Announcements

To join clicker to class today (Clickers with LCD display joins automatically):

- 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).

- Even if the weather is nice do not forget to wear appropriate clothing to lab!

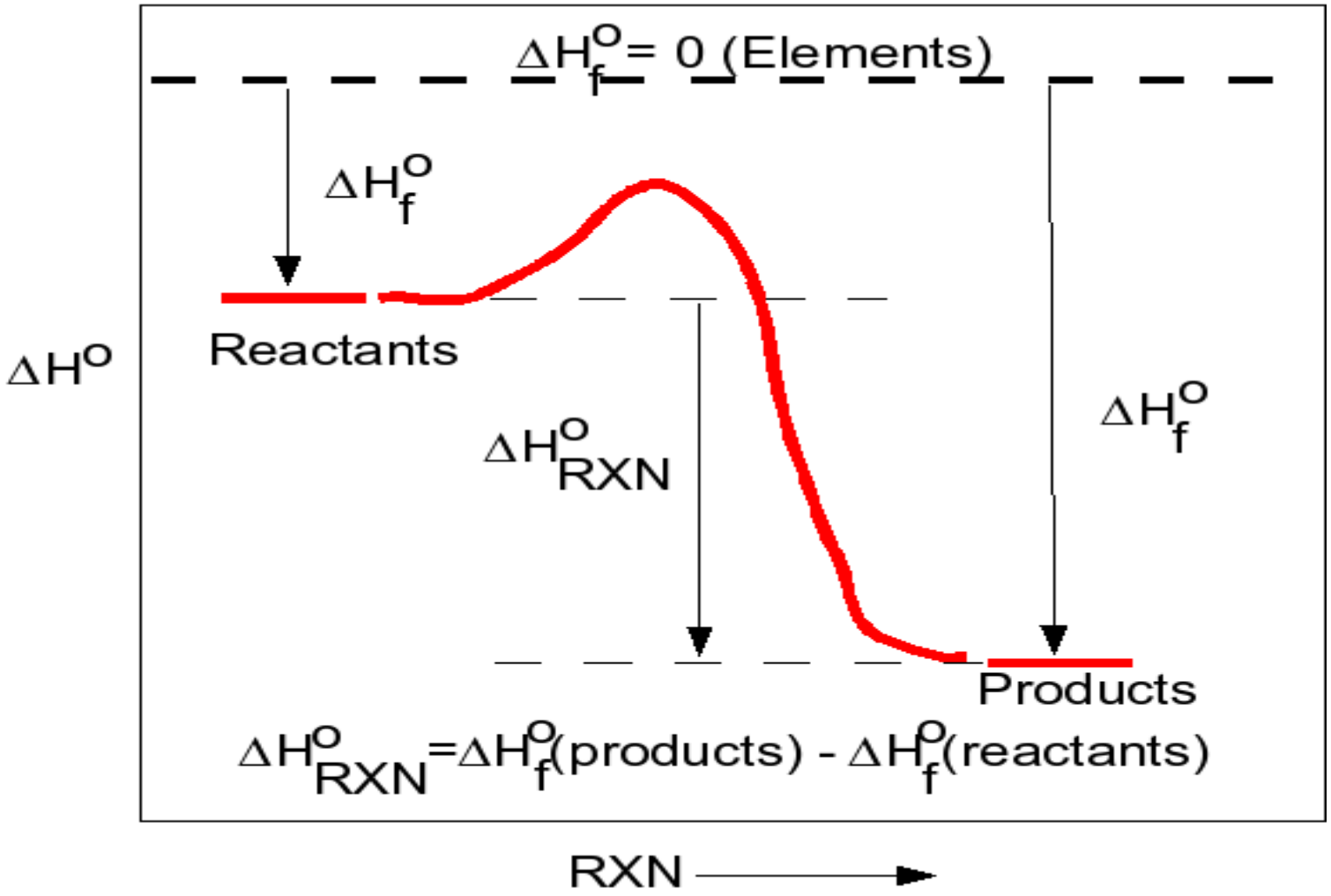
- Next exam (exam III) one week from Today.
- Exam III covers everything since exam II plus the material covered during the class immediately before exam II.

Review

- 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.)
- Internal Energy $\Delta E = q + w$ (energy is conserved).
- 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).
- Constant pressure/solution Calorimetry
  - Key relationship: $0 = \Delta H_{RXN} + C\Delta T \Rightarrow \Delta H_{RXN} = -C\Delta T$

Chang Table 9.2

Enthalpy of RXN from Enthalpy of Formation



$$\Delta H^{o}_{RXN} = \sum \Delta H^{o}_{f}(prod) - \sum \Delta H^{o}_{f}(react)$$

Chang Table 6.4

Substance	ΔH^{o}_{f} (kJ/mol)
CH_4	-74.8
C_2H_6	-84.7
C_2H_6O	-277.6
C_8H_{18}	-249.9
$C_6H_{12}O_6$	-1274.4

Molar $\Delta H_{combustion}$

Compound	Combustion Eq	ΔH as written (kJ)	Molar ΔH (kJ/mol)
CH_4 (Methane)	$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$	-802.3	-802.3
C_2H_6 (Ethane)	$2CH_3CH_3(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$	-2855	-1428
C_2H_6O (Ethanol)	$CH_3CH_2OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(g)$	-1234.8	-1234.8
C_8H_{18} (Octane)	$2C_8H_{18}(l) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(g)$	-9356	-4678
$C_6H_{12}O_6$ (glucose)	$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(g)$	-2537	-2537
H_2	$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$	-483.6	-241.8

Fuel Values

Compound	Combustion Eq	Molar ΔH (kJ/mol)	Molar Mass (g)	Fuel Value (kJ/g)
CH_4 (Methane)	$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$	-802.3	16.04	50.02
C_2H_6 (Ethane)	$2CH_3CH_3(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$	-1428	30.07	47.49
C_2H_6O (Ethanol)	$CH_3CH_2OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(g$	-1234.8	46.07	26.8
C_8H_{18} (Octane)	$2C_8H_{18}(l) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(g$	-4678	114.23	40.95
$C_6H_{12}O_6$ (glucose)	$C_6H_{12}O_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(g)$	-2537	180.16	14.08
H_2	$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$	-241.8	2.02	120