

## Activation Energy Quiz Answer Key PDF

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#### What happens to the activation energy when a catalyst is used?

- A. It increases
- B. It decreases ✓**
- C. It remains the same
- D. It doubles

#### What is activation energy?

- A. The energy released during a reaction
- B. The minimum energy required to start a reaction ✓**
- C. The energy absorbed by the products
- D. The energy stored in reactants

#### Which factor does NOT directly affect activation energy?

- A. Temperature
- B. Catalyst
- C. Concentration of reactants ✓**
- D. Pressure

#### Which part of a potential energy diagram represents activation energy?

- A. The energy of reactants
- B. The energy of products
- C. The peak energy point ✓**
- D. The baseline energy level

**Discuss the impact of temperature on the activation energy and rate of a chemical reaction.**

As temperature increases, the kinetic energy of molecules increases, leading to more frequent and energetic collisions. This can lower the effective activation energy and increase the rate of the reaction, as more molecules have sufficient energy to overcome the energy barrier.

**Explain how activation energy affects the rate of a chemical reaction.**

Activation energy affects the rate of a chemical reaction by determining how easily reactants can overcome the energy barrier to form products; lower activation energy leads to a higher reaction rate.

**What information can be obtained from a potential energy diagram regarding activation energy?**

The activation energy can be determined from a potential energy diagram by measuring the height of the energy barrier between the reactants and the transition state.

**How can the Arrhenius equation be used to determine the activation energy of a reaction?**

To determine the activation energy of a reaction using the Arrhenius equation, you can plot  $\ln(k)$  versus  $1/T$ , where  $k$  is the rate constant and  $T$  is the temperature in Kelvin. The slope of the resulting line will be equal to  $-E_a/R$ , where  $E_a$  is the activation energy and  $R$  is the gas constant.

**Describe the role of a catalyst in a chemical reaction and how it affects activation energy.**

A catalyst lowers the activation energy of a chemical reaction, enabling the reaction to occur more rapidly without being consumed in the process.

**What does a potential energy diagram illustrate?**

- A. The concentration of reactants over time
- B. The energy changes during a reaction ✓**
- C. The speed of a reaction
- D. The color change in a reaction

**What are the effects of increasing temperature on a chemical reaction?**

- A. Increases the kinetic energy of molecules ✓**
- B. Decreases the activation energy
- C. Increases the reaction rate ✓**

D. Changes the chemical equilibrium

**Which of the following are characteristics of a catalyst?**

A. It is consumed in the reaction.

**B. It lowers the activation energy. ✓**

**C. It speeds up the reaction. ✓**

D. It alters the equilibrium position.

**In the Arrhenius equation, which parameters are involved?**

**A. Activation energy ✓**

**B. Rate constant ✓**

**C. Temperature ✓**

D. Concentration of products

**Which of the following are true about potential energy diagrams?**

**A. They show the energy of reactants and products. ✓**

**B. They illustrate the activation energy. ✓**

C. They indicate the reaction rate.

**D. They depict the transition state. ✓**

**What is the role of a catalyst in a chemical reaction?**

A. Increases the activation energy

**B. Decreases the activation energy ✓**

C. Consumes reactants

D. Increases the temperature

**In which units is activation energy typically measured?**

A. Joules

B. Kilowatts

**C. Kilojoules per mole ✓**

D. Moles per liter

Which of the following factors can influence the rate of a chemical reaction?

- A. Temperature ✓
- B. Catalyst ✓
- C. Activation energy ✓
- D. Surface area of reactants ✓

Provide an example of an industrial application where controlling activation energy is crucial and explain why.

An example of an industrial application where controlling activation energy is crucial is the Haber process, which synthesizes ammonia from nitrogen and hydrogen gases. This process requires precise temperature and pressure conditions to optimize the reaction rate and yield.

Which of the following best describes the Arrhenius equation?

- A. It relates pressure and volume.
- B. It describes the energy change in a reaction.
- C. It relates the rate constant to activation energy and temperature. ✓
- D. It calculates the concentration of reactants.

Which statements about activation energy are true?

- A. It is the energy required to break bonds in reactants. ✓
- B. It can be lowered by increasing the temperature. ✓
- C. It is unaffected by the presence of a catalyst.
- D. It determines the speed of a reaction. ✓