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1. What is the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

2. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?

4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?

Write the molecular formulas of the following compounds:

5. A compound with an empirical formula of C_2OH_4 and a molar mass of 88 grams per mole.

6. A compound with an empirical formula of C_4H_4O and a molar mass of 136 grams per mole.

7. A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole.

8. A compound with an empirical formula of C_2H_8N and a molar mass of 46 grams per mole.

Answer the following questions:

9. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid.

10. The molar mass for question #9 was determined by experiment to be 60.0 g/mol. What is the molecular formula?

11. Aniline, a starting material for urethane plastic foams, consists of C, H, and N. Combustion of such compounds yields CO_2, H_2O, and N_2 as products. If the combustion of 9.71 g of aniline yields 6.63 g H_2O and 1.46 g N_2, what is its empirical formula?

12. The molar mass of aniline is 93 g/mol. What is its molecular formula?

13. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide, C_2H_5NO.

14. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound?

15. When 2.5000 g of an oxide of mercury, (Hg_xO_y) is decomposed into the elements by heating, 2.405 g of mercury are produced. Calculate the empirical formula.

16. The compound benzamide has the following percent composition. What is the empirical formula?
    C = 69.40 % H= 5.825 % O = 13.21 % N= 11.57 %

17. A component of protein called serine has an approximate molar mass of 100 g/mole. If the percent composition is as follows, what is the empirical and molecular formula of serine?

    C = 34.95 % H= 6.844 % O = 46.56 % N= 13.59 %

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1. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen? C_3H_3O mass = 55 g/mole
2. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula? $C_6H_6O_2$
3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen? Li_2CO_3
4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula? Li_2CO_3

Write the molecular formulas of the following compounds:

5. A compound with an empirical formula of C_2OH_4 and a molar mass of 88 grams per mole. $C_4O_2H_8$
6. A compound with an empirical formula of C_4H_4O and a molar mass of 136 grams per mole. $C_8H_8O_2$
7. A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole. $C_2F_2Br_2O_2$
8. A compound with an empirical formula of C_2H_8N and a molar mass of 46 grams per mole. C_2H_8N

Answer the following questions:

9. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid. CH_2O
10. The molar mass for question #9 was determined by experiment to be 60.0 g/mol. What is the molecular formula? $C_2H_4O_2$
11. Aniline, a starting material for urethane plastic foams, consists of C, H, and N. Combustion of such compounds yields CO_2, H_2O, and N_2 as products. If the combustion of 9.71 g of aniline yields 6.63 g H_2O and 1.46 g N_2, what is its empirical formula? C_6H_7N
12. The molar mass of aniline is 93 g/mol. What is its molecular formula? C_6H_7N
13. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide, C_2H_5NO. **%C 40.668 %H 8.533 %N 23.713 %O 27.086**
14. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound? PCl_3
15. When 2.5000 g of an oxide of mercury, (Hg_xO_y) is decomposed into the elements by heating, 2.405 g of mercury are produced. Calculate the empirical formula. Hg_2O
16. The compound benzamide has the following percent composition. What is the empirical formula?
    C = 69.40 % H= 5.825 % O = 13.21 % N= 11.57 % C_7H_7NO
17. A component of protein called serine has an approximate molar mass of 100 g/mole. If the percent composition is as follows, what is the empirical and molecular formula of serine?

    C = 34.95 % H= 6.844 % O = 46.56 % N= 13.59 %

    $C_3H_7NO_3$ empirical formula
    $C_3H_7NO_3$ molecular formula

Molecular Formula Worksheet ANSWER KEY

Write the molecular formulas of the following compounds:

1) A compound with an empirical formula of C_2OH_4 and a molar mass of 88 grams per mole. **$C_4O_2H_8$**

2) A compound with an empirical formula of C_4H_4O and a molar mass of 136 grams per mole. **$C_8H_8O_2$**

3) A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole. **$C_2F_2Br_2O_2$**

4) A compound with an empirical formula of C_2H_8N and a molar mass of 46 grams per mole. **C_2H_8N**

Percent Composition and Molecular Formula Worksheet Solutions

1) What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

C_3H_3O

2) If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

$C_6H_6O_2$

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3) What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?

Li_2CO_3

4) If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?

Li_2CO_3 (In this case, the molecular and empirical formulas are the same, a frequent occurrence for inorganic compounds)

9. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid.

10. (CH2O) The molar mass was determined by experiment to be 60.0 g/mol. What is the molecular formula? (C2H4O2)

7. Aniline, a starting material for urethane plastic foams, consists of C, H, and N. Combustion of such compounds yields CO2, H2O, and N2 as products. If the combustion of 9.71 g of aniline yields 6.63 g H2O and 1.46 g N2, what is its empirical formula? (C6H7N) The molar mass of aniline is 93 g/mol. What is its molecular formula? (C6H7N)

Chapter 3: Worksheet #1 Mass Relationships

1. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide, C_2H_5NO.

%C 40.668 %H 8.533 %N 23.713 %O 27.086

2. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound?

PCl_3

3. When 2.5000 g of an oxide of mercury, (Hg_xO_y) is decomposed into the elements by heating, 2.405 g of mercury are produced. Calculate the empirical formula.

Hg_2O

4. The compound benzamide has the following percent composition. What is the empirical formula?

C = 69.40 % H= 5.825 % O = 13.21 % N= 11.57 %

C_7H_7NO

5. A component of protein called serine has an approximate molar mass of 100 g/mole. If the percent composition is as follows, what is the empirical and molecular formula of serine?

C = 34.95 % H= 6.844 % O = 46.56 % N= 13.59 %

$C_3H_7NO_3$ empirical formula

$C_3H_7NO_3$ molecular formula

6. Balance the following equations:

2 $NaCl(aq) + Ba(NO_3)_2(aq)$ **2** $NaNO_3(aq) + BaCl_2(aq)$

$Na_3PO_4(aq)$ + **3** $AgNO_3(aq)$ **3** $NaNO_3(aq) + Ag_3PO_4(s)$

$K_2SO_4(aq) + BaCl_2(aq)$ $BaSO_4(s)$ + **2** $KCl(aq)$

2 $HCl(aq) + Ca(OH)_2(aq)$ **2** $H_2O(l) + CaCl_2(aq)$

2 $Na(s) + S(s)$ $Na_2S(s)$

2 $C_2H_6(g)$ + **7** $O_2(g)$ **4** $CO_2(g)$ + **6** $H_2O(l)$

2 $Li(s)$ + **2** $H_2O(l)$ **2** $LiOH\ (s) + H_2(g)$

$Mg(s) + CuCl_2(aq)$ $MgCl_2(aq) + Cu(s)$

2 $HgO(s)$ **2** $Hg(l) + O_2(g)$
4 $FeO(s) + O_2(g)$ **2** $Fe_2O_3(s)$
$Ca(HSO_3)_2(s)$ $CaO(s) + H_2O(l) +$ **2** $SO_2(g)$
2 $Fe(s) +$ **3** $Br_2(l)$ **2** $FeBr_3(s)$
$CH_3CH_2OH(l) +$ **3** O_2 **2** $CO_2(g) +$ **3** $H_2O(l)$