

Diffusion

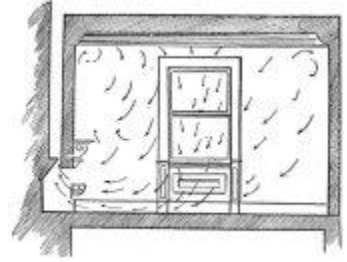
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Name _____

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¹ Why do we smell bread baking throughout the house? The answer is diffusion. A good way to describe diffusion is the moving of molecules from a place where they are concentrated close together to a place where they are less concentrated or farther apart. When molecules are spread out evenly, diffusion seems to stop.

² Smells travel in the air by diffusion. Because molecules are always moving, some molecules leave the bread as it is baking. They are vented with the excess heat from the oven. These tiny molecules of bread travel through the air throughout the house to our noses.



³ Have you ever passed by a bakery and noticed the delicious smells down the street from it? If the wind is blowing, there will be more mixing of the molecules in the air. That can either make the smell reach you sooner, or it can spread the molecules out so that you don't notice the smell as much. Since our brains are used to the smell of air, we don't smell the oxygen, nitrogen, or carbon dioxide. Instead, we smell the other molecules mixed with our air. This is why we smell the bread baking, smoke, perfume, or other smells.

⁴ **Diffusion is the movement of molecules from an area of high concentration to an area of low concentration** by means of random molecular motion. The **Kinetic Theory of Matter** says that all matter is made of small particles that are in constant motion. This random motion causes molecules of unlike substances to mix. Diffusion can be thought of as a migration of molecules from their "homeland" (where there are more of them) to a "new country" (where there are less of them.) To help you remember this:

Diffusion, diffusion, diffusion GO, GO, GOES,
From an area of high concentration to LOW, LOW, LOW.

⁵ Molecules diffuse in liquids as well. You can easily see diffusion happening when you mix powdered drink mix. Fill a pitcher with water. Let it sit on the counter until the water settles. Slowly add the powdered drink mix, but do not stir. Watch what happens in the water. Color will start to swirl through the water until the entire pitcher is colored. What made it mix all by itself? It is because molecules are always in motion. Even though it looks as if the water is still, the molecules of water and the powder are in motion, and this motion causes the two different substances to mix.

⁶ Water is very important to all living things because a large percentage of a cell is water. The movement of water into and out of a cell by diffusion through a membrane is common. This special kind of diffusion is called osmosis. **Osmosis** is the movement of water across a semi-permeable membrane. Semi-permeable (sem-ee-pur-mee-uh-buhl) means that the cell membrane has pores or openings that let some things, but not all, pass through it. Like other kinds of diffusion, osmosis keeps going until the concentration of water on one side of the cell membrane is the same as on the other side. Many substances will dissolve in water. Water can diffuse through the cell membrane carrying dissolved materials into and out of the cell. This is why water is so very important to cells.

⁷ Another place where diffusion happens in the human body is in the lungs. We need to get oxygen from the air into our blood. We need to remove the waste gas carbon dioxide from blood into the air. This gas exchange happens in the alveoli in the lungs by diffusion. The alveoli are adapted to make the gas exchange in lungs happen easily and efficiently. The gases move by diffusion from where there is a high concentration to where there is a low concentration. This does not require any energy from the cell.

⁸ In some cases molecules pass through a cell membrane in a direction different from diffusion. The molecules go from an area of low concentration to high concentration. For this type of movement, the use of energy by the cell is needed. It is called active transport. Think of riding a bicycle uphill. You must work hard and be very active to move the bicycle up the hill. This is just like active transport in the cell. The cell must use energy to move the molecules in the other direction.

⁹ Diffusion and osmosis are both forms of passive transport. Passive transport is movement of a chemical substance across a cell membrane without the cell having to use energy. It is helpful to any living thing to conserve energy whenever it can. Diffusion is called passive transport because it happens without the cell having to use energy to cause it. Think of riding a bicycle downhill. You don't have to waste any energy to make the bicycle go. You are passive or not actively having to work to make the bicycle move.

<p>1. What is diffusion?</p> <p><input type="radio"/> A Movement of air from an area of high concentration to an area of low concentration</p> <p><input type="radio"/> B Movement of molecules from an area of high concentration to an area of low concentration</p> <p><input type="radio"/> C Movement of water from an area of low concentration to high concentration</p>	<p>2. What is the Kinetic Theory of Matter?</p> <p><input type="radio"/> A All matter is made of small particles that are in constant motion.</p> <p><input type="radio"/> B Liquids and gases are made of small particles that are in constant motion.</p> <p><input type="radio"/> C Only gases are made of small particles that are in constant motion.</p>
<p>3. What causes diffusion?</p> <p><input type="radio"/> A Semi-permeable membranes</p> <p><input type="radio"/> B Low concentrations</p> <p><input type="radio"/> C Random movement of molecules</p>	<p>4. What is osmosis?</p> <p><input type="radio"/> A A special kind of diffusion</p> <p><input type="radio"/> B The movement of water through a semi-permeable membrane</p> <p><input type="radio"/> C A form of passive transport</p> <p><input type="radio"/> D All of the above</p>
<p>5. What does "semi-permeable" mean?</p> <p><input type="radio"/> A Something that will let some things pass through it but not all things</p> <p><input type="radio"/> B Something that will let only water pass through it</p> <p><input type="radio"/> C Something that will let all things pass through it</p>	<p>6. What is active transport?</p> <p><input type="radio"/> A Movement of molecules from an area of higher concentration to an area of lesser concentration</p> <p><input type="radio"/> B Movement of molecules through a membrane that does require energy</p> <p><input type="radio"/> C Movement of molecules through a membrane that does not require energy</p>
<p>7. What is passive transport?</p> <p><input type="radio"/> A Movement of molecules through a membrane that does not require energy</p> <p><input type="radio"/> B Movement of molecules from an area of higher concentration to an area of lesser concentration</p> <p><input type="radio"/> C Movement of molecules through a membrane that does require energy</p>	<p>8. How are active and passive transport different?</p> <p><input type="radio"/> A Active transport requires energy; passive transport does not.</p> <p><input type="radio"/> B Active transport moves molecules in the opposite direction as compared to passive transport.</p> <p><input type="radio"/> C Both A and B</p> <p><input type="radio"/> D None of the above</p>

Describe one example of diffusion. What two kinds of molecules are interacting, and how do they interact?

Where in the human body does diffusion take place?
