This list is a general guideline to help you study. It is NOT a definitive list. There are potentially things on here that will not show up on the test, and there are potentially things not on this list that will show up on the test. Material that appeared in Warm Ups, Notes, Homework, Classwork, Labs, Study Materials, etc are all have the potential to appear on the test.

+ denotes calculations

Advanced Chemical Ratios

+ Limiting Reagent Stoichiometry
  - Be able to identify the limiting reagent and excess reagent in a problem
    - Must be able to justify your answer with actual work, either method 1 with mole rations (fast method), or method 2 with two stoichiometry problems (simpler but slower method)
  - Once you have identified the limiting reagent be able to perform various stoichiometry problems using the limiting reagent amount as your starting value
  - Be able to determine how much of your excess reagent is left over after the reaction
+ Percent Composition
+ Empirical Formulas
  - Percent to mass, mass to mole, divide by small, multiply by whole!
+ Determining Molecular Formulas
  - Use empirical formula and molecular weight to find the multiplier for your coefficients
+ ~~Combustion Analysis with things such as C, H, O, N~~
  - ~~Just empirical formula calculations where your numbers are from lab data and you have to work to find which numbers to use!~~
  - ~~Remember to find the mass of the obvious elements first, then subtract from total mass to find grams of the one you can't find easily (usually Oxygen).~~
  - ~~Remember to be careful to use single atom masses and numbers, not diatomics!~~
  - ~~Careful with elements found in separate experiments (usually Nitrogen)!~~

Gas Laws

- Conceptual items
  - Properties of Gases
  - KMT theory assumptions
  - Why we use kelvins
  - Pressure units and STP values
  - Kinetic Energy and Temperature relationship
  - How mass affects the speed of gases
  - Ideal versus Real Gases
  - Diffusion and Effusion
+ Basic Gas Law Equations
  - Know equations and be able to do calculations with them
    - Boyle's
    - Charles'
    - Gay-Lussac's
    - Avogadro's
    - Combined
  - Which equations are direct or indirect relationships
  - Identify graphs of each gas law equation
+ Ideal Gas Law Equation
  - Ideal Gas Constant
  - Calculating the molar mass by rearranging the Ideal Gas Law
  - Calculating density by rearranging the Ideal Gas Law
+ Dalton's Law of Partial Pressures
  - Regular Partial Pressure Problems
  - Problems using more than one equation. Example:
    - Use Boyle's Law to find the Pressure values needed to find Partial Pressure
  - Collecting gas over water
    - Dry vs Wet Gas concept - Don't forget to subtract out the wet gas!

+ Gas Stoichiometry
    - Remember this is JUST stoichiometry! Sometimes you just need an equation instead of a conversion factor! Use your "Mole Highway" just like always!
    - Sometimes you can use Molar Volume as a shortcut if you are at STP

Thermochemistry

- Conceptual information
    - Definitions from chapter
    - Types of heat transfer
    - 1st Law of Thermodynamics
    - Endo vs. Exothermic including reaction diagrams
    - Meaning of all variables in the equations used this chapter
+ Q=mCΔT
+ Calorimetry
    - Q = -Q
+ Q=mL calculations
    - Understand *why* phase changes need a new equation
    - Remember L can be positive or negative
+ Heating/Cooling Curve calculations
    - Sketching a graph with start/end points can be very helpful!

~~+ Mixed Phase Calorimetry~~
- ~~Sketching a graph and labeling everything is very helpful!~~
- ~~Can either do Q = -Q, or you can use the Q + Q = 0 trick to help eliminate double negatives if it helps your algebra (or sanity – ha!)~~

~~- Phase Diagrams~~
- ~~Phase change lines~~
- ~~Triple point and Critical point~~
- ~~Supercritical fluid~~
- ~~Identifying information when given things like a specific temperature and/or pressure~~

- Molar Heat Calculations
    - Either converting moles to grams before doing a thermo calculation, or using C or L values that are in moles instead of grams
- Heat of Reaction Calculations
    - Back to dimensional analysis again!
    - Sometimes you don't know what the heat of reaction is for a given equation. BUT if you know how much energy it takes to FORM each of the chemicals in the reaction, then you can figure out what the heat of reaction is for the equation you are interested in!
        - ΔH°rxn = ΔH°formation Products - ΔH°formation Reactants
        - Don't forget you want to take into account the number of moles of each product and reactant in the balanced equation!
- Bond Energy
    - It ALWAYS takes energy to break a bond. = endothermic = +ΔH
    - It ALWAYS releases energy to make a bond = exothermic = -ΔH
    - Use a chart of bond energies to calculate the heat of reaction.
        - (Bonds Broken, + values) + (Bonds Formed, - values)
        - Remember – you can draw lewis structures to help you determine which bonds are broken/formed
- Hess's Law
    - Calculate the energy of a reaction by adding together the energy of individual steps with known energy values
    - If reversing a reaction, reverse the algebraic sign on the ΔH for that step
    - If multiplying the coefficients in a reaction, multiply the ΔH by the same value