

Calculate the Molar Mass (g/mol) for each of the following:

Ammonium Carbonate

Sulfuric Acid

Sodium Phosphate

Diphosphorus Heptoxide

Copper (II) Nitrite

Calculate the Mass Percent for **each** element in the compound:

Ammonium Carbonate

1. How many moles of oxygen are in 9.85 g of  $(\text{NH}_4)_2\text{CO}_3$ ?
2. How many hydrogen atoms are in 0.546 lb of  $(\text{NH}_4)_2\text{CO}_3$ ?
3. How many grams of nitrogen are in a mass of  $(\text{NH}_4)_2\text{CO}_3$  that contains  $1.23 \times 10^{23}$  carbon atoms?
4. How many grams of  $(\text{NH}_4)_2\text{CO}_3$  are in the previous problem?

Calculate the Mass Percent for **each** element in the compound:

Sodium Phosphate

1. How many atoms of sodium are in 5.55 grams of  $\text{Na}_3\text{PO}_4$ ?
2. How many grams of oxygen are in a mass of  $\text{Na}_3\text{PO}_4$  that contains 3.69 moles of phosphorus?
3. How many grams of phosphorus are in a sodium phosphate molecule?
4. How many oxygen atoms are in 4.75 moles of sodium phosphate?

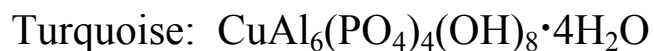
Mass ↔ Moles ↔ Atoms or Molecules

Substance	Mass of Sample	Moles of Sample	Atoms in Sample
Silicon	0.456 lb		
Boron		8.21 mol	
Manganese			$3.97 \times 10^{25}$ atoms
Aluminum	$6.28 \times 10^{-2}$ kg		
Carbon		5.87 mol	
Chlorine			$4.92 \times 10^{22}$ atoms

Substance	Mass of Sample	Moles of Sample	Molecules in Sample
Ammonium Carbonate	5.92 g		
Sulfuric Acid		0.987 mol	
Sodium Phosphate			$2.58 \times 10^{23}$ molecules
Acetic Acid	400 mg		
Diphosphorus Heptoxide		1.46 mol	
Copper (II) Nitrite			$7.55 \times 10^{21}$ molecules

Mass ↔ Moles ↔ Atoms or Molecules....Continued

1. How many moles of Silicon (Si) are in 12.00 grams of Silicon?
2. How many atoms of Gold (Au) are in 25.5 ounces of Gold?
3. How many grams of Iron (Fe) are in a sample of  $99 \times 10^{25}$  Iron atoms?
4. How many atoms of Oxygen (O) are in a 0.146 kilogram sample of Oxygen molecules ( $O_2$ )?
5. How many kilograms of Titanium (Ti) are in a sample of  $5.0 \times 10^{26}$  Titanium (IV) Phosphate molecules?
6. How many atoms of Sodium (Na) are in a 3.870 gram sample of Sodium Oxalate?



- 1) What is the total number of atoms in a 5.00 gram sample of turquoise?
- 2) How many water molecules are there in a sample of turquoise with a mass of 10 grams?
- 3) What mass of turquoise (in milligrams) contains  $3.75 \times 10^{22}$  atoms of oxygen?
- 4) How many phosphate ions are in a sample of turquoise that contains 435 micrograms of hydrogen?
- 5) What is the mass of hydrogen in a sample of turquoise that contains 3.50 milligrams of oxygen(O)?

Acetaminophen:  $C_8H_9O_2N$  is the painkilling ingredient in Tylenol products

- 1) What is the molar mass of acetaminophen?
- 2) How many hydrogen atoms are in 25.00 grams of acetaminophen?
- 3) How many grams of carbon are in 10.55 grams of acetaminophen?
- 4) What is the % composition by mass of carbon and nitrogen in the molecule?
- 5) How many grams of oxygen are in a sample of acetaminophen that contains  $9.64 \times 10^{26}$  carbon atoms?



## Combustion Reactions

Propane,  $C_3H_8$ , is a fuel commonly used for heating in rural areas where natural gas is unavailable.

- 1) Write the balanced equation for the combustion of propane:
- 2) Calculate the mass (in grams) of carbon dioxide that will be produced from the burning of 25.00 grams of propane. \*Assume excess oxygen\*
- 3) Calculate the mass (in grams) of dihydrogen monoxide that will be produced from the burning of 25.00 grams of propane. \*Assume excess oxygen\*
- 4) If 3.75 moles of carbon dioxide were produced (in another combustion of propane reaction), how many oxygen atoms were consumed in the process?