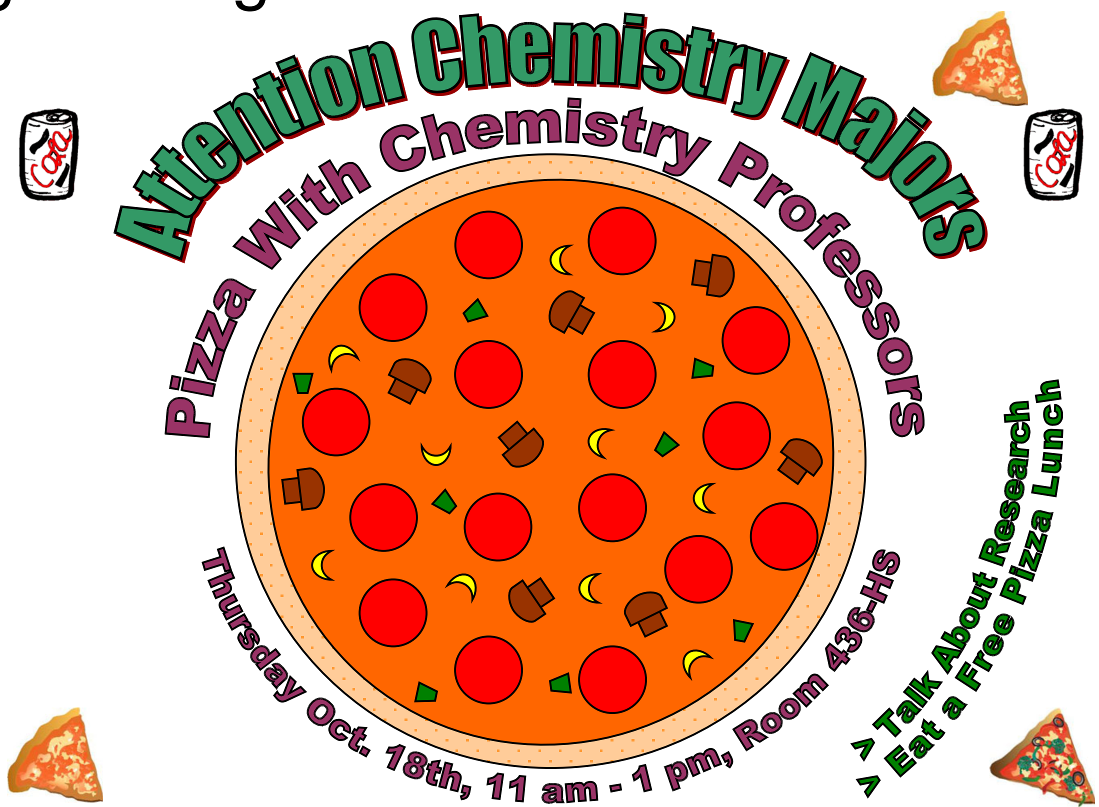
Announcements

- Turn on the Clicker (the red LED comes on).
- Push “Join” button followed by “20” followed by the “Send” button (switches to flashing green LED if successful).

- Next exam on ΔG, Macronutrients, Kinetics and Smog one week from Thursday.

- Quiz on Wednesday will go through section 14.3
- Pizza with Professors:



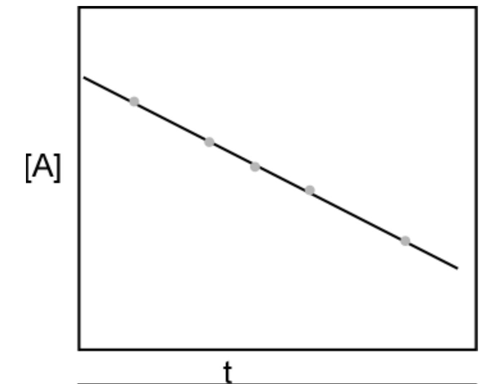
Review

- Reaction Rates
  - Write rate using derivative notation (Example A + 2B --> C):

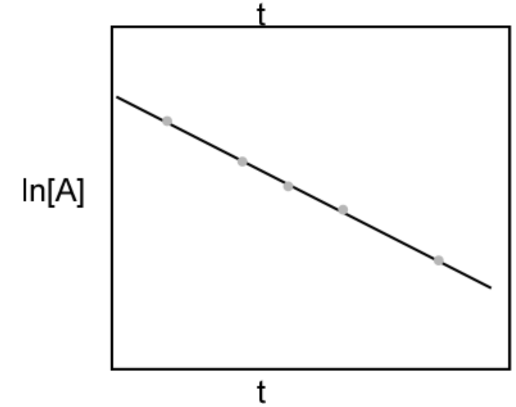
    $R = -d[A]/dt = -(1/2)d[B]/dt = d[C]/dt$.
  - Rate laws of form: $R = -d[A]/dt = k[A]^a[B]^b[C]^c...$
  - Simple exponents (2, 1, 0, -1, -2) can easily be determined from initial rate data.
    - Rate doubles on doubling a species exponent = 1
    - Rate halves on doubling a species exponent = -1
    - Rate quadruples on doubling a species exponent = 2
    - Rate unchanged on doubling a species exponent = 0

Simple Integrated Rate Laws for $-d[A]/dt = k_{app}[A]^a$

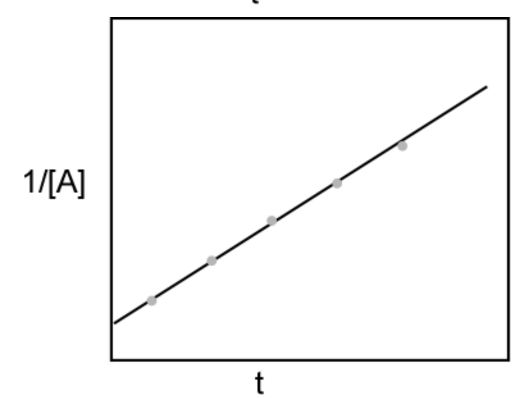
- 0^{th} order a = 0: $[A]_t = [A]_o - k_{app}t$



- 1^{st} order a = 1: $[A]_t = [A]_o \exp\{-k_{app}t\}$
  - Linear: $\ln[A]_t = \ln[A]_o - k_{app}t$



- 2^{nd} order a = 2: $1/[A]_t = 1/[A]_o + kt$
  - Alternate form: $$[A] = \frac{[A]_0}{[A]_0 kt + 1}$$



Review

Initial Rate Data for RXN:

A + B + C --> X

$(d[X]/dt)_0$	$[A]_0$	$[B]_0$	$[C]_0$
1.0 M/s	10.0	10.0	0.01
4.0 M/s	10.0	10.0	0.02
16.0 M/s	10.0	10.0	0.04
2.0 M/s	20.0	10.0	0.01
4.0 M/s	40.0	10.0	0.01
1.0 M/s	10.0	100.0	0.01

• Pseudo-order (Swamping) method

- Consider A + B ---> C, $R = k[A]^a[B]^b$
- Use large excess of all but one reactant, so concentration of only the limiting reactant (A) changes significantly.
  - Mathematically: $[B]_t \approx [B]_o$ which is constant.
  - $R = -d[A]/dt = (k[B]_o^{\,b})[A]^a \approx k_{app}[A]^a$
  - For a = 0, 1, 2 easily integrated to get a function for $[A]_t$
  - If $a \neq$ integer: $\ln R = \ln k_{app} + a \cdot \ln[A]_t$, which is a line with slope = a.