

The Overhead Oscillating Clock Worksheet

Discussion Questions

1. Describe what happened in this demonstration.
2. This oscillating reaction involves two competing processes in which bromate ions are reduced. The first, Process A, occurs when bromide ion concentration is above a certain level, and the second, Process B, occurs when the same concentration is below a certain level. Write the chemical equation for the following steps in both processes.
 - a. Process A, Part 1. Bromate ions are reduced by bromide ions in the presence of hydrogen molecules.
 - b. Process A, Part 2. Bromine reacts with malonic acid $[\text{CH}_2(\text{CO}_2\text{H})_2]$.
 - c. Process B, Part 1. Bromate ions are reduced to bromine by iron(II) ions.
3. Write the equation for the overall chemical reaction, in which bromate ions are reduced to bromide ions and malonic acid is oxidized to carbon dioxide and water.
4. The Fe(II) complex is red, while the Fe(III) complex is blue. During Process A the solution is red, but during Process B the solution is blue. Knowing this, explain how red, violet, and blue are all produced in the solution.