

Mole Conversions and Percent Composition

Show all work; observe all significant figures, and record units with all answers.

- One (1) mole of anything contains _____ particles.
- One (1) mole of any gas at STP occupies _____ liters.
- Determine the molar mass of each of the following substances. Round to the tenths place.
 - 1 mol Cu = _____ g.
 - 1 mol Al = _____ g.
 - 1 mol Zn = _____ g.
 - 1 mol NaCl = _____ g.
 - 1 mol H₂O = _____ g.
- Show work for each calculation. *Be sure to show unit cancellation.* You may use the mole map to help you set up the calculations.
 - 3.8 mol Cu = _____ atoms Cu
 - 4.9×10^{19} atoms Al = _____ mol Al.
 - 857 g Zn = _____ mol Zn.
 - 4.68 mol NaCl = _____ g NaCl.
 - 6.12×10^{28} molecules H₂O = _____ g H₂O.
 - 5.8 g Cu = _____ atoms Cu.
 - 88 L He at STP = _____ mol He.
 - 4.4×10^{25} atoms Ne = _____ L Ne at STP.

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5. Answer the following questions about carbon dioxide, CO_2 . Show your work, and round answers to the ones place.
 - a. Determine the molar mass of carbon dioxide.
 - b. Determine the % by mass of carbon in carbon dioxide.
 - c. Determine the % by mass of oxygen in carbon dioxide.
 - d. How many grams of C are in a sample of 400 g CO_2 ?
 - e. What is the total mass of a sample of CO_2 that contains 85 g O?

6. Answer the following questions about potassium phosphate, K_3PO_4 . Show your work, and round answers to the ones place.
 - a. Determine the molar mass of potassium phosphate, K_3PO_4 .
 - b. Determine the % by mass of potassium in potassium phosphate.
 - c. Determine the % by mass of phosphorus in potassium phosphate.
 - d. Determine the % by mass of oxygen in potassium phosphate.
 - e. How many grams of K are in a sample of 25 g K_3PO_4 ?

7. Answer the following questions about octane, C_8H_{18} . Show your work, and round answers to the ones place.
 - a. Determine the % by mass C and the % by mass H in octane.
 - b. What is the *empirical* formula for octane?
 - c. How is the % composition of the molecular formula related to the % composition of the empirical formula?

8. Determine the empirical formula for a compound made of 75% C and 25% H, by mass.

9. Determine the empirical formula for a compound made of 35.2% P and 64.8% F, by mass.