Announcements

To join clicker to class today (Clickers with LCD display join automatically):

- Turn on the Clicker (the red LED comes on).
- Push "Join" button followed by "20" followed by the "Send" button (switches to flashing green LED if successful).

- Exam 2 next Monday. Sample exam and review sheets are updated.
- Discussion quiz today on material from shapes of orbitals through today's material molar mass (last thing we did Monday).
- D2L is now accepting grade updates from me.

Review

- Naming binary compounds, oxoacids, halogen acids, and hydrates of ionic compounds.
  - CO: carbon monoxide – SO_3: sulfur trioxide
  - $CaCl_2$: calcium chloride – Mn_2O_3: manganese (III) oxide
  - Na_2HPO_4: sodium hydrogen phosphate
  - H_3PO_4: phosphoric acid – HF: hydrofluoric acid
  - $CuSO_4 \cdot 2H_2O$: copper (II) sulfate dihydrate
- Calculating molar mass (ex. H_2O).
  - 1 mol contains 6.022×10^{23} things (called Avogadro's #, symbol N_A). Can also be thought of as amu/g.

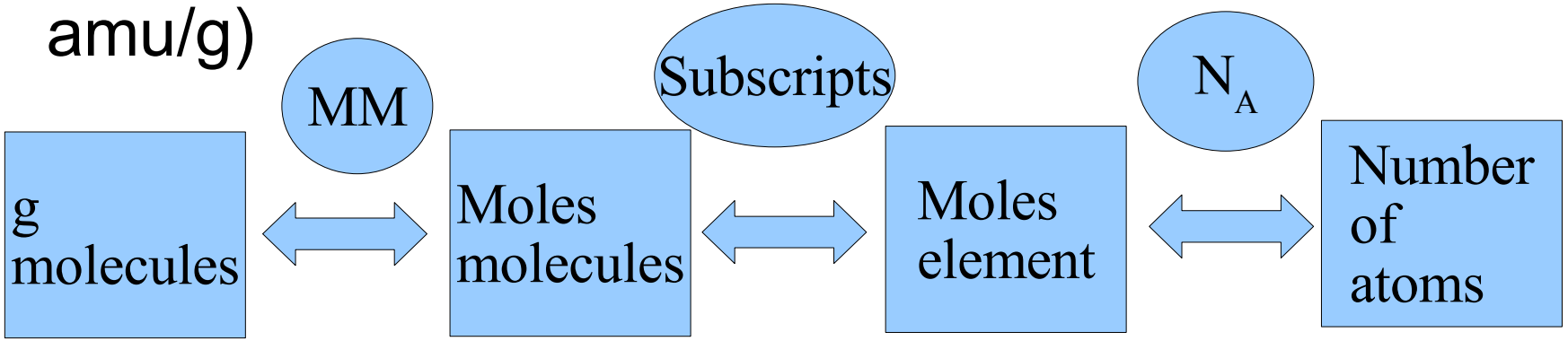
(2 mol H/mol H_2O)(1.00794 g H/mol H) = 2.01588 g H/mol H_2O

+(1 mol O/mol H_2O)(15.9994 gO/mol O)=15.9995 g O/mol H_2O

18.0153 g H_2O/mol

Avogadro's Number and Molar Mass

- N_A=6.022 x 10^{23} particles/mole (also number of amu/g)



- Ex: suppose you have 24.022 g SO_3 how many O atoms? Info: 80.064 g SO_3/mol SO_3 or MM(SO_3)= 80.064 g/mol
  - atoms O = (24.022 g SO_3)(1mol SO_3/80.064 g SO_3) x ($3O/SO_3$)(6.022 x 10^{23} mol^{-1}) = 5.420 x 10^{23} O atoms

Steps to Balance Chemical Equations

1. Write correct molecular formula (empirical formula if ionic) for reactants and product (reactants on left, products on right).
2. Start with the heaviest atom other than O or H and balance those. Note: it is best to start with atoms that appear in only one compound on each side.
3. After doing all the other atoms balance O, then H.
4. HINT: ALWAYS CHECK THAT CHEMICAL EQUATIONS ARE BALANCED.
   - EXCEPTION: ON EXAMS IF YOU ARE TOLD THAT AN EQUATION IS BALANCED YOU MAY ASSUME IT IS.

Stoichiometry/Mole Map

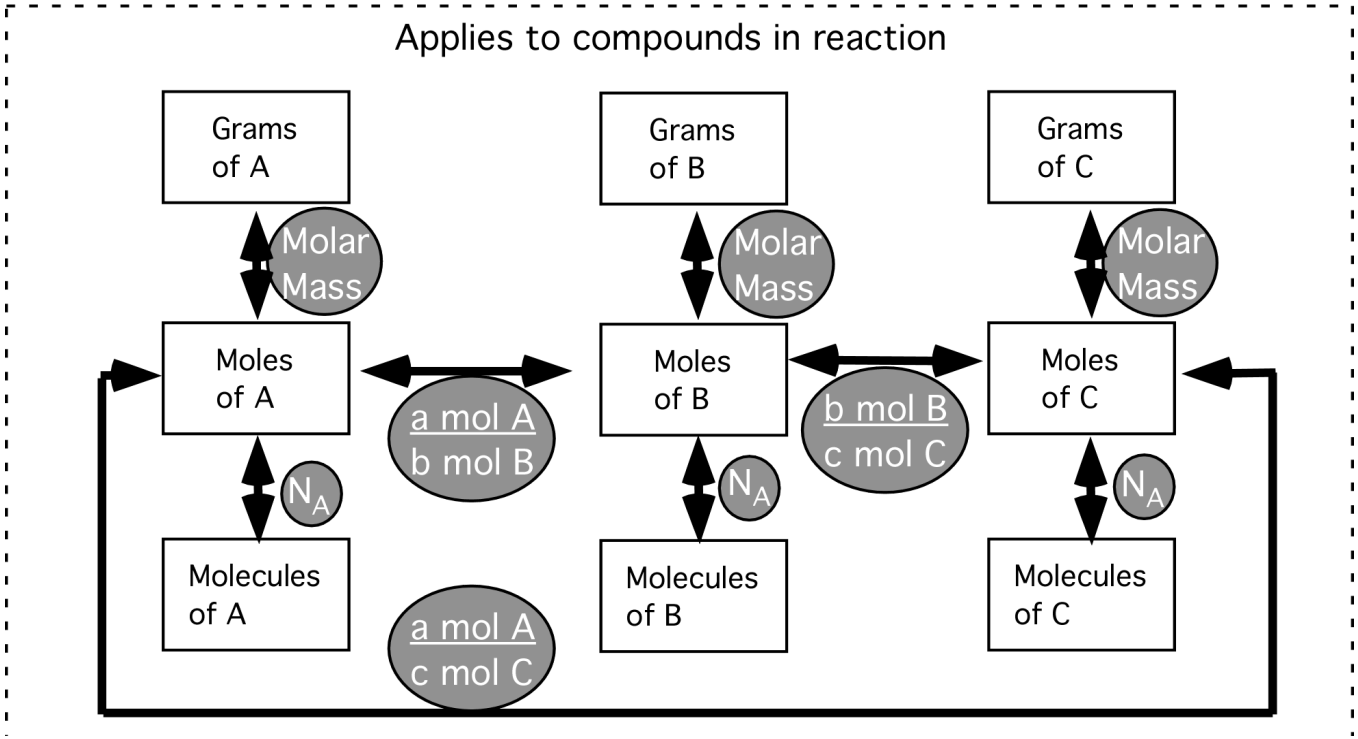
Model Reaction: $aA + bB \longrightarrow cC$

A, B and C represent molecular formulas

a, b and c represent the stoichiometric coefficients

= conversion factor

$N_A = 6.022 \times 10^{23} \frac{\text{things}}{\text{mole}}$



Stoichiometry

- Can answer questions like: How much SO_3 necessary to produce the 3.959×10^{10} kg of H_2SO_4 manufactured in 2000?
- Produced using same RXN as occurred in early atmosphere: $SO_3(g) + H_2O(l) \text{---> } H_2SO_4(aq)$ (balanced).
- Key info
  - 80.064 g SO_3/mol SO_3 or $\mathcal{M}(SO_3)$= 80.064 g/mol
  - 98.079 g H_2SO_4/mol H_2SO_4 or $\mathcal{M}$ (H_2SO_4)= 98.079 g/mol
- Route to solution (know amount of A want amount of B):

  mass of A -{$\div\mathcal{M}$(A)}-> moles of A -{mole ratio}-> moles B -{$x\mathcal{M}$(B)}-> mass B