4.4	-9.8	-7.1	7.9	-1.1	1.8	-4.4	7.3
43	-170.3	-145.6	7.3	36.8	22.0	24.5	2.4	4.1	27.1	45.2
44	157.3	141.6	-19.1	-42.0	-30.5	33.9	-3.6	6.0	-19.3	32.2
45	176.7	177.4	-1.6	-4.3	-2.9	3.2	-1.7	2.8	-1.0	1.7
46	-179.5	176.8	1.5	-4.2	-1.3	1.5	-1.0	1.6	-4.7	7.8

Thioamides TS

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
1	105.7	78.0	-72.9	-103.4	-88.2	98.0	-1.4	2.3	-29.1	48.5
2	107.0	79.3	-71.5	-102.2	-86.8	96.5	-1.5	2.5	-29.2	48.7
3	104.6	75.5	-74.2	-105.8	-90.0	100.0	-1.3	2.1	-30.4	50.6
4	97.2	60.1	-85.2	-117.5	78.7	87.4	2.4	4.0	-34.7	57.9
5	98.7	75.4	-78.3	-107.6	87.1	96.7	-3.0	5.0	-26.3	43.9
6	104.5	77.1	-73.5	-104.9	-89.2	99.1	-2.0	3.3	-29.5	49.1
13	62.8	105.0	-114.9	-77.3	83.9	93.3	-2.3	3.8	39.9	66.5
14	100.8	73.3	-82.6	-103.3	87.1	96.8	3.4	5.7	-24.1	40.1
15	98.8	70.4	-79.5	-111.3	84.6	94.0	-1.7	2.9	-30.1	50.2
16	105.1	76.2	-73.5	-105.2	-89.3	99.3	-1.4	2.4	-30.3	50.6
17	111.2	73.0	-64.4	-111.3	-87.9	97.6	-4.3	7.2	-42.5	70.9
23	105.5	78.6	-70.4	-105.4	-87.9	97.7	-4.0	6.7	-30.9	51.6
24	103.9	77.4	-71.0	-107.7	-89.4	99.3	-5.1	8.5	-31.6	52.7
25	103.3	80.2	-75.7	-100.8	-88.2	98.1	-1.0	1.6	-24.2	40.3
26	105.1	70.9	-73.6	-110.4	88.0	97.8	-1.3	2.2	-35.5	59.1
31	101.3	78.0	-72.9	-107.8	89.6	99.6	-5.8	9.7	-29.1	48.5
32	103.6	64.5	-74.0	-117.8	84.1	93.4	-2.3	3.8	-41.5	69.1
33	111.1	65.9	-69.7	-113.2	88.5	98.3	0.9	1.4	-44.3	73.9
34	108.8	69.4	-66.9	-114.8	89.1	99.0	-4.3	7.1	-43.7	72.8
39	102.6	67.7	-73.8	-115.9	85.1	94.6	-3.6	6.0	-38.5	64.1
40	90.9	47.8	-95.2	-126.1	69.4	77.1	6.1	10.2	-37.0	61.6
41	139.7	103.9	-35.4	-81.1	-58.2	64.7	-4.9	8.2	-40.7	67.9
42	112.0	68.5	-66.0	-113.5	-89.8	99.7	-2.0	3.3	-45.5	75.8

Amides TS

	ω_1	ω_2	ω_3	ω_4	τ		X_C		X_N	
7	106.6	74.9	-71.5	-107.0	-89.2	99.1	-1.9	3.2	-33.6	56.0
8	107.5	75.9	-70.5	-106.1	-88.3	98.1	-2.0	3.4	-33.6	56.0
9	105.9	72.7	-72.7	-108.7	89.3	99.2	-1.4	2.3	-34.6	57.7
10	101.0	63.3	-81.0	-114.7	82.2	91.3	2.0	3.3	-35.7	59.5
11	99.0	69.9	-79.2	-111.9	84.5	93.8	-1.8	2.9	-30.9	51.5
12	105.5	74.6	-72.5	-107.5	-90.0	100.0	-2.1	3.5	-33.0	54.9
18	63.9	107.2	-115.1	-73.8	85.5	95.0	-1.0	1.6	42.3	70.5
19	70.9	103.7	-108.8	-76.6	87.3	97.0	-0.3	0.5	32.5	54.2
20	101.5	70.0	-77.0	-111.6	85.7	95.3	-1.6	2.6	-33.1	55.1
21	105.8	73.6	-72.7	-107.9	89.7	99.7	-1.6	2.6	-33.7	56.2
22	123.8	83.8	-48.3	-104.1	-76.2	84.6	-7.9	13.2	-47.9	79.8
27	105.1	76.8	-71.6	-106.5	-89.0	98.9	-3.3	5.5	-31.6	52.6
28	101.3	69.0	-73.2	-116.5	85.1	94.6	-5.5	9.1	-37.8	63.0
29	109.5	83.7	-69.5	-97.3	-83.4	92.7	-1.1	1.8	-26.8	44.7
30	105.4	69.0	-73.2	-112.4	87.2	96.9	-1.4	2.3	-37.8	63.0
35	124.9	85.8	-46.8	-102.4	-74.6	82.9	-8.2	13.7	-47.3	78.9
36	108.8	74.9	-71.5	-104.8	-88.1	97.9	0.3	0.4	-33.6	56.0
37	112.4	62.0	-68.9	-116.7	87.2	96.9	1.3	2.2	-49.1	81.8
38	111.8	59.0	-72.2	-117.0	85.4	94.9	4.0	6.7	-48.8	81.3
43	102.5	55.9	-77.4	-124.3	79.2	88.0	-0.2	0.3	-46.8	78.0
44	98.0	45.0	-90.6	-126.3	71.5	79.5	8.6	14.4	-44.4	74.0
45	119.8	74.9	-54.5	-110.9	-82.7	91.9	-5.7	9.6	-50.6	84.4
46	113.8	71.6	-69.4	-105.3	-87.3	97.0	3.1	5.2	-39.0	65.1

Thioamides			HOMO		LUMO		HOMO-LUMO gap		Dipole moment	
TS		trans	cis	trans	cis	trans	cis	trans	cis	trans
1	-72.9	171.6	-0.21026	-0.2	-0.06	-0.052	0.15	0.15277	5.9002	5.4691
2	-71.5	179.6	-0.21183	-0.2	-0.05	-0.037	0.1585	0.16704	5.8198	5.5694
3	-74.2	179.2	-0.20988	-0.2	-0.04	-0.034	0.173	0.17046	6.2839	5.6122
4	-85.2	179.8	-0.20753	-0.2	-0.04	-0.034	0.1707	0.16884	6.3521	5.6305
5	-78.3	179.4	-0.20673	-0.2	-0.05	-0.026	0.1574	0.17096	5.6472	5.3942
6	-73.5	178.3	-0.20819	-0.2	-0.03	-0.033	0.1735	0.17024	6.5565	5.9198
13	-114.9	180.0	-0.21809	-0.21	-0.05	-0.039	0.166	0.17366	6.0362	5.9643
14	-82.6	178.3	-0.24825	-0.24	-0.1	-0.1	0.1507	0.14498	7.0541	7.1549
15	-79.5	146.5	-0.20651	-0.2	-0.04	-0.027	0.1706	0.17382	5.8631	5.8790
16	-73.5	180.0	-0.22057	-0.22	-0.03	-0.024	0.1929	0.19171	4.5036	4.1077
17	-64.4	132.4	-0.20759	-0.2	-0.06	-0.048	0.1467	0.15398	4.5893	4.9291
23	-70.4	178.3	-0.23416	-0.23	-0.07	-0.071	0.1637	0.15824	6.2327	5.8725
24	-71.0	163.5	-0.24071	-0.23	-0.09	-0.075	0.147	0.15236	5.7130	5.6971
25	-75.7	162.8	-0.2111	-0.21	-0.05	-0.044	0.1611	0.16075	5.6895	5.2504
26	-73.6	178.8	-0.2089	-0.2	-0.03	-0.023	0.174	0.18189	7.2711	6.5584
31	-72.9	128.5	-0.20675	-0.2	-0.06	-0.05	0.1449	0.15146	4.3057	4.6729
32	-74.0	143.3	-0.20042	-0.2	-0.04	-0.041	0.1585	0.15824	5.6426	5.0957
33	-69.7	155.4	-0.19625	-0.2	-0.03	-0.034	0.1704	0.16199	6.1462	5.4092
34	-66.9	182.3	-0.1986	-0.2	-0.03	-0.032	0.1708	0.16546	6.0067	5.4761
39	-73.8	120.7	-0.20933	-0.2	-0.07	-0.054	0.14	0.14915	3.6251	4.4010
40	-109.9	154.3	-0.19274	-0.2	-0.03	-0.037	0.1633	0.15849	5.9973	5.3009
41	-35.4	170.4	-0.19625	-0.19	-0.03	-0.03	0.1665	0.16386	5.9452	5.6930
42	-66.0	174.6	-0.19718	-0.2	-0.03	-0.031	0.168	0.16653	5.8794	5.6584
Amides										
7	-71.5	167.9	-0.238	-0.24	-0.05	-0.04	0.1928	0.20197	4.3808	4.2564
8	-70.5	171.0	-0.2393	-0.24	-0.04	-0.031	0.2032	0.21184	4.1451	4.0438
9	-72.7	178.0	-0.24533	-0.23	-0.03	-0.022	0.2164	0.20925	4.4624	4.2381
10	-81.0	176.6	-0.2473	-0.24	-0.03	-0.019	0.2191	0.22535	4.7223	4.2538
11	-79.2	176.8	-0.24476	-0.24	-0.03	-0.018	0.2163	0.2268	4.5210	4.0789
12	-72.5	174.6	-0.25008	-0.23	-0.03	-0.022	0.2206	0.20949	4.8596	4.4856
18	-115.1	174.6	-0.25785	-0.23	-0.03	-0.029	0.2272	0.20369	5.1439	4.4878
19	-108.8	176.2	-0.27637	-0.26	-0.09	-0.098	0.183	0.16338	6.8059	6.6139
20	-77.0	125.2	-0.22468	-0.21	-0.02	-0.014	0.2007	0.19711	4.0018	4.9364
21	-72.7	176.0	-0.25374	-0.23	-0.02	-0.019	0.2299	0.21191	2.9436	2.8210
22	-48.3	145.3	-0.22775	-0.23	-0.01	-0.009	0.2179	0.22568	3.5813	3.7315
27	-71.6	175.0	-0.25462	-0.25	-0.04	-0.042	0.212	0.21061	5.6094	5.1300
28	-73.2	165.7	-0.26823	-0.27	-0.05	-0.032	0.2213	0.23525	5.7986	5.3836
29	-69.5	158.2	-0.21433	-0.22	-0.03	-0.03	0.1817	0.18737	4.4289	4.1217
30	-73.2	173.1	-0.23402	-0.23	-0.03	-0.018	0.2063	0.2104	4.7112	4.8623
35	-46.8	144.1	-0.22565	-0.23	-0.01	-0.011	0.2154	0.22129	3.3888	3.6154
36	-71.5	153.7	-0.23176	-0.23	-0.01	-0.011	0.221	0.22246	4.3573	3.8020
37	-68.9	180.0	-0.23595	-0.24	-0.01	-0.011	0.2238	0.22534	4.4576	4.0621
38	-72.2	171.3	-0.23469	-0.24	-0.01	-0.011	0.2225	0.22381	4.4013	4.0340
43	-77.4	145.6	-0.22262	-0.23	-0.02	-0.01	0.2048	0.22288	2.9007	3.5784
44	-90.6	141.6	-0.23173	-0.23	-0.01	-0.011	0.222	0.22005	4.2654	3.7963
45	-54.5	177.4	-0.23539	-0.24	-0.01	-0.011	0.2237	0.22511	4.3108	4.1293
46	-69.4	176.8	-0.23446	-0.23	-0.01	-0.011	0.223	0.22349	4.2918	4.1071

Thioami	C=N bond		%Vbur	%Vbur (with H)		C=X bond		Chem.Pot		Chem.Har		Electrophili	
	cis	trans	cis	cis	trans	cis	trans	cis	tran	cis	tran	cis	tran
1	1.355	1.351	78.6	80.0	68.7	1.678	1.677	-	###	0.1	0.1	0.06	0.05
2	1.351	1.348	77.7	78.9	68.2	1.679	1.676	-	###	0.1	0.1	0.05	0.04
3	1.353	1.354	71.8	72.0	59.7	1.687	1.686	-	###	0.1	0.1	0.04	0.04
4	1.350	1.352	74.2	76.3	62.3	1.682	1.679	-	###	0.1	0.1	0.04	0.04
5	1.363	1.358	79.9	82.3	73.2	1.684	1.684	-	###	0.1	0.1	0.05	0.03
6	1.349	1.350	65.3	67.7	55.4	1.680	1.679	-	###	0.1	0.1	0.04	0.04
13	1.343	1.339	57.8	59.1	45.9	1.662	1.662	-	###	0.1	0.1	0.05	0.04
14	1.332	1.333	74.1	75.0	62.7	1.644	1.642	-	###	0.1	0.1	0.09	0.10
15	1.388	1.376	75.1	77.2	65.5	1.694	1.693	-	###	0.1	0.1	0.04	0.03
16	1.351	1.351	67.2	68.5	55.2	1.679	1.678	-	###	0.1	0.1	0.04	0.03
17	1.385	1.366	81.7	84.2	74.7	1.675	1.680	-	###	0.1	0.1	0.06	0.05
23	1.345	1.346	74.5	75.4	64.6	1.661	1.659	-	###	0.1	0.1	0.07	0.07
24	1.372	1.358	90.1	90.8	83.7	1.655	1.664	-	###	0.1	0.1	0.09	0.07
25	1.368	1.362	87.3	89.0	76.9	1.681	1.681	-	###	0.1	0.1	0.05	0.04
26	1.359	1.358	62.5	64.8	52.0	1.699	1.697	-	###	0.1	0.1	0.04	0.03
31	1.390	1.370	81.5	84.7	76.7	1.674	1.679	-	###	0.1	0.1	0.06	0.05
32	1.372	1.366	78.8	81.7	71.8	1.685	1.680	-	###	0.1	0.1	0.04	0.04
33	1.356	1.356	79.1	81.9	76.0	1.694	1.688	-	###	0.1	0.1	0.03	0.04
34	1.354	1.354	74.1	77.2	70.7	1.688	1.685	-	###	0.1	0.1	0.03	0.04
39	1.403	1.382	82.5	85.8	80.2	1.665	1.678	-	###	0.1	0.1	0.06	0.05
40	1.365	1.366	81.1	84.3	77.5	1.697	1.683	-	###	0.1	0.1	0.03	0.04
41	1.359	1.356	80.2	83.0	80.4	1.694	1.690	-	###	0.1	0.1	0.03	0.03
42	1.356	1.356	75.0	78.0	77.7	1.689	1.690	-	###	0.1	0.1	0.03	0.03
Amides													
7	1.378	1.375	76.2	77.5	66.8	1.228	1.226	-	###	0.1	0.2	0.05	0.04
8	1.376	1.373	74.8	76.5	65.5	1.228	1.227	-	###	0.2	0.2	0.04	0.04
9	1.376	1.381	69.3	70.8	58.5	1.229	1.227	-	###	0.2	0.2	0.04	0.03
10	1.371	1.377	72.8	75.0	64.4	1.228	1.226	-	###	0.2	0.2	0.04	0.03
11	1.378	1.380	79.0	81.4	72.3	1.229	1.226	-	###	0.2	0.2	0.04	0.03
12	1.374	1.382	64.4	66.7	54.2	1.227	1.224	-	###	0.2	0.2	0.04	0.03
18	1.358	1.371	57.3	58.9	44.3	1.222	1.217	-	###	0.2	0.2	0.04	0.04
19	1.336	1.342	73.2	74.1	61.4	1.202	1.224	-	###	0.1	0.1	0.09	0.09
20	1.403	1.420	73.5	75.4	64.1	1.230	1.224	-	###	0.2	0.1	0.03	0.03
21	1.363	1.373	65.9	67.1	53.8	1.219	1.216	-	###	0.2	0.2	0.04	0.03
22	1.402	1.382	79.2	82.4	73.3	1.224	1.227	-	###	0.2	0.2	0.03	0.03
27	1.354	1.359	73.9	74.8	61.0	1.217	1.215	-	###	0.2	0.2	0.05	0.05
28	1.368	1.361	88.9	89.6	82.7	1.214	1.214	-	###	0.2	0.2	0.05	0.04
29	1.383	1.385	85.7	87.4	75.5	1.222	1.220	-	###	0.1	0.1	0.04	0.04
30	1.385	1.366	60.7	61.9	50.9	1.228	1.225	-	###	0.2	0.2	0.04	0.03
35	1.406	1.383	80.0	83.3	75.2	1.224	1.227	-	###	0.2	0.2	0.03	0.03
36	1.385	1.380	77.8	81.1	75.2	1.233	1.228	-	###	0.2	0.2	0.03	0.03
37	1.373	1.372	77.3	80.3	74.7	1.233	1.232	-	###	0.2	0.2	0.03	0.03
38	1.373	1.371	72.0	75.1	69.0	1.231	1.231	-	###	0.2	0.2	0.03	0.03
43	1.420	1.389	80.8	84.1	79.3	1.220	1.228	-	###	0.2	0.2	0.03	0.03
44	1.384	1.385	78.9	82.2	79.0	1.234	1.227	-	###	0.2	0.2	0.03	0.03
45	1.375	1.373	78.3	81.3	78.9	1.232	1.232	-	###	0.2	0.2	0.03	0.03
46	1.373	1.371	72.8	75.9	74.4	1.232	1.231	-	###	0.2	0.2	0.03	0.03

Thioamides	NBO charge cis			NBO charge trans			$\%V_{Bur}$[1]	%Vbur	$\%V_{bur}$[2]
	N	**S**	**C**	**N**	**S**	**C**	ts	cis	cis
1	-0.466	-0.193	0.140	-0.473	-0.187	0.144	70.1	78.5	62.9
2	-0.467	-0.204	0.134	-0.474	-0.194	0.136	65.2	77.1	61.5
3	-0.475	-0.265	0.166	-0.482	-0.247	0.164	60.3	70.6	55.3
4	-0.481	-0.245	0.180	-0.490	-0.219	0.174	65.0	74.2	59.1
5	-0.496	-0.212	0.179	-0.495	-0.203	0.176	72.7	80.3	64.8
6	-0.481	-0.240	0.155	-0.487	-0.224	0.154	54.0	65.4	49.6
13	-0.444	-0.213	-0.039	-0.462	-0.217	-0.028	51.8	58.5	34.2
14	-0.459	-0.075	0.212	-0.467	-0.057	0.209	64.0	74.0	57.3
15	-0.535	-0.288	0.311	-0.530	-0.281	0.334	64.9	75.7	58.6
16	-0.500	-0.288	0.451	-0.503	-0.275	0.448	55.6	67.5	50.9
17	-0.566	-0.149	0.189	-0.528	-0.190	0.187	74.5	82.5	65.6
23	-0.448	-0.117	0.024	-0.455	-0.098	0.019	65.8	74.6	59.1
24	-0.501	-0.015	0.083	-0.479	-0.061	0.090	86.7	90.4	74.7
25	-0.543	-0.217	0.323	-0.508	-0.212	0.323	84.0	86.4	69.6
26	-0.510	-0.342	0.319	-0.511	-0.328	0.317	49.6	62.9	45.7
31	-0.574	-0.141	0.201	-0.537	-0.181	0.196	79.4	83.2	66.1
32	-0.517	-0.205	0.184	-0.513	-0.201	0.184	69.8	79.7	64.3
33	-0.471	-0.249	0.182	-0.485	-0.231	0.185	77.4	79.2	64.6
34	-0.472	-0.248	0.181	-0.483	-0.236	0.181	71.9	74.1	59.4
39	-0.622	-0.105	0.219	-0.553	-0.167	0.204	82.4	85.4	65.7
40	-0.490	-0.260	-0.199	-0.509	-0.215	0.191	79.5	81.2	65.5
41	-0.485	-0.247	0.191	-0.488	-0.240	0.188	81.0	80.4	64.7
42	-0.479	-0.254	0.190	-0.487	-0.252	0.194	72.5	75.0	59.4
Amides									
7	-0.508	-0.638	0.685	-0.513	-0.633	0.684	67.4	76.2	61.3
8	-0.509	-0.642	0.676	-0.512	-0.639	0.674	63.9	75.0	60.1
9	-0.516	-0.674	0.695	-0.510	-0.662	0.695	58.6	69.5	54.8
10	-0.519	-0.671	0.711	-0.526	-0.653	0.706	63.9	73.0	58.5
11	-0.525	-0.660	0.716	-0.528	-0.648	0.713	71.2	79.2	64.8
12	-0.526	-0.663	0.697	-0.515	-0.644	0.698	52.8	64.4	49.4
18	-0.511	-0.646	0.545	-0.492	-0.623	0.550	51.4	57.7	34.2
19	-0.494	-0.578	0.797	-0.491	-0.565	0.801	68.7	73.2	57.4
20	-0.551	-0.683	0.833	-0.538	-0.654	0.839	64.0	74.0	57.9
21	-0.531	-0.676	0.934	-0.517	-0.661	0.937	54.0	66.1	50.4
22	-0.575	-0.635	0.740	-0.538	-0.660	0.724	74.0	80.8	65.4
27	-0.489	-0.603	0.608	-0.486	-0.589	0.607	64.4	74.0	59.2
28	-0.510	-0.585	0.703	-0.503	-0.590	0.697	84.9	88.9	74.7
29	-0.531	-0.646	0.843	-0.518	-0.637	0.843	82.6	85.4	70.2
30	-0.533	-0.691	0.812	-0.530	-0.682	0.811	48.5	61.0	44.9
35	-0.629	-0.579	0.748	-0.537	-0.656	0.728	77.0	81.3	65.7
36	-0.527	-0.676	0.717	-0.534	-0.664	0.724	73.4	78.1	64.3
37	-0.505	-0.671	0.709	-0.511	-0.511	0.710	74.8	77.5	63.5
38	-0.510	-0.671	0.710	-0.516	-0.676	0.713	68.9	72.2	58.3
43	-0.615	-0.618	0.776	-0.538	-0.662	0.732	79.8	83.2	65.4
44	-0.528	-0.682	0.719	-0.558	-0.656	0.732	77.0	79.1	64.2
45	-0.514	-0.674	0.715	-0.515	-0.674	0.713	75.9	78.6	63.6
46	-0.515	-0.678	0.714	-0.520	-0.679	0.717	70.7	73.0	58.2

[1] calculated with a dummy atom, not with the central point among groups in *cis*; [2] for only the groups in *cis*, the rest is removed.

For ΔG_{trans} for all the molecules (n=46)

R^2 for 1, 2, ..., 6 descriptors are 0.6789, 0.7284, 0.7582, 0.7979, 0.8186, 0.8425

In those MLR models there is some uniformity, and the involved variables are some (or all) of the following ones:

$\%\tau_{cis}$ $\%XC_{cis}$ XN_{trans} $\%XN_{cis}$ qNBO-C_{cis} qNBO-C_{trans}

In order to seek for a more predictive linear model, w also searched for equations giving the highest R^2 value for leave-one-out cross-validation (*i.e.* simulating the extraction of one molecule and predicting the experimental value with the equation obtained with the other molecules). In this case, the so-called R^2_{CV} values are

R^2_{CV} for 1, 2, ..., 7 descriptors are 0.6474, 0.6899, 0.6896, 0.7306, 0.7492, 0.7241, 0.7473

The variables involved in these models are more or less the same ones indicated above. Actually, when the variables coincide along R^2 and R^2_{CV} optimized models, the final MLR model is the same.

For ΔG_{TS} for all the molecules (n=46)

When modeling the property ΔG_{TS}, correlations are a little bit better, confirming a major role for kinetics than thermodynamics:

R^2 for 1, 2, ..., 6 descriptors are 0.7272, 0.8410, 0.8688, 0.8914, 0.9037, 0.9079

But here, the variables appearing in the MLR are more unstable (change more from model to model involving a different number of descriptors). Some of the variables used more times are:

$\%XC_{cis}$ XN_{trans} C=N-BL_{cis} qNBO-S_{trans} qNBO-C_{trans}

When optimizing for R^2_{CV} we obtain:

R^2_{CV} for 1, 2, ..., 7 descriptors: 0.7053, 0.8121, 0.8355, 0.8546, 0.8674, 0.8689, 0.8822

The descriptors involved in these models use to be the following ones:

$\%XC_{cis}$ XN_{trans} C=N-BL_{cis} qNBO-S_{trans} qNBO-C_{trans}

Calculations involving only 23 molecules (thioamides or amides, only)

For ΔG_{TS}, the equations involving only the thioamides (n=23) increase the R^2_{CV} values, reaching up to 0.95 or more:

R^2_{CV} (Thio only): 0.7859, 0.8286, 0.8801, 0.9097, 0.9514, 0.9569, 0.9648

In this case, the variables $\%\tau_{trans}$, XC_{trans} and C=X bond length$_{cis}$ are used several times along the models.

For $\underline{\Delta}G_{trans}$, the equations involving only the Amides (n=23) the R^2_{CV} values are:

R^2_{CV} (Amides only): 0.6735, 0.7018, 0.8168, 0.8638, 0.9043, 0.9012, 0.9213

PLS calculations

After the focus on the linear models described above, to reproduce the property ($\underline{\Delta}G_{trans}$ or ΔG_{TS}) with a small linear model involving only a few descriptors, and (if possible) being interpretable, we have also played with the linear technique called PLS, Partial Least Squares (https://dogedaos.com/wiki/Partial_least_squares_regression.html) which is a procedure similar to a diagonalization of the matrix *X* containing *all* the descriptors and, at the same time trying to correlate with a property. So, instead of eigenvectors (which are related only to the *X* matrix of descriptors) one seeks for the so-called Latent Variables (LV), which are similar to eigenvectors, but focused (correlated) towards a property. In PLS the final linear model involves *all* the variables. For instance, for ΔG_{TS} (the best case) and for all the 46 molecules, the fitted vs experimental values give Figure S5 (n=46, 48 variables, R=0.950, R^2=0.903):

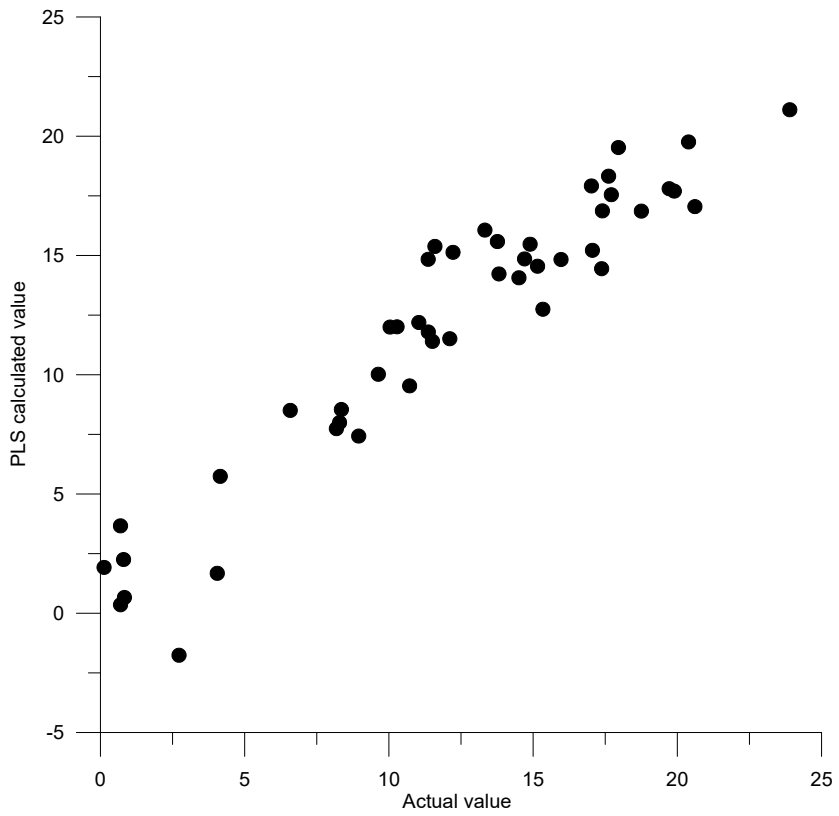

Figure S5. 5 LVs, fitting with PLS, R=0.950, R^2=0.903

PLS calculations can be useful to obtain the coefficients attached to all the variables, like in Figure S6, where we have been able to screen/study which variables are more contributive, or which ones have a positive or a negative coefficient.

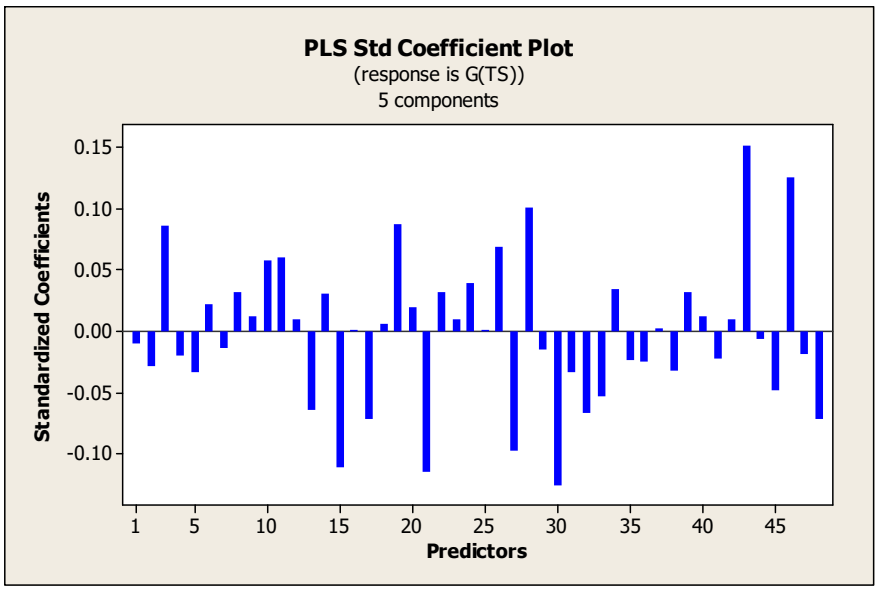

Figure S6. PLS standard coefficient plot (5 LV, GTS)

[i] Gaussian 16, Revision C.01, Frisch, M. J.; Trucks, G. W.; Schlegel, H. B.; Scuseria, G. E.; Robb, M. A.; Cheeseman, J. R.; Scalmani, G.; Barone, V.; Petersson, G. A.; Nakatsuji, H.; Li, X.; Caricato, M.; Marenich, A. V.; Bloino, J.; Janesko, B. G.; Gomperts, R.; Mennucci, B.; Hratchian, H. P.; Ortiz, J. V.; Izmaylov, A. F.; Sonnenberg, J. L.; Williams-Young, D.; Ding, F.; Lipparini, F.; Egidi, F.; Goings, J.; Peng, B.; Petrone, A.; Henderson, T.; Ranasinghe, D.; Zakrzewski, V. G.; Gao, J.; Rega, N.; Zheng, G.; Liang, W.; Hada, M.; Ehara, M.; Toyota, K.; Fukuda, R.; Hasegawa, J.; Ishida, M.; Nakajima, T.; Honda, Y.; Kitao, O.; Nakai, H.; Vreven, T.; Throssell, K.; Montgomery, J. A., Jr.; Peralta, J. E.; Ogliaro, F.; Bearpark, M. J.; Heyd, J. J.; Brothers, E. N.; Kudin, K. N.; Staroverov, V. N.; Keith, T. A.; Kobayashi, R.; Normand, J.; Raghavachari, K.; Rendell, A. P.; Burant, J. C.; Iyengar, S. S.; Tomasi, J.; Cossi, M.; Millam, J. M.; Klene, M.; Adamo, C.; Cammi, R.; Ochterski, J. W.; Martin, R. L.; Morokuma, K.; Farkas, O.; Foresman, J. B.; Fox, D. J. Gaussian, Inc., Wallingford CT, 2016.

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