HOMESCHOOL SCIENCE EXPERIMENT

Testing the Effect of Temperature on the Rate of Diffusion

Name: _____

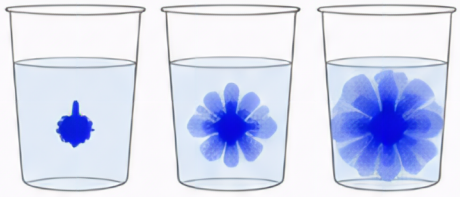
Date: _____

BACKGROUND

Diffusion is the movement of particles from an area of high concentration to an area of low concentration until evenly spread out. Temperature affects how fast particles move. When temperature increases, particles have more kinetic energy and move faster, so diffusion happens more quickly.

MATERIALS

- 3 clear cups or beakers (same size)
- Water
- Food coloring (one color)
- Thermometer
- Hot water (not boiling)
- Ice and cold water
- Stopwatck or timer
- Ruler (mm or cm)



Cold | Room Temperature | Hot

PROCEDURE

1. Set up three cups of water at different temperatures:
   - **Cold:** Add ice to cold water (about 5–10 °C).
   - **Room Temperature:** Use water at room temperature (about 20–25 °C).
   - **Hot:** Use hot water (about 40–50 °C). (Do not use boiling water.)
2. Measure and record the temperature of each cup of water.
3. Using the same dropper height (about 1 cm above the water), add one drop of food coloring to the center of each cup at the same time.
4. Start the timer immediately.
5. Watch the food coloring spread. Stop the timer when the color has diffused to the edge of the cup or when the color is evenly spread throughout the water.
6. Record the time in the data table.
7. Repeat the experiment one more time for each temperature and record the second time.

DATA TABLE

Temperature Condition	Temperature (°C)	Time for Color to Diffuse to the Edge (seconds)		Average Time (seconds)
		Trial 1	Trial 2	
Cold (5–10 °C)				
Room Temperature (20–25 °C)				
Hot (40–50 °C)				

Average Time = (Trial 1 + Trial 2) ÷ 2

ANALYSIS QUESTIONS

1. Which temperature had the fastest rate of diffusion (shortest time)? _____
2. Which temperature had the slowest rate of diffusion (longest time)? _____
3. Describe the relationship between temperature and the rate of diffusion.

   _____

   _____
4. Why do you think temperature affects the rate of diffusion?

   _____

   _____
5. If the experiment were repeated with warmer water (but not boiling), what do you predict would happen? Why?

   _____

   _____

TIP: Keep all other factors the same (cup size, amount of water, drop size of food coloring) so that only temperature affects the rate of diffusion.