

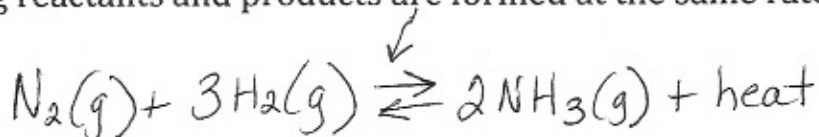
Notes - 5/7/20

LeChatelier's Principle: a system (chemical reaction) at equilibrium will counteract (do the opposite) if a stress is added

Stresses in chemical reactions = changes in concentration of reactant or product, changes in temperature, or changes in pressure (for gases only)

1. EXAMPLE OF CONCENTRATION CHANGES

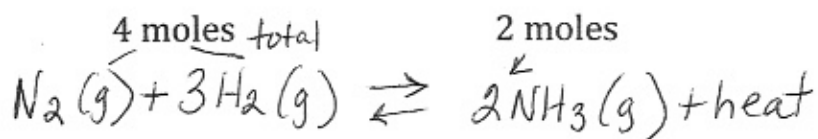
- the double arrow indicates that the system is at equilibrium meaning reactants and products are formed at the same rate



- If extra H_2 is added, the increased concentration is the stress. The system will counteract the stress by USING UP THE EXCESS H_2 . H_2 needs to be a reactant in order for it to be used up. The reaction will shift to the right (forward) reaction until equilibrium is re-established.
- If N_2 is decreased, reaction will shift to the left (reverse) in order to make more N_2 . Shifting left means N_2 becomes a product and more of it will be made.

So, basically the reaction shifts in a way to do the opposite of the effect of the stress. If you decrease the concentration, the reaction shifts in a way to make more. If you increase the concentration, the reaction shifts in order to use up the substance.

2. EXAMPLE OF PRESSURE CHANGES- if pressure is increased, the reaction will shift toward the side with fewer moles:



The reaction will shift right (forward) if pressure increases, since there are only 2 moles on the right.

I hope this helps! Try the practice problems on the next page ☺

Le Chatelier's Principle

Le Chatelier's Principle says that when a system at equilibrium is subjected to a stress, the system will shift its equilibrium in order to relieve the stress. Additionally, all the species inside the reaction either increase or decrease in concentration.

Complete the following charts by writing left (\leftarrow), right (\rightarrow), or no shift (N/A) for the equilibrium shift that takes place in each column. For the concentration columns (the ones with brackets) write decreases (-), increases (+), or remains the same (0).

Remember that [] = concentration or amount of substance (the brackets will be seen surrounding that particular substance).

CHART #1:



\leftarrow Increase or decrease \rightarrow

Stress	right or left Equilibrium Shift	[N ₂]	[H ₂]	[NH ₃]
1. Add N ₂				
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				

OVER \rightarrow