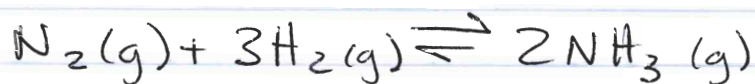


Chem Catalyst:

Q: What do you think will happen if $[N_2]$ increases?

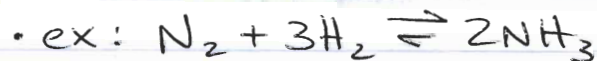
if $[H_2]$ is decreased?

Q: What is different about this rxn?

Notes:

• Can chemical rxns be reversible?

• Yes! Most chemical rxns do NOT go to completion (go just one way)
- they can occur in both forward & reverse directions



- use 2 opposite arrows in the equation

• What is chemical equilibrium?

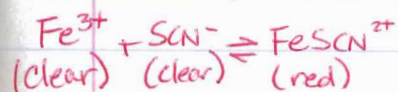
• occurs in reversible rxns
• a point where the $[reactants]$ & $[products]$ remain constant (but NOT necessarily equal)
• the forward rate of the reaction equals the backward rate of the reaction

• What is Le Chatelier's Principle?

• when a rxn @ equilibrium is subjected to a stress (increase/decrease in reactants, products, temp, or pressure) it will shift its equilibrium to relieve the stress



*Demo: Fe^{3+}/SCN^-



- If we stress it by...

↑ reactants

↑ products

↓ reactants

it will shift

right

left

left

192

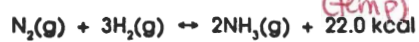
Activity:

LE CHATELIER'S PRINCIPLE

Name _____

Le Chatelier's Principle states that when a system at equilibrium is subjected to a stress, the system will shift its equilibrium point in order to relieve the stress.

Complete the following chart by writing left, right or none for equilibrium shift, and decreases, increases or remains the same for the concentrations of reactants and products, and for the value of K.



Stress	Equilibrium Shift	$[\text{N}_2]$	$[\text{H}_2]$	$[\text{NH}_3]$	K
1. Add N_2	right	_____	decreases	increases	remains the same
2. Add H_2			_____		
3. Add NH_3				_____	
4. Remove N_2		_____			
5. Remove H_2			_____		
6. Remove NH_3				_____	
7. Increase Temperature					
8. Decrease Temperature					
9. Increase Pressure					
10. Decrease Pressure					

Making Sense Notes:

• What happens if you "stress" a chemical rxn?

• the rxn will shift its equilibrium pt. to "rebalance" it

• ex: $\text{COCl}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{Cl}_2(\text{g}) + 10\text{kcal}$

- if we stress it by:

$\uparrow [\text{COCl}_2]$

$\uparrow [\text{CO}]$

$\downarrow [\text{COCl}_2]$

$\downarrow \text{temp}$

$\uparrow \text{pressure}$

$\downarrow [\text{Cl}_2]$

it will shift:

right

left

left

right

left *

right

* when pressure is increased, the rxn will shift toward less pressure $\Rightarrow$ side w/ less moles of gas

• what is Dalton's Law of Partial Pressures?

• the pressure of a mixture of gases is equal to the sum of the pressures of all the gases that make it up

$$P_{\text{total}} = P_1 + P_2 + P_3 + \dots$$

• ex: The atmospheric pressure is 762 mmHg. What is the partial pressure of N_2 if it makes up 78% of the air?

$$P_{\text{N}_2} = 762 \times 0.78 = 594 \text{ mmHg}$$