

## "What you do, it tries to undo." Part 2

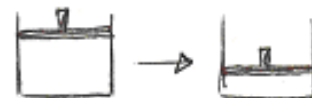
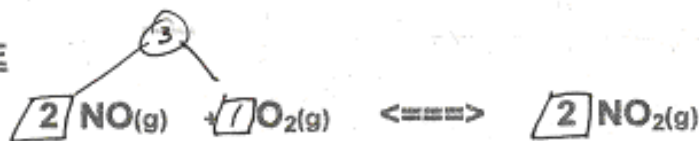
TEMPERATURERESULTS

STRESS	SHIFT	[CoCl <sub>2</sub> ]	[H <sub>2</sub> O]	[Co(H <sub>2</sub> O) <sub>6</sub> <sup>+2</sup> ]	[Cl <sup>-1</sup> ]	Observation
increase T (add heat)	←	↑	↑	↓	↓	More blue

- Rules 1) An increase in temperature (adding heat) shifts the equilibrium in the direction away from the heat (endothermic direction).
- 2) A decrease in temperature (removing heat) shifts the equilibrium in the direction towards the heat (exothermic direction).

RESULTS

STRESS	SHIFT	[N <sub>2</sub> O <sub>4</sub> ]	[NO <sub>2</sub> ]	Observation
decrease T (remove heat)	←	↑	↓	More colorless

PRESSURERESULTS

STRESS	SHIFT	amount: NO	O <sub>2</sub>	NO <sub>2</sub>
increase P	→	↓	↓	↑

↓ V<sub>container</sub>  
↑ P

- Rules 1) An increase in pressure shifts the equilibrium towards the side with less moles of gas.
- 2) A decrease in pressure shifts the equilibrium towards the side with more moles of gas.

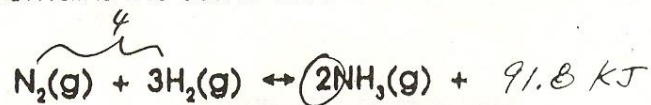
RESULTS

STRESS	SHIFT	amount: C <sub>2</sub> H <sub>6</sub>	O <sub>2</sub>	CO <sub>2</sub>	H <sub>2</sub> O
decrease P	←	↓	↓	↑	↑

Note: adding/removing (s), (l) and catalysts, do NOT shift equilibria  
Now, let's do some more shifting! Continue doing problems on the next page.

Le Chateller'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,



Stress	Equilibrium Shift	[N <sub>2</sub> ]	[H <sub>2</sub> ]	[NH <sub>3</sub> ]
1. Add N <sub>2</sub>	right	<del>_____</del>	decreases	Increases
2. Add H <sub>2</sub>	→	↓	<del>_____</del>	↑
3. Add NH <sub>3</sub>	←	↑	↑	<del>_____</del>
4. Remove N <sub>2</sub>	←	<del>_____</del>	↑	↓
5. Remove H <sub>2</sub>	←	↑	<del>_____</del>	↓
6. Remove NH <sub>3</sub>	→	↓	↓	<del>_____</del>
7. Increase Temperature	←	↑	↑	↓
8. Decrease Temperature	→	↓	↓	↑
*9. Increase Pressure	→	↓	↓	↑
*10. Decrease Pressure	←	↑	↑	↓

TECHNICALLY, For Changes in Pressure, the results refer to Amount not Concentration [ ]