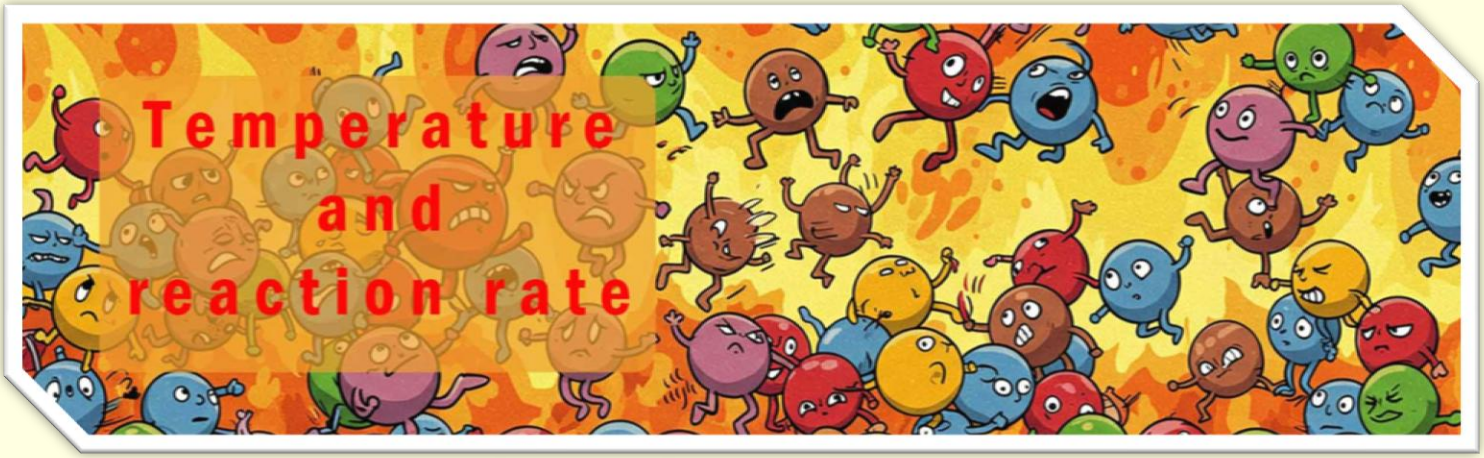

Answer all the questions below then check your answers.

1. What effect does increasing the temperature have on the rate of a reaction?

a) It decreases the rate of reaction b) It has no effect on the rate of reaction

c) It increases the rate of reaction

d) It decreases the number of successful collisions

2. Why does increasing the temperature increase the rate of reaction?

a) The particles move slower and collide less often

b) More particles have energy greater than the activation energy

c) The activation energy increases

d) The reactants become less concentrated

3. Balanced the symbol equation below for the reaction between magnesium and hydrochloric acid.

$$Mg_{(s)} + HCl_{(aq)} \longrightarrow MgCl_{2(aq)} + H_{2(g)}$$

3a. Identify the independent and dependent variables in an experiment investigating how temperature affects the rate of reaction between magnesium and hydrochloric acid.

4. Describe a method to investigate the effect of temperature on the rate of reaction between magnesium and hydrochloric acid.

4b. Why is it important to keep the concentration and volume of hydrochloric acid the same throughout the experiment?

5. A student plotted a graph of reaction rate against temperature and found that the curve steeply increased as temperature rose. Explain why this trend is observed.

6. If the student had an anomalous result in their experiment, what should they do?

7. Explain, using collision theory, why increasing temperature leads to a faster rate of reaction.

Answers

1. What effect does increasing the temperature have on the rate of a reaction?

a) It decreases the rate of reaction b) It has no effect on the rate of reaction

c) It increases the rate of reaction

d) It decreases the number of successful collisions

Answer: c) It increases the rate of reaction

2. Why does increasing the temperature increase the rate of reaction?

a) The particles move slower and collide less often

b) More particles have energy greater than the activation energy

c) The activation energy increases

d) The reactants become less concentrated

Answer: b) More particles have energy greater than the activation energy

3. Balanced the symbol equation below for the reaction between magnesium and hydrochloric acid.

Answer: $Mg_{(s)} + 2HCl_{(aq)} \longrightarrow MgCl_{2(aq)} + H_{2(g)}$

3a. Identify the independent and dependent variables in an experiment investigating how temperature affects the rate of reaction between magnesium and hydrochloric acid.

Answer:

Independent variable: Temperature of the hydrochloric acid

Dependent variable: Time taken for the magnesium to react or volume of hydrogen gas collected

4. Describe a method to investigate the effect of temperature on the rate of reaction between magnesium and hydrochloric acid.

Answer:

Measure 50 cm^3 of hydrochloric acid using a measuring cylinder and pour it into a conical flask.

Heat the acid to the desired temperature using a water bath.

Add a strip of magnesium ribbon to the acid and immediately start a stopwatch.

Measure the time taken for the magnesium to completely react.

Repeat the experiment at different temperatures and record the results.

Repeat each experiment at least twice for reliability.

4b. Why is it important to keep the concentration and volume of hydrochloric acid the same throughout the experiment?

Answer: To ensure that only temperature is affecting the rate of reaction and to maintain a fair test.

5. A student plotted a graph of reaction rate against temperature and found that the curve steeply increased as temperature rose. Explain why this trend is observed.

Answer: At higher temperatures, particles have more kinetic energy, leading to more frequent and energetic collisions. More particles have energy greater than the activation energy, increasing the number of successful collisions and making the reaction faster.

6. If the student had an anomalous result in their experiment, what should they do?

Answer: The student should repeat the experiment at that temperature to check if the result was due to an error or inconsistency in the method.

7. Explain, using collision theory, why increasing temperature leads to a faster rate of reaction.

Answer: Collision theory states that for a reaction to occur, reactant particles must collide with sufficient energy. Increasing the temperature gives particles more kinetic energy, making them move faster and collide more frequently. Additionally, more particles have energy greater than the activation energy, increasing the proportion of successful collisions, which speeds up the reaction.