BEILSTEIN JOURNAL OF ORGANIC CHEMISTRY

Supporting Information

for

Regio- and stereochemical stability induced by anomeric and *gauche* effects in difluorinated pyrrolidines

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Beilstein J. Org. Chem. **2024,** *20,* 1572–1579. doi:10.3762/bjoc.20.140

Standard orientations for the difluorinated pyrrolidines in the gas phase and DMSO

Standard orientations for the difluorinated pyrrolidines (gas phase, B3LYP-GD3BJ/6-311++G**)

1

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.207852	-1.337734	-0.400837
2	6	0	0.697527	-0.489806	0.495450
3	6	0	0.016870	0.879619	0.467467
4	6	0	-1.606124	-0.700101	-0.229161
5	1	0	0.146700	-1.232763	-1.427113
6	1	0	-0.186703	-2.393517	-0.133551
7	1	0	0.730413	-0.852481	1.525352
8	1	0	0.330855	1.582063	1.238604
9	1	0	-2.285022	-1.346602	0.331479
10	1	0	-2.064415	-0.485346	-1.199220
11	7	0	-1.337871	0.528173	0.547253
12	9	0	0.358288	1.517676	-0.771125
13	9	0	2.007517	-0.447063	0.035434
14	1	0	-2.001499	1.284043	0.457379

G° (Hartree-Fock) -411.1320928 Imag. Freq. = 0

2

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.726367	-0.829764	0.900838
2	6	0	-0.710186	0.599955	0.363490
3	6	0	0.608253	0.670790	-0.399903
4	6	0	0.179231	-1.635418	-0.061812
5	1	0	-0.316849	-0.836240	1.911860
6	1	0	-1.748224	-1.206089	0.942732
7	1	0	-0.793146	1.373293	1.125034
8	1	0	0.689997	1.476620	-1.126895
9	1	0	-0.385474	-2.358069	-0.654301
10	1	0	0.951067	-2.177647	0.4933355
11	7	0	0.746107	-0.604317	-0.943427
12	1	0	1.599440	-0.813595	-1.439387
13	9	0	1.617503	0.975409	0.603751
14	9	0	-1.764630	0.795544	-0.544205

G° (Hartree-Fock) -411.1358488 Imag. Freq. = 0

3

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.971306	-0.390336	0.983068
2	6	0	0.362726	0.845371	0.340660

3	6	0	-0.850108	0.289100	-0.405349
4	6	0	0.714522	-1.491054	-0.059176
5	1	0	2.026826	-0.249700	1.214486
6	1	0	0.432212	-0.603765	1.908982
7	1	0	0.116551	1.659201	1.019877
8	1	0	-1.152159	0.888382	-1.263850
9	1	0	0.586412	-2.471444	0.405574
10	1	0	1.542824	-1.55299	-0.773485
11	7	0	-0.522537	-1.039930	-0.709228
12	1	0	-0.741781	-1.387075	-1.627712
13	9	0	-1.959249	0.363180	0.506326
14	9	0	1.254383	1.356644	-0.625714

G° (Hartree-Fock) -411.1348173 Imag. Freq. = 0

4

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	1.444511	0.571046	0.409603
2	6	0	-0.044309	0.863379	0.521698
3	6	0	-0.696723	-0.541759	0.494408
4	6	0	1.474827	-0.666831	-0.503171
5	1	0	1.992709	1.432333	0.025534
6	1	0	1.837875	0.319112	1.399600
7	1	0	2.347158	-1.299338	-0.331547
8	1	0	1.473315	-0.371560	-1.556569
9	1	0	0.237530	-1.383457	-0.163361
10	1	0	0.345511	-2.307763	0.220736
11	7	0	-0.958898	-0.884869	1.500328
12	1	0	-0.335344	1.441402	1.399288
13	9	0	-1.926425	-0.480142	-0.185083
14	9	0	-0.455227	1.591239	-0.598146

G° (Hartree-Fock) -411.1255847 Imag. Freq. = 0

5 = 4

7 = 6 = 2

8 = 1

9

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.763949	-0.421154	0.526499
2	6	0	-0.054227	0.882775	0.521099
3	6	0	-1.485318	0.361275	0.446206
4	6	0	-0.153278	-1.456959	-0.172487

5	1	0	0.996059	-0.709784	1.555074
6	1	0	0.165144	1.550417	1.355388
7	1	0	-1.807701	0.023733	1.439007
8	1	0	-2.183412	1.124054	0.101481
9	1	0	-0.333448	-2.305743	0.493151
10	1	0	0.322464	-1.832502	-1.078678
11	7	0	-1.432071	-0.784667	-0.471384
12	1	0	-1.412534	-0.43146	-1.422812
13	9	0	0.222544	1.588684	-0.657845
14	9	0	1.983141	-0.268571	-0.127802

G° (Hartree-Fock) -411.1169296 Imag. Freq. = 0

10

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.840288	-0.340015	-0.395815
2	6	0	0.415178	-0.824704	0.334949
3	6	0	0.975938	0.448914	0.956112
4	6	0	-0.604264	1.174517	-0.610022
5	1	0	0.432439	0.661532	1.883399
6	1	0	2.038419	0.372512	1.187173
7	1	0	-1.399127	1.708734	-0.081490
8	1	0	-0.642739	1.461769	-1.660895
9	1	0	0.707780	1.506337	-0.026133
10	1	0	1.418694	1.471844	-0.748083
11	7	0	0.216458	-1.649317	1.019162
12	1	0	-1.018347	-0.909730	-1.307535
13	9	0	1.321722	-1.286673	-0.643758
14	9	0	-1.952793	-0.537102	0.441520

G° (Hartree-Fock) -411.1222198 Imag. Freq. = 0

11 = 10

12

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.078071	0.877514	0.463337
2	6	0	0.619429	-0.555114	0.458574
3	6	0	-0.319531	-1.267174	-0.516695
4	6	0	-1.433744	0.680223	0.262182
5	1	0	0.350526	1.450533	1.349900
6	1	0	0.522279	-0.980233	1.463957
7	1	0	-0.038796	-1.006705	-1.541614
8	1	0	-0.307408	-2.352403	-0.418811
9	1	0	-1.769262	1.387959	-0.500235
10	1	0	-1.995938	0.880384	1.176622

11	7	0	-1.641113	-0.719135	-0.187247
12	1	0	-2.066841	-1.263296	0.552682
13	9	0	0.610067	1.565161	-0.636520
14	9	0	1.959698	-0.620130	0.105837

G° (Hartree-Fock) -411.1160778 Imag. Freq. = 0

13 = 12

15 = 14 = 10

16

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.763141	-0.423859	0.527318
2	6	0	-0.052702	0.882419	0.522735
3	6	0	-1.485217	0.365365	0.441240
4	6	0	-0.158922	-1.458857	-0.166787
5	1	0	0.999228	-0.711842	1.555181
6	1	0	0.165234	1.546701	1.360164
7	1	0	-1.813196	0.028347	1.432396
8	1	0	-2.179203	1.130612	0.093599
9	1	0	-0.348223	-2.299973	0.506168
10	1	0	0.317212	-1.846603	-1.067619
11	7	0	-1.431657	-0.780611	-0.476107
12	1	0	-1.403369	-0.430481	-1.427497
13	9	0	1.979500	-0.274030	-0.132595
14	9	0	0.230067	1.591486	-0.652592

17

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-1.179704	0.089144	0.380986
2	6	0	-0.042865	-0.723475	1.015715
3	6	0	1.220210	-0.170727	0.370274
4	6	0	-0.498906	1.300856	-0.282570
5	1	0	-1.948303	0.372320	1.100119
6	1	0	-0.168854	-1.789908	0.835724
7	1	0	-0.005527	-0.547304	2.092791
8	1	0	2.139748	-0.292760	0.942088
9	1	0	-0.914530	2.251824	0.056290
10	1	0	-0.645103	1.217510	-1.364716
11	7	0	0.907363	1.182946	0.128512
12	1	0	1.577959	1.687664	-0.435493
13	9	0	1.463406	-0.899219	-0.849324
14	9	0	-1.838889	-0.673531	-0.598768

G° (Hartree-Fock) -411.1364769 Imag. Freq. = 0

18

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-1.187090	-0.281477	0.502085
2	6	0	0.076096	-1.104002	0.295394
3	6	0	1.033177	-0.163620	-0.462511
4	6	0	-0.671042	1.152822	0.539521
5	1	0	-1.780541	-0.570571	1.370525
6	1	0	0.525570	-1.355222	1.259049
7	1	0	-0.383763	1.412593	1.565141
8	1	0	-1.425027	1.865870	0.205536
9	7	0	0.498039	1.148495	-0.344350
10	1	0	0.377831	1.635953	-1.217570
11	1	0	-0.126980	-2.029716	-0.241642
12	9	0	-2.025297	-0.435438	-0.627316
13	1	0	1.213293	-0.444720	-1.500435
14	9	0	2.314907	-0.250782	0.152084

G° (Hartree-Fock) 411.1348201 Imag. Freq. = 0

19

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	1.085146	-0.218668	0.508728
2	6	0	0.025619	-1.164342	-0.083008
3	6	0	-1.113250	-0.250310	-0.531300
4	6	0	0.461688	1.174921	0.433675
5	1	0	0.461645	-1.690899	-0.932990
6	1	0	1.211548	1.926551	0.185114
7	1	0	0.006050	1.428662	1.399752
8	1	0	-0.526708	1.024724	-0.639318
9	7	0	-1.175948	1.789660	-0.766192
10	1	0	-0.337655	-1.899077	0.634272
11	1	0	-1.642068	-0.553151	-1.433656
12	1	0	1.401115	-0.486769	1.516404
13	9	0	-2.135795	-0.284587	0.498183
14	9	0	2.247690	-0.264041	-0.286632

G° (Hartree-Fock) -411.137674 Imag. Freq. = 0

24 = 21 = 20 = 17

22 =19
23 = 18

Standard orientations for the difluorinated pyrrolidines (DMSO, B3LYP-GD3BJ/6-311++G**)

1

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.282718	-1.332334	0.403692
2	6	0	-0.649786	-0.533484	-0.504240
3	6	0	-0.039251	0.864359	-0.497135
4	6	0	1.648982	-0.631618	0.237427
5	1	0	-0.075348	-1.243315	1.431120
6	1	0	0.315004	-2.387266	0.136172
7	1	0	-0.680697	-0.910156	-1.527087
8	1	0	-0.375409	1.557836	-1.263416
9	1	0	2.346090	-1.234302	-0.348010
10	1	0	2.111105	-0.415685	1.204200
11	7	0	1.314970	0.601491	-0.501392
12	9	0	-0.496441	1.521269	0.762223
13	9	0	-1.977150	-0.538779	-0.037826
14	1	0	1.960803	1.378505	-0.481275
G° (Hartree-Fock)	-411.1473709		Imag. Freq. =	0	

2

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.746059	0.792271	0.919170
2	6	0	0.673446	-0.628175	0.374730
3	6	0	-0.619595	-0.634673	-0.428434
4	6	0	-0.099783	1.644345	-0.055003
5	1	0	0.315885	0.806386	1.921622
6	1	0	1.781451	1.124975	0.991983
7	1	0	0.730990	-1.417355	1.119773
8	1	0	-0.754471	-1.438120	-1.147181
9	1	0	0.508749	2.336325	-0.640719
10	1	0	-0.855143	2.223530	0.482566
11	7	0	-0.706391	0.639319	-0.942499
12	1	0	-1.504697	0.891067	-1.508843
13	9	0	-1.683151	-0.923445	0.597129
14	9	0	1.741063	-0.859294	-0.539850
G° (Hartree-Fock)	-411.147371		Imag. Freq. =	0	

3

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.975470	0.400275	0.980594
2	6	0	-0.365537	-0.837278	0.351886

3	6	0	0.831638	-0.290159	-0.420561
4	6	0	-0.703134	1.501069	-0.055127
5	1	0	-2.033514	0.266257	1.204868
6	1	0	-0.447285	0.606901	1.914749
7	1	0	-0.126851	-1.652147	1.030487
8	1	0	1.148753	-0.891982	-1.268908
9	1	0	-0.561261	2.477014	0.412568
10	1	0	-1.521696	1.580504	-0.776788
11	7	0	0.531679	1.037171	-0.715572
12	1	0	0.707971	1.351236	-1.658458
13	9	0	1.975134	-0.373731	0.511074
14	9	0	-1.265451	-1.364205	-0.621104

G° (Hartree-Fock) -411.1490084 Imag. Freq. = 0

4

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.282702	-1.332353	0.403666
2	6	0	0.649805	-0.533474	-0.504241
3	6	0	0.039241	0.864357	-0.497139
4	6	0	-1.648965	-0.631622	0.237451
5	1	0	-0.314999	-2.387273	0.136096
6	1	0	0.075376	-1.243392	1.431095
7	1	0	0.680736	-0.910136	-1.527092
8	1	0	0.375404	1.557839	-1.263415
9	1	0	-2.111030	-0.415653	1.204244
10	1	0	-2.346116	-1.234309	-0.347931
11	7	0	-1.314974	0.601465	-0.501419
12	1	0	-1.960811	1.378475	-0.481272
13	9	0	0.496401	1.521272	0.762228
14	9	0	1.977153	-0.538745	-0.037807

G° (Hartree-Fock) -411.1473709 Imag. Freq. = 0

5

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.479401	-1.269665	-0.459934
2	6	0	0.528000	-0.617270	0.474690
3	6	0	0.135464	0.859079	0.460259
4	6	0	-1.753747	-0.482228	-0.134015
5	1	0	-0.171275	-1.102791	-1.495137
6	1	0	-0.587100	-2.339315	-0.286364
7	1	0	0.437560	-0.992237	1.496355
8	1	0	0.451573	1.443304	1.320832
9	1	0	-2.283364	-0.933885	0.710757
10	1	0	-2.439543	-0.425849	-0.981129

11	7	0	-1.234742	0.852959	0.224955
12	9	0	0.857640	1.498367	-0.657577
13	9	0	1.861067	-0.833764	0.082934
14	1	0	-1.814920	1.459143	0.785782

G° (Hartree-Fock) -411.1469837 Imag. Freq. = 0

6

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.975750	0.400246	0.980413
2	6	0	0.365348	-0.837179	0.351913
3	6	0	-0.831436	-0.289954	-0.420911
4	6	0	0.703454	1.501166	-0.055141
5	1	0	0.447903	0.607016	1.914727
6	1	0	2.033800	0.265882	1.204489
7	1	0	1.522078	1.580884	-0.776713
8	1	0	0.561217	2.477049	0.412587
9	7	0	-0.531009	1.036842	-0.715657
10	1	0	-1.149152	-0.891994	-1.268862
11	1	0	0.126395	-1.651908	1.030559
12	9	0	-1.975636	-0.373507	0.511209
13	9	0	1.265285	-1.364732	-0.620973
14	1	0	-0.710709	1.353657	-1.656951

G° (Hartree-Fock) -411.14903 Imag. Freq. = 0

7 = 2

8 = 4

9

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.717111	-0.491135	0.548382
2	6	0	-0.011113	0.870935	0.554160
3	6	0	-1.469058	0.481567	0.353148
4	6	0	-0.291226	-1.474940	-0.080939
5	1	0	1.013683	-0.778770	1.556374
6	1	0	0.194982	1.482089	1.430778
7	1	0	-1.892188	0.189435	1.320431
8	1	0	-2.061518	1.301029	-0.054041
9	1	0	-0.622391	-2.179391	0.686614
10	1	0	0.160499	-2.040214	-0.896449
11	7	0	-1.447673	-0.685145	-0.544882
12	1	0	-1.265093	-0.358258	-1.490113
13	9	0	0.416440	1.621317	-0.572030
14	9	0	1.909276	-0.414480	-0.204406

G° (Hartree-Fock)	-411.1318907	Imag. Freq. =	0

10

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-0.414195	-0.806645	0.347891
2	6	0	0.836325	-0.313158	-0.385499
3	6	0	0.628874	1.207471	-0.550677
4	6	0	-1.033214	0.461674	0.913877
5	1	0	-0.208615	-1.599483	1.064979
6	1	0	1.372906	1.714332	0.071324
7	1	0	0.755102	1.537705	-1.580947
8	1	0	-0.539060	0.690645	1.864165
9	1	0	-2.104588	0.367888	1.091239
10	1	0	-0.729623	1.516865	-0.066192
11	7	0	-1.380739	1.434300	-0.841756
12	1	0	-1.293903	-1.350088	-0.633091
13	9	0	0.998851	-0.853542	-1.316552
14	9	0	1.972432	-0.561684	0.428351

G° (Hartree-Fock)	-411.1351838	Imag. Freq. =	0

11 = 10

12

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	0.083915	0.869491	0.475331
2	6	0	0.592211	-0.570169	0.464910
3	6	0	-0.346687	-1.267099	-0.516528
4	6	0	-1.422155	0.712156	0.242243
5	1	0	0.357816	1.438740	1.360869
6	1	0	0.501017	-0.996238	1.466430
7	1	0	-0.058665	-1.015068	-1.542298
8	1	0	-0.357360	-2.350740	-0.407671
9	1	0	-1.726459	1.419284	-0.533927
10	1	0	-1.992050	0.932754	1.145279
11	7	0	-1.661184	-0.692068	-0.189989
12	1	0	-2.050516	-1.207748	0.592280
13	9	0	0.664181	1.557089	-0.627902
14	9	0	1.948130	-0.650731	0.100482

G° (Hartree-Fock)	-411.132017	Imag. Freq. =	0

13 = 12

15 = 14 = 10

16 = 9

17

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-1.187346	0.050100	0.375980
2	6	0	-0.009639	-0.546091	1.141034
3	6	0	1.201682	-0.032767	0.384338
4	6	0	-0.630222	1.298827	-0.314085
5	1	0	-2.063540	0.242746	0.990380
6	1	0	-0.055262	-1.632341	1.201924
7	1	0	0.008950	-0.139668	2.155266
8	1	0	2.156461	-0.047984	0.903536
9	1	0	-1.041905	2.210577	0.124451
10	1	0	-0.889950	1.278312	-1.376214
11	7	0	0.819170	1.222580	-0.072998
12	1	0	1.436854	1.704677	-0.711999
13	9	0	1.451503	-0.985855	-0.747420
14	9	0	-1.621797	-0.880233	-0.619243

G° (Hartree-Fock) -411.15235 Imag. Freq. = 0

18

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6	0	-1.181672	-0.277894	0.512496
2	6	0	0.074072	-1.103632	0.292484
3	6	0	1.017656	-0.164976	-0.472710
4	6	0	-0.668733	1.153234	0.542545
5	1	0	-1.775113	-0.567526	1.377825
6	1	0	0.515674	-1.351083	1.260881
7	1	0	-0.379200	1.404306	1.568012
8	1	0	-1.415801	1.872888	0.208851
9	7	0	0.503925	1.148697	-0.348858
10	1	0	0.351149	1.607709	-1.236012
11	1	0	-0.126226	-2.031979	-0.241226
12	9	0	-2.039462	-0.434351	-0.625392
13	1	0	1.216314	-0.443875	-1.504994
14	9	0	2.332549	-0.251394	0.154256

G° (Hartree-Fock) -411.1509097 Imag. Freq. = 0

19

			Coordinates (Angstroms)		
Center Number	Atomic Number	Atomic Type	X	Y	Z
1	6		1.094192	-0.227227	0.529331
2	6		0.013348	-1.167025	-0.018407

3	6	-1.077570	-0.242105	-0.552063
4	6	0.476731	1.162274	0.472360
5	1	0.426144	-1.786094	-0.816226
6	1	1.219258	1.931409	0.259130
7	1	-0.000942	1.389008	1.433384
8	7	-0.488842	1.022317	-0.625068
9	1	-1.112395	1.801227	-0.798566
10	1	-0.384681	-1.826244	0.752216
11	1	-1.582725	-0.548675	-1.464042
12	1	1.472625	-0.498838	1.511746
13	9	-2.189306	-0.261671	0.444517
14	9	2.227573	-0.268720	-0.343349

G° (Hartree-Fock)	-411.1525187	Imag. Freq. =	0

24 = 21 = 20 = 17

22 =19

23 = 18