Announcements

- 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).

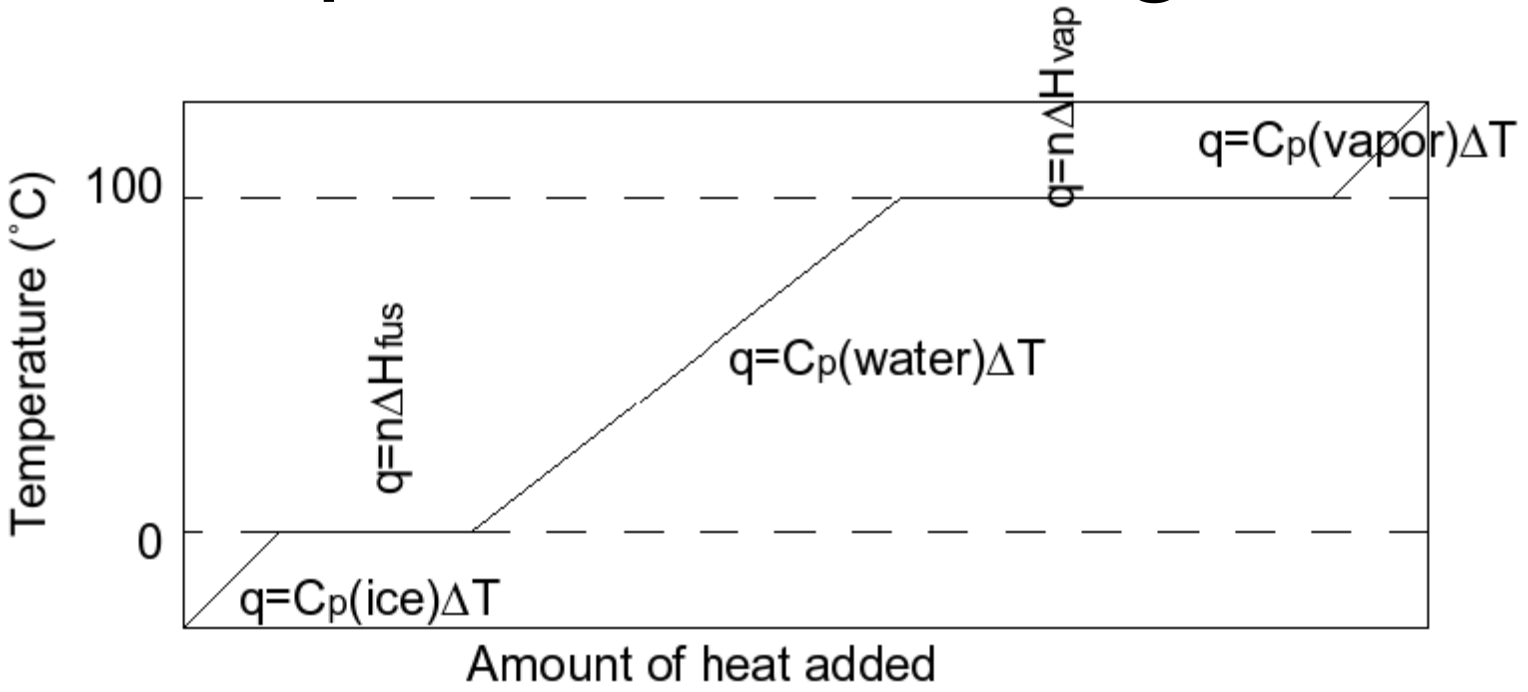
- Answers for first assignment now available on web site.
- Class Username: chem10607
- Class Password: enthalpy07.

- Deadline for subscription to e-mail list is this Friday(Sept. 14). More than half of you have signed up.
- Quiz tomorrow on part of material included in this lecture (through section 6.5 in text).

Review

- Thermodynamic System= Everything we are interested in. In chemistry, at minimum, this contains all reactants and products. First law of thermodynamics $\Delta E=q+w$, energy is conserved.
- Pressure volume work: $w = -P\Delta V$. Take care with sign (work done on surroundings or by system is negative, work done on system is positive.)
- Enthalpy (ΔH) is easier to keep track of because under constant P conditions $\Delta H = q$ (or sometimes q_p, to indicate constant pressure).
- $q = C_p\Delta T$, C_p = constant pressure heat capacity of sample ($C_p = nc_p$, c_p = molar heat capacity or $C_p = ms$, m = mass, s = specific heat).
- For phase change $q = n\Delta H_{\text{phase change}}$ (either "fus" or "vap")

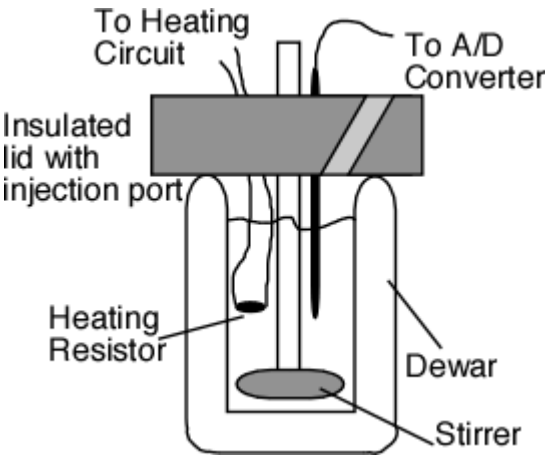
Example of calculating ΔH or q



- q_{vap} = (2.00 mol)(40.67 x 10^3 J/mol) = 81.3 kJ
- q(vapor) =(2.00 mol)(33.58 $Jmol^{-1}°C^{-1}$)(110 ˚C -100 ˚C)=0.67 kJ
  - $\Delta H_{process}$ = sum of q's = q(ice) + q_{fus} + q(water) + q_{vap} + q(vapor) = (0.74 + 12.0 + 15.1 + 81.3+0.67) kJ = 109.8 kJ

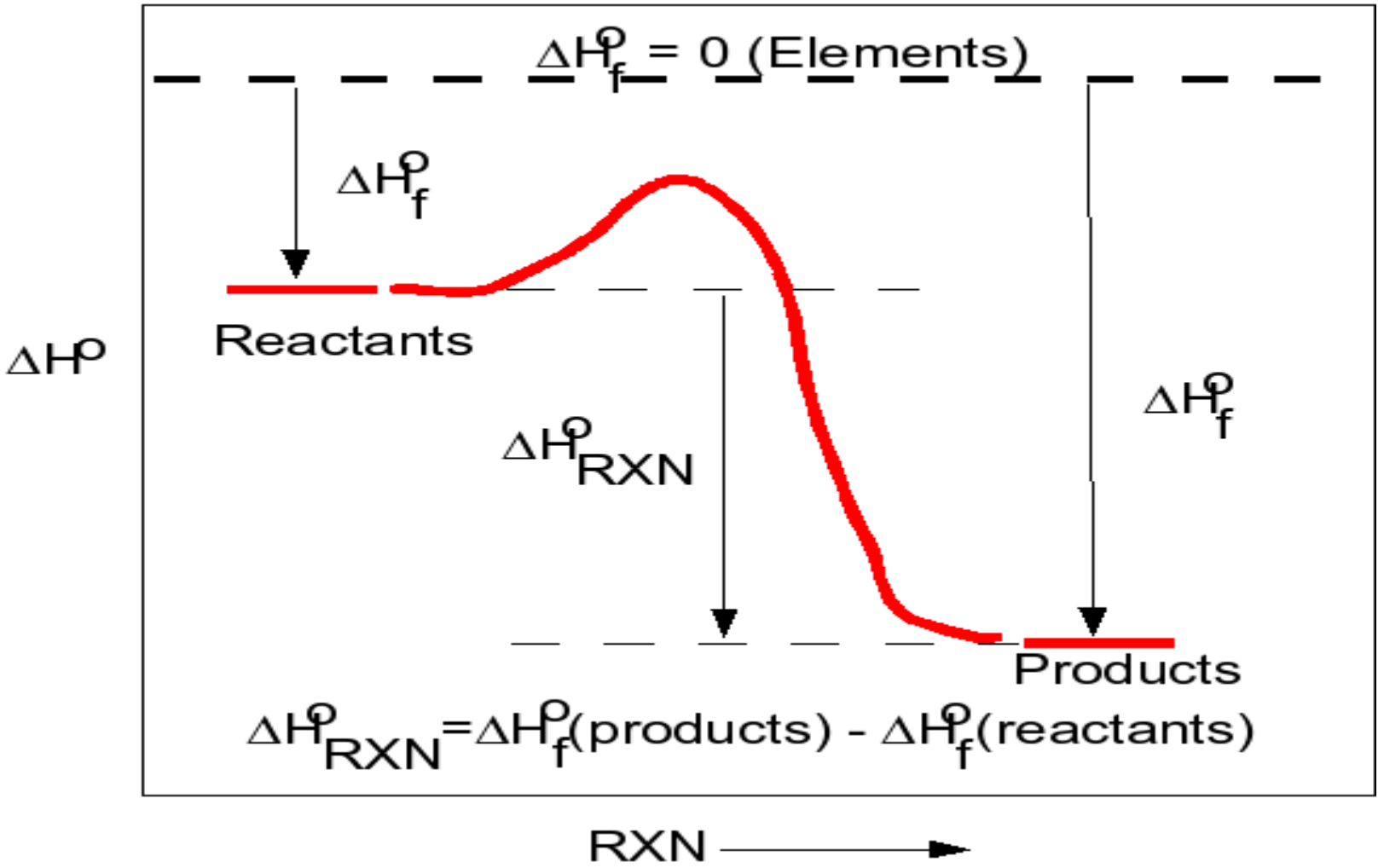
Calorimetry

- Use insulated container to make q=0 (no heat exchange with surroundings).
- Key relationship
  - $q = 0 = \Delta H_{RXN} + C\Delta T$, where C = heat capacity of everything in calorimeter.
  - => $\Delta H_{RXN} = - C\Delta T$
- Research solution calorimeter:



Chang Table 9.2

Enthalpy of RXN from Enthalpy of Formation



Chang 6.4