

The Mole

- Identify and calculate the number of representative particles in each of the following quantities.
 - 2.15 moles of gold
 - 0.151 mole of nitrogen oxide
 - 11.5 moles of potassium bromide
- Calculate the number of moles of the substance that contains the following number of representative particles.
 - 8.92×10^{23} atoms of barium
 - 5.50×10^{25} molecules of carbon monoxide
 - 2.66×10^{22} formula units of potassium iodide
- Determine the mass in grams of each of the following quantities.
 - 1.24 moles of beryllium
 - 3.35 moles of calcium
 - 0.155 mole of sulfur
- Calculate the number of moles in each of the following quantities.
 - 6.35 g lithium
 - 346 g zinc
 - 115 g nickel
- How many atoms are in the following samples?
 - 1.24 g cobalt
 - 0.575 g cesium
 - 65.6 g silicon
- Which quantity has the greatest mass?
 - 4.16×10^{23} atoms of radium
 - 1.50×10^{20} atoms of cadmium
 - 1.33×10^{24} atoms of argon
- Calculate the number of moles in each of the following quantities.
 - atoms of each element in 3.35 moles of aspirin ($C_9H_8O_4$)
 - positive and negative ions in 1.75 moles of calcium fluoride (CaF_2)
- Determine the molar mass of each of the following compounds.
 - formic acid (CH_2O_2)
 - ammonium dichromate ($(NH_4)_2Cr_2O_7$)
- What is the mass in grams of each of the following quantities?
 - 2.53 moles of lead(II) nitrate ($Pb(NO_3)_2$)
 - 4.62 moles of magnesium bromide ($MgBr_2$)
- Calculate the number of moles in each of the following samples.
 - 3.75 g calcium carbide (CaC_2)
 - 245 g aluminum nitrite ($Al(NO_2)_3$)
- Determine the percent composition of each of the following compounds.
 - manganese oxide (MnO)
 - propanol (C_3H_8O)
 - calcium phosphate ($Ca_3(PO_4)_2$)

- 12.** Determine the empirical formula for a 100.00-g sample of a compound having the following percent composition.
- 94.07% sulfur and 5.93% hydrogen
 - 80.68% mercury, 12.87% oxygen, and 6.45% sulfur
- 13.** A 48.30-g sample of an aluminum-iodine compound contains 3.20 g of aluminum. What is the empirical formula for the compound?
- 14.** A 50.00-g sample of hydrated manganese(II) chloride yields 31.75 g of the anhydrous compound after heating. Determine the chemical formula and name of the hydrate.
- 15.** Caffeine is a compound found in some natural coffees and teas and in some colas.
- Determine the empirical formula for caffeine, using the following composition of a 100.00-g sample.
49.47 grams of carbon, 28.85 grams of nitrogen, 16.48 grams of oxygen, and 5.20 grams of hydrogen
 - If the molar mass of caffeine is 194.19 g/mol, calculate its molecular formula.