CHAPTER 7 REVIEW

Chemical Formulas and Chemical Compounds

MIXED REVIEW

SHORT ANSWER   Answer the following questions in the space provided.

1. Write formulas for the following compounds:

_____ **a.** copper(II) carbonate

_____ **b.** sodium sulfite

_____ **c.** ammonium phosphate

_____ **d.** tin(IV) sulfide

_____ **e.** nitrous acid

2. Write the Stock system names for the following compounds:

_____ **a.** $Mg(ClO_4)_2$

_____ **b.** $Fe(NO_3)_2$

_____ **c.** $Fe(NO_2)_3$

_____ **d.** CoO

_____ **e.** dinitrogen pentoxide

3. _____ **a.** How many atoms are represented by the formula $Ca(HSO_4)_2$?

_____ **b.** How many moles of oxygen atoms are in a 0.50 mol sample of this compound?

_____ **c.** Assign the oxidation number to sulfur in the HSO_4^- anion.

4. Assign the oxidation number to the element specified in each of the following:

_____ **a.** hydrogen in H_2O_2

_____ **b.** hydrogen in MgH_2

_____ **c.** sulfur in S_8

_____ **d.** carbon in $(CO_3)^{2-}$

_____ **e.** chromium in $Na_2Cr_2O_7$

_____ **f.** nitrogen in NO_2

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MIXED REVIEW continued

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

5. _____ Following are samples of four different compounds. Arrange them in order of increasing mass, from smallest to largest.

a. 25 g of oxygen gas   **c.** 3×10^{23} molecules of C_2H_6
b. 1.00 mol of H_2O **d.** 2×10^{23} molecules of $C_2H_6O_2$

6. _____ **a.** What is the formula for sodium hydroxide?

_____ **b.** What is the formula mass of sodium hydroxide?

_____ **c.** What is the mass in grams of 0.25 mol of sodium hydroxide?

7. _____ What is the percentage composition of ethane gas, C_2H_6, to the nearest whole number?

8. _____ Ribose is an important sugar (part of RNA),with a molar mass of 150.15 g/mol. If its empirical formula is CH_2O, what is its molecular formula?

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9. Butane gas, C_4H_{10}, is often used as a fuel.

_____ **a.** What is the mass in grams of 3.00 mol of butane?

_____ **b.** How many molecules are present in that 3.00 mol sample?

_____ **c.** What is the empirical formula of the gas?

10. _____ Naphthalene is a soft covalent solid that is often used in mothballs. Its molar mass is 128.18 g/mol and it contains 93.75% carbon and 6.25% hydrogen. Determine the molecular formula of napthalene from this information.

11. Nicotine has the formula $C_xH_yN_z$. To determine its composition, a sample is burned in excess oxygen, producing the following results:

1.0 mol of CO_2
0.70 mol of H_2O
0.20 mol of NO_2

Assume that all the atoms in nicotine are present as products.

_____ **a.** Determine the number of moles of carbon present in the products of this combustion.

_____ **b.** Determine the number of moles of hydrogen present in the combustion products.

_____ **c.** Determine the number of moles of nitrogen present in the combustion products.

_____ **d.** Determine the empirical formula of nicotine based on your calculations.

_____ **e.** In a separate experiment, the molar mass of nicotine is found to be somewhere between 150 and 180 g/mol. Calculate the molar mass of nicotine to the nearest gram.

12. When $MgCO_3(s)$ is strongly heated, it produces solid MgO as gaseous CO_2 is driven off.

_____ **a.** What is the percentage loss in mass as this reaction occurs?

_____ **b.** Assign the oxidation number to each atom in $MgCO_3$.

_____ **c.** Does the oxidation number of carbon change upon the formation of CO_2?

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SHORT ANSWER Answer the following questions in the space provided.

1. Write formulas for the following compounds:

     _____**CuCO₃**_____ **a.** copper(II) carbonate

     _____**Na₂SO₃**_____ **b.** sodium sulfite

     _____**(NH₄)₃PO₄**_____ **c.** ammonium phosphate

     _____**SnS₂**_____ **d.** tin(IV) sulfide

     _____**HNO₂**_____ **e.** nitrous acid

2. Write the Stock system names for the following compounds:

     _____**magnesium perchlorate**_____ **a.** $Mg(ClO_4)_2$

     _____**iron(II) nitrate**_____ **b.** $Fe(NO_3)_2$

     _____**iron(III) nitrite**_____ **c.** $Fe(NO_2)_3$

     _____**cobalt(II) oxide**_____ **d.** CoO

     _____**nitrogen(V) oxide**_____ **e.** dinitrogen pentoxide

3. _____**13 atoms**_____ **a.** How many atoms are represented by the formula $Ca(HSO_4)_2$?

     _____**4.0 mol**_____ **b.** How many moles of oxygen atoms are in a 0.50 mol sample of this compound?

     _____**+6**_____ **c.** Assign the oxidation number to sulfur in the HSO_4^- anion.

4. Assign the oxidation number to the element specified in each of the following:

     _**+1**_ **a.** hydrogen in H_2O_2

     _**−1**_ **b.** hydrogen in MgH_2

     _**0**_ **c.** sulfur in S_8

     _**+4**_ **d.** carbon in $(CO_3)^{2-}$

     _**+6**_ **e.** chromium in $Na_2Cr_2O_7$

     _**+4**_ **f.** nitrogen in NO_2

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MIXED REVIEW continued

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

5. _____**c, b, d, a**_____ Following are samples of four different compounds. Arrange them in order of increasing mass, from smallest to largest.

        a. 25 g of oxygen gas   **c.** 3×10^{23} molecules of C_2H_6
        b. 1.00 mol of H_2O **d.** 2×10^{23} molecules of $C_2H_6O_2$

6. _____**NaOH**_____ **a.** What is the formula for sodium hydroxide?

    _____**40.00 g/mol**_____ **b.** What is the formula mass of sodium hydroxide?

    _____**10. g**_____ **c.** What is the mass in grams of 0.25 mol of sodium hydroxide?

7. _____**80% C, 20% H**_____ What is the percentage composition of ethane gas, C_2H_6, to the nearest whole number?

8. _____**$C_5H_{10}O_5$**_____ Ribose is an important sugar (part of RNA),with a molar mass of 150.15 g/mol. If its empirical formula is CH_2O, what is its molecular formula?

Name _____ Date _____ Class _____

9. Butane gas, C_4H_{10}, is often used as a fuel.

_____**174 g**_____ **a.** What is the mass in grams of 3.00 mol of butane?

___**1.81×10^{24} molecules**___ **b.** How many molecules are present in that 3.00 mol sample?

_____**C_2H_5**_____ **c.** What is the empirical formula of the gas?

10. _____**$C_{10}H_8$**_____ Naphthalene is a soft covalent solid that is often used in mothballs. Its molar mass is 128.18 g/mol and it contains 93.75% carbon and 6.25% hydrogen. Determine the molecular formula of napthalene from this information.

11. Nicotine has the formula $C_xH_yN_z$. To determine its composition, a sample is burned in excess oxygen, producing the following results:

1.0 mol of CO_2
0.70 mol of H_2O
0.20 mol of NO_2

Assume that all the atoms in nicotine are present as products.

_____**1.0 mol**_____ **a.** Determine the number of moles of carbon present in the products of this combustion.

_____1.40 mol_____   **b.** Determine the number of moles of hydrogen present in the combustion products.

_____0.20 mol_____   **c.** Determine the number of moles of nitrogen present in the combustion products.

_____C_5H_7N_____   **d.** Determine the empirical formula of nicotine based on your calculations.

_____162 g/mol_____   **e.** In a separate experiment, the molar mass of nicotine is found to be somewhere between 150 and 180 g/mol. Calculate the molar mass of nicotine to the nearest gram.

12. When $MgCO_3(s)$ is strongly heated, it produces solid MgO as gaseous CO_2 is driven off.

_____52.2%_____   **a.** What is the percentage loss in mass as this reaction occurs?

__Mg is +2, C is +4, and O is −2__   **b.** Assign the oxidation number to each atom in $MgCO_3$.

_____No_____   **c.** Does the oxidation number of carbon change upon the formation of CO_2?