Diffusion

Teacher Support Page

Biology Lab

Overview:

Immerse yourself in the fascinating world of diffusion with our captivating laboratory experience. Explore the intricate process of solute diffusion through various mediums, from semisolid gelatin to liquid and even air. Witness the mesmerizing movement of potassium permanganate crystals and measure their progress using precise measurements and timers. Calculate diffusion rates and uncover the secrets behind varying speeds. Discover why air proves to be the fastest medium for diffusion, as it offers minimal friction and benefits from air currents. Embark on this illuminating journey, unraveling the mysteries of solute diffusion and expanding your understanding of cellular dynamics.

How to Find the Experience

Once logged in on the VXRLabs homepage, navigate to the "Subjects" tab, select the "Biology" option from the left-side menu, then select the "General Biology" option, then select the "Diffusion" option

Next Generation Science Standards (NGSS)

Visit the link below or scan the provided QR code to see specific standards and acknowledgments.

Movement of Molecules Into Or Out of Cells

https://ngss.nsta.org/Resource.aspx?ResourceID=520

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Gameplay Instructions

A. Experimental Procedure: Solute Diffusion Through a Semisolid

1. The student will observe a petri dish containing gelatin or agar.
2. The student will place a crystal of potassium permanganate in the center depression of the petri dish.
3. The student will note the starting time (time zero) in Table 5.1.
4. After ten minutes, the student will measure (in mm) the movement of potassium permanganate (KMnO4) from the center of the depression outward in one direction.
5. The student will calculate the speed of diffusion using this formula:

   Rate [mm/h] = (diameter [mm] / time [min]) x 60 [min]

B. Experimental Procedure: Solute Diffusion Through a Liquid

1. The student will add enough water to cover the bottom of a glass petri dish.
2. The student will place the petri dish over the thin, flat ruler. The student will position the petri dish directly over a mm measurement line.
3. Using tweezers, the student will add a crystal of crystal of potassium permanganate (KMnO4) directly over the mm measurement line. The student will note the starting time (time zero).
4. After ten minutes, the student will note the distance the color has moved:
   - The final time
   - The length of time in hours
   - The distance moved
5. The student will calculate the speed of diffusion using this formula:

   Rate [mm/h] = (diameter [mm] / time [min]) x 60 [min]

C. Experimental Procedure: Solute Diffusion Through Air

1. There will be two designated areas on both sides of a laboratory. For example, an area by a dry-erase board (front of lab) and an area at the back of the lab.
2. The student will measure the distance with a yardstick from the dry-erase board to the back of the lab.
3. The student will record the starting time (time zero) when a perfume is released (sprayed) into the air.
4. Usually, a student will note the time they can smell the perfume. Since this exercise is in a virtual setting, this step can be shown as perfume particles move from front of the class (dry-erase board) to back of the lab.
5. The student will note the time at which they can see the perfume particles at the back of the lab (this can happen in 5 minutes).
6. The student will calculate the speed of diffusion using this formula:

   Rate [mm/h] = (diameter [mm] / time [min]) x 60 [min]