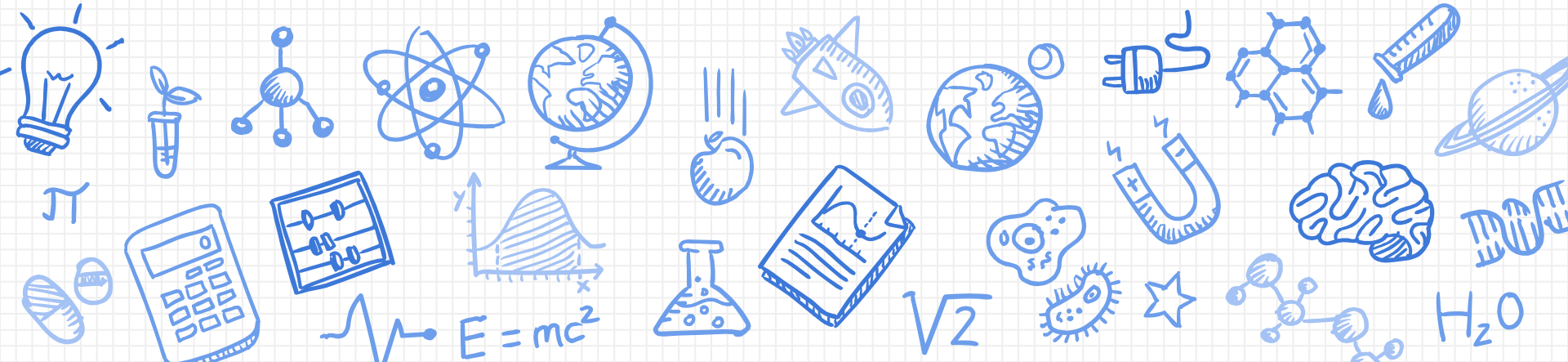
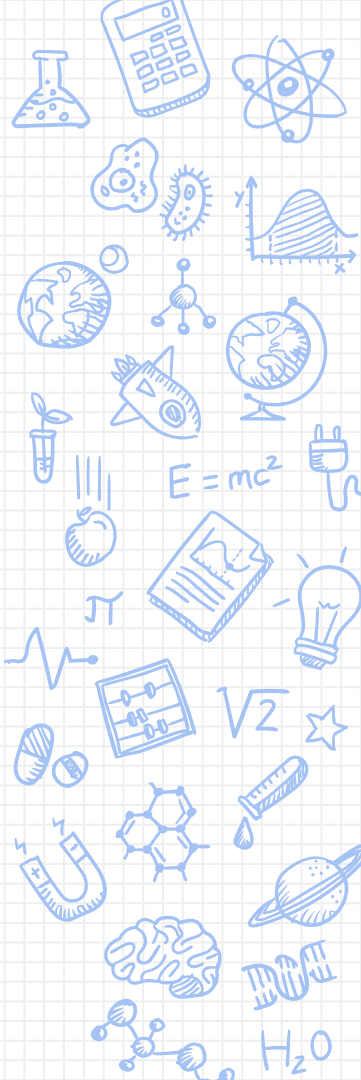
CHM1025
Exam 2 Review

Chandler Lentovich, Teaching Center



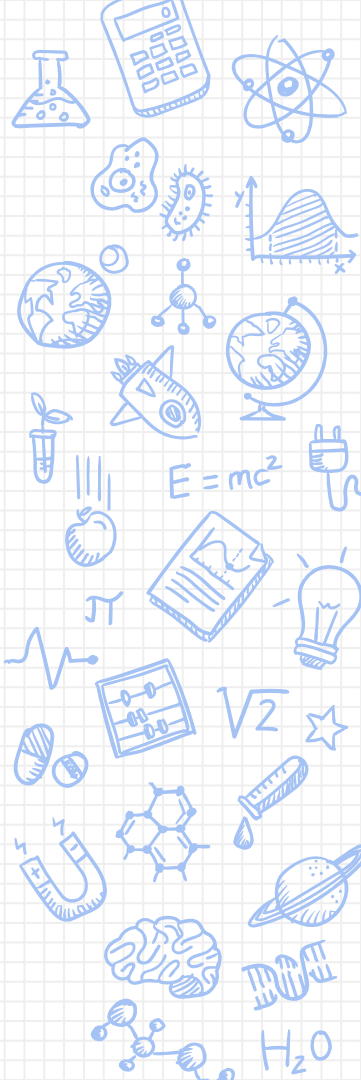
Introduction

- ✘ Leader: Chandler Lentovich
- ✘ Support: Sundip Singh
- ✘ We will be covering the more complicated subjects
- ✘ Chemistry drop-in tutoring (Turlington 1315)
  - ✗ Monday: 1pm-5pm
  - ✗ Wednesday: 1pm-5pm
  - ✗ Friday: 1pm-3pm
- ✘ This will be recorded and posted on the Teaching center website

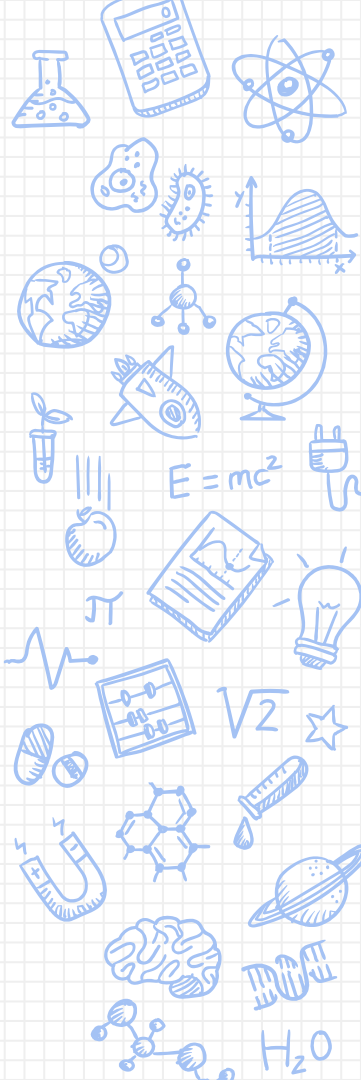


Balancing Reactions

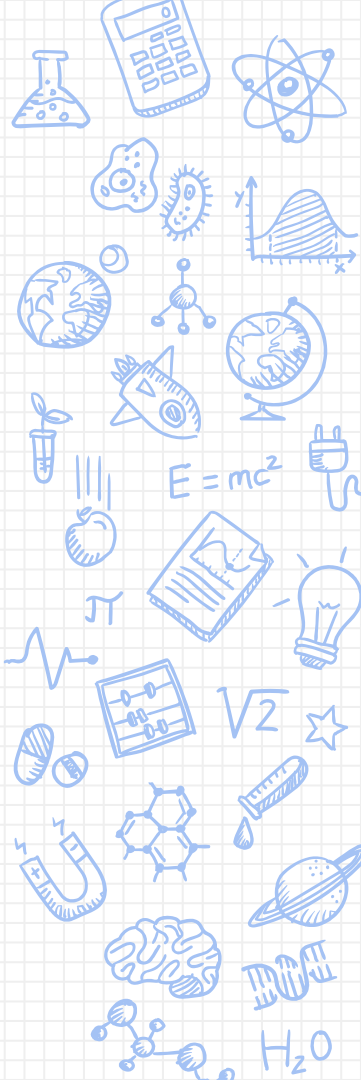
- Note which atoms only show up in one molecule on each side (with different quantities!)
  - Set those equal to each other
- Note quantities of all other atoms on each side
  - Make adjustments until the quantities of all atoms are equal
- If there's a polyatomic ion present on BOTH sides, it can be treated as one unit
- Can be a bit trial and error-esque!



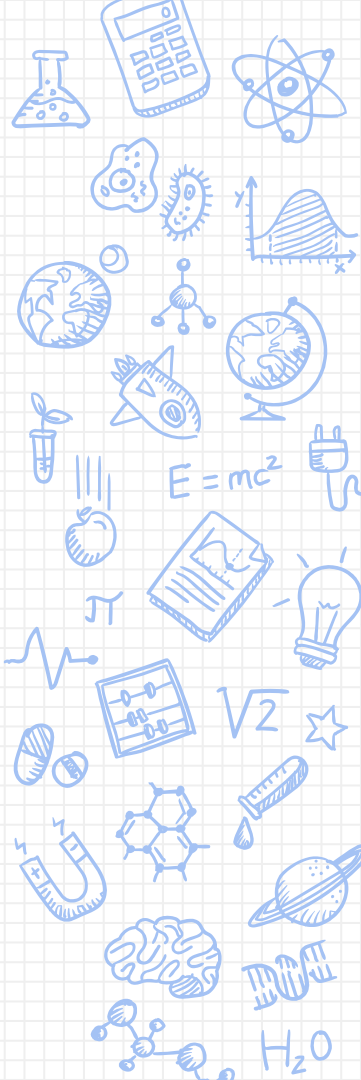
$$?Mg(OH)_2 + ?HCl \rightarrow ?MgCl_2 + ?H_2O$$



$$?SiO_2 + ?HF \rightarrow ?SiF_4 + ?H_2O$$

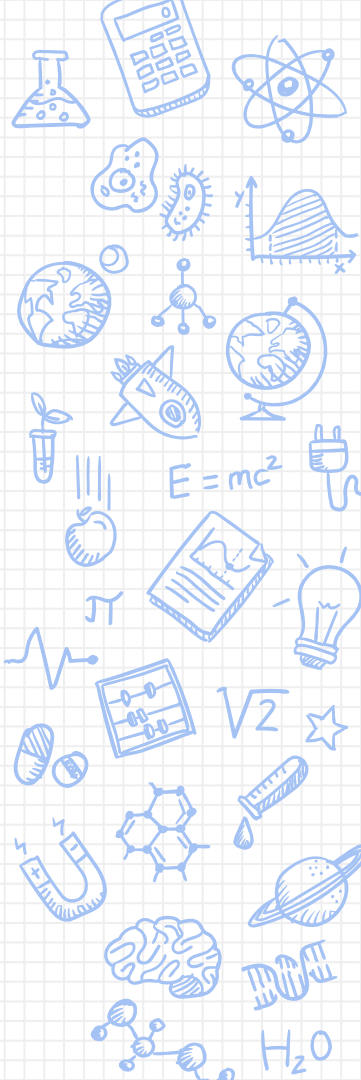


?$CaCl_2$ + ?Na_3PO_4 -> ?$Ca_3(PO_4)_2$ + ?NaCl



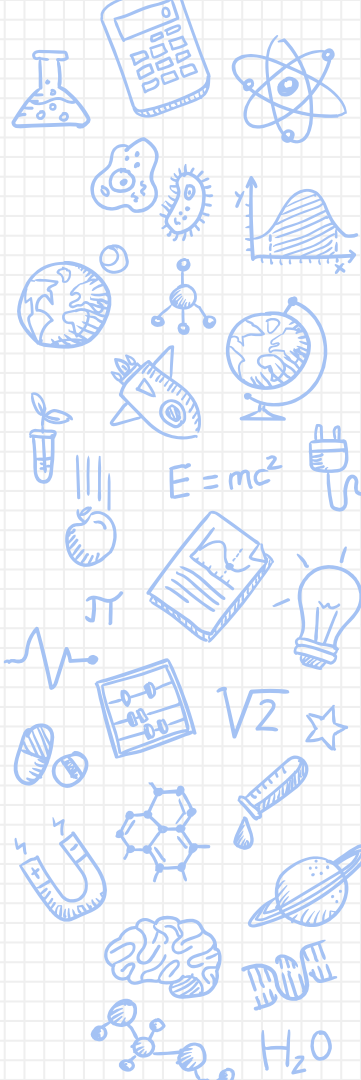
Limiting Reagents

- Typically, you'll be given grams of each reactant to start
  - Find moles of each reactant
  - Calculate yield that each reactant produces
  - Note reactant that produces lowest amount of yield. This yield will be your answer.



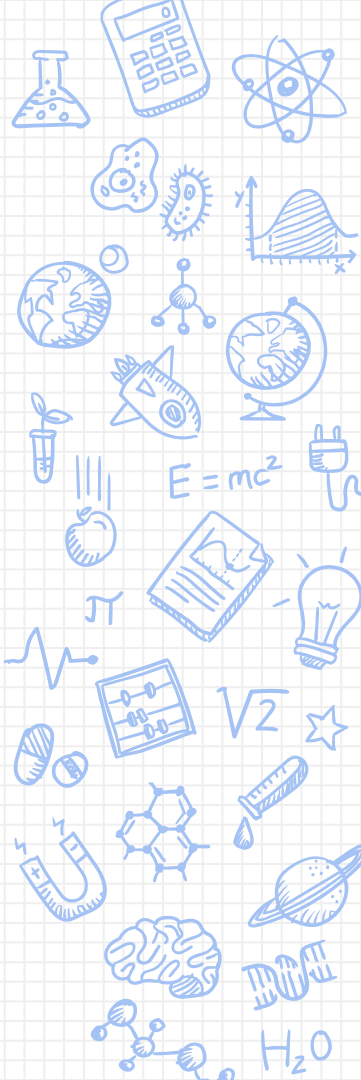
$NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl$

- How many grams of AgCl will be produced from 7.00 g of NaCl and 95.0 g of $AgNO_3$?



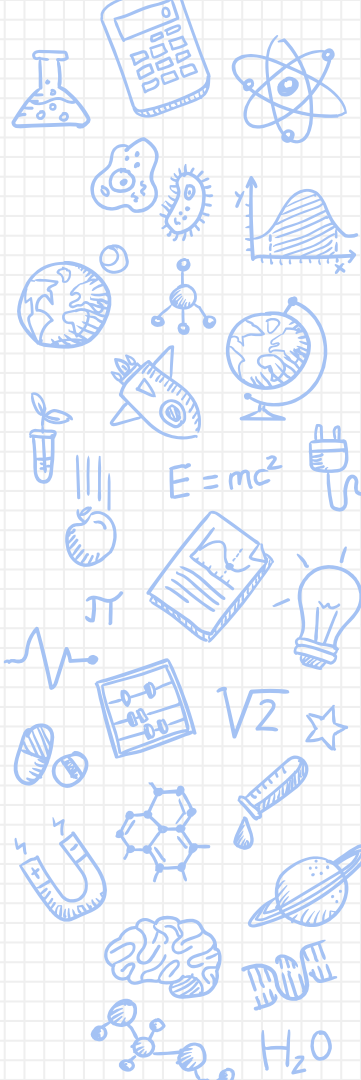
$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

- ✘ How many grams of CO_2 will be produced from 15.0 g CH_4, and 114 g of O_2?



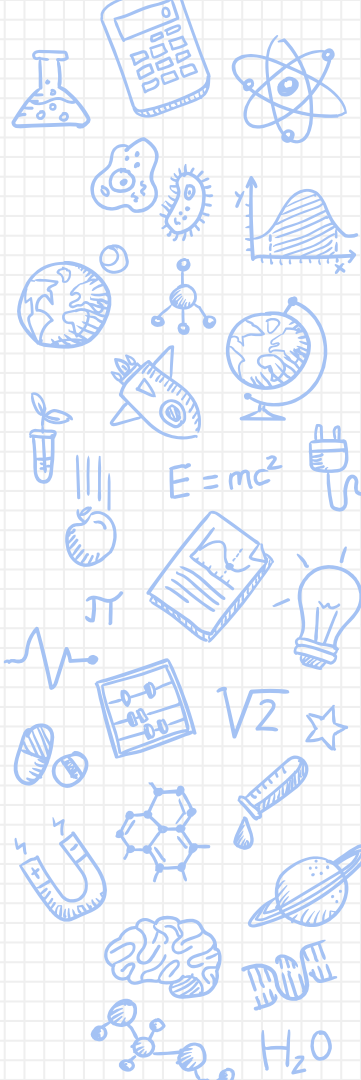
Polyatomic Ions Recap

- ✘ Great resource: Symbols and Names for Common Polyatomic Ions
- ✘ Understanding polyatomics differing in oxygen number
  - ✗ Most Os: per[base name]ate
  - ✗ [base name]ate
  - ✗ [base name]ite
  - ✗ Least Os: Hypo[base name]ite
  - ✗ Just remember the [base name]ate version (usually most common), and figuring other ones out will be much easier



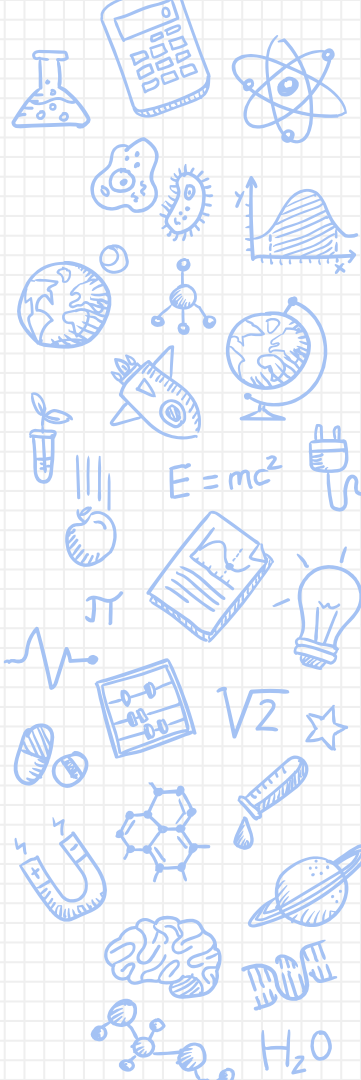
[Base Name]ate: Chlorate (ClO_3^-)

- ✘ One more O: ClO_4^-: perchlorate
- ✘ One less O: ClO_2^-: chlorite
- ✘ One less O than chlorite: ClO^-: hypochlorite



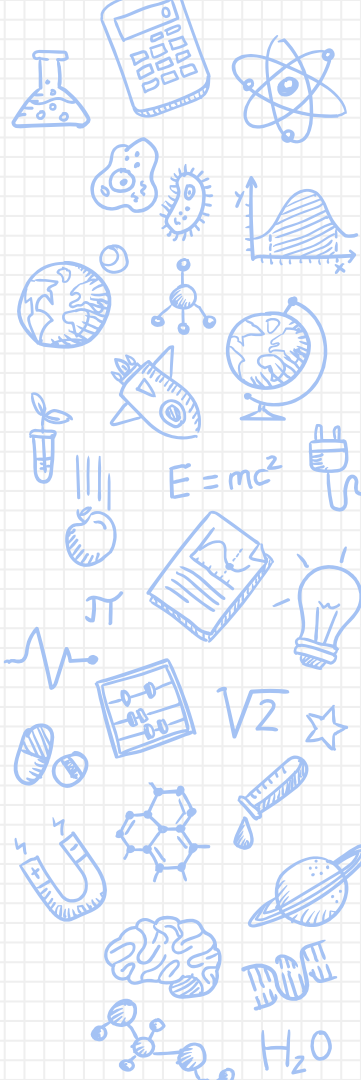
[Base Name]ate: Sulfate (SO_4^{2-})

- ✘ One less O: SO_3^{2-}: sulfite
- ✘ Note: know how many variations of the base name exist for each polyatomic with multiple Os!



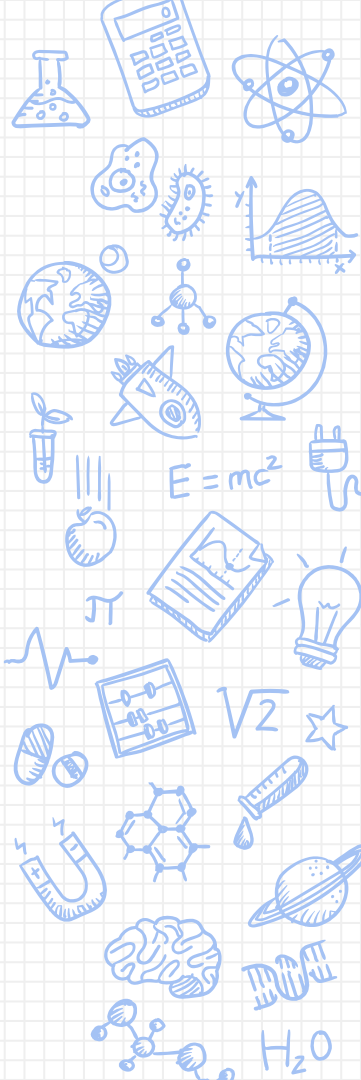
Same Concept With Acids

- Understanding acids differing in oxygen number
  - Most Os: per[base name]ate
    - per[base name]ic acid
  - [base name]ate
    - [base name]ic acid
  - [base name]ite
    - [base name]ous acid
  - Least Os: hypo[base name]ite
    - hypo[base name]ous acid



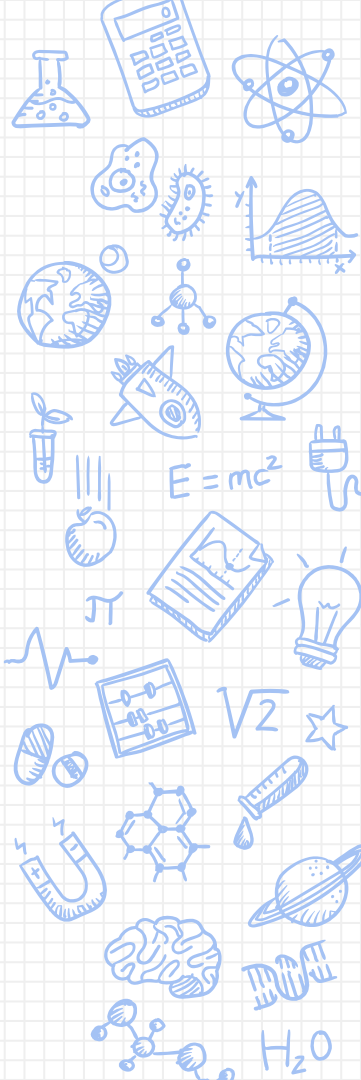
Chloric Acid ($HClO_3$) Acid Derivatives

- ✘ One more O: $HClO_4$: perchloric acid
- ✘ $HClO_3$: chloric acid
- ✘ One less O: $HClO_2$: chlorous acid
- ✘ One less O than chlorous acid: HClO: hypochlorous acid



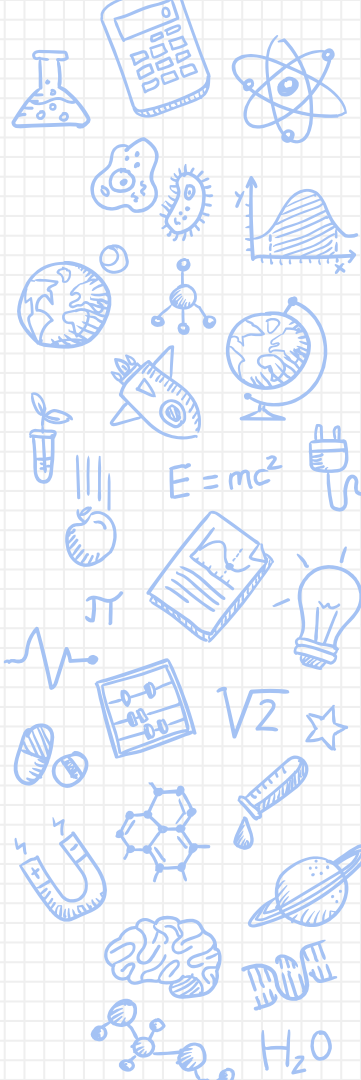
Bronsted-Lowry Acids and Bases

- ✘ Acids donate an H^+
- ✘ Bases accept an H^+
- ✘ Example: $HCl + NaOH \rightarrow H_2O + NaCl$

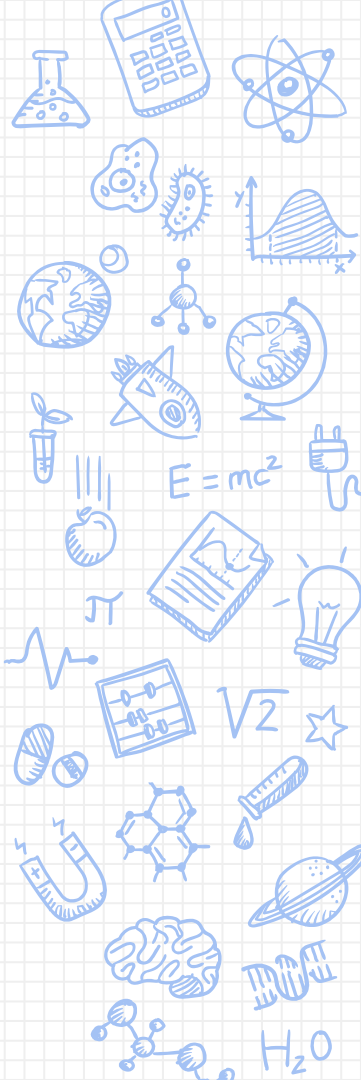


Calorimetry

- 1 nutritional Calorie=1000 chemical calories= 1 kcal
  - Difference: capital C
- 1 kcal= 4184 joules
- You can solve for various variables with the $q=mc\Delta t$ equation
  - q= heat
  - m=mass
  - c=specific heat (will be given this or you'll be solving for it)
    - Water= 4.184 J/g*C, but if they give you something different, use that
  - t=temperature
  - Always check your units!

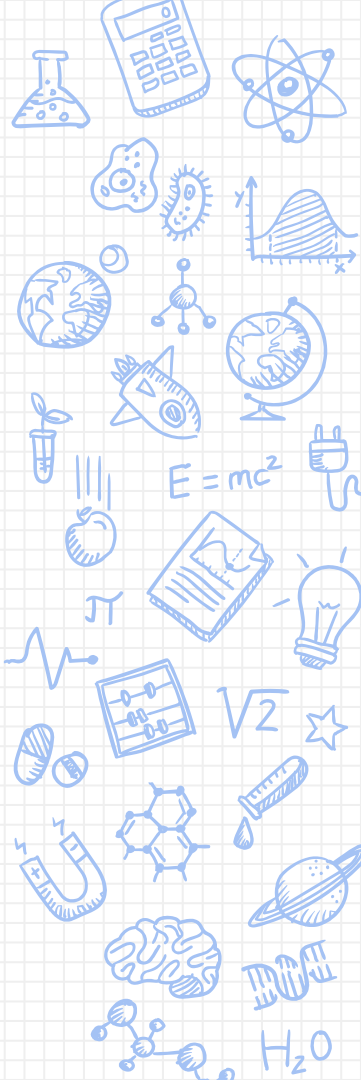


A food sample is burned in a calorimeter that contains 2000 g of water. The temperature increases from 22°C to 44.3°C. How many Calories (kcal) does this food sample contain if the specific heat of water is 4,186 J/kg*C?

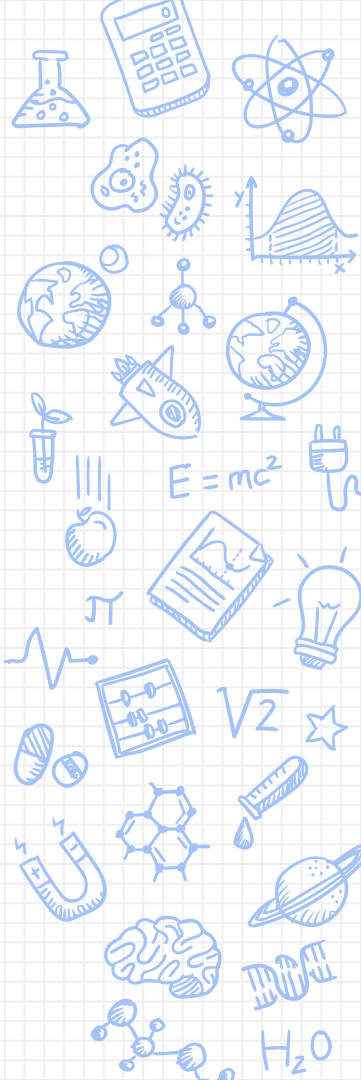


Using ΔH

- ✘ Can be given for one mole of reaction or multiple moles
  - ✗ They have to tell you which one
- ✘ Negative value= exothermic
  - ✗ Releases energy
- ✘ Positive value=endothermic
  - ✗ Absorbs energy
- ✘ If they ask how much energy is released/absorbed, just give the magnitude as your answer



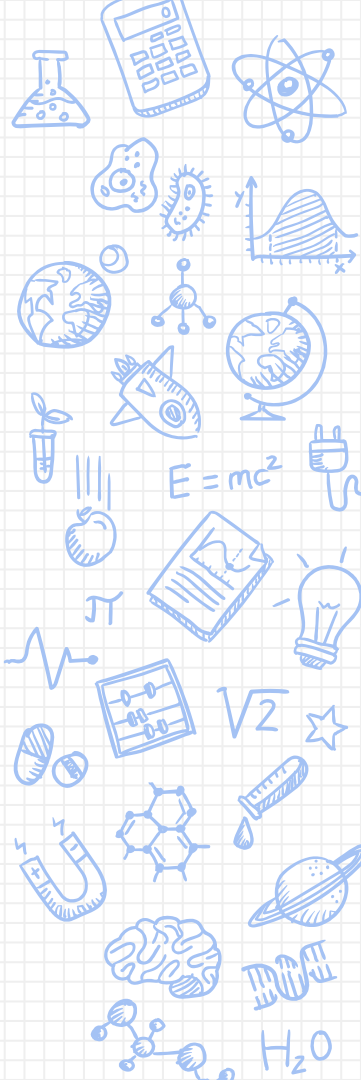
What mass, in grams, of PbS is converted to lead oxide if 1,350.775 kJ of heat is liberated in the reaction between PbS and O_2?



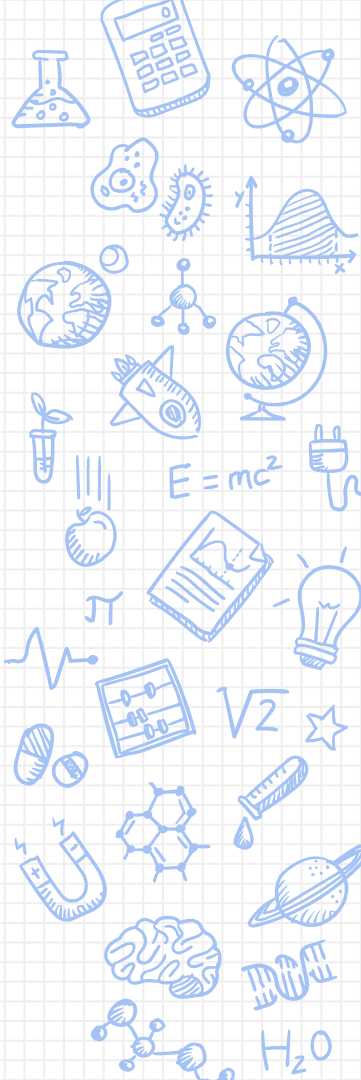
Percent Yield

- ✘ Theoretical yield: found through stoichiometry
- ✘ Percent yield: found through experimentation, mathematically related to theoretical yield

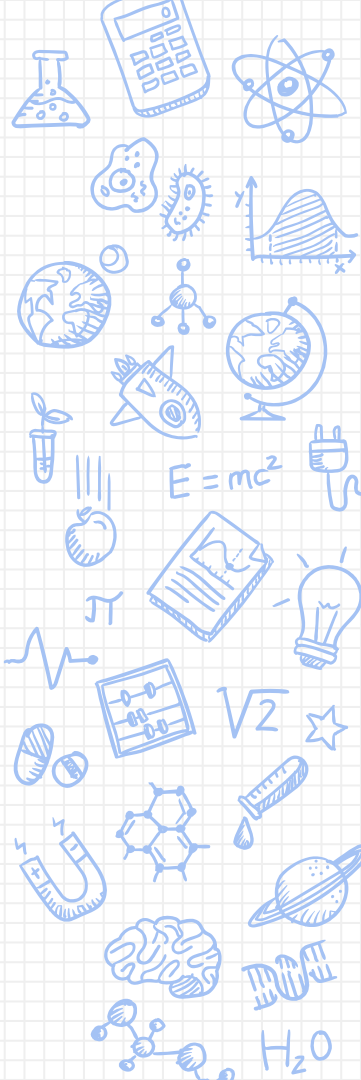
$$\text{Percent Yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$$



You drop some of the iron that you are using in an experiment, making your yield of Iron (III) Oxide 19.7 g. What is your percent yield if the equation for this reaction is $Fe + O_2 \rightarrow Fe_2O_3$?



If your percent yield is 94.9%, what mass in grams of hydrogen is produced by the reaction of 4.73 g of Mg with 1.83 g of H_2O?



Thank You! :)