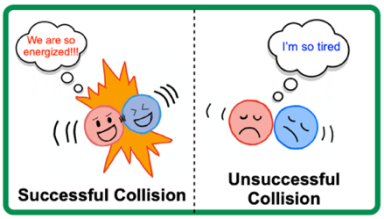
CONCEPT: FACTORS INFLUENCING RATES

- There are ___ major factors that directly influence how _____ or _____ a reaction proceeds.
  - □ For a reaction to occur, reacting molecules must _____ with enough _____
    - *collision frequency*: number of molecule collisions per unit of _____
    - *successful collisions*: energetic collisions resulting in _____ formation



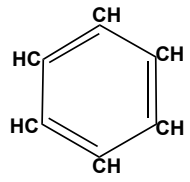
4 Factors Influencing Reaction Rates

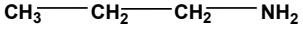
Factors	Condition	Effect on Collisions	Increase Rate?
1 **Concentration of Reactants**	___ [reactants]	___ collision frequency	_____
2 **Surface Area of Reactants**	___ surface area □ linear = ___ SA: $CH_3CH_2CH_2CH_3$ □ branched = ___ SA: $CH_3CH(CH_3)_2$	___ collision frequency	_____
3 **Temperature**	___ temperature □ 10°C increase = ___ rate	___ collision frequency & ___ collision energy	_____
4 **Catalysts**	_____ of catalyst	___ Activation Energy (Ea) & ___ successful collisions	_____

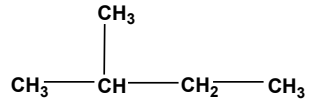
EXAMPLE: Which of the following would cause the rate of a chemical reaction to slow?

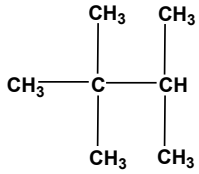
a. Increase in temperature of the reactants
c. Increased surface area of the reactants
b. Increase in concentration of the reactants
d. Increase in volume that the reactants take up

PRACTICE: Which of the following reacting molecules are able to produce products the fastest?

A) 

B) 

C) 

D) 

PRACTICE: A chemist tries to burn sulfur in air and notices that it burns very slowly. Chemist then burns sulfur in pure oxygen and observes a brilliant blue flame. Which factor is affecting the reaction rate?

a) increase in temperature

b) the presence of a catalyst

c) increase in reactant concentration

d) physical state of reactants