

*Chem 151 Help Session I Handouts*  
**Mole and Molarity**

**Mole**

To count a bottle of glass beads by its mass

1 dozen = 12

1 lb = 454 gram

To count atoms and molecules by their masses

1 mole =  $6.0221 \times 10^{23}$

Knowing the molar mass of atoms/molecules enable us to count the number of atoms/ molecules.

1. How many sucrose molecules ( $C_{12}H_{22}O_{11}$ ) in 5.00 lbs of cane sugar?
2. How many carbon atoms in 5.00 lbs of cane sugar?
3. If 5.00 lbs of cane sugar is burned in air and all the carbon turns into carbon dioxide gas, how many grams of carbon dioxide can be produced from the reaction?
4. When bromine is added to sodium hydroxide solution at elevated temperature, the following reaction takes place.  
$$3 Br_2 + 6 NaOH \rightarrow 5 NaBr + NaBrO_3 + 3 H_2O$$
Calculate the number of grams of sodium bromide and sodium bromate that can be produced by the reaction of 3.00 g bromine and an excess amount of sodium hydroxide.

## Molarity

$$\text{Molarity of } x = \frac{\text{moles of } x}{\text{Volume of solution in L}}$$

$$\text{Moles of } x = M_x V_x$$

5. 5.00 g of  $\text{MgCl}_2$  (MM = 95.25 g/mol) dissolves in water to make 80.0 mL of solution.
- What is the molarity of  $\text{MgCl}_2$  in solution?
  - What is the molarity of  $\text{Cl}^-$  ions in solution?
  - What is the molarity of  $\text{Mg}^{2+}$  ions in solution?
6. 5.00 g of  $\text{MgCl}_2$  and 4.00 g of  $\text{NaCl}$  (MM = 58.44 g/mol) dissolves in water to make 80.0 mL of solution. What is the molarity of  $\text{Cl}^-$  in solution?
7. How many grams of  $\text{NaCl}$  are needed for preparing 600. mL of a 0.250 M solution?
8. Calculate the mass of  $\text{AgCl}$  precipitate (MM = 143.32 g/mol) formed from the reaction of 150 mL of 0.300 M  $\text{AgNO}_3$  solution and an excess amount of  $\text{BaCl}_2$ .
9. Calculate the volume of a 0.200M barium chloride solution required in order to precipitate all the silver ions from 150 mL of 0.300 M  $\text{AgNO}_3$  solution.