

Section 12.2

Factors Affecting Reaction Rates



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Learning Objectives



- Describe the effects of chemical nature, physical state, temperature, concentration, and catalysis on reaction rates

Factors Effecting Reaction Rates



- 1) Chemical properties of the reactants
- 2) State of subdivision, lumps vs. fine particles.
 - Available surface area for reactions to occur.
- 3) Temperature of the reactants
- 4) Concentration of the reactants
- 5) Catalytic activity

Chemical Nature of Reactants

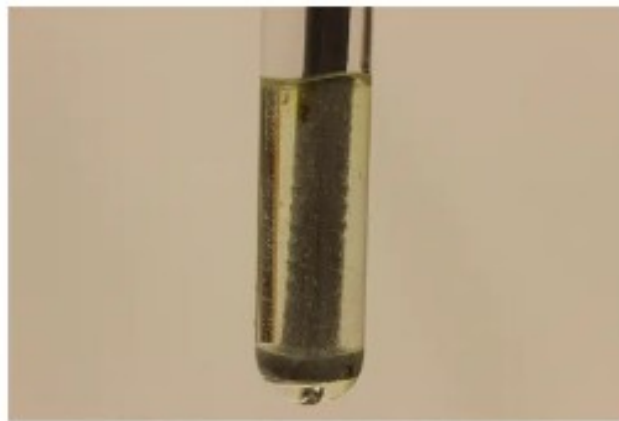
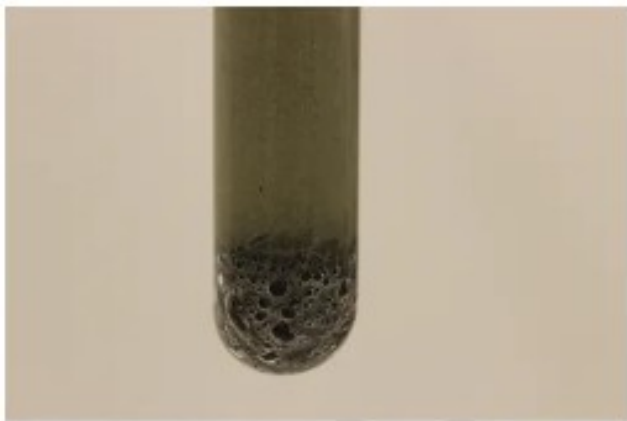


- Reactions that appear similar may have different rates under the same conditions.
- Reactivity of elements tend to be similar within the same group.
 - But rates will vary
- Few conclusions can be drawn from the chemical identity.

Physical State of Reactants



- A chemical reaction between two or more substances requires contact between the reactants.
- When reactants are in different phases the reaction takes place only at the interface between the phases.



Temperature of Reactants



- We will learn in a later chapter about the relationship between temperature and spontaneity.
- Most chemical reactions are faster when you increase the temperature.
- This can be justified by considering the increase in atomic collisions that are accompanied by an increase in the average kinetic energy.
- A general rule of thumb, reaction rates are approximately doubled when the temperature is raised by 10 °C.

Concentrations of Reactants



- Rates usually increase when the concentration of one or more of the reactants increases.
- We will learn more about the dependence of reaction rate on concentration in the next sections.

Catalysis



- Substances that function to increase the rate of a reaction are called catalysts.
- Catalysts are able to increase reaction rates by providing an alternate reaction pathway that requires less activation energy.