

## Reaction Rate 2 HW Q15-20

- 15) Based on the nature of the reactants in each of the equations below, which reaction at 25°C will occur at the *fastest* rate?
- A)  $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$   
 B)  $\text{NaOH}(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
 C)  $\text{CH}_3\text{OH}(\text{l}) + \text{CH}_3\text{COOH}(\text{l}) \rightarrow \text{CH}_3\text{COOCH}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
 D)  $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
- 16) A 1.0-gram piece of zinc reacts with 5 milliliters of  $\text{HCl}(\text{aq})$ . Which of these conditions of concentration and temperature would produce the *greatest* rate of reaction?
- A) 2.0 M  $\text{HCl}(\text{aq})$  at 20.°C  
 B) 1.0 M  $\text{HCl}(\text{aq})$  at 20.°C  
 C) 1.0 M  $\text{HCl}(\text{aq})$  at 40.°C  
 D) 2.0 M  $\text{HCl}(\text{aq})$  at 40.°C
- 17) Given the reaction at 25°C:

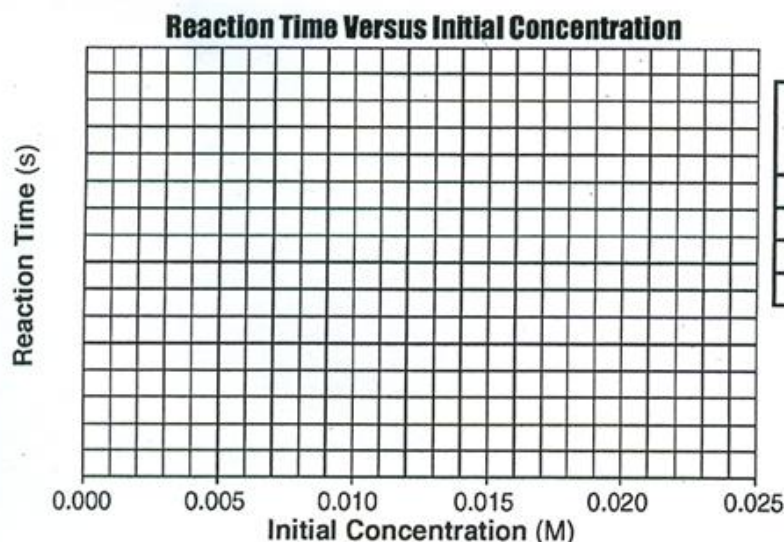


The rate of this reaction can be increased by using 5.0 grams of powdered zinc instead of a 5.0-gram strip of zinc because the powdered zinc has

- A) more surface area  
 B) lower kinetic energy  
 C) lower concentration  
 D) more zinc atoms
- 18) A 5.0-gram sample of zinc and a 50.-milliliter sample of hydrochloric acid are used in a chemical reaction. Which combination of these samples has the *fastest* reaction rate?
- A) a zinc strip and 1.0 M  $\text{HCl}(\text{aq})$   
 B) zinc powder and 1.0 M  $\text{HCl}(\text{aq})$   
 C) a zinc strip and 3.0 M  $\text{HCl}(\text{aq})$   
 D) zinc powder and 3.0 M  $\text{HCl}(\text{aq})$
- 19) Explain, in terms of collision theory, why the rate of a chemical reaction increases with an increase in temperature.

Questions 20 through 22 refer to the following:

An investigation was conducted to study the effect of the concentration of a reactant on the total time needed to complete a chemical reaction. Four trials of the same reaction were performed. In each trial the initial concentration of the reactant was different. The time needed for the chemical reaction to be completed was measured. The data for each of the four trials are shown in the table below.



**Reactant Concentration and Reaction Time**

Trial	Initial Concentration (M)	Reaction Time (s)
1	0.020	11
2	0.015	14
3	0.010	23
4	0.005	58

- 20) (a) On the grid provided, mark an appropriate scale on the axis labeled "Reaction Time(s)." An appropriate scale is one that allows a trend to be seen.
- (b) Plot the data from the data table shown. Circle and connect the points. **EXAMPLE:**
- (c) State the effect of the concentration of the reactant on the rate of the chemical reaction in the experiment described.
- (d) In a different experiment involving the same reaction as described in the given paragraph, it was found that an increase in temperature increased the rate of the reaction. Explain this result in terms of collision theory.