

Name: Key
Blk: _____ Date: _____

CHEMISTRY 11

Calculating MOLAR MASS

Finding the MOLAR MASS of a compound simply involves using the Periodic Table to look up the mass of every atom involved and then adding the masses together and expressing the answer

1. in grams
2. to the first decimal place.

Example 1. Calculate the MOLAR MASS of $C_{12}H_{22}O_{11}$:

$$\begin{aligned} 12 \text{ C} &= 12(12.0) = 144.0 \\ 22 \text{ H} &= 22(1.0) = 22.0 \\ 11 \text{ O} &= 11(16.0) = 176.0 \end{aligned}$$

$$\boxed{342.0 \text{ g } C_{12}H_{22}O_{11}}$$

Example 2. Calculate the MOLAR MASS of $(NH_4)_2SO_4$:

$$\begin{aligned} 2 \text{ N} &= 2(14.0) = 28.0 \\ 8 \text{ H} &= 8(1.0) = 8.0 \\ 1 \text{ S} &= 1(32.1) = 32.1 \\ 4 \text{ O} &= 4(16.0) = 64.0 \end{aligned}$$

$$\boxed{132.1 \text{ g } (NH_4)_2SO_4}$$

Example 3. Calculate the MOLAR MASS of $Cu(NO_3)_2 \cdot 6H_2O$:

$$\begin{aligned} 1 \text{ Cu} &= 1(63.5) = 63.5 \\ 2 \text{ N} &= 2(14.0) = 28.0 \\ 6 \text{ O} &= 6(16.0) = 96.0 \\ 12 \text{ H} &= 12(1.0) = 12.0 \\ 6 \text{ O} &= 6(16.0) = 96.0 \end{aligned}$$

$$\boxed{295.5 \text{ g } Cu(NO_3)_2 \cdot 6H_2O}$$

MOLAR MASS PROBLEMS

1. Calculate the MOLAR MASS of each of the following:

a. NO
 $1\text{N} = 1(14.0) = 14.0$
 $1\text{O} = 1(16.0) = 16.0$
30.0 g NO

b. NH₃
 $1\text{N} = 1(14.0) = 14.0$
 $3\text{H} = 3(1.0) = 3.0$
17.0 g NH₃

c. CO₂
 $1\text{C} = 1(12.0) = 12.0$
 $2\text{O} = 2(16.0) = 32.0$
44.0 g CO₂

d. Ca(OH)₂
 $1\text{Ca} = 1(40.1) = 40.1$
 $2\text{O} = 2(16.0) = 32.0$
 $2\text{H} = 2(1.0) = 2.0$
74.1 g Ca(OH)₂

e. FeCl₃
 $1\text{Fe} = 1(55.8) = 55.8\text{ g}$
 $3\text{Cl} = 3(35.5) = 106.5\text{ g}$
162.3 g FeCl₃

f. K₂CrO₄
 $2\text{K} = 2(39.1) = 78.2$
 $1\text{Cr} = 1(52.0) = 52.0$
 $4\text{O} = 4(16.0) = 64.0$
194.2 g K₂CrO₄

g. CH₃COOH
 $2\text{C} = 2(12.0) = 24.0$
 $4\text{H} = 4(1.0) = 4.0$
 $2\text{O} = 2(16.0) = 32.0$
60.0 g CH₃COOH

h. (NH₄)₃PO₄
 $3\text{N} = 3(14.0) = 42.0$
 $12\text{H} = 12(1.0) = 12.0$
 $1\text{P} = 1(31.0) = 31.0$
179.0 g (NH₄)₃PO₄

i. Al₂(SO₄)₃
 $2\text{Al} = 2(27.0) = 54.0\text{ g}$
 $3\text{S} = 3(32.1) = 96.3$
 $12\text{O} = 12(16.0) = 192.0$
342.3 g Al₂(SO₄)₃

j. SnC₂O₄
 $1(\text{Sn}) = 1(118.7) = 118.7$
 $2(\text{C}) = 2(12.0) = 24.0$
 $4(\text{O}) = 4(16.0) = 64.0$
206.7 g SnC₂O₄

k. CH₃CH₂CH₂CH₃
 $4\text{C} = 4(12.0) = 48.0$
 $10(\text{H}) = 10(1.0) = 10.0$
58.0 g CH₃CH₂CH₂CH₃

l. Ni(H₂O)₂(NH₃)₄Cl₂
 $1\text{Ni} = 1(58.7) = 58.7$
 $16\text{H} = 16(1.0) = 16.0$
 $2\text{O} = 2(16.0) = 32.0$
 $4\text{N} = 4(14.0) = 56.0$
 $2\text{Cl} = 2(35.5) = 71.0$
233.7 g Ni(H₂O)₂(NH₃)₄Cl₂

2. Calculate the MOLAR MASS of each of the following:

a. Co₃(AsO₄)₂ · 8H₂O
 $3\text{Co} = 3(58.9) = 176.7$
 $2\text{As} = 2(74.9) = 149.8$
 $8\text{O} = 8(16.0) = 128.0$
 $16\text{H} = 16(1.0) = 16.0$
 $8\text{O} = 8(16.0) = 128.0$
598.5 g Co₃(AsO₄)₂ · 8H₂O

b. Pb(C₂H₃O₂)₂ · 3H₂O
 $1\text{Pb} = 207.2$
 $4\text{C} = 48.0$
 $6\text{H} = 6.0$
 $4\text{O} = 64.0$
 $6\text{H} = 6.0$
 $3\text{O} = 48.0$
379.2 g Pb(C₂H₃O₂)₂ · 3H₂O

c. MgSO₄ · 7H₂O
 $1\text{Mg} = 1(24.3) = 24.3$
 $1\text{S} = 1(32.1) = 32.1$
 $4\text{O} = 4(16.0) = 64.0$
 $14\text{H} = 14(1.0) = 14.0$
 $7\text{O} = 7(16.0) = 112.0$
246.4 g MgSO₄ · 7H₂O

d. KAl(SO₄)₂ · 12H₂O
 $1\text{K} = 39.1$
 $1\text{Al} = 27.0$
 $2\text{S} = 64.2$
 $8\text{O} = 128.0$
 $24\text{H} = 24.0$
 $12\text{O} = 192.0$
474.3 g KAl(SO₄)₂ · 12H₂O