Le Chatelier's Principle Practice

1. According to LeChatelier: What will a system do when a stress is applied?

2. $N_2O_{4\,(g)}$ <--------> $2NO_{2(g)}$ $\Delta H = +\ 92$ KJ

Stress	$[N_2O_4]$	Shift	$[NO_2]$	Favors Reactants or Products
A. $[N_2O_4]$ is increased	**x**			
B. $[NO_2]$ is increased			**x**	
C. Temp is increased				
D. $[N_2O_4]$ is decreased	**x**			
E. Pressure is decreased				
F. $[NO_2]$ is decreased			**x**	
G. Temp is decreased				

H. Write the equilibrium expression for equation 2.

Note : **Adding solids or liquids and removing solids or liquids does not shift the equilibrium. This is because you cannot change the concentration of a pure liquid or solid as they are 100% pure. It is only a concentration change that will change the # of collisions and hence shift the equilibrium. So, the Keq expression will not include a solid or liquid.** ***(inc. vol = dec. pressure and visa versa)***

3. $CaCO_{3\,(s)}$ + 170 KJ <----------> $CaO_{\,(s)}$ + $CO_{2\,(g)}$

Stress	$[CO_2]$ (inc/dec)	Shift: Right or Left	Favors: Reactants or Products
A. $CaCO_3$ is added			
B. CaO is added			
C. pressure is increased			
D. Temp is decreased			
E. A catalyst is added			
F. Volume is increased			
G. Temp is increased			
H. CaO is removed			

I. Write the equilibrium expression for equation 3.

3. State the direction in which each of the following equilibrium systems would be shifted upon the application of the following stress listed beside the equation.

		Stress applied	**Direction of shift**
A.	$2\ SO_{2\ (g)} + O_{2\ (g)}$ <----------> $2\ SO_{3\ (g)}$ + energy	decrease temperature	
B.	$C_{\ (s)} + CO_{2\ (g)}$ + energy <----------> $2\ CO_{\ (g)}$	Increase temperature	
C.	$N_2O_{4\ (g)}$ <----------> $2\ NO_{2\ (g)}$	increase total pressure	
D.	$CO_{\ (g)} + H_2O_{\ (g)}$ <----------> $CO_{2\ (g)} + H_{2\ (g)}$	decrease total pressure	
E.	$2\ NOBr_{\ (g)}$ <----------> $2\ NO_{\ (g)} + Br_{2\ (g)}$	decrease total pressure	
F.	$3\ Fe_{\ (s)} + 4\ H_2O_{\ (g)}$ <----------> $Fe_3O_{4\ (s)} + 4\ H_{2\ (g)}$	add $Fe_{(s)}$	
G.	$2SO_{2\ (g)} + O_{2\ (g)}$ <----------> $2\ SO_{3\ (g)}$	add catalyst	
H.	$CaCO_{3\ (s)}$ <----------> $CaO_{\ (s)} + CO_{2\ (g)}$	remove $CO_{2\ (g)}$	
I.	$N_{2\ (g)} + 3\ H_{2\ (g)}$ <----------> $2\ NH_{3\ (g)}$	increase $[H_{2\ (g)}]$	

4. Consider the following equilibrium system:

$$3\ Fe_{\ (s)} + 4\ H_2O_{\ (g)} \text{ <------> } Fe_3O_{4\ (s)} + 4\ H_{2\ (g)}$$

State what effect each of the following will have on this system in terms of shifting. Shift left, right or no change

A. The volume of the vessel is decreased

B. The pressure is decreased

C. More Fe is added to the system

D. Some Fe_3O_4 is removed from the system

E. A catalyst is added to the system

F. Write the equilibrium expression for the equation.