Mole Practice Sheet Key

1. Calculate the mass of 2.99 moles of gold (Au)

$$?g Au=2.99 mol Au×\frac{196.97 g Au}{1 mol Au}=5.89 ×10^{2} g Au or 589 g Au$$

1. Calculate the number of atoms of gold in 5.31 moles of gold.

$$?atoms Au=5.31 mol Au×\frac{6.022×10^{23}atom Au}{1 mol Au}=3.20×10^{24}atom Au$$

1. Calculate the molar mass of benzaldehyde (C7H6O)

$$molar mass=7\left({12.01 g}/{mol}\right)+6\left({1.008 g }/{mol}\right)+1\left({16.00 g}/{mol}\right)$$

$$=84.07+6.048+16.00$$

$$={106.12 g}/{mol}$$

1. Calculate the number of moles of benzaldehyde in 76.1 grams of benzaldehyde.

$$?mol C\_{7}H\_{6}O=76.1 g C\_{7}H\_{6}O×\frac{1 mol C\_{7}H\_{6}O}{106.1 g C\_{7}H\_{6}O}=0.717 mol C\_{7}H\_{6}O$$

1. Calculate the number of atoms of carbon in 6.00 g of benzaldehyde.

$$?atoms C=6.00 g C\_{7}H\_{6}O×\frac{1 mol C\_{7}H\_{6}O}{106.1 g C\_{7}H\_{6}O}×\frac{7 mol C}{1 mol C\_{7}H\_{6}O}×\frac{6.022×10^{23}atom C}{1 mol C}=2.39×10^{23}atom C$$

or

$$?atoms C=6.00 g C\_{7}H\_{6}O×\frac{1 mol C\_{7}H\_{6}O}{106.1 g C\_{7}H\_{6}O}×\frac{6.022×10^{23}mol C}{1 mol C\_{7}H\_{6}O}×\frac{7 atom C}{1 molecule C\_{7}H\_{6}O}=2.39×10^{23}atom C$$

1. Determine the empirical formula of methyl butyrate, the flavor of apples. It is composed of 58.80% C, 9.87% H, and 31.33% O.

$$58.80 g C×\frac{1 mol C}{12.01 g C}=4.90 mol C$$

$$9.87 g H×\frac{1 mol H}{1.008 g H}=9.79 mol H$$

$$31.33 g O×\frac{1 mol O}{16.00 g O}=1.96 mol O$$

$$C\_{\frac{4.90}{1.96}}H\_{\frac{9.79}{1.96}}O\_{\frac{1.96}{1.96}}$$

$$C\_{2.50}H\_{5}O\_{1}\rightarrow C\_{5}H\_{10}O\_{2}$$

1. A compound has an empirical formula of C6H7N and a molar mass of 570.8.5 g/mol. What is the molecular formula of the compound?

Molar mass of C6H7N = 6(12) + 7(1) + 16 = 95 g/mol

 There are 570/95 or 6 units of this in the compound

Molecular formula = C36H42N6