Exam-V Outline—Thermochemistry and Kinetic-molecular Theory:

CP Chem—Chapters 17, 13, and 14 **KNOW:**

1. **enthalpy change, specific heat, and calorimetry**
   - a. define, calculate, and use specific heat capacity in problems.
   - b. perform calorimetry calculations, using $q = m \times C \times \Delta T$.
   - c. do enthalpy-change problems (stoichiometry using ΔH).
   - d. do problems involving Hess's law of heat summation.
   - e. distinguish between temperature (def.), heat (def.), and enthalpy.
   - f. conceptualize ΔH—i.e., (1) $\Delta H = q_{rxn}$ (at constant pressure) in kJ/mol of substance in question; and (2) sign convention of ΔH, with respect to endo- or exothermic reactions.
2. **the kinetic-molecular theory**
   - a. the *postulates* (assumptions) of the K-M Theory, and the *observations* they are based upon, as well as the difference between the two.
   - b. as it applies to solids, liquids, and gases.
3. **how to interpret heating curves and phase diagrams.**
4. **how to do calculations from heating curves, using $q = m \times S \times \Delta T$, ΔH_{fus}, and ΔH_{vap}**
5. **the relationships between**
   - a. pressure and volume (Boyle's law).
   - b. volume and temperature (Charles's law).
   - *c.* P, V, T, and n—the amt of gas—(Ideal Gas law).
6. **Dalton's law of partial pressures.**
7. **Graham's law of effusion (and diffusion) *(CP Only)***
8. **how to do calculations with all of the above.**
9. **how to determine what kind of intermolecular forces would be predominant in given substances.**
   - a. dispersion ; b. dipole-dipole ; c. hydrogen bonding ; d. none
10. **metallic bonding.**
11. **how and when to use the following formulas and constants:**

$q_{sur} = m \times C \times \Delta T$; specific heats, including those for water:
$C_{ice} = 2.09$ J / g·K , $C_{water} = 4.18$ J / g·K , $C_{steam} = 1.84$ J / g·K , and other substances* given in a table (**CP only*) ; $q_T = q_1 + q_2 + q_3 + \ldots$; 1 atm = 101.3 kPa = 760 mmHg; K = °C + 273 ; $V_1 / T_1 = V_2 / T_2$; $P_1V_1 = P_2V_2$; $PV = nRT$; $P_T = P_a + P_b + P_c + \ldots$; gas constant (R) = 0.0821 atm·L / mol·K ; $\Delta H_{vap} = 40.7$ kJ / mol and $\Delta H_{fus} = 6.00$ kJ / mol, for water, in addition to other substances* given in a table (**CP only*) ; AND Graham's law:

$$\frac{\text{Rate}_A}{\text{Rate}_B} = \frac{\sqrt{\mathcal{M}_B}}{\sqrt{\mathcal{M}_A}}$$