Reaction Rates review sheet. Name: _____

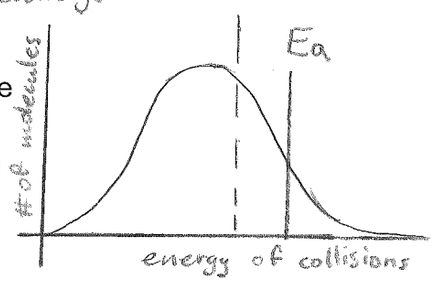
1. What are the 5 main factors that effect the rate of a particular reaction?

   won't change for a particular rxn.

   T, P, [ ], (bond strength + particle size, nature of material), SA, catalyst.

2. The Boltzmann distribution to the right represents the # of molecules vs the energy of their collisions. It also shows the activation energy E_a of an uncatalysed reaction. **Draw the new position of the activation energy after the addition of a catalyst.**

   It lowers the activation energy.



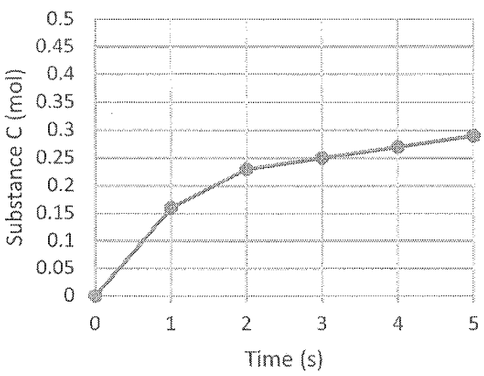
3. What happens to the rate of a rxn if the concentration of reactants are increased? Explain at the molecular level.

   The rate increases because there are more collisions. Better chance for successful collisions.

4. Provide the predicted rate equation for 2A + B → 2C? What would happen to the rxn rate if the concentration of both A & B were tripled?

   rate = $k[A]^2[B]$ 27x greater

5. The graph below represents the # of moles of substance C as a function of time. What is the average rate of formation for the first 3 seconds?



$\text{rate} = \frac{0.25-0}{3-0} = \frac{0.25}{3} = 0.083 \text{ mol/s}$

6. The following results were obtained in experiments designed to study the rate of the reaction below:

$$2\,NO_{(g)} + Br_{2\,(g)} \rightarrow 2\,NOBr_{(g)}$$

Experiment	Initial Concentration (mol/L) [NO]	[Br_2]	Initial rate of appearance of NOBr (*M*/sec)
1	0.02	0.02	9.5×10^{-2}
2	0.04	0.02	3.8×10^{-1}
3	0.02	0.04	1.9×10^{-1}

A) Find the rate law for this equation.
B) Then calculate the rate constant k, include the units.

1 vs 2 $\frac{9.5\times10^{-2}}{3.8\times10^{-1}} = \frac{k(0.02)^x(0.02)^y}{k(0.04)^x(0.02)^y}$

$0.25 = \left(\frac{0.02}{0.04}\right)^x$

$0.25 = (0.5)^x$

$x = 2$

1 vs 3 $\frac{9.5\times10^{-2}}{1.9\times10^{-1}} = \frac{k(0.02)^x(0.02)^y}{k(0.02)^x(0.04)^y}$

$0.5 = (0.5)^y$

$y = 1$

rate = $k[NO]^2[Br_2]^1$

3rd order

(k)

$9.5\times10^{-2}\frac{M}{s} = k(0.02\,M)^2(0.02\,M)$

$9.5\times10^{-2}\frac{M}{s} = k(8\times10^{-6}M^3)$

$K = 11\,875\ \frac{1}{M^2 s}$ or $11875\ \frac{L^2}{mol^2 s}$