Buffer Solutions Quiz Answer Key PDF

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Which of the following are components of a basic buffer? (Select all that apply)

A. Weak base ✓
B. Strong acid
C. Conjugate acid ✓
D. Strong base

What is a buffer solution?

A. A solution that changes pH easily
B. A solution that resists changes in pH ✓
C. A solution with a neutral pH
D. A solution that only contains strong acids

In which industries are buffer solutions commonly used? (Select all that apply)

A. Pharmaceuticals ✓
B. Agriculture
C. Food and Beverage ✓
D. Textile

How does a buffer solution maintain its pH?

A. By diluting itself
B. By neutralizing added acids or bases ✓
C. By evaporating water
D. By changing temperature

Which of the following statements about buffer solutions are true? (Select all that apply)

A. Buffers can be made from strong acids and bases
B. Buffers resist changes in pH ✓
C. Buffers are effective only at pH 7
D. Buffers can be used in fermentation processes ✓

Which of the following is NOT a characteristic of a buffer solution?

A. It can resist pH changes
B. It is made from strong acids and bases ✓
C. It has a limited capacity
D. It is used in biological systems

Which of the following is a component of an acidic buffer?

A. Strong acid and its salt
B. Weak acid and its conjugate base ✓
C. Strong base and its salt
D. Weak base and its conjugate acid

Which of the following factors affect the buffer capacity? (Select all that apply)

A. Concentration of buffer components ✓
B. Temperature
C. Ionic strength
D. Proximity of pH to pKa ✓

Describe the process of preparing a buffer solution with a desired pH.

A. Mix strong acids and bases
B. Mix a weak acid/base with its conjugate salt ✓
C. Use only distilled water
D. Adjust the temperature

Explain how the pKa of a weak acid affects the pH of a buffer solution.

A. It has no effect on pH
B. It determines the pH at which the acid and its conjugate base are in equilibrium ✓

C. It only affects strong acids
D. It is irrelevant to buffer solutions

Buffers are used in which of the following biological processes? (Select all that apply)

A. Digestion ✓
B. Respiration ✓
C. Photosynthesis
D. Protein synthesis ✓

Using the Henderson-Hasselbalch equation, calculate the pH of a buffer solution with a pKa of 4.75, where the concentration of the conjugate base is 0.1 M and the concentration of the acid is 0.1 M.

A. 4.25
B. 4.75 ✓
C. 5.00
D. 5.25

Discuss why buffers are crucial in maintaining the pH of blood.

A. They increase blood acidity
B. They maintain pH within a narrow range ✓
C. They have no effect on pH
D. They only work at pH 7

What challenges might arise when using buffers in industrial applications?

A. Buffers are always effective
B. Maintaining buffer capacity can be challenging ✓
C. Buffers are inexpensive to produce
D. Buffers are not used in industry

Explain the role of a conjugate base in an acidic buffer solution.

A. It increases the acidity of the solution
B. It neutralizes added acids ✓
C. It decreases the pH

D. It has no effect on pH

Describe what is meant by buffer capacity and what factors influence it.

A. It is the same for all buffers
B. It is the amount of acid or base a buffer can neutralize ✓
C. It is not influenced by concentration
D. It is only relevant at pH 7

What is the effective pH range of a buffer solution?

A. Within one pH unit above or below the pKa ✓
B. Between pH 1 and 14
C. Only at pH 7
D. Between pH 0 and 1

What variables are used in the Henderson-Hasselbalch equation? (Select all that apply)

A. pH ✓
B. pKa ✓
C. Concentration of conjugate base ✓
D. Concentration of strong acid

What happens to the buffer capacity when the concentration of buffer components is increased?

A. It decreases
B. It remains the same
C. It increases ✓
D. It becomes unpredictable

Which equation is used to calculate the pH of a buffer solution?

A. Arrhenius Equation
B. Henderson-Hasselbalch Equation ✓
C. Nernst Equation
D. Van't Hoff Equation