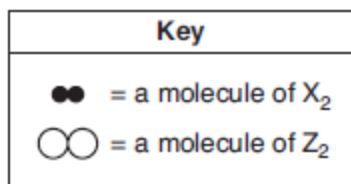1. The equation below represents a reaction between two molecules, X_2 and Z_2. These molecules form an "activated complex," which then forms molecules of the product.

Which diagram represents the most likely orientation of X_2 and Z_2 when the molecules collide with proper energy, producing an activated complex?

2. A chemical reaction occurs when reactant particles

  A) are separated by great distances
  B) have no attractive forces between them
  C) collide with proper energy and proper orientation
  D) convert chemical energy into nuclear energy

3. A reaction is most likely to occur when the colliding particles have proper orientation and

  A) mass   B) volume
  C) half-life   D) energy

4. What is required for a chemical reaction to occur?

  A) standard temperature and pressure
  B) a catalyst added to the reaction system
  C) effective collisions between reactant particles
  D) an equal number of moles of reactants and products

5. As the temperature of a chemical reaction in the gas phase is increased, the rate of the reaction increases because

  A) fewer particle collisions occur
  B) more effective particle collisions occur
  C) the required activation energy increases
  D) the concentration of the reactants increases

6. As the temperature of a reaction increases, it is expected that the reacting particles collide

  A) more often and with greater force
  B) more often and with less force
  C) less often and with greater force
  D) less often and with less force

7. A 5.0-gram sample of Fe(s) is to be placed in 100 milliliters of HCl(aq). Which changes will result in the fastest rate of reaction?

  A) increasing the surface area of Fe(s) and increasing the concentration of HCl(aq)
  B) increasing the surface area of Fe(s) and decreasing the concentration of HCl(aq)
  C) decreasing the surface area of Fe(s) and increasing the concentration of HCl(aq)
  D) decreasing the surface area of Fe(s) and decreasing the concentration of HCl(aq)
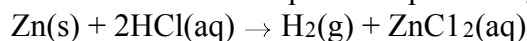
8. At STP, which 4.0-gram zinc sample will react fastest with dilute hydrochloric acid?

  A) lump   B) bar
  C) powdered   D) sheet metal

9. A catalyst increases the rate of a chemical reaction by

  A) providing an alternate reaction pathway
  B) providing the required heat of reaction
  C) increasing the potential energy of the products
  D) increasing the activation energy of the reaction

10. Given the balanced equation representing a reaction:
$$Zn(s) + 2HCl(aq) \rightarrow H_2(g) + ZnCl_2(aq)$$
Which set of reaction conditions produces $H_2(g)$ at the fastest rate?

  A) a 1.0-g lump of Zn(s) in 50. mL of 0.5 M HCl(aq) at 20.°C
  B) a 1.0-g lump of Zn(s) in 50. mL of 0.5 M HCl(aq) at 30.°C
  C) 1.0 g of powdered Zn(s) in 50. mL of 1.0 M HCl(aq) at 20.°C
  D) 1.0 g of powdered Zn(s) in 50. mL of 1.0 M HCl(aq) at 30.°C