

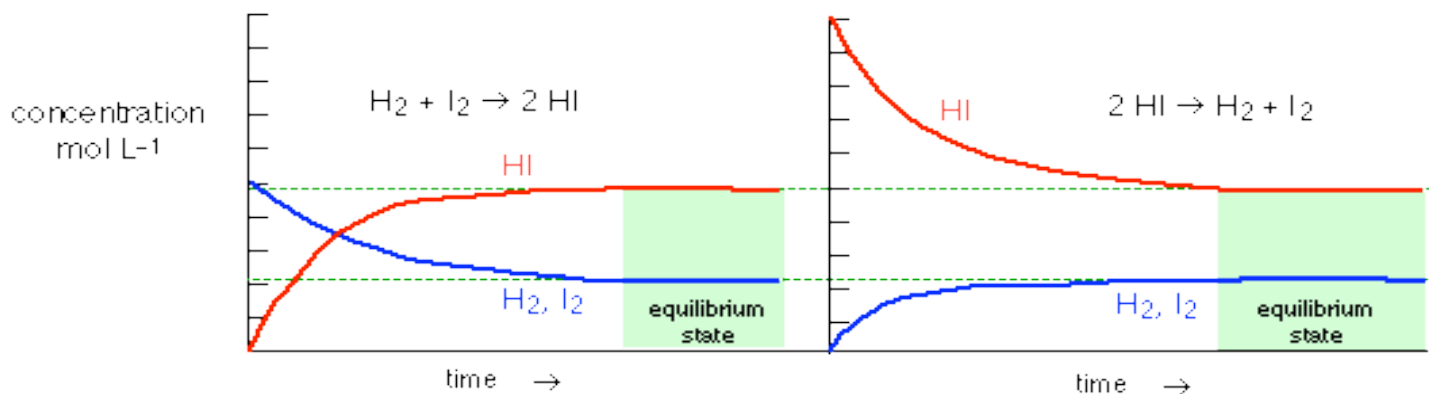
Assignment: Intro to Le Chatelier



Graphing Equilibrium

Sometimes it is beneficial to graph the progress of a reaction. To do so, we plot the concentration (Molarity) versus time. This allows us to see what happens when equilibrium is reached.

Examine the two sets of plots carefully, noting which substances have zero initial concentrations, and are thus "products" of the reaction equations shown.



- 1.) For the first plot (the one on the left)...
 - a.) What are your reactants? _____
 - b.) What are your products? _____

- 2.) For the second plot (the one on the right)...
 - a.) What are your reactants? _____
 - b.) What are your products? _____
 - c.) If the chemical equation was NOT given, how could you determine what your reactants and products were from the graph?

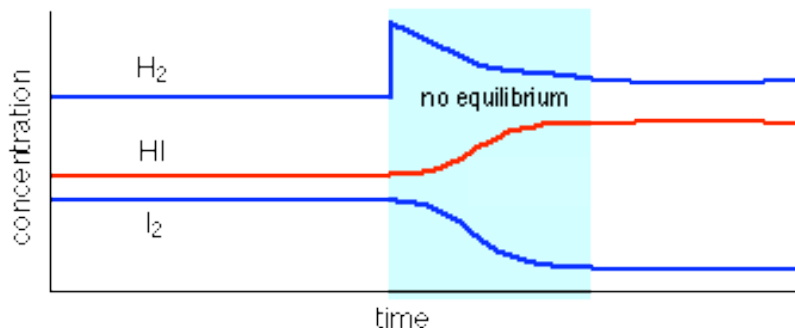
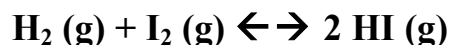
- 3.) For either graph, once equilibrium is reached...
 - a.) Is the reactant concentration equal to the product concentration? _____
 - b.) Do the concentrations of the reactants and products change or do they stay constant? _____

- 4.) A reaction has reached equilibrium when:
 - 1) _____
 - 2) _____

Satisfy yourself that these two graphs represent the same chemical reaction system, but with the reactions occurring in opposite directions. Most importantly, note how the final (equilibrium) concentrations of the components are the same in the two cases.

What would the graph look like if equilibrium were disrupted?

The graph below represents a system that starts at equilibrium, and then hydrogen gas is injected into the system (increasing H_2 concentration).



According to LeChatelier's principle, the addition of hydrogen gas disrupts the equilibrium system. The system will now act to offset the stress of added hydrogen gas. As seen in the plot above, the concentration of hydrogen iodide (HI) increases while the concentration of iodine (I_2) decreases.

- 5.) What information on the graph indicates that the system was initially at equilibrium?
- 6.) After the disturbance (addition of H_2) how can you tell that equilibrium is once again achieved?
- 7.) Explain, in terms of LeChatelier's principle, why the final concentration of HI (g) is greater than the initial concentration of HI (g).
- 8.) Explain, in terms of collision theory, why the concentration of H_2 (g) begins to *decrease* immediately after more H_2 (g) is added to the system.