Acid Base Worksheet Answer Key PDF

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Part 1: Foundational Knowledge

Which of the following is a characteristic of a base?

undefined. A) Donates protons
undefined. B) Accepts protons ✓
undefined. C) Has a pH less than 7
undefined. D) Completely dissociates in water

A base accepts protons.

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A base accepts protons.

Which of the following are strong acids? (Select all that apply)

undefined. A) Hydrochloric acid (HCl) ✓
undefined. B) Acetic acid (CH_3COOH)
undefined. C) Sulfuric acid (H_2SO_4) ✓
undefined. D) Ammonia (NH_3)

Strong acids include hydrochloric acid and sulfuric acid.

Which of the following are strong acids? (Select all that apply)

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undefined. C) Sulfuric acid (H_2SO_4) ✓
undefined. D) Ammonia (NH_3)

Strong acids completely dissociate in water.

Explain the difference between a strong acid and a weak acid in terms of dissociation in water.

Strong acids completely dissociate in water, while weak acids only partially dissociate.

Explain the difference between a strong acid and a weak acid in terms of dissociation in water.

Strong acids fully dissociate, while weak acids partially dissociate.

List two examples of a weak base and a weak acid.

1. Weak Base Example 1
Ammonia

2. Weak Base Example 2
Sodium bicarbonate

3. Weak Acid Example 1
Acetic acid

4. Weak Acid Example 2
Citric acid

Examples of weak bases include ammonia and baking soda; weak acids include acetic acid and citric acid.

What is the pH of a neutral solution?

undefined. A) 0
undefined. B) 7 ✓
undefined. C) 14
undefined. D) 10

A neutral solution has a pH of 7.

What is the pH of a neutral solution?

undefined. A) 0
undefined. B) 7 ✓
undefined. C) 14
undefined. D) 10

The pH of a neutral solution is 7.

Part 2: Understanding Concepts

Which of the following statements about buffers is true? (Select all that apply)

undefined. A) Buffers resist changes in pH. ✓
undefined. B) Buffers are composed of a strong acid and its conjugate base.
undefined. C) Buffers are used to maintain a stable pH in biological systems. ✓
undefined. D) Buffers can only be made from weak acids and their conjugate bases. ✓

Buffers resist changes in pH and are typically made from weak acids and their conjugate bases.

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Buffers resist changes in pH and are made from weak acids and their conjugate bases.

Describe how the Henderson-Hasselbalch equation is used to calculate the pH of a buffer solution.

The Henderson-Hasselbalch equation relates the pH of a buffer solution to the concentration of the acid and its conjugate base.

Describe how the Henderson-Hasselbalch equation is used to calculate the pH of a buffer solution.

The equation relates pH to the ratio of the concentrations of the acid and its conjugate base.

Part 3: Applying Knowledge

If you add a small amount of hydrochloric acid to a buffer solution, what is most likely to happen?

undefined. A) The pH will increase significantly.
undefined. B) The pH will decrease significantly.
undefined. C) The pH will remain relatively stable. ✓
undefined. D) The buffer will become neutralized.

The pH will remain relatively stable due to the buffer's capacity.

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The pH will remain relatively stable due to the buffer's action.

During a titration, which of the following indicators could be used to determine the endpoint? (Select all that apply)

undefined. A) Phenolphthalein ✓
undefined. B) Litmust
undefined. C) Bromothymol blue ✓
undefined. D) Methyl orange ✓

Indicators like phenolphthalein and bromothymol blue can be used to determine the endpoint.

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undefined. C) Bromothymol blue ✓

undefined. D) Methyl orange ✓

Indicators change color at specific pH levels, signaling the endpoint.

A solution has a pH of 3. Is it acidic, basic, or neutral? Explain your reasoning.

A solution with a pH of 3 is acidic because it is below 7 on the pH scale.

A solution has a pH of 3. Is it acidic, basic, or neutral? Explain your reasoning.

A pH of 3 indicates an acidic solution.

Part 4: Analyzing Relationships

Analyze the following reactions and identify which are neutralization reactions. (Select all that apply)

undefined. A) $HCl + NaOH \rightarrow NaCl + H_2O$ ✓
undefined. B) $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$ ✓
undefined. C) $NH_3 + H_2O \rightarrow NH_4^+ + OH^-$
undefined. D) $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$ ✓

Reactions A, B, and D are neutralization reactions.

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undefined. D) $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$ ✓

Neutralization reactions typically involve an acid and a base producing water and a salt.

Explain the role of water in acid-base reactions and how it affects the dissociation of acids and bases.

Water acts as a solvent and can participate in acid-base reactions, affecting dissociation.

Explain the role of water in acid-base reactions and how it affects the dissociation of acids and bases.

Water acts as a solvent and can participate in acid-base reactions.

Part 5: Synthesis and Reflection

Which of the following scenarios would require the use of a buffer solution?

undefined. A) Preparing a solution for a chemical reaction that requires a specific pH. ✓
undefined. B) Cleaning a surface with a strong acid.
undefined. C) Neutralizing a base spill in a laboratory.
undefined. D) Diluting an acid with water.

Preparing a solution for a chemical reaction that requires a specific pH would require a buffer.

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Preparing a solution for a chemical reaction that requires a specific pH would require a buffer.

Evaluate the following statements and identify which are true about the pH scale. (Select all that apply)

undefined. A) A pH of 0 indicates a very strong acid. ✓
undefined. B) A pH of 14 indicates a very strong base. ✓
undefined. C) A pH of 7 is always neutral, regardless of the solution.
undefined. D) The pH scale is logarithmic, meaning each whole number change represents a tenfold change in acidity or basicity. ✓

The pH scale is logarithmic, and a pH of 0 indicates a very strong acid.

Evaluate the following statements and identify which are true about the pH scale. (Select all that apply)

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undefined. C) A pH of 7 is always neutral, regardless of the solution.

undefined. **D) The pH scale is logarithmic, meaning each whole number change represents a tenfold change in acidity or basicity.** ✓

Statements A, B, and D are true about the pH scale.

Design an experiment to test the buffering capacity of a solution. Describe the steps you would take and the observations you would expect.

An experiment could involve adding acid or base to a buffer and measuring pH changes.

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An experiment could involve adding acid to a buffer solution and measuring pH changes.