Close Reading and Text Dependent Questions in Science
Molecular Movement (Biology – HS)

The text selection, *Molecular Movement,* can be found in
BSCS Biology: A Human Approach, 2nd edition pgs. 226-227.

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Molecular Movement (*BSCS Biology: A Human Approach*, 2nd edition)

Someone in the next room opens the oven and takes out a pan of hot brownies. Almost imm
your mouth starts to water as you smell the chocolate. How did the odor get to your nose?
from the chocolate were released by heat and traveled through the air. The protein receptor
your nose detected these chocolate molecules.

This is an example of molecular movement. Molecules
random directions. But overall, they tend to spread from
where they are more concentrated to an area where they
concentrated. This dispersion continues until the concen
molecules is the same everywhere (see Figure E4.5). Th
molecular movement is called **diffusion**.

Say you could sample the concentration at various point
most concentrated area to the least concentrated area. Y
that the concentration decreases gradually. This gradual
forms a distribution known as the **concentration gradie**
molecules diffuse from areas of higher concentration to
concentration, they are said to move *down* the concentra

Diffusion occurs because the universe, and all the molec
drifts into a less ordered state unless some energy input
orderly. Think, for example, about your room. It takes y
maintain order—to keep your clothes off the floor, your
place, and your papers on the desk. Without a continual
energy, the organization of your room soon disintegrate
to look like the room in Figure E4.6. Organisms use ene
continuously to maintain their own order and unique int

Look in the Student Learning Outcome (SLO) Documents for guidance on when this should be taught. These can be found on the BPS Science Department's website: http://bpsscience.weebly.com/ You will find the Student Learning Outcomes documents organized there by grade level.

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Student Questions

1. What is the meaning of disperse in paragraph 2, and how does it relate to diffusion?

2. According to the text, what would happen if you sampled the concentration of molecules at various points?

3. The writer opens the article by presenting a question. What is the question and how does it relate to the overall explanatory purpose in the article?

4. What is the purpose of the analogy regarding "your room" in paragraph 4?

5. According to paragraph 5, on what two factors does the movement of salt across a membrane depend?

6. Which sentence or two in paragraph 6 best explains how concentration determines the movement of water molecules in osmosis?

7. Based on your answer to question 6, how does the concentration of water outside a cell affect the size of a cell?

8. Which sentence best explains how plant cells behave differently than animal cells in response to osmotic pressure?

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Sample Answers

1. **What is the meaning of disperse in paragraph 2 and how does it relate to diffusion?**
   Disperse as it is used in paragraph 2 means to spread out. It relates to diffusion because diffusion is the spreading out of molecules. You can see an example of diffusion in Figure E4.5.

2. **According to the text, what would happen if you sampled the concentration of molecules at various points?**
   The concentration (or amount of molecules in a given area) would slowly go down as you move away from the most concentrated area of the molecules.

3. **The writer opens the article by presenting a question. What is that question, and how does it relate to the overall explanatory purpose in the article?**
   The question is "How did the odor get to your nose?" The writer chose this example because readers are familiar with it and so the writer could use it as a starting place for explaining diffusion. In this case, the molecules from the chocolate were released and travelled through the air to your nose where they were detected by protein receptors on the cells in your nose.

4. **What is the purpose of the analogy regarding "your room" in paragraph 4?**
   The purpose of including the "room" analogy is to provide an example that readers can relate to and to make clear the scientific principle that energy is needed to make things orderly, both in your room and with molecules in nature. This relates to molecules naturally spreading out in diffusion – spreading out or being "messy" does not require energy. To organize those molecules would require energy.

5. **According to paragraph 5, on what two factors does the movement of salt across a membrane depend?**
   The two factors are the concentration of solute inside the cell compared to outside the cell and special proteins in the membrane.

6. **Which sentence or two in paragraph 6 best explains how concentration determines the movement of water molecules in osmosis?**
   One sentence is "When the initial concentration of water is greater outside a cell than inside, water rushes into a cell." Another sentence is "Conversely, if the concentration of water is greater inside than outside a cell, water leaks out and the cell shrinks."

7. **Based on your answer to question 6, how does the concentration of water outside a cell affect the size of a cell?**
   If the concentration of water is greater outside the cell, then water will move into the cell making it bigger (and it may burst), whereas if the concentration of water is lower outside the cell, the water will move out of the cell and the cell will get smaller.

8. **Which sentence best explains how plant cells behave differently than animal cells in response to osmotic pressure?**
   The sentence is "The water in a vacuole exerts osmotic pressure on a cell's contents, pressing the cell membrane tightly against the cell wall." Note: This sentence describes the build up of pressure in a vacuole that gives plant structures their firmness. The sentence refers to both the cell wall and vacuole.