## Chemistry 12 – Unit II – Dynamic Equilibrium

Learning Goal B3: Apply Le Chatelier's principle to the shifting of equilibrium.

## m. Key

## Problem Set A: Le Châtelier's Principle

Describe the changes that occur after each stress is applied to the equilibrium.

I.  $N_{2 (g)} + 3 H_{2 (g)} \rightleftharpoons 2 NH_{3 (g)} + 92 KJ$ 

Stress	$[N_2]$	[H <sub>2</sub> ]	[NH <sub>3</sub> ]	Shifts Right or Left	Shifts to the Reactants or Products
1. [N <sub>2</sub> ] is increased			1	<u> </u>	products
2. [H <sub>2</sub> ] is increased		- Landerson Company	- Alexander	R	producto
3. [NH <sub>3</sub> ] is increased	- Additions				reactants
4. Temp is increased	1	- Indiana	V	e de la companion de la compan	reactants
5. [N <sub>2</sub> ] is decreased	<u> </u>	1	- Commence	Management .	reactants
6. [H <sub>2</sub> ] is decreased	<u> </u>	- The second sec		4 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Veactants
7. [NH <sub>3</sub> ] is decreased	1	· we-many	$\perp$	R	producto
8. Temp is decreased	<u> </u>			R	products
9. A catalyst is added	-graphical entrol	=memoriful about A	ang emelekalis	Noshift	No shift

II.  $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$ ;  $\Delta H = + 92 \text{ KJ}$ 

Stress	[N <sub>2</sub> O <sub>4</sub> ]	$[NO_2]$	Shifts Right or Left	Shifts to Favour the Reactants or Products
1. [N <sub>2</sub> O <sub>4</sub> ] is increased	1		<u> </u>	_producto_
2. [NO <sub>2</sub> ] is increased	1	1		Veactants
3. Temp is increased			R	products
4. [N <sub>2</sub> O <sub>4</sub> ] is decreased		<u> </u>	Baselone.	reactanto
5. Ne is added	Management of	- American de Carlos	noshit	no Shift/no change
6. [NO <sub>2</sub> ] is decreased			R	products
7. Temp is decreased	1			reactants.

## Chemistry 12 - Unit II - Dynamic Equilibrium

Key

III. 
$$4 \text{ HCl}_{(g)} + O_{2(g)} \rightleftharpoons 2 \text{ H}_2O_{(g)} + 2 \text{ Cl}_{2(g)} + 98 \text{ KJ}$$

Stress	$[O_2]$	[H <sub>2</sub> O]	[HCI]	Shifts Right or Left	Shifts to Favour the Reactants or Products
1. [HCl] is increased	· reservoid de la constantina della constantina	1	- Annie de la constante de la	R	producto
2. [H <sub>2</sub> O] is increased	1	Manager Control	1	s augmented	reactants
3. [O <sub>2</sub> ] is increased	- Account			R	products
4. Temp is increased		The contract of the contract o	New York Constitution of the Constitution of t	** Children	reactants
5. [H <sub>2</sub> O] is decreased				2	producto
6. [HCl] is decreased	1_4_	Contraction of the Contraction o	- Commence of the Commence of		Mactarito
7. [O <sub>2</sub> ] is decreased	1			-	reactants
8. Temp is decreased	<u> </u>			R	products
9. A catalyst is added	Management (24)	egeption of the second	ACCOUNTS OF THE PROPERTY OF TH	No Change	ho shift.

IV. 
$$CaCO_{3(s)} + 170 \text{ KJ} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$$

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.

Stress	$[CO_2]$	Shifts Right or Left	Shifts to Favor the Reactants or Products
1. CaCO <sub>3</sub> is added	A Contraction	None	no change
2. CaO is added	**amble-gazew	hone	ho change
3. CO <sub>2</sub> is added		Egyptians	reactanto
4. Temp is decreased		and the same of th	<u>reactanto</u>
5. A catalyst is added	spigergenaliseshill	here	he Change
6. [CO <sub>2</sub> ] is decreased		R	products
7. Temp is increased	22 Commons	<u> </u>	products:
8. CaO is removed	. <sub>Auggress</sub> and physical distribution	hone	ho change