

Variables that Effect Reaction Rates

Aim

- to describe the influences on reaction rates

Notes

Nature of reactants

- ★ chemical reactions occur by breaking and rearranging existing bonds
- ★ the less electrons need to be rearranged, the faster the reaction is
 - ☆ Reactions between ionic substances in aqueous solution are rapid
 - ★ double replacement reactions
 - ☆ Reactions in which covalent bonds are broken occur slowly at room temperature
 - ★ decomposition of hydrogen peroxide

Concentration of reactants - an increase in concentration results in an increase in the frequency of collisions

- ★ usually as the concentration increases, the reaction rate increases
 - ☆ if the concentration of only the reactants that are NOT involved in the rate determining step are increased, the number of collisions are increased without effecting the reaction rate
- ★ gas and liquid - increasing pressure increases the concentration of the gas

Surface area - increasing the surface area of reactants increases the opportunity for collisions

Temperature - as temperature increases so does the reaction rate

- ★ Increasing temperature increases kinetic energy of the particles increasing both the frequency and effectiveness of collisions
- ★ An increase in temperature of 10°C approximately doubles the speed of many reactions

Catalysts - speed up reactions without being permanently altered

- ★ Change the reaction mechanism so less activation energy is required

Answer the questions below by circling the number of the correct response

- The net effect of a catalyst is to change the
 - potential energy of the reactants
 - potential energy of the products
 - heat of reaction
 - rates of both the forward and reverse reactions
- An increase in temperature increases the rate of a chemical reaction because the
 - activation energy increases
 - activation energy decreases
 - number of molecular collisions increases
 - number of molecular collisions decreases
- Which change may occur in a reaction system when a catalyst is added?
 - The equilibrium point is reached more rapidly.
 - The potential energy of the reactants increases.
 - The potential energy of the products decreases.
 - The heat of reaction becomes smaller.
- As the concentration of a reactant in a chemical reaction increases, the rate of the reaction generally
 - decreases
 - increases
 - remains the same
- As the rate of a given reaction increases due to an increase in the concentration of the reactants, the activation energy for that reaction
 - decreases
 - increases
 - remains the same
- An increase in the rate of all chemical reactions results from
 - an increase in pressure
 - a decrease in pressure
 - an increase in temperature
 - a decrease in temperature
- If the pressure on a gaseous system is increased, the rate of reaction increases because
 - the activation energy is increased
 - the temperature is decreased
 - the concentration is increased
 - the volume is increased
- The rate of a reaction may be increased by
 - an increase in concentration
 - a catalyst
 - an increase in temperature
 - all of the above.