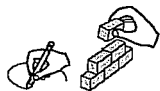


Name \_\_\_\_\_

Course/Section \_\_\_\_\_

Date \_\_\_\_\_

Professor/TA \_\_\_\_\_



## Activity 42.2 How do we breathe, and why do we breathe?

This activity is designed to give you an understanding of how and why we breathe and some of the mechanisms that control the rates of breathing.

How do we breathe? Explain the mechanics of breathing. To do this, diagram (or model) and explain the general movement of oxygen and carbon dioxide into and out of the lungs, lung alveoli, blood, and tissues. Be sure to include all of these terms in your diagram.

diaphragm

diffusion

CO<sub>2</sub> removal

O<sub>2</sub> demand

lungs

alveoli

expired air

inspired air

oxygen

carbon dioxide

brain

P<sub>CO<sub>2</sub></sub> sensors

medulla oblongata

lung tissue cells

skeletal muscle cells

carbohydrate + O<sub>2</sub> → CO<sub>2</sub> + H<sub>2</sub>O +  
energy

CO<sub>2</sub> + H<sub>2</sub>O ↔ H<sub>2</sub>CO<sub>3</sub> ↔ HCO<sub>3</sub><sup>-</sup> + H<sup>+</sup>

**Use your diagram or model to answer the questions.**

1. Explain briefly why we breathe. Or, more specifically, where is what we breathe in used in the body and where is what we breathe out produced in the body?

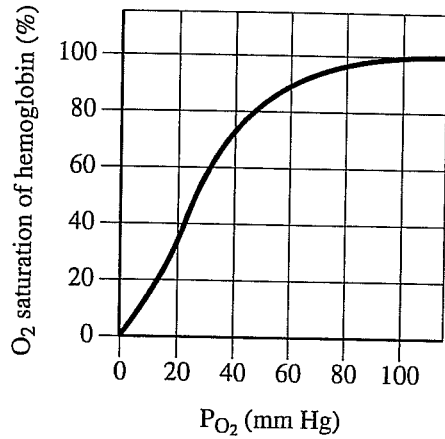
2. Oxygen is transported in the blood in reversible combination with hemoglobin.

a. How does the level of carbon dioxide in the blood contribute to blood pH? (Write the chemical reaction.)

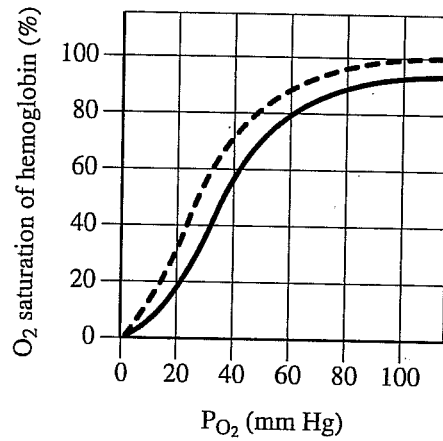
b. How does the level of  $\text{CO}_2$  in the blood affect the affinity of hemoglobin for oxygen? That is, how does the concentration of  $\text{CO}_2$  in the blood change its ability to carry oxygen (the effect of the Bohr shift)? What is the Bohr shift?

c. Is the Bohr shift more likely to occur after exercise or after hyperventilation (rapid breathing with no exercise involved)? Explain.

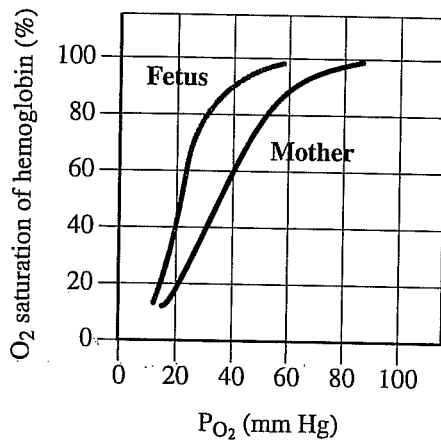
3. Compare these oxygen dissociation curves for hemoglobin.



**Normal adult**



**Reduced pH conditions**



**Fetal vs. Adult**

- a. How do the curves differ?
  - i. Normal versus reduced pH?
  - ii. Infant versus adult?
- b. What would happen if fetal and adult hemoglobin had the same affinities for oxygen?