Review

- How is a reaction rate measured?
  $\frac{\Delta \text{concentration}}{\Delta \text{time}} = \frac{M}{s}$
- What must occur for successful reaction?
  collide, enough energy, correct orientation
- What is the activation energy of a reaction?
  energy required for a rxn to occur
- What is an activated complex?
  - aka transition state
  - old bonds are breaking; new bonds are forming
  - very unstable

May 17-10:57 AM

Describe, in detail, how each of the following would affect the rate of a reaction:

- Heating the reaction.
  ↑, molecules move faster — more collisions
- Crushing the reactants.
  ↑, ↑ surface area, more likely to have correct orientation
- Adding a catalyst.
  ↑, lowers activation energy (Ea)

May 17-11:00 AM

Calculate the equilibrium constant:

$2NO\ (g) + 2H_2\ (g) \leftrightarrow N_2\ (g) + 2H_2O\ (g)$

- Calculate K_{eq} if
- $[NO]=1.5\times10^{-2}M$,
- $[H_2]=2.35\times10^{-3}M$,
- $[N_2]=8.24\times10^{-2}M$,
- $[H_2O]=6.03\times10^{-2}M$.

$$K_{eq}=\frac{[N_2][H_2O]^2}{[NO]^2[H_2]^2}$$

$$K_{eq}=\frac{[8.24\times10^{-2}][6.03\times10^{-2}]^2}{[1.5\times10^{-2}]^2[2.35\times10^{-3}]^2}=2.4\times10^5$$

- Are the reactants or products favored at equilibrium? How do you know?

products >1

- The magnitude (value) of K_{eq} is dependent only on which variable?

temp

May 17-11:00 AM

Answer the following with shift left or shift right or no change & explain your answer:

$CH_{4(g)} + 2O_{2(g)} \text{ <---> } CO_{(g)} + 2H_2O_{(g)} + \text{heat}$

3 mol 3 mol

- Which way will the reaction shift if CH_4 is added?

shift right, ↑ products

- Which way if the temperature is raised?

shift left, ↑ reactants

- Which way if water is removed?

shift right, ↑ products

- Which way if the volume is increased?

no change

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Rate Laws

- The following experimental data were obtained for reaction at 250 KF_2 + 2 ClO_2 -----> 2 $FClO_2$

$[F_2]$	$[ClO_2]$	Rate M/s
0.10	0.01	1.2×10^{-3}
0.10	0.04	4.8×10^{-3}
0.20	0.01	4.8×10^{-3}

- Write the rate law for this reaction.

$[F_2] \times 2$ rate $\times 4$ $2^x = 4$ $x = 2$

$[ClO_2] \times 4$ rate $\times 4$ $4^y = 4$ $y = 1$

rate $= k[F_2]^2[ClO_2]$

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Ksp

Calculate the solubility (in mol/L) of barium sulfate. The solubility product constant for barium sulfate is 1.08×10^{-10}

$BaSO_4$

Ksp

$BaSO_4(s) \rightleftharpoons Ba^{2+}(aq) + SO_4^{2-}(aq)$

$Ksp = [Ba^{2+}][SO_4^{2-}]$

$Ksp = x^2$

$\sqrt{1.08 \times 10^{-10}} = \sqrt{x^2}$ $= 1.04 \times 10^{-5}\ M$

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