

Molar Mass of ionic compounds

Molar Mass

- Molar mass- same as atomic mass but for a compound rather than an atom.
- To determine the molar mass of any compound you add up the atomic mass of all atoms present.
- NaCl
- $22.99 + 35.45 = 58.44 \text{ g/mol (amu)}$

Molar mass with subscript numbers

- Subscript numbers mean there are that many of that atom.
- CaI_2
- $40.08 + 126.9 + 126.9 =$
- or you can multiply
- $40.08 + 126.9 \times 2 =$
- $= 293.88 \text{ g/mol (amu)}$

Molar Mass with parentheses

- Parentheses and a subscript number mean there are that many of everything in the parentheses
- Be(OH)_2
- $9.012 + (16.00 + 1.008) \times 2 =$
- $9.012 + (17.008) \times 2 =$
- $9.012 + 34.016 = 43.028 \text{ g/mol}$

Combining all of them

- $(\text{NH}_4)_2\text{CO}_3$
- $(14.01 + 1.008 \times 4) \times 2 + 12.01 + 16.00 \times 3$
- $(14.01 + 4.032) \times 2 + 12.01 + 48$
- $(18.042) \times 2 + 60.01$
- $36.084 + 60.01$
- $= 96.094 \text{ g/mol}$

Converting between moles and grams using molar mass

Converting between moles and grams

- molar mass is the conversion factor
- that many grams equal one mole of the substance!
- so convert 64 g of NaCl into moles

$$\frac{64 \text{ g NaCl}}{58.44 \text{ g NaCl}} \times \frac{1 \text{ mole NaCl}}{1 \text{ mole NaCl}} = 1.1 \text{ mol NaCl}$$

Practice problem

- How many grams are in 1.4 mol of potassium arsenate?

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- How many grams are in 1.4 mol of potassium arsenate?
- K_3AsO_4
- $= 256.22 \text{ g/mol}$
- $1.4 \text{ mol} \times \frac{256.22 \text{ g}}{1 \text{ mole}} =$
- $= 360 \text{ g K}_3\text{AsO}_4$

Another Problem

■ How many moles are in 54 g of chromium (III) carbonate?

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■ How many moles are in 54 g of chromium (III) carbonate?

■ $\text{Cr}_2(\text{CO}_3)_3$

■ 284.03 g/mol

■ 54 g

1 mole

284.03 g

■ =0.19 mol $\text{Cr}_2(\text{CO}_3)_3$