

# Class Announcements

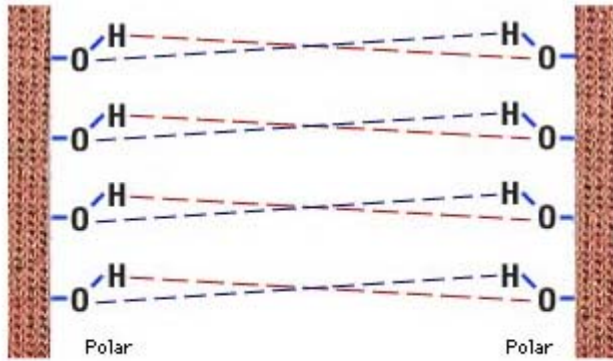
Lab 4 : Saturday, Oct 29, 1:30-4:30

Exam II : Tuesday, November 1, 12:45-2:15, In class.

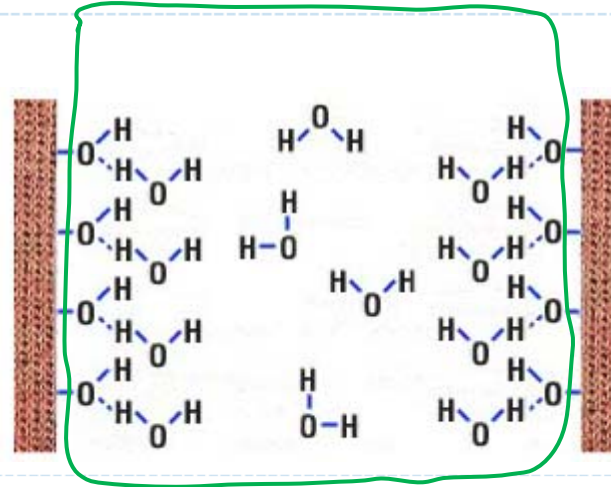
Review ... Sunday, October 30, 3:00-4:45, ISB 135.

### 3.11 Consequence of Molecular Polarity

Static cling!



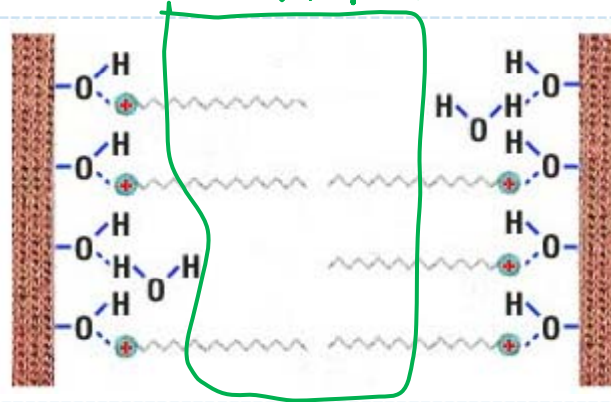
Hydrophilic



Oh so soft!

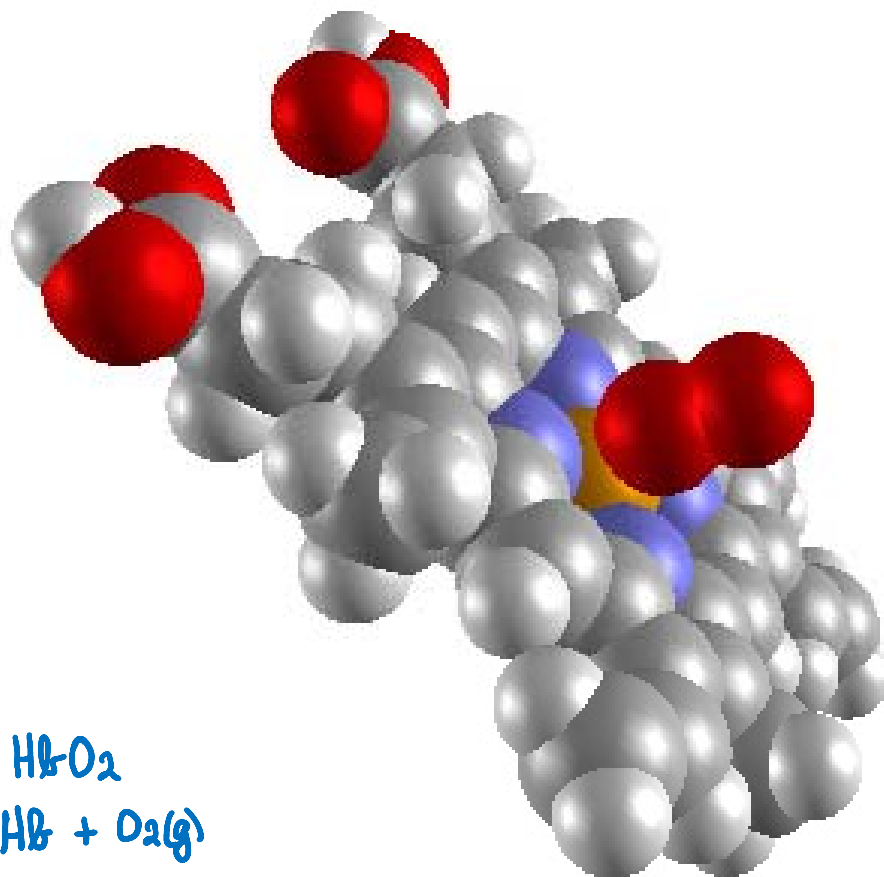
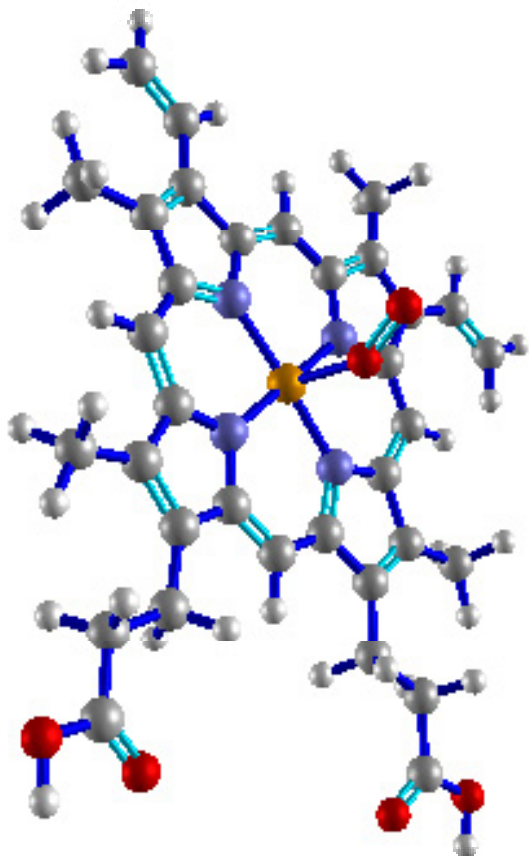


Hydrophobic



fabric softener

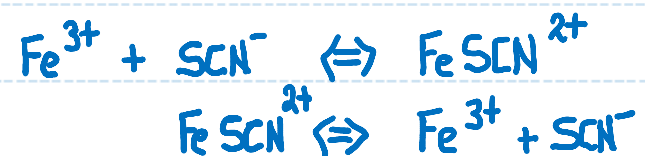
## 7.5 What Does It Mean to Say That a Reaction Has Reached Equilibrium



" $\rightleftharpoons$ " used to indicate an equilibrium

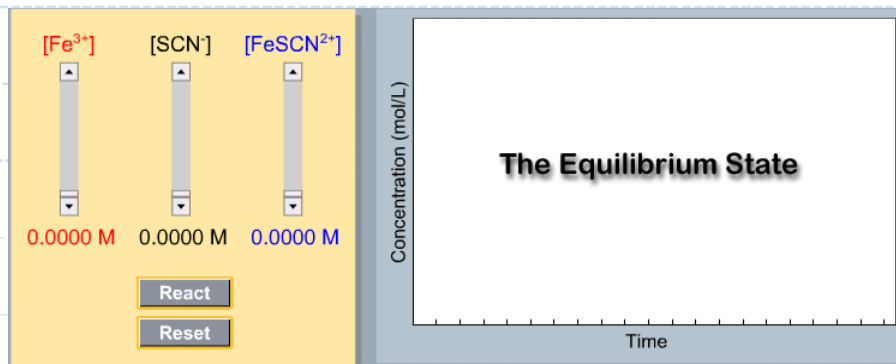
## 7.5 What Does It Mean to Say That a Reaction Has Reached Equilibrium

The screenshot shows an interactive simulation interface. On the left, there are three vertical sliders for the concentrations of  $[\text{Fe}^{3+}]$ ,  $[\text{SCN}^-]$ , and  $[\text{FeSCN}^{2+}]$ . Each slider is currently set to 0.0000 M. Below the sliders are two buttons: "React" and "Reset". On the right, there is a graph with "Concentration (mol/L)" on the y-axis and "Time" on the x-axis. The graph area contains the text "The Equilibrium State" and a handwritten note in green: "See class web site to explore this interactive module."



## 7.5 What Does It Mean to Say That a Reaction Has Reached Equilibrium

\* [ ] : mol. L<sup>-1</sup>



Starting Concentrations			
	[Fe <sup>3+</sup> ]	[SCN <sup>-</sup> ]	[FeSCN <sup>2+</sup> ]
#1	0.004	0.007	0
#2	0	0	0.007
#3	0.004	0.003	0.004

Equilibrium Concentrations					
	[Fe <sup>3+</sup> ]	[SCN <sup>-</sup> ]	[FeSCN <sup>2+</sup> ]	[Fe <sup>3+</sup> ][SCN <sup>-</sup> ]/[FeSCN <sup>2+</sup> ]	[FeSCN <sup>2+</sup> ]/[Fe <sup>3+</sup> ][SCN <sup>-</sup> ]
#1	2.285 × 10 <sup>-3</sup>	5.285 × 10 <sup>-3</sup>	1.714 × 10 <sup>-3</sup>	7.046 × 10 <sup>-3</sup>	141.9
#2	4.333 × 10 <sup>-3</sup>	4.333 × 10 <sup>-3</sup>	2.666 × 10 <sup>-3</sup>	7.042 × 10 <sup>-3</sup>	142.0
#3	5.069 × 10 <sup>-3</sup>	4.069 × 10 <sup>-3</sup>	2.930 × 10 <sup>-3</sup>	7.040 × 10 <sup>-3</sup>	142.0

$$\frac{[\text{Fe}^{3+}][\text{SCN}^-]}{[\text{FeSCN}^{2+}]} = \text{Constant}$$

$$\frac{[\text{FeSCN}^{2+}]}{[\text{Fe}^{3+}][\text{SCN}^-]} = \text{Constant}$$



## 7.6 What is an Equilibrium Constant and How Do We Use It? Writing Equilibrium Expressions

1)  $K = \frac{[\text{Products}]}{[\text{Reactants}]}$

$K = \text{Equilibrium constant.}$

2) When writing equilibrium expressions (equations) ... pure solids and liquids do not appear in the expression.

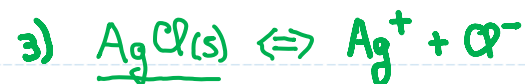


$$K = \frac{[\text{H}_2\text{O}_2]}{[\text{H}_2][\text{O}_2]}$$



$$K = \frac{[\text{NH}_3][\text{NH}_3]}{[\text{N}_2][\text{H}_2][\text{H}_2][\text{H}_2]}$$

$$K = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$$



$$K = [\text{Ag}^+][\text{Cl}^-]$$



$$K = \frac{[\text{H}_3\text{O}^+][\text{F}^-]}{[\text{HF}]}$$



## 7.6 What is an Equilibrium Constant and How Do We Use It?

### The Significance of the Magnitude of K

The simulation interface is divided into several sections:

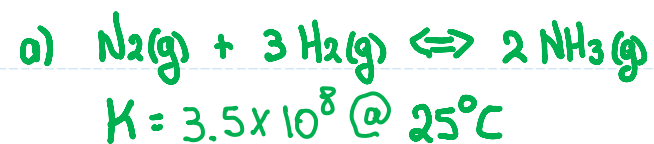
- Top Left:** A rectangular box containing 30 blue spheres representing molecules in a container.
- Top Right:** A graph with a vertical axis labeled "Number of Molecules" and a horizontal axis labeled "Time". Inside the graph area, the text "See class web site" is written in green, and "The Meaning of the Equilibrium Constant." is written in black.
- Bottom Left:** A control panel with the text "Blue: 30" and "Red: 0". Below this are two buttons: "Play" and "Reset".
- Bottom Right:** A yellow control panel with three sections:
  - Equilibrium Constant:** Three radio buttons labeled  $K > 1$ ,  $K = 1$ , and  $K < 1$ . The  $K = 1$  option is selected.
  - Number of Spheres:** Three radio buttons labeled 30, 20, and 10. The 30 option is selected.
  - Temperature:** Two radio buttons labeled High and Low. The High option is selected.



## 7.6 What is an Equilibrium Constant and How Do We Use It?

### The Significance of the Magnitude of K

a)  $K \gg 1$  : At equilibrium the reaction favors products



$K \gg 1$

Product favored at equilibrium.

