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CHEMICAL NAMES AND FORMULAS

Vocabulary Review

Match the correct vocabulary term to each numbered statement. Write the letter of the correct term on the line.

Column A

Column B

- B 1. compounds that contain one or more hydrogen atoms and produce hydrogen ions in solution
- C 2. an ionic compound that produces hydroxide ions when dissolved in water
- G 3. any atom or group of atoms that has a positive charge
- D 4. compounds composed of metal cations and nonmetal anions
- E 5. composed of two elements and can be either ionic or molecular
- F 6. an ion consisting of a single atom with a positive or negative charge
- H 7. a tightly bound group of atoms that behaves as a unit and carries a charge
- A 8. any atom or group of atoms that has a negative charge

- a. anion
- b. acids
- c. base
- d. ionic compounds
- e. binary compound
- f. monatomic ion
- g. cation
- h. polyatomic ion

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CHEMICAL NAMES AND FORMULAS

Practice Problems

SECTION 9.1 NAMING IONS

- What is the charge on the ion typically formed by each element?

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|-----------------|-------------------|-----------------------------------|
| a. oxygen 2^- | c. sodium 1^+ | e. nickel, 2 electrons lost 2^+ |
| b. iodine 1^- | d. aluminum 3^+ | f. magnesium 2^+ |
- How many electrons does the neutral atom gain or lose when each ion forms?

| | | |
|---------------------|---------------------|--------------------|
| a. Cr^{3+} lose 3 | c. Li^+ lose 1 | e. Cl^- gain 1 |
| b. P^{3-} gain 3 | d. Ca^{2+} lose 2 | f. O^{2-} gain 2 |
- Identify each as a cation or an anion.

| | | |
|---------------------|-----------------|---------------------|
| a. Sn^{2+} cation | c. Br^- anion | e. H^- anion |
| b. Co^{3+} cation | d. K^+ cation | f. Mn^{2+} cation |
- Write the formula (including charge) for each ion. Use Table 9.3 if necessary.

| | | |
|------------------------------|----------------------------|------------------------------|
| a. carbonate ion CO_3^{2-} | c. sulfate ion SO_4^{2-} | e. chromate ion CrO_4^{2-} |
| b. nitrite ion NO_2^- | d. hydroxide ion OH^- | f. ammonium ion NH_4^+ |
- Name the following ions. Identify each as a cation or an anion.

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|------------------------------|------------------------------|----------------------------|
| a. CN^- cyanide (A) | c. PO_4^{3-} phosphate (A) | e. Ca^{2+} Calcium (C) |
| b. HCO_3^- bicarbonate (A) | d. Cl^- chloride (A) | f. SO_3^{2-} sulfite (A) |

SECTION 9.2 NAMING AND WRITING FORMULAS FOR IONIC COMPOUNDS

- Write the formulas for these binary ionic compounds:

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|-----------------------------|-------------------------------|----------------------------|
| a. magnesium oxide MgO | c. potassium iodide KI | e. sodium sulfide Na_2S |
| b. tin(II) fluoride SnF_2 | d. aluminum chloride $AlCl_3$ | f. ferric bromide $FeBr_3$ |
- Write the formulas for the compounds formed from these pairs of ions.

| | | |
|--------------------------------|-------------------------------|-----------------------------------|
| a. Ba^{2+} , Cl^- $BaCl_2$ | c. Ca^{2+} , S^{2-} CaS | e. Al^{3+} , O^{2-} Al_2O_3 |
| b. Ag^+ , I^- AgI | d. K^+ , Br^- KBr | f. Fe^{2+} , O^{2-} FeO |
- Name the following binary ionic compounds.

| | | | | | | | |
|--------------------------------|----------------------------|------------------------------|-------------------------------|---------------------------------|-----------------------------|---------------------------------|------------------------------|
| a. MnO_2 Manganese(II) oxide | b. Li_3N Lithium nitride | c. $CaCl_2$ calcium chloride | d. $SrBr_2$ strontium bromide | e. $NiCl_2$ Nickel(II) chloride | f. K_2S potassium sulfide | g. $CuCl_2$ Copper(II) chloride | h. $SnCl_4$ Tin(IV) chloride |
|--------------------------------|----------------------------|------------------------------|-------------------------------|---------------------------------|-----------------------------|---------------------------------|------------------------------|
- Write formulas for the following ionic compounds.

| | | | |
|--------------------------------|-------------------------------|----------------------------|----------------------------|
| a. sodium phosphate Na_3PO_4 | b. magnesium sulfate $MgSO_4$ | c. sodium hydroxide $NaOH$ | d. potassium cyanide KCN |
|--------------------------------|-------------------------------|----------------------------|----------------------------|
- Write formulas for compounds formed from these pairs of ions.

| | | | |
|--|-----------------------------|--|---|
| a. NH_4^+ , SO_4^{2-} $(NH_4)_2SO_4$ | b. K^+ , NO_3^- KNO_3 | c. barium ion and hydroxide ion $Ba(OH)_2$ | d. lithium ion and carbonate ion Li_2CO_3 |
|--|-----------------------------|--|---|
- Name the following compounds.

| | | | | | |
|--------------------------|--------------------------------|------------------------------|----------------------------------|------------------------------------|-----------------------------|
| a. $NaCN$ Sodium cyanide | b. $FeCl_3$ Iron(III) chloride | c. Na_2SO_4 sodium sulfate | d. K_2CO_3 potassium carbonate | e. $Cu(OH)_2$ Copper(II) hydroxide | f. $LiNO_3$ Lithium nitrate |
|--------------------------|--------------------------------|------------------------------|----------------------------------|------------------------------------|-----------------------------|

SECTION 9.3 NAMING AND WRITING FORMULAS FOR MOLECULAR COMPOUNDS

1. Name the following molecular compounds.
- a. PCl_5 phosphorous pentachloride
 b. CCl_4 carbon tetrachloride
 c. NO_2 nitrogen dioxide
 d. N_2F_2 dinitrogen difluoride
 e. P_4O_6 tetraphosphorous hexoxide
 f. XeF_2 xenon difluoride
 g. SiO_2 silicon dioxide
 h. Cl_2O_7 dichlorine heptoxide
2. Write the formulas for the following binary molecular compounds.
- a. nitrogen tribromide NBr_3
 b. dichlorine monoxide Cl_2O
 c. sulfur dioxide SO_2
 d. dinitrogen tetrafluoride N_2F_4

SECTION 9.5 THE LAWS GOVERNING FORMULAS AND NAMES

1. Write the formulas for these compounds.
- a. potassium sulfide K_2S
 b. tin(IV) chloride SnCl_4
 c. hydrosulfuric acid H_2S
 d. calcium oxide CaO
 e. hydrobromic acid HBr
 f. aluminum fluoride AlF_3
 g. dinitrogen pentoxide N_2O_5
 h. iron(III) carbonate $\text{Fe}_2(\text{CO}_3)_3$
 i. sulfur hexafluoride SF_6
 j. magnesium chloride MgCl_2
 k. phosphoric acid H_3PO_4
 l. nitric acid HNO_3

2. Name the following compounds.

a. K_3PO_4 Potassium phosphate
 b. $\text{Al}(\text{OH})_3$ Aluminium hydroxide
 c. NaHSO_4 Sodium bisulfate
 d. HgO Mercury(II) oxide
 e. N_2O_5 Dinitrogen pentoxide
 f. NBr_3 Nitrogen tribromide
 g. PI_3 Phosphorous triiodide
 h. $(\text{NH}_4)_2\text{SO}_4$ Ammonium sulfate

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