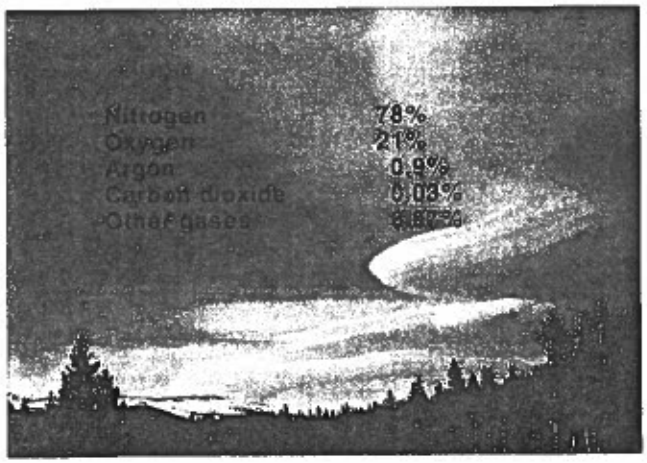
14-4 How does oxygen get into the blood?

Objectives ▸ Explain gas exchange in the lungs and between the blood and body cells. ▸ Compare the gas makeup of inhaled air and exhaled air.

Oxygen in the Air Air is a mixture of gases. It is made up mostly of nitrogen and oxygen. Your body cells need oxygen to carry out respiration. Oxygen enters the lungs in the air you inhale. One of the jobs of the lungs is to take in oxygen from the air.

Analyze: What percentage of air is made up of oxygen?



Alveoli The alveoli are where gases are exchanged in the lungs. Alveoli look like a bunch of grapes. The alveoli have very thin walls. They are surrounded by many capillaries. Capillaries are very tiny blood vessels. Red blood cells move through the capillaries in single file.

In the lungs, oxygen and carbon dioxide are exchanged between the alveoli and the blood. Oxygen molecules pass through the walls of the alveoli into the capillaries. The oxygen molecules attach to red blood cells. The red blood cells carry the oxygen to cells of the body. Carbon dioxide molecules pass from the blood plasma through the capillary walls into the alveoli. The carbon dioxide is removed from your body when you exhale.

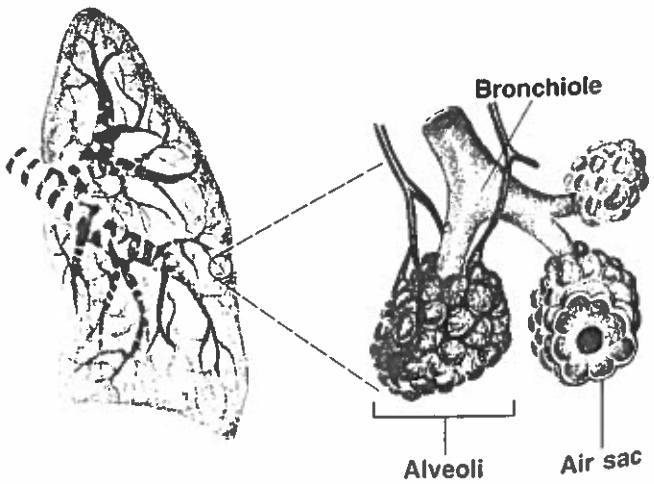
Describe: What happens to oxygen molecules in the lungs?

Gas Exchange in Cells Oxygen and carbon dioxide are exchanged between the body cells and red blood cells. Oxygen moves from the red blood cells into the body cells. Carbon dioxide moves from the body cells into the capillaries. The carbon dioxide is carried back to the lungs.

Describe: What happens to carbon dioxide molecules in the body cells?

Air In and Air Out The gas makeup of the air you breathe in is different from the gas makeup of the air you breathe out. Inhaled air contains more oxygen than does exhaled air. Exhaled air contains more carbon dioxide than does inhaled air. Some oxygen from the air you breathe in is removed by the lungs. Your body cells add carbon dioxide to the air you breathe out. Water also is added to the air you exhale.

Analyze: Why is there more carbon dioxide in exhaled air than inhaled air?



LESSON SUMMARY

- Air is a mixture of gases including nitrogen, oxygen, and carbon dioxide.
- The alveoli are the places where gases are exchanged in the lungs.
- In the lungs, oxygen and carbon dioxide are exchanged between the alveoli and the blood.
- Oxygen and carbon dioxide are exchanged between body cells and red blood cells at the capillaries.
- The air that you inhale has more oxygen and less carbon dioxide in it than the air that you exhale.

CHECK *Find the sentence in the lesson that answers each question. Then, write the sentence.*

1. What is air?
2. Where are gases exchanged in the lungs?
3. What are capillaries?
4. How is carbon dioxide removed from the body?
5. Does inhaled air contain more oxygen or more carbon dioxide than exhaled air?
6. Does exhaled air contain more oxygen or more carbon dioxide than inhaled air?

APPLY *Complete the following.*

7. How much of the air is made up of nitrogen?
8. **Infer:** Which percentages would most likely be inhaled air?
   a. 78% nitrogen; 21% oxygen
   b. 78% nitrogen; 17% oxygen
9. **Infer:** Which percentage would most likely be air you exhaled? How do you know?
   a. 21% oxygen; 0.03% carbon dioxide
   b. 17% oxygen; 4% carbon dioxide

Skill Builder

Graphing A graph is a good way to organize information. Use the percentages of the gases contained in air shown on page 276 to make a graph of this data. Use either a bar graph or a pie graph.

ACTIVITY

ANALYZING EXHALED AIR

You will need a flat piece of glass, such as a window pane, 25 mL of limewater, a drinking glass, and a drinking straw.

1. Breathe out onto the flat piece of glass.
2. Add the 25 mL of limewater to the drinking glass. Limewater is used to test for carbon dioxide. If carbon dioxide is present, the limewater becomes cloudy.
3. Put the straw into the limewater. Gently blow through the straw into the glass of limewater. **Caution: Do not inhale while the straw is in the limewater.**

Questions

1. **a. Observe:** What forms on the pane of glass? **b.** Where did it come from?
2. **Infer:** What happens to the limewater when you bubble exhaled air into it? Explain your answer.
3. **Infer:** What does this tell you about the air you exhale?