Moles & particles — Practice Worksheet

Six multistep problems · built to pair with the IntoChemistry Problem-Solving Studio

Name: _____ Date: _____

Instructions: Show your dimensional-analysis setup and units. Round your final result to an appropriate number of significant figures. For particles, use 6.022×10^{23} mol^{-1}.

1. Water molecules

A sample contains 36.04 g of H_2O. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of H_2O using atomic masses supplied in the reference strip.

b. How many moles are present in 36.04 g of H_2O?

c. How many molecules are in this sample?

2. Carbon dioxide molecules

A sample contains 22.00 g of CO_2. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of CO_2 using atomic masses supplied in the reference strip.

b. How many moles are present in 22.00 g of CO_2?

c. How many molecules are in this sample?

3. Sodium chloride formula units

A sample contains 5.844 g of NaCl. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of NaCl using atomic masses supplied in the reference strip.

b. How many moles are present in 5.844 g of NaCl?

c. How many formula units are in this sample?

4. Calcium carbonate formula units

A sample contains 10.009 g of $CaCO_3$. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of $CaCO_3$ using atomic masses supplied in the reference strip.

b. How many moles are present in 10.009 g of $CaCO_3$?

c. How many formula units are in this sample?

5. Ammonia molecules

A sample contains 8.520 g of NH_3. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of NH_3 using atomic masses supplied in the reference strip.

b. How many moles are present in 8.520 g of NH_3?

c. How many molecules are in this sample?

6. Glucose molecules

A sample contains 9.009 g of $C_6H_{12}O_6$. Work from atomic masses to amount and then number of particles.

Atomic masses (g/mol): H 1.01 · C 12.01 · N 14.01 · O 16.00 · Na 22.99 · Cl 35.45 · Ca 40.08 · Mg 24.31 · K 39.10 · Fe 55.85; $N_a = 6.022 \times 10^{23}$ mol^{-1}.

a. Calculate the molar mass of $C_6H_{12}O_6$ using atomic masses supplied in the reference strip.

b. How many moles are present in 9.009 g of $C_6H_{12}O_6$?

c. How many molecules are in this sample?