

# The Causes of stress

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- **CHANGES IN CONCENTRATION:**

Changing the amount of any reactant or product in a system at equilibrium disturbs the equilibrium.

- **Adding** a chemical pushes the equilibrium position toward the opposite side of the arrow.

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- **Removing** a chemical pulls the equilibrium position toward the same side of the arrow.

- **CHANGES IN TEMPERATURE:**



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- **Adding** the temperature causes the equilibrium position of a reaction to shift in the direction away from the heat term

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- **Removing** the temperature causes the equilibrium position of a reaction to shift in the direction toward the heat term.

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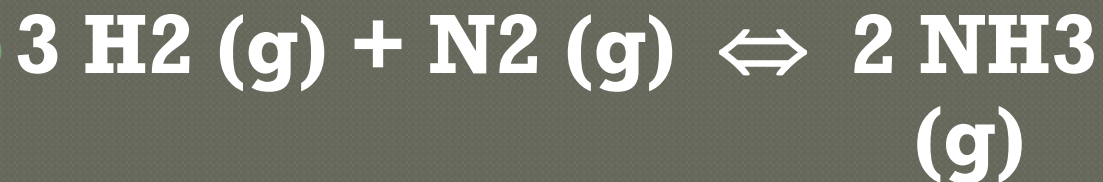
◉ **DEMONSTRATION:** In this demonstration you will look at the following equation:



◉ **Pink**

**Blue**

● **CHANGES IN PRESSURE:** Pressure will only affect an equilibrium with an unequal number of moles of reactants and products. For example



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- An **Increase** in pressure will shift the equilibrium to the side with the **Least** number of moles



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- ⦿ A **decrease** in pressure will shift the equilibrium to the side with the **greater** number of moles

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⊙ **Demonstration** In this experiment you will look at the following equation:



⊙ **Colorless**                      **Brown**

## Lets summarize:

- All reversible reactions in a **closed** system (e.g. container) will come to a state of equilibrium.

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- If stress is applied to a system at equilibrium, the system readjusts so that the stress is **Reduced**. This is Le Chatelier's principle.

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- The stress may be a change in temperature or concentration. If a **Gas** is present in the reaction, another possible stress is a change in pressure.

F.Y.I.

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- Gases fill large volumes with **VERY** few particles. The **KINETIC** Theory explains how they can do this.

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- Think of a balloon, how does the balloon **INFLATE** with only a relatively few air particles inside it?

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- According to the Kinetic Theory, these few, but **FAST** moving particles **COLLIDE** into the sides of the balloon at a very fast rate (an O<sub>2</sub> molecule at room temperature may be moving at 600 mph) causing the sides of the balloon to expand.



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- The frequency and force that these molecular "bangings" happen at determines the **PRESSURE** exerted by a gas.