Good morning!

Please grab a lab sheet from the front desk.

Take out your homeowork.

Please check your answers with the key above the chem hood.

Today

- Developing Reference Equations.
- Review of 10.1 & 10.2.and 10.3
- Mole lab.

Mole Lab:

There are four stations that you will rotate through.

At each station you will be able to measure a chemical, and then describe it in a different way using mole conversions (dimensional analysis).

You will also explore % composition and empirical formulas.

Station 1: Aluminum Can

Station 2: Pennies

Station 3: Snack Food: Eat the snack food (1 bag per group please) if you would like.

Station 4: Sand. Mass a weigh boat. Add three large scoops of sand using a scoopula. Use this to determine the mass of sand.

Tip: use the answer from #5 to help you with numbers 6 and 7.

Finished?

Put the lab sheet in your folder.
Put your folder in the box at the front of the room.

Grab a white board.

Write down the type of problem that you would like to see reviewed from chapter 10.

Reference Formulas

- Anything that is true about 1 mole of a particular substance.
- This may include the molar mass, number of particles, and volume (in the case of gases at STP.
- We will assume STP (standard temperature and pressure) is true for now.

Set Up

- 1 mole is always 6.02 x 10^23.
- 1 mole of a substance is always the atomic mass, but in grams. **Called Molar Mass**
- 1 mole of a gas is always 22.4L at STP (0 degrees Celsius and 1 atm)

1 mole of Salt: NaCl

23+35,45

- 1 mole = 6.02 x 10^23 formula units.
- 1 mole = 58.45g
- Put your into into one large equation.
- 1 mole = 6.02 x 10^23 formula units = 58.45g.

1 mole of Platinum

- 1 mole = atoms.
- 1 mole = g.
- 1 mole = atoms = g.

Applying the Reference Formula

- Identify the unknown and write it in first.
- Make 1 fraction that relates the known quantity to the unknown quantity that the problem asks for.
- Unknown on top, known on the bottom.
- Use dimensional analysis to solve for the unknown.

How many molecules of SO_2 in a 30g sample?

- Reference Formula: 1 mole = 6.02×10^{23} molecules = 64 g.
- Known: 30 g
- Unknown: molecules
- DA: $\frac{30\text{ g}}{1} \times \frac{6.02 \times 10^{23}\text{ molecules}}{64\text{ g}} = 2.8 \times 10^{23}\text{ molecule}$

How many grams in a 25L sample of CO?

- Reference Formula: 1 mole = 6.02×10^{23} molecules = 28 g = 22.4L
- Known: 25 L
- Unknown: ~~molecules~~ g
- DA: $\frac{25\text{L}}{1} \times \frac{28\text{ g}}{22.4\text{L}} = 31.25\text{ g}$

What is the mass of 2.3 x 10^21 formula units of $CaCl_2$?

- Reference Formula: 1 mole = formula units = g.
- Known:
- Unknown: molecules
- DA:

How many moles are in a sample of 94g of Al?

- Reference Formula: 1 mole = atoms = g.
- Known:
- Unknown: molecules
- DA:

What is the mass of 15L of CH_4?

- Reference Formula: 1 mole = molecules = g = 22.4L
- Known:
- Unknown: ~~molecules~~ grams
- DA:

How many grams are in a sample of Strontium Fluoride containing 1.3x10^19 formula units?

NutraSweet is 57.14% C, 6.16% H, 9.52% N, and 27.18% O. Calculate the empirical formula of NutraSweet and find the molecular formula. (The molar mass of NutraSweet is 294.30 g/mol)

C: 57.14 / 12 = 4.75 / 0.68

H: 6.16 / 1 = 6.16 / 0.68

N: 9.52 / 14 = 0.68 / 0.68

O: 27.18 / 16 = 1.7 / 0.68

Given ↓ P.T. ↓

$$57.14\ \text{g}\,\text{C} \times \frac{1\ \text{mol C}}{12.0\ \text{g}\,\text{C}} = \frac{4.76}{0.68}\ \text{mol C} \Rightarrow 7(2) = 14$$

$$6.16\ \text{g}\,\text{H} \times \frac{1\ \text{mol H}}{1.01\ \text{g}\,\text{H}} = \frac{6.10}{0.68}\ \text{mol H} \Rightarrow 8.97 \approx 9(2) = 18$$

$$9.52\ \text{g}\,\text{N} \times \frac{1\ \text{mol N}}{14.0\ \text{g}\,\text{N}} = \frac{0.68}{0.68}\ \text{mol N} \Rightarrow 1(2) = 2$$

$$27.18\ \text{g}\,\text{O} \times \frac{1\ \text{mol O}}{16.0\ \text{g}\,\text{O}} = \frac{1.70}{0.68}\ \text{mol O} \Rightarrow 2.5(2) = 5$$

↑ too far to round, multiply to get a whole number

Empirical formula = $\boxed{C_{14}H_{18}N_2O_5}$

Mole Lab

- You will Identify the mass of a given substance.
- Mass each material as labeled on the canisters.
- The T (tare) is the mass of the canister.
- Easier to find the mass of the sample.

Mole Lab:
Make a reference equation for each chemical that you are measuring.
Use this to convert from grams of a sample to:
Number of particles of a chemical.
Number of moles of a chemical.