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|-----------------|---|--------------|--|
| <b>Topic</b>    | How does temperature affect the rate of diffusion?  | <b>Level</b> | GCSE (or any other course for students aged 11-16) |
| <b>Outcomes</b> | <ol style="list-style-type: none"> <li>To measure the rate of diffusion of food colouring at different temperatures</li> <li>To draw a bar graph of your results</li> <li>To explain how temperature affects the rate of diffusion</li> </ol> |              |  |

## How does temperature affect the rate of diffusion?

**Aim:** In this practical you will investigate how temperature affects the rate of diffusion.

### Method:

- Fill a Petri dish with cold water and record the temperature
- Place the Petri dish on some 1cm<sup>2</sup> graph paper
- Using a pipette, put 1 cm<sup>3</sup> of food dye into the centre of the Petri dish
- Start the stop watch
- Stop the stop watch after 1.5 minutes and work out the area covered by the food dye
- Now repeat the experiment twice more, using fresh cold water, so that you can calculate an average
- Now repeat steps 1-6 for warm water from the tap and hot water from the kettle. The temperature of the water should be similar to the temperatures in the table below. Use a thermometer to check.

### Equipment list:

Read the method and write a list of all the equipment you will need

### Results:

| Water Temperature (°C) | Area Covered in 1.5 minutes (cm <sup>2</sup> ) |   |   |     | Rate of diffusion (cm <sup>2</sup> /min) |   |   |     |
|------------------------|--|---|---|-----|--|---|---|-----|
|                        | 1  | 2 | 3 | Av. | 1  | 2 | 3 | Av. |
| 4 °C                   |  |   |   |     |  |   |   |     |
| 25 °C                  |  |   |   |     |  |   |   |     |
| 50 °C                  |  |   |   |     |  |   |   |     |

Draw a graph of your results



**Questions:**

1. What did you find out about the relationship between the rate of diffusion and the temperature of the water?
2. Can you explain your results using your knowledge of the particle model?
3. Other than the temperature of the water, what other factors do you think would affect how quickly a substance diffuses in water?
4. Can you use your results and your own knowledge to explain why, in very cold water, fresh-water flatworms are unable to get enough oxygen for respiration and therefore move very slowly?

**Progress:** further resources on particles are available here:

<http://www.thescienceteacher.co.uk/particles/>