LeChâtelier's Principle

STRESS*ful* examples ☺

1. For the HABER REACTION, identify as many ways as possible in which the equilibrium concentration of ammonia gas can be increased in a closed vessel :

$$N_2\,(g) \quad + \quad 3H_2\,(g) \rightleftharpoons 2NH_3(g) \quad + 92.4\ kJ$$

For the following reactions, show clearly how each stress will affect the concentrations of each reactant and product, which way the equilibrium will shift to offset the stress, and the net effect on the Keq value.

2.

$$2SO_2\,(g) + \quad O_2\,(g) \rightleftharpoons 2SO_3(g) \quad + kJ$$

STRESS:					**EFFECT on K**
$[SO_2]$ ↑					
$[SO_3]$ ↓					
↑ Pressure (by decreasing the volume)					
↑ Temp.					

3. $C_3H_4\,(g) + kJ \rightleftharpoons 3C\,(s) + 2H_2\,(g)$

STRESS:					**EFFECT on K**
$[H_2]$ ↑					
↑ $[C_3H_4]$					
↓ Pressure (increase volume)					
↑ Temp.					

4. $C_3H_8\,(g) + 5O_2\,(g) \rightleftharpoons 3CO_2\,(g) + 4H_2O\,(l) + kJ$

STRESS:						**EFFECT on K**
↓ $[C_3H_8]$						
↑ $[CO_2]$						
↑ Volume						
Temp. ↓						
Add catalyst						
Add Ne to the closed reaction:						
Volume remains the same.						
Volume adjusted to accommodate for increased pressure due to increased moles of gas.						