



COLLISION THEORY

Answer the following questions then check your answers.

1. What is meant by collision theory?
2. What is activation energy?
3. State two factors that can increase the rate of a reaction, according to collision theory.
4. Explain why increasing the temperature of a reaction increases the rate.
5. Explain how increasing the concentration of reactants affects the rate of a reaction.
6. Explain why powdered reactants react faster than the same mass of large chunks.
7. Describe how a catalyst increases the rate of a reaction without being used up itself.
8. Explain the relationship between activation energy and the rate of a reaction.
9. Discuss how the factors of temperature, concentration, and surface area affect the rate of a reaction according to collision theory.

Answers

1. What is meant by collision theory?

Collision theory states that chemical reactions occur when reactant particles collide with sufficient energy and in the correct orientation to overcome the bonds holding the reactant particles together.

2. What is activation energy?

The minimum energy that particles need to collide with in order to react.

3. State two factors that can increase the rate of a reaction, according to collision theory.

Any two from

- Increased temperature
- Increased concentration of reactants
- Increase surface area of reactants
- Add a catalyst
- In the pressure if the reaction involves gases

4. Explain why increasing the temperature of a reaction increases the rate.

Increasing temperature gives particles more kinetic energy, leading to more frequent collisions and a higher proportion of successful collisions. More of the particles at the higher temperature will have energies above the activation energy of the reaction.

5. Explain how increasing the concentration of reactants affects the rate of a reaction.

A higher concentration means more particles are present in a given volume. This leads to:

- More frequent collisions between particles
- A greater chance of successful collisions

6. Explain why powdered reactants react faster than the same mass of large chunks.

Powdered reactants have a larger surface area than chunks. This means more particles are exposed and available to collide. Resulting in more frequent collisions and a faster reaction.

7. Describe how a catalyst increases the rate of a reaction without being used up itself.

- Catalysts provide an alternative reaction pathway with a lower activation energy.
- More particles now have enough energy/energy above the activation energy to react when they collide.
- This leads to more successful collisions and a faster reaction rate.

8. Explain the relationship between activation energy and the rate of a reaction.

Activation energy is the energy barrier that reactants must overcome to react. A higher activation energy means fewer particles have enough energy to react upon collision. This results in fewer successful collisions and a slower reaction rate.

9. Discuss how the factors of temperature, concentration, and surface area affect the rate of a reaction according to collision theory.

Temperature: Increases particle kinetic energy, leading to more frequent and energetic collisions, increasing the rate. More of the reacting particles have energy above the activation energy at higher temperatures.

Concentration: Increases the number of particles in a given volume, resulting in more frequent collisions and a faster rate.

Surface Area: Exposes more reactant particles