Chemistry Nomenclature Practice Test (Sample)

Study Guide

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Questions

1. What is the chemical name for K2O?

- **A. Potassium sulfate**
- **B. Potassium oxide**
- **C. Potassium hydroxide**
- **D. Potassium carbonate**

2. What is the systematic name for HF?

- **A. Hydrofluoric acid**
- **B. Fluorine acid**
- **C. Hydrofluorate**
- **D. Fluoronic acid**

3. What is the chemical formula for ammonium phosphate?

- **A. (NH4)2PO4**
- **B. (NH4)3PO4**
- **C. (NH4)4PO4**
- **D. (NH4)(PO4)2**

4. What is the common name for the compound CO?

- **A. Carbon dioxide**
- **B. Carbon monoxide**
- **C. Carbon tetrafluoride**
- **D. Carbon disulfide**

5. What is the name of the compound with the formula P4O10?

- **A. Tetraphosphorus decoxide**
- **B. Diphosphorus trioxide**
- **C. Phosphorus pentoxide**
- **D. Boron trifluoride**

6. What is the chemical formula of calcium iodide once more?

- **A. CaI2**
- **B. CaI3**
- **C. Ca2I**
- **D. CaI**

7. What is the formula for mercury(I) nitrite?

A. $Hg(NO_2)$

B. $Hg(NO_2)_2$

C. $Hg_2(NO_2)_2$

D. $Hg_2N_2O_4$

8. What is the chemical name for HNO_2?

A. Nitric acid

B. Nitrous acid

C. Hydrochloric acid

D. Acetic acid

9. What is the chemical name for N_2O_5?

A. Dinitrogen pentoxide

B. Dinitrogen tetroxide

C. Trinitrogen pentoxide

D. Dinitrogen oxalate

10. What is the correct formula for mercury(II) phosphate?

A. $HgPO_4$

B. $Hg_2(PO_4)_2$

C. $Hg_3(PO_4)_2$

D. $Hg(PO_4)_3$

Answers

1. B
2. A
3. B
4. B
5. A
6. A
7. C
8. B
9. A
10. C

Explanations

1. What is the chemical name for K2O?

A. Potassium sulfate

B. Potassium oxide

C. Potassium hydroxide

D. Potassium carbonate

Potassium oxide is the correct name for K2O because it consists of potassium (K) and oxygen (O) in a simple ionic compound format. In K2O, there are two potassium ions (K^+) for each oxide ion (O^2-), reflecting a common oxidation behavior of these elements. The name reflects this configuration, where "potassium" comes from the metal and "oxide" indicates the presence of the oxygen. In naming ionic compounds, the cation (the positively charged ion) is named first, followed by the anion (the negatively charged ion). Therefore, K2O is referred to as potassium oxide, as it's the straightforward combination of the two constituent ions. Other options represent different compounds with distinct compositions, which is why they are not suitable. For instance, potassium sulfate contains a sulfate ion (SO4^2-), potassium hydroxide includes hydroxide (OH^-), and potassium carbonate has the carbonate ion (CO3^2-). Each of these has a different combination of elements and ions, leading to their respective names that do not apply to K2O.

2. What is the systematic name for HF?

A. Hydrofluoric acid

B. Fluorine acid

C. Hydrofluorate

D. Fluoronic acid

The systematic name for HF is hydrofluoric acid, which is derived from the rules of naming acids. When naming binary acids, which consist of hydrogen and a nonmetal, the prefix "hydro-" is added in front of the name of the nonmetal. In this case, the nonmetal is fluorine, and when it forms an acid with hydrogen, it becomes hydrofluoric acid. The naming convention dictates that the suffix "ic" is also added to the nonmetal's root name when it is part of an acid formed from a binary compound. Thus, HF, being a binary acid, is systematically named hydrofluoric acid. This name accurately reflects the composition of the compound and adheres to the established rules of chemical nomenclature for acids.

3. What is the chemical formula for ammonium phosphate?

A. (NH4)2PO4

B. (NH4)3PO4

C. (NH4)4PO4

D. (NH4)(PO4)2

The correct chemical formula for ammonium phosphate is given as (NH4)3PO4. This formula is derived from the components of the compound: ammonium, which has the formula NH4+, and the phosphate ion, which is PO4^3-. To achieve charge neutrality in the compound, the number of ammonium ions must balance the charge of the phosphate ion. Since each ammonium has a +1 charge and phosphate has a -3 charge, three ammonium ions will provide a total charge of +3, which balances the -3 charge of one phosphate ion. Thus, the correct combination is three ammonium ions combined with one phosphate ion, leading to the formula (NH4)3PO4. Understanding the importance of oxidation states and charge balance is key in determining correct formulas in ionic compounds like this, which helps in correctly identifying the formula of ammonium phosphate as (NH4)3PO4.

4. What is the common name for the compound CO?

A. Carbon dioxide

B. Carbon monoxide

C. Carbon tetrafluoride

D. Carbon disulfide

The compound CO is known commonly as carbon monoxide. This name derives from its molecular composition, consisting of one carbon atom bonded to one oxygen atom. The prefix "mono-" indicates the presence of one of that particular element in the formula, which is crucial for distinguishing it from other carbon-oxygen compounds. In contrast, carbon dioxide (another common compound) is represented by the formula CO_2, indicating two oxygen atoms are bonded to one carbon atom, thus giving it a different molecular structure and properties. Carbon tetrafluoride and carbon disulfide refer to entirely different compounds with differing atoms and ratios, which is why they do not match the given formula CO. Understanding these distinctions in nomenclature is essential for correctly identifying and naming chemical compounds.

5. What is the name of the compound with the formula P4O10?

A. Tetraphosphorus decoxide

B. Diphosphorus trioxide

C. Phosphorus pentoxide

D. Boron trifluoride

The compound with the formula P4O10 is named tetraphosphorus decoxide. This name is derived from the molecular formula, which indicates that there are four phosphorus atoms and ten oxygen atoms present in the molecule. In nomenclature, the "tetra-" prefix signifies four phosphorus atoms, while "deca-" refers to ten oxygen atoms. The term "oxide" is used as a standard nomenclature for compounds formed from oxygen and another element. Naming conventions for molecular compounds, especially those that are covalently bonded, involve using Greek prefixes to indicate the number of each type of atom in the formula. This systematic approach helps convey the structure of the compound and allows chemists to easily identify its composition based on the name. In this case, the correct name accurately reflects both the molecular composition and the applicable naming rules, confirming the choice of tetraphosphorus decoxide as the right answer.

6. What is the chemical formula of calcium iodide once more?

A. CaI2

B. CaI3

C. Ca2I

D. CaI

The correct answer is calcium iodide is represented by the formula CaI2 because of the need to balance the charges between calcium (Ca) and iodine (I). Calcium is an alkaline earth metal that typically has a +2 charge when it forms ions. Iodine, on the other hand, is a halogen and typically has a -1 charge. To create a neutral compound, two iodide ions are required to balance the +2 charge from one calcium ion. This means you need two iodide (I-) ions to surround one calcium ion (Ca2+), resulting in the formula CaI2. This formula indicates that one calcium ion is combined with two iodide ions, satisfying the requirement for charge neutrality in the compound. This process of determining the chemical formula through charge balancing is crucial in chemistry, as it not only reflects the ratio of the elements present but also ensures that the final compound is stable.

7. What is the formula for mercury(I) nitrite?

A. Hg(NO2)

B. Hg(NO2)2

C. Hg2(NO2)2

D. Hg2N2O4

The correct formula for mercury(I) nitrite is represented by Hg2(NO2)2. This compound contains mercury in the +1 oxidation state, which is often indicated as mercury(I). Mercury(I) exists as a dimer, which means that it forms pairs of mercury atoms. In this case, two mercury atoms are linked together, indicated by the use of the Hg2 notation. Each mercury(I) ion is +1 charged, resulting in a total charge of +2 from the two mercury atoms when they form the dimer. The nitrite ion (NO2) has a -1 charge. Therefore, to balance the +2 charge from the dimerized mercury, two nitrite ions are required, thus giving the full formula of Hg2(NO2)2. This shows that both nitrite ions contribute -1 charge each, perfectly countering the +2 charge from the paired mercury ions. In this context, other options do not fit for various reasons. For instance, Hg(NO2) denotes a single mercury ion paired with one nitrite ion, which would imply that the mercury is in a +2 state and does not adhere to the +1 state of mercury(I). Similarly, Hg(NO2)2 suggests

8. What is the chemical name for HNO2?

A. Nitric acid

B. Nitrous acid

C. Hydrochloric acid

D. Acetic acid

The chemical name for HNO2 is nitrous acid. This compound is an oxyacid that contains nitrogen in a lower oxidation state compared to its counterpart, nitric acid (HNO3), which is a more oxidized form. The nomenclature for such acids is based on the suffixes used to identify their oxidation states: acids formed from anions ending in "-ite," like nitrite (NO_2^-), are named with the suffix "-ous," hence HNO2 is named nitrous acid. In contrast, nitric acid, the option listed as "A," corresponds to HNO3, where the nitrogen is in a higher oxidation state, signified by the suffix "-ic." The names in options "C" and "D," hydrochloric acid and acetic acid, refer to totally different compounds: hydrochloric acid is HCl, while acetic acid is CH3COOH. These distinctions in nomenclature and oxidation states are key for correctly identifying the chemical names of acids.

9. What is the chemical name for N2O5?

A. Dinitrogen pentoxide

B. Dinitrogen tetroxide

C. Trinitrogen pentoxide

D. Dinitrogen oxalate

Dinitrogen pentoxide is the correct name for N2O5. This compound is made up of two nitrogen (N) atoms and five oxygen (O) atoms. In chemical nomenclature, the prefix "di-" is used to indicate the presence of two nitrogen atoms, while "penta-" signifies the five oxygen atoms. Therefore, the systematic name accurately reflects the number of each atom present in the molecular formula. For example, the prefix "di-" corresponds to the two nitrogen atoms, and "pent-" corresponds to the five oxygen atoms. The ending "-oxide" is standard for oxides of elements, which includes compounds formed with oxygen. This approach to naming ensures clarity and uniformity when communicating compound structures in chemistry. Other options do not correctly represent the composition of N2O5. Dinitrogen tetroxide would imply four oxygen atoms instead of five. Trinitrogen pentoxide suggests three nitrogen atoms, which is incorrect. Dinitrogen oxalate refers to a different compound entirely, leading to confusion with its specific functional group associated with oxalic acid. Thus, the name Dinitrogen pentoxide accurately describes the chemical formula and composition of the substance in question.

10. What is the correct formula for mercury(II) phosphate?

A. HgPO4

B. Hg2(PO4)2

C. Hg3(PO4)2

D. Hg(PO4)3

The correct formula for mercury(II) phosphate is represented as Hg3(PO4)2. This is derived from understanding the charge of mercury and the phosphate ion. Mercury(II) indicates that mercury has a +2 oxidation state. The phosphate ion (PO4) has a -3 charge. To balance the charges, we need three mercury ions to provide a total charge of +6 (3 × +2) and two phosphate ions, which contribute a total charge of -6 (2 × -3). This results in a neutral compound, satisfying the requirement for a stable ionic compound. Thus, the formula Hg3(PO4)2 accurately represents the composition of mercury(II) phosphate, with three mercury atoms and two phosphate groups.