***Equilibrium***

*Basic Overview*

With reaction aA + bB ➝ cC + dD:

$K\_{c}=\frac{[C]^{c}[D]^{d}}{[A]^{a}[B]^{b}}$

$K\_{p}=\frac{p\_{C}^{c}\*p\_{D}^{d}}{p\_{A}^{a}\*p\_{B}^{b}}$

$K\_{p}=K\_{c}(RT)^{Δn}$(*Δn* = prod. - reac. moles)

$ΔG=ΔG°+RTlnQ$

Le Chatelier's Principle: Changing temperature, volume, or moles in equilibrium will cause a shift in the opposite direction.

* Q > K => reaction goes reverse
* Q = K => equilibrium
* Q < K => reaction goes forward
* exothermic + T increase -> reverse
* endothermic + T increase -> forward

*Practice Problems*

**2014 USNCO Local**





**2009 USNCO Local**



**2008 USNCO Local**







**2006 USNCO Local**



**2006 USNCO National**

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**2001 USNCO National**

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***ANSWER KEYS***

*2014 USNCO Local*

31. D

32. D

33. B

36. C

*2009 USNCO Local*

32. C

*2008 USNCO Local*

31. A

32. C

36. D

*2006 USNCO Local*

31. A

*2001 USNCO National*

31. A

*2001 USNCO National*

31. B

32. A