Le Chatelier's Principle

Le Chatelier's principle is great chemistry. The people who write the AP do a good job of testing students on their "chemistry intuition." Along with shielding, sublevel stability, and like-dissolves-like, Le Chat's is one of the intuitive rules to know.

Le Chatelier's Principle is just: **A chemical reaction will try to counter, if it can, any stress imposed on it. It tries to do the opposite of what is done to it.**

- If you add a product or reactant, the reaction shifts in the direction to use it up.
- If you increase temperature, the reaction will shift in the endothermic direction to try to decrease temperature.
- If you decrease temperature, the reaction will shift in the exothermic direction to try to increase temperature.
- If you increase pressure the rxn will try to decrease pressure by shifting in the direction which makes fewer molecules and vice-versa. (If both sides have the same # of molecules it can't do anything.)

  (Also, remember that volume changes are like pressure changes. Increasing volume decreases the pressure and decreasing the volume increases the pressure.)
- Adding species that does not appear in the equilibrium constant expression does nothing.

Take a look at this example:

$$PCl_{5(g)} \longleftrightarrow PCl_{3(g)} + Cl_{2(g)} \qquad \Delta H = 92.5 \text{ kJ}$$

stress	equlibrium shift and why
Addition of $Cl_{2(g)}$	System will attempt to decrease the concentration of $Cl_{2(g)}$ by shifting to the left
Increase in Pressure	System will attempt to decrease the pressure by shifting in direction that has fewer moles of gas. To the left
Increase in Volume	Increasing the volume is the same as decreasing the pressure. The system will shift to increase pressure and that's in the direction of greater moles of gas. To the right.
Decrease in Temperature	The system will attempt to heat itself up by shifting in the direction that gives off energy (exothermic direction). The forward direction is endothermic and therefore the reaction shifts to the left (reverse direction).
Addition of $N_{2(g)}$	Nitrogen does not appear in the equilibrium constant. Adding it causes no shift in the equilibrium position.
Addition of a Catalyst	Catalysts do not appear in the equilibrium constant. Adding it causes no shift in the equilibrium position.