Regulation of pH

To complete this worksheet, select:

Module: Balancing Fluids
Activity: Animations
Title: Regulation of pH

Introduction

1. a. Explain the correlation between molecular dissociation and hydrogen ions. 

b. Explain the function of the pH scale. How does it reflect hydrogen ion concentration (acidosis or alkalosis)?

c. Why is pH important to enzymes?

d. Explain the importance of blood pH regulation.

e. Identify 3 regulatory mechanisms for blood pH.

Chemical Buffers

2. a. Explain buffer action in each of the following situations:

   increased hydrogen ions / decreasing pH - ________________________________
   
   ________________________________
   
   decreased hydrogen ions / increasing pH - ________________________________
   
   ________________________________

b. Identify the three chemical buffer systems: ________________________________
   
   ________________________________
   
   ________________________________
c. Explain how protein buffers accommodate dropping or rising pH conditions.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

d. Explain how phosphate buffers accommodate dropping or rising pH conditions.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

e. Explain how bicarbonate buffers accommodate dropping or rising pH conditions.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

Role of Respiratory System

3. The respiratory system regulates blood pH by controlling the amount of carbon dioxide in the blood. Explain.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

4. Explain how the respiratory center accommodates rising and falling blood pH resulting from carbon dioxide.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________
Role of the Urinary System

5. Describe how the tubular cells of the PCT and collecting ducts (tubules) alter blood pH.

6. Explain how the nephron accommodates acid conditions.

7. Explain how the nephron accommodates alkaline conditions.

Acid-Base Imbalances

8. a. Chemical buffers, the respiratory system, and the urinary system work together to maintain blood pH homeostasis. Identify the two main categories that cause pH imbalance.

b. Define the following:

   - respiratory acidosis - 
   - respiratory alkalosis - 
   - metabolic acidosis - 
   - metabolic alkalosis - 


10. Describe urinary system compensation for respiratory alkalosis.
11. Describe respiratory compensation for metabolic acidosis.

12. Describe respiratory compensation for metabolic alkalosis.