Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Chemistry

**Kinetics (Rate of a Reaction) Graphic Organizer**

Collision Theory states that in order for a reaction to occur the reactant particles must collide under the following conditions:

1. Proper amount of Energy
2. Proper alignment, direction, or orientation.

Six (6) Factors Affecting Rate of Reaction

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | How Rate is Affected? | Why Factor Affects the Rate? | Visual Interpretation |
| Nature of Reactants |  |  |  |
| Concentration |  |  |  |
| Pressure |  |  |  |
| Temperature |  |  |  |
| Surface Area |  |  |  |
| Catalyst |  |  |  |

|  |  |  |
| --- | --- | --- |
| Factor | How Rate is Affected | Why Factor Affects the Rate? |
| Nature of Reactants | IONIC substances  react FASTER    COVALENT  substances react  SLOWER | * Ionic = smaller (LESS bonds to   break; LESS steps):    NaCl(aq) + AgNO3(aq) → NaNO(aq) + AgCl(s)  Na+(aq) + Cl-(aq) + Ag+(aq) + NO3-(aq) →  Na+(aq) + NO3-(aq) AgCl(s) (1 step)     * Covalent = larger (MORE bonds to   break; MORE steps):  CH4(g) + O2(g) → CO2(g) + 2H2O(l)  (break 4 C-H bonds, 1O-O bond, form 2 C-O bonds, and 4 O-H bonds) |
| Concentration | INCREASE  concentration,  INCREASE reaction rate | The MORE PARTICLES in a given  space, the LESS SPACE b/w  particles🡪MORE COLLISIONS |
| Pressure | INCREASE pressure,  INCREASE reaction rate (affects  GASES ONLY!) | Increasing pressure DECREASES  VOLUME which DECREASES  SPACE b/w particles🡪MORE COLLISIONS |
| Temperature | INCREASE temperature,  INCREASE reaction rate | Greater SPEED 🡪 MORE total COLLISIONS  Greater AVERAGE Kinetic energy🡪collisions  take place with MORE energy |
| Surface Area | INCREASE the surface area (by  making PIECES SMALLER) INCREASES the reaction rate | Increasing surface area EXPOSES  MORE REACTANT PARTICLES to  possible collisions |
| Catalyst | SPEEDS UP THE RXN WITHOUT CHANGING THE NATURE OF THE  REACTANTS/PRODUCTS | Provides a SHORTCUT or ALTERNATIVE PATHWAY for the mechanism.  Lowers the ACTIVATION ENERGY for the reaction |