CONCEPT: COLLISION THEORY

- According to **Collision Theory**, a chemical reaction is successful when two _____ reactants successfully collide.
 - □ Successful collision: reacting molecules must collide with enough _____ and with proper __

Factors Influencing Collisions
1 Temperature:Temp, energetic collisions
2 Activation Energy: Ea, reaction rate.
③ [Reactants]: [reactants], frequency of collisions
4 Orientation: molecules must collide with proper = successuful collision.
- determined by of molecules

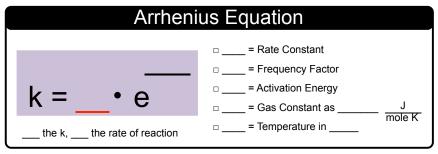
☐ The rate of a reaction is influenced by molecular collisions: ____ collisions, ____ rate of reaction.

EXAMPLE: For a chemical reaction to occur, all of the following must happen *except*.

- a) A large enough number of collisions must occur
- d) Reactant molecules must collide with enough energy
- b) Chemical bonds in the reactants must break
- e) None of the above
- c) Reactant molecules must collide with correct orientation

Intro to Arrhenius Equation

- Illustrates how the *rate of reaction* is affected by different variables.
 - \Box Faster reaction rate = $__$ k, $__$ A, $__$ Ea, $__$ Temp.



- □ Frequency Factor (A) can be split into 2 variables: orientation factor (p) and collision frequency (z).
 - **Orientation factor (p):** a number that represents the fraction of collisions with correct orientation.

- _____ the reactant, _____ the orientation factor, _____ successful collisions.

2 Collision Frequency (z): frequency of molecule collisions.

EXAMPLE: Determine which of the following reactions has the smallest orientation factor (p).

a)
$$I + HI \longrightarrow I_2 + H$$

b)
$$H + H \longrightarrow H_2$$

c)
$$Br_2 + H_2C = CH_2 \longrightarrow H_2BrC - CBrH_2$$

d) All of these reactions should have same orientation factors.