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Workshop 9 – Mole Conversions

Show calculation setups and answers for all problems below. Use scientific notation for very large or very small numbers.

1. Find the molar mass of (a) carbonic acid, H_2CO_3; (b) aluminum sulfate, $Al_2(SO_4)_3$; and (c) ammonium dichromate, $(NH_4)_2Cr_2O_7$.

   (a) _____

   (b) _____

   (c) _____

2. A sample of nickel(II) phosphate, $Ni_3(PO_4)_2$, weighs 114 g. How many moles are in this sample?

   _____

3. What is the mass (in kg) of 35.6 moles of methane gas, CH_4?

   _____

4. Calculate the molecules of copper(II) nitrite, $Cu(NO_2)_2$, in 0.92 mol $Cu(NO_2)_2$.

   _____

5. How many molecules of water, H_2O, are present in 28.4 g of H_2O?

   _____

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6. Find the weight (in mg) of one atom of gold, Au.

_____

7. Determine the weight (in g) of nitrogen atoms in 6.14×10^{30} molecules of dinitrogen tetroxide, N_2O_4.

_____

8. Calculate the percent composition by mass of aluminum hydroxide, $Al(OH)_3$.

Al _____

O _____

H _____

9. Caffeine, a compound found in coffee, tea, and cola drinks is found to contain 49.47% C, 5.19% H, 28.86% N, and 16.48% O by mass. Its experimentally determined molar mass is 194 g/mol. What is the empirical formula of caffeine? What is its molecular formula?

Empirical _____

Molecular _____

10. How many mL of liquid mercury (Hg) with a density of 13.6 g/mL must you dispense to have 1.56×10^{-3} mol?

_____