

**Chemistry 144**  
**Organic Synthesis**  
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**Equilibria and Free Energy Difference**

Relationship between Percentage of More Stable Isomer at Equilibrium, Equilibrium Constant K, and Standard Free-Energy Difference  $\Delta G^\circ$  at 25°C and 80°C for an Equilibrium of Isomers:  $A \rightleftharpoons B$

<b>% Stabler Isomer</b>	<b>K</b>	<b><math>\Delta G^\circ_{25}</math> kcal/mole</b>	<b><math>\Delta G^\circ_{80}</math> kcal/mole</b>
50	1.00	0	0
55	1.22	0.119	0.141
60	1.50	0.240	0.285
65	1.86	0.367	0.434
70	2.33	0.502	0.595
75	3.00	0.651	0.771
80	4.00	0.821	0.973
85	5.67	1.028	1.217
90	9.00	1.302	1.542
95	19.00	1.744	2.066
98	49.00	2.306	2.731
99	99.99	2.722	3.224
99.9	999.9	4.092	4.846
99.99	9999	5.456	6.463

Correlation between the free energy difference ( $\Delta G^\circ$ ) and the equilibrium constant (K) for two equilibrating species (conformers), also expressed as the percentage of the component in excess.