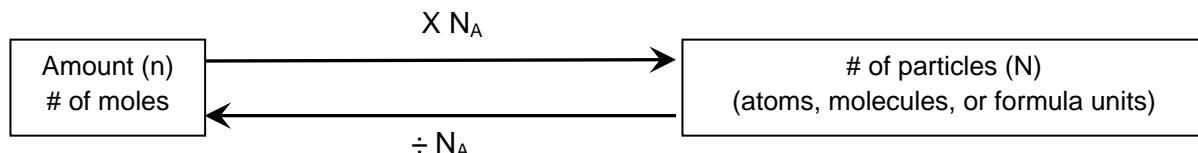


**Avogadro's Constant Problem Set**

Helpful hint:



1. A small pin contains 0.0178 mol of iron. How many atoms of iron are in the pin?
2. A sample contains 0.02 mol of gold. How many atoms of gold are in the sample?
3. A sample of  $\text{Al}_2\text{O}_3$  contains  $7.71 \times 10^{24}$  formula units. How many moles of aluminum oxide are there?
4. How many formula units are contained in 0.21 mol of magnesium nitrate?
5. A vat of cleaning solution contains  $8.03 \times 10^{26}$  molecules of ammonia ( $\text{NH}_3$ ). How many moles of ammonia are in the vat?
6. A litre of water contains 55.6 mol of water. How many molecules of water are in the sample?
7. A typical bottle of nail polish remover contains 2.5 mol of ethyl acetate ( $\text{C}_4\text{H}_8\text{O}_2$ ).
  - a. How many molecules of ethyl acetate are in the bottle?
  - b. How many atoms are in the bottle?
  - c. How many carbon atoms are in the bottle?
8. Consider a 0.829 mol sample of sodium sulfate ( $\text{Na}_2\text{SO}_4$ ).
  - a. How many formula units are in the sample?
  - b. How many sodium ions are in the sample?
9. A sample of cyanic acid HCN, contains  $1.11 \times 10^{22}$  molecules. How many moles of cyanic acid are in the sample?
10. **CHALLENGE QUESTION:** A sample of pure acetic acid,  $\text{CH}_3\text{COOH}$ , contains  $1.40 \times 10^{23}$  carbon atoms.
  - a. How many molecules of acetic acid are there? Hint: think about how many carbon atoms are in each molecule.
  - b. How many moles of acetic acid are there?

**ANSWERS:**

1.  $1.07 \times 10^{22}$  atoms    2.  $1 \times 10^{22}$  atoms    3. 12.8 mol    4.  $1.3 \times 10^{23}$  formula units    5.  $1.33 \times 10^3$  mol  
 6.  $3.35 \times 10^{25}$  molecules    7. a)  $1.5 \times 10^{24}$  molecules    b)  $2.1 \times 10^{25}$  atoms    c)  $6.0 \times 10^{24}$  C atoms  
 8.a)  $4.99 \times 10^{23}$  formula units    b)  $9.98 \times 10^{23}$   $\text{Na}^+$  ions    9. 0.0184 mol    10.a)  $N = 7.00 \times 10^{22}$  molecules    b) 0.116 mol