Polyatomic Ions Worksheet Answer Key PDF

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Part 1: Building a Foundation

Which of the following is a polyatomic ion?

undefined. A) Na^+

undefined. B) Cl^-

undefined. C) NH4^+ ✓

undefined. D) Mg^2+

The correct answer is C) NH4^+ as it is a polyatomic ion.

Which of the following are examples of polyatomic ions? (Select all that apply)

undefined. A) SO4^2- ✓

undefined. B) H2O

undefined. C) CO3^2- ✓

undefined. D) NO3^- ✓

The correct answers are A) SO4^2-, C) CO3^2-, and D) NO3^- as they are all polyatomic ions.

Explain what distinguishes a polyatomic ion from a monatomic ion.

A polyatomic ion consists of two or more atoms bonded together, while a monatomic ion consists of a single atom.

List the chemical formulas for the following polyatomic ions:

1. A) Sulfate

SO4^2-

2. B) Nitrate

NO3^-

3. C) Phosphate
PO4^3-

The chemical formulas are: A) SO4^2-, B) NO3^-, C) PO4^3-.

Part 2: Comprehension and Application

What is the charge on the phosphate ion (PO4)?

undefined. A) -1
undefined. B) -2
undefined. C) -3 ✓
undefined. D) 0

The correct answer is C) -3 as phosphate has a charge of -3.

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

undefined. A) They are always negatively charged.
undefined. B) They consist of two or more atoms. ✓
undefined. C) They can form salts with cations. ✓
undefined. D) They are only found in organic compounds.

The correct answers are B) They consist of two or more atoms and C) They can form salts with cations.

Describe how the naming of polyatomic ions typically reflects their composition or the central atom present.

The naming of polyatomic ions often includes the central atom's name and a suffix that indicates the number of oxygen atoms.

Which compound is formed when ammonium ions (NH4^+) combine with sulfate ions (SO4^2-)?

undefined. A) (NH4)2SO4 ✓
undefined. B) NH4SO4
undefined. C) NH4(SO4)2
undefined. D) (NH4)3SO4

The correct answer is A) (NH4)2SO4 as it balances the charges.

When combining carbonate ions (CO3^2-) with calcium ions (Ca^2+), which of the following statements are true? (Select all that apply)

undefined. A) The resulting compound is CaCO3. ✓

undefined. B) The compound formed is soluble in water.

undefined. C) The charges of the ions balance each other. ✓

undefined. D) The resulting compound is a type of salt. ✓

The correct answers are A) The resulting compound is CaCO3, C) The charges of the ions balance each other, and D) The resulting compound is a type of salt.

Write the balanced chemical equation for the reaction between sodium ions (Na^+) and phosphate ions (PO4^3-).

The balanced equation is 3Na^+ + PO4^3- → Na3PO4.

Part 3: Analysis, Evaluation, and Creation

Which of the following best describes the relationship between hydroxide ions (OH^-) and water (H2O)?

undefined. A) Hydroxide ions are a form of water.

undefined. B) Hydroxide ions are formed by the dissociation of water. ✓

undefined. C) Hydroxide ions have no relation to water.

undefined. D) Hydroxide ions are the same as water.

The correct answer is B) Hydroxide ions are formed by the dissociation of water.

Analyze the following statements and identify which are correct regarding the formation of polyatomic ions. (Select all that apply)

undefined. A) Polyatomic ions are formed by ionic bonds.

undefined. B) Polyatomic ions are formed by covalent bonds. ✓

undefined. C) Polyatomic ions can participate in redox reactions. ✓

undefined. D) Polyatomic ions are always stable in solution.

The correct answers are B) Polyatomic ions are formed by covalent bonds and C) Polyatomic ions can participate in redox reactions.

Compare and contrast the structural differences between nitrate (NO3^-) and nitrite (NO2^-).

Nitrate has three oxygen atoms while nitrite has two, affecting their reactivity and properties.

Which of the following scenarios would result in the formation of a precipitate?

undefined. A) Mixing sodium nitrate (NaNO3) with potassium chloride (KCl).

undefined. B) Mixing calcium chloride (CaCl2) with sodium carbonate (Na2CO3). ✓

undefined. C) Mixing ammonium sulfate ((NH4)2SO4) with sodium hydroxide (NaOH).

undefined. D) Mixing magnesium sulfate (MgSO4) with barium nitrate (Ba(NO3)2).

The correct answer is B) Mixing calcium chloride (CaCl2) with sodium carbonate (Na2CO3) results in a precipitate.

Propose which of the following polyatomic ions could be used to create a buffer solution. (Select all that apply)

undefined. A) Acetate (C2H3O2^-) ✓

undefined. B) Phosphate (PO4^3-) ✓

undefined. C) Sulfate (SO4^2-)

undefined. D) Bicarbonate (HCO3^-) ✓

The correct answers are A) Acetate (C2H3O2^-), B) Phosphate (PO4^3-), and D) Bicarbonate (HCO3^-).

Design a simple experiment to demonstrate the formation of a polyatomic ion precipitate. Describe the materials, procedure, and expected results.

An example experiment could involve mixing solutions of barium chloride and sodium sulfate to form barium sulfate precipitate.