

TABLE I  
Dehydration reactions and their standard free energies ( $\Delta G^{\circ}$ )

Dehydration reactions	Standard free energy ( $\Delta G^{\circ}$ )
<i>Primary alcohols</i>	
(1a) $\text{CH}_2\text{OH}-\text{CH}_3 \rightarrow \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$	-0.2 kcal/mol
(1b) $\text{CH}_2\text{OH}-\text{CH}_2- \rightarrow \text{CH}_2=\text{CH}- + \text{H}_2\text{O}$	-1.3 kcal/mol
(1c) $\text{CH}_2\text{OH}-\text{CH}< \rightarrow \text{CH}_2=\text{C}< + \text{H}_2\text{O}$	-0.9 kcal/mol
<i>Secondary alcohols</i>	
(2a) $-\text{CHOH}-\text{CH}_3 \rightarrow -\text{CH}=\text{CH}_2 + \text{H}_2\text{O}$	1.7 kcal/mol
(2b) $-\text{CHOH}-\text{CH}_2- \rightarrow -\text{CH}=\text{CH}- + \text{H}_2\text{O}$	0.6 kcal/mol
(2c) $-\text{CHOH}-\text{CH}< \rightarrow -\text{CH}=\text{C}< + \text{H}_2\text{O}$	1.0 kcal/mol
<i>Tertiary alcohols</i>	
(3a) $>\text{COH}-\text{CH}_3 \rightarrow >\text{C}=\text{CH}_2 + \text{H}_2\text{O}$	2.1 kcal/mol
(3c) $>\text{COH}-\text{CH}_2- \rightarrow >\text{C}=\text{CH}- + \text{H}_2\text{O}$	1.0 kcal/mol
(3c) $>\text{COH}-\text{CH}< \rightarrow >\text{C}=\text{C}< + \text{H}_2\text{O}$	1.4 kcal/mol
<i>Primary diols</i>	
(4a) $\text{CH}_2\text{OH}-\text{CH}_2\text{OH} \rightarrow [\text{CH}_2=\text{CHOH}] + \text{H}_2\text{O}$	-1.3 kcal/mol
$[\text{CH}_2=\text{CHOH}] \rightarrow \text{CH}_3-\text{CHO}$	-9.7 kcal/mol
(4b) $\text{CH}_2\text{OH}-\text{CHOH}- \rightarrow [\text{CH}_2=\text{COH}-] + \text{H}_2\text{O}$	-0.9 kcal/mol
$[\text{CH}_2=\text{COH}-] \rightarrow \text{CH}_3-\text{CO}-$	-10.7 kcal/mol
<i>Secondary diols</i>	
(5a) $-\text{CHOH}-\text{CH}_2\text{OH} \rightarrow [-\text{CH}=\text{CHOH}] + \text{H}_2\text{O}$	0.6 kcal/mol
$[-\text{CH}=\text{CHOH}] \rightarrow -\text{CH}_2-\text{CHO}$	-9.0 kcal/mol
(5b) $-\text{CHOH}-\text{CHOH}- \rightarrow [-\text{CH}=\text{COH}-] + \text{H}_2\text{O}$	1.0 kcal/mol
$[-\text{CH}=\text{COH}-] \rightarrow -\text{CH}_2-\text{CO}-$	-9.6 kcal/mol
<i>Tertiary diols</i>	
(6a) $>\text{COH}-\text{CH}_2\text{OH} \rightarrow [>\text{C}=\text{CHOH}] + \text{H}_2\text{O}$	1.0 kcal/mol
$[>\text{C}=\text{CHOH}] \rightarrow >\text{CH}-\text{CHO}$	-9.4 kcal/mol
(6b) $>\text{COH}-\text{CHOH}- \rightarrow [>\text{C}=\text{COH}-] + \text{H}_2\text{O}$	-1.4 kcal/mol
$[>\text{C}=\text{COH}-] \rightarrow >\text{CH}-\text{CO}-$	-10.0 kcal/mol
<i><math>\alpha</math>-Hydroxyaldehydes</i>	
(7a) $\text{CH}_2\text{OH}-\text{CHO} \rightarrow [\text{CH}_2=\text{C}=\text{O}] + \text{H}_2\text{O} \rightarrow \text{CH}_3-\text{COOH}$	-28.2 kcal/mol
(7b) $-\text{CHOH}-\text{CHO} \rightarrow [-\text{CH}=\text{C}=\text{O}] + \text{H}_2\text{O} \rightarrow -\text{CH}_2-\text{COOH}$	-25.2 kcal/mol
(7c) $>\text{COH}-\text{CHO} \rightarrow [>\text{C}=\text{C}=\text{O}] + \text{H}_2\text{O} \rightarrow >\text{CH}-\text{COOH}$	-25.2 kcal/mol