

Le Chatelier's Principle

When stress is applied to a system at equilibrium, the system will react to relieve the stress and restore an equilibrium.

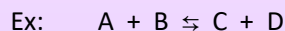
What are examples of these stresses?

1. Change in any Concentration

The equilibrium will:

Shift toward the substance that decreases

Shift away from the substance that increases



If [A] is increased: reaction shifts right

If [C] is increased: reaction shifts left

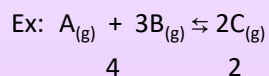
If [B] is decreased: reaction shifts left

2. Change Pressure or Volume

(Only affects gas systems)

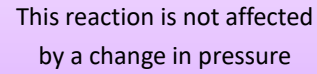
Increase pressure - system shifts to side with the least number of gas particles

Decrease pressure - system shifts to side with more gas particles



Pressure increases: shifts right

Pressure decreases: shifts left

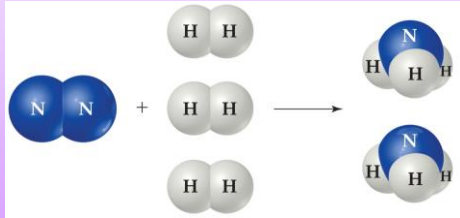


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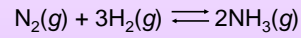
The Haber Process

Great significance in agriculture

Ammonia-based fertilizers are extremely important

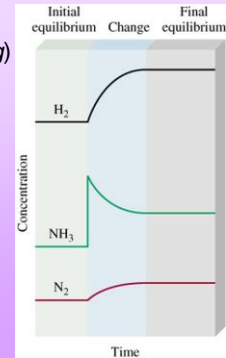


The Haber Process

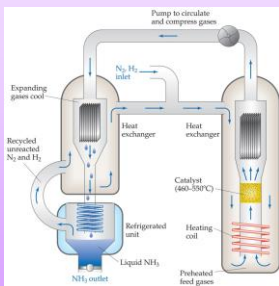


Equilibrium shifts left to offset stress

↑
Add NH_3



The Haber Process



This apparatus helps push the equilibrium to the right by removing the ammonia (NH_3) from the system as a liquid.