

# Gen Chem

Wednesday 11/11/15

Today: Finish Chp 9 for test  
Read: 9.1-9.3, 9.11  
Do problems: 9.4-9.10

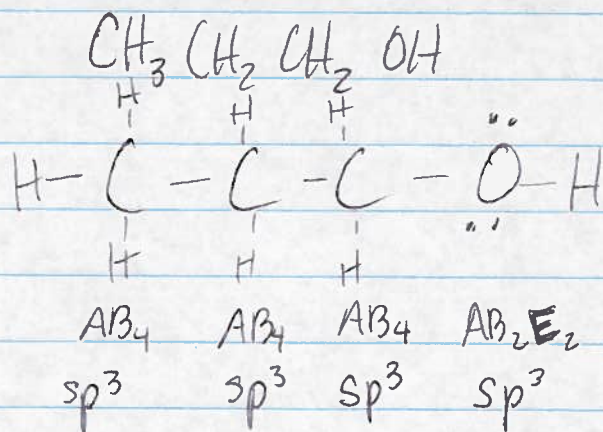
Thursday: Review @ 6pm Eppley 110  
Chem Show @ 7:30pm Riggs 120

Friday: Miscellaneous topics in Chp 7-9

Sunday: Review @ 7pm Eppley 110

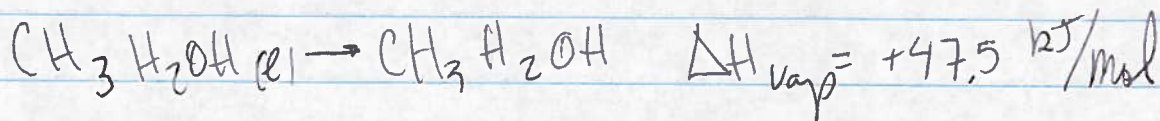
Monday: CK5

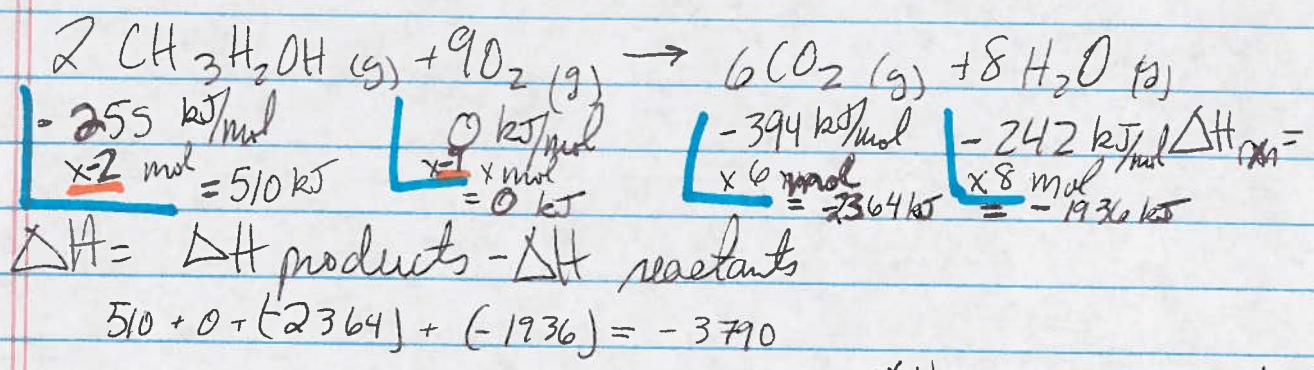
## 1-propanol



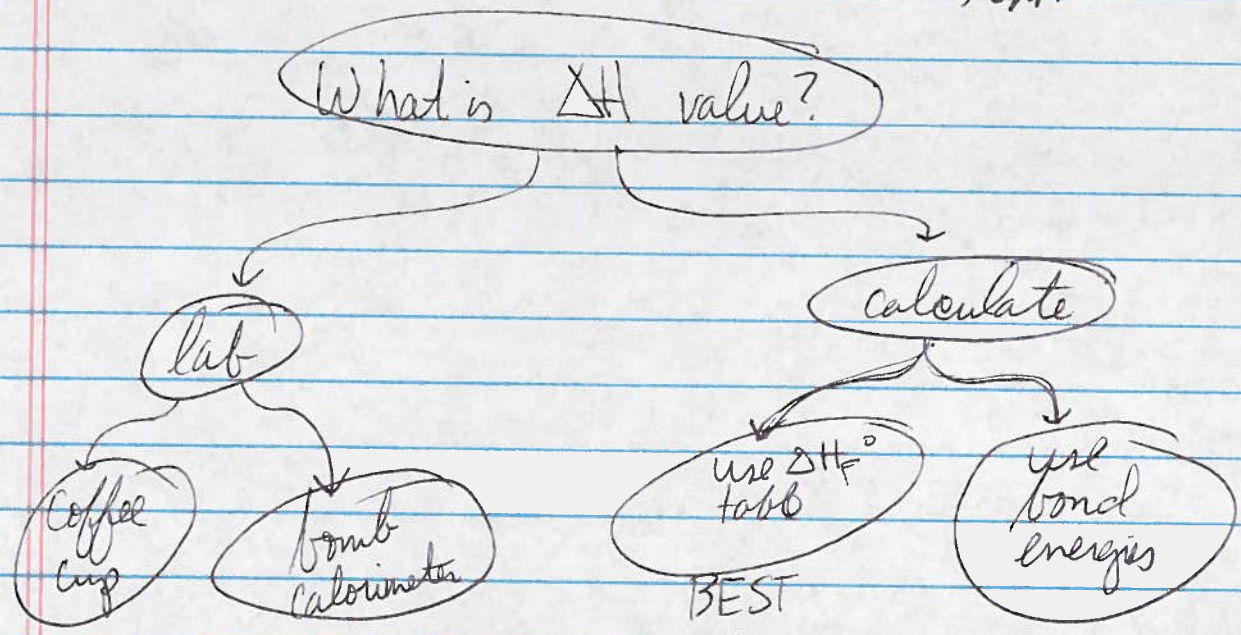
London dispersion ✓  
dipole-dipole: kind of...  
H-bonding: ✓

bp: 97°C

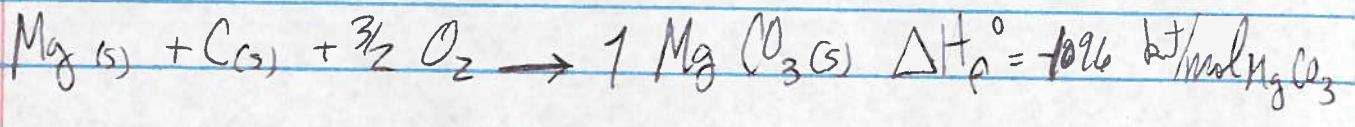
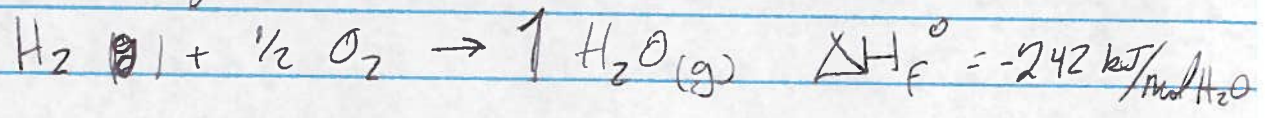


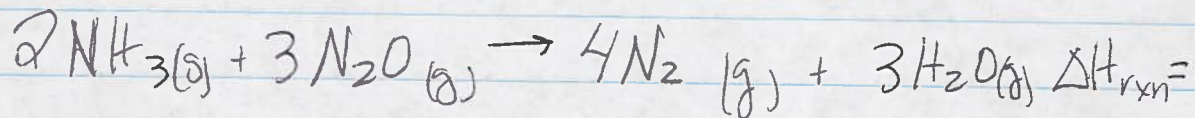


$$\Delta H_{\text{rxn}} = -3790 \text{ kJ}$$



Heat of formations     Enthalpy of formations





$\Delta H_f^\circ$	-46 kJ/mol	+82 kJ/mol	0 kJ/mol	-242 kJ/mol
	x -2 mol	x -3 mol	x 4 mol	x 3 mol
	92 kJ	-246 kJ	0 kJ	-726 kJ

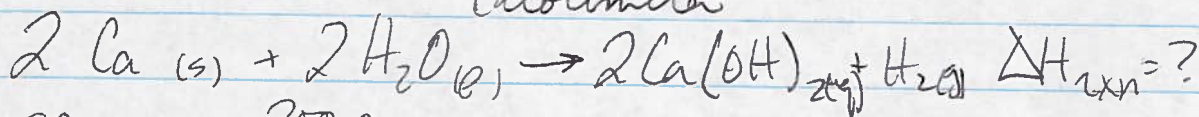
$$\begin{array}{r} + \\ 92 \end{array}$$

$$+ (-246)$$

$$+ (-726)$$

$$\boxed{-880 \text{ kJ}}$$

Calorimeter



60 mole'	.80 g	200.0 g
	.0200 mol	

$$T_i = 22.5^\circ\text{C} \quad T_f = 39.9^\circ\text{C}$$

$$q = SH_{\text{sol'n}} * M_{\text{sol'n}} * \Delta T_{\text{sol'n}}$$

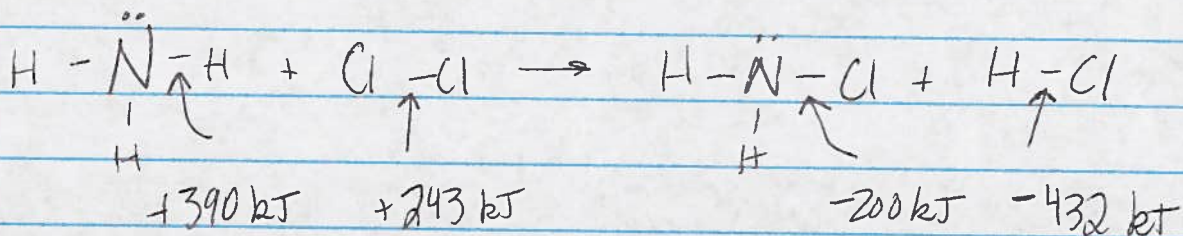
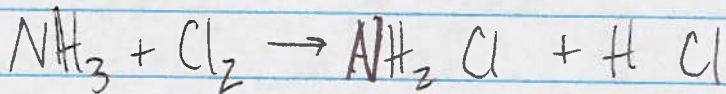
$$= \frac{4.18 \text{ J}}{\text{g deg}} * 200.8 \text{ g} * (39.9 - 22.5)_{\text{deg}} = 14605 \text{ J}$$

$$= 14.6 \text{ kJ}$$

$$q_{\text{rxn}} = -q_{\text{cal}} = -14.6 \text{ kJ}$$

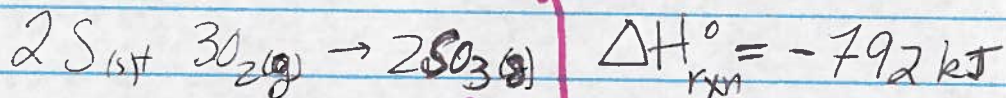
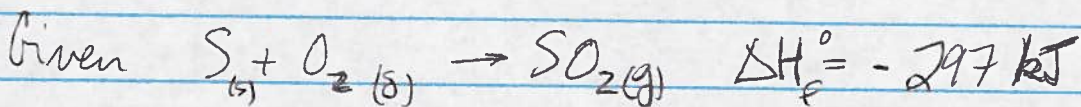
$$\Delta H_{\text{rxn}} = \frac{-14.6 \text{ kJ}}{.0200 \text{ mol Calcium}} = -730 \text{ kJ/mol Ca}$$

$$\text{mol of LR} = \frac{-1460 \text{ kJ}}{2 \text{ mol Ca}} = \boxed{-1460 \text{ kJ}}$$

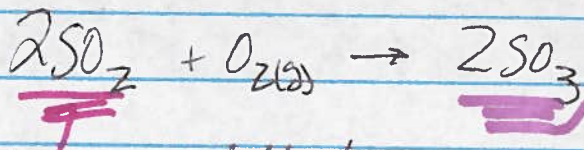


$$390 + 243 - 200 - 432 = +1 \text{ kJ}$$

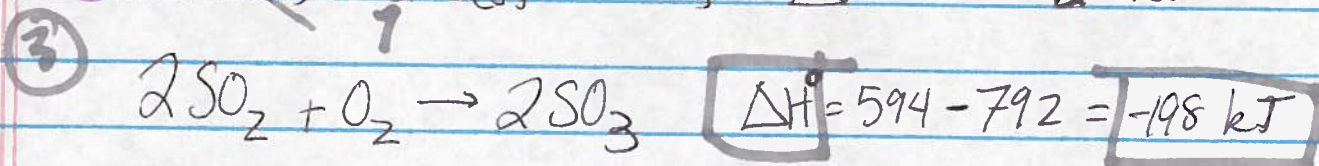
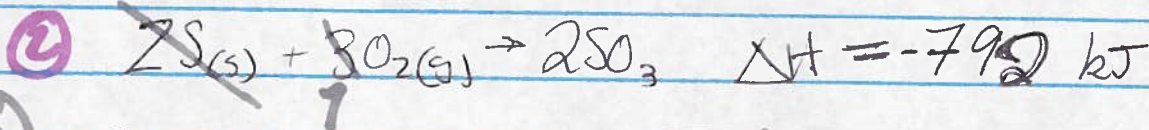
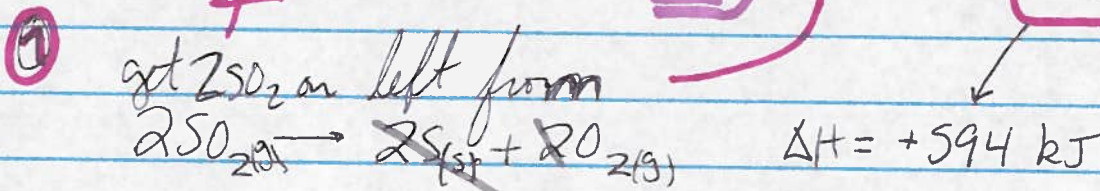
Hess's Law



Calc  $\Delta H^\circ$  For



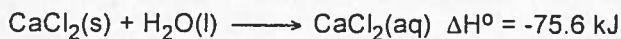
$-(-297) \times 2$



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Chm 203 Student number: TA

1. Calculate  $q_{cal}$  when 30.0 g of calcium chloride is dissolved in water in a well-insulated calorimeter, ~~the~~ ~~temperature of the solution.~~



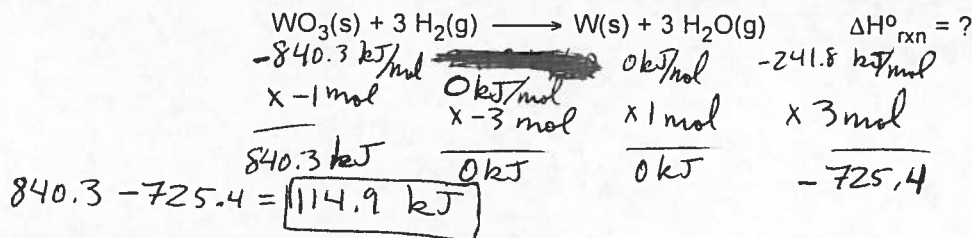
$$\Delta H^\circ = \frac{-75.6 \text{ kJ}}{1 \text{ mol CaCl}_2}$$

$$\Delta H^\circ = \frac{q_{rxn}}{\text{mol LR}} \Rightarrow -75.6 = \frac{q_{rxn}}{30.0 \text{ g} \times \frac{1 \text{ mol}}{(40.078 + 70) \text{ g CaCl}_2}} \Rightarrow q_{rxn} = 20.6 \text{ kJ} = -q_{cal}$$

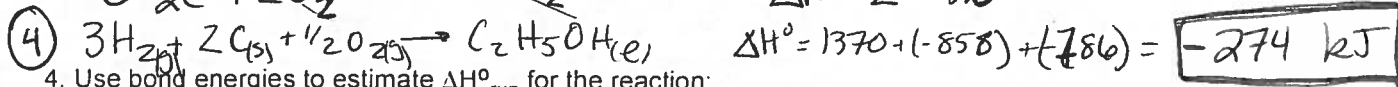
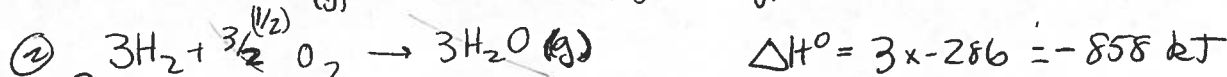
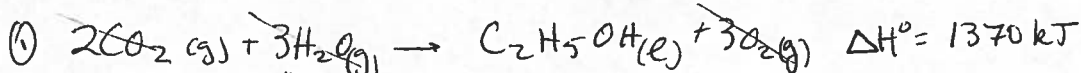
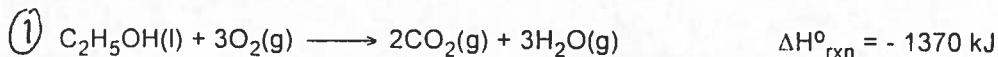
$$\boxed{q_{cal} = -20.6 \text{ kJ}}$$

2. Tungsten is obtained commercially by the reduction of  $\text{WO}_3$  with hydrogen according to the equation below.

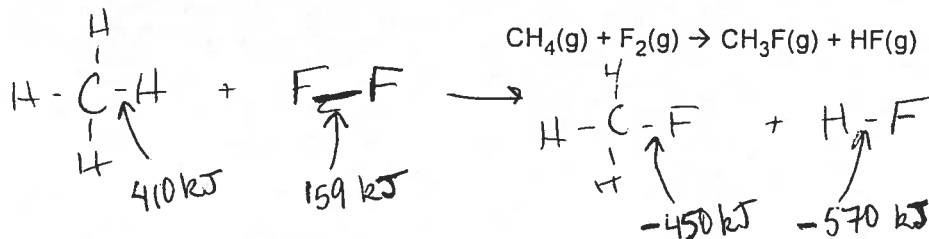
Use these  $\Delta H^\circ_f$  data to determine  $\Delta H^\circ_{rxn}$  for this reaction:  $\Delta H^\circ_f$  for  $\text{WO}_3(s) = -840.3 \text{ kJ/mole}$ ;  $\Delta H^\circ_f$  for  $\text{H}_2\text{O}(g) = -241.8 \text{ kJ/mole}$ .



3. The heat of formation of ethyl alcohol,  $\text{C}_2\text{H}_5\text{OH}$ , cannot be measured directly. Calculate this heat of formation from the following information:



4. Use bond energies to estimate  $\Delta H^\circ_{rxn}$  for the reaction:



$$\begin{array}{r} 410 \\ + 159 \\ - 450 \\ - 570 \\ \hline \boxed{-451 \text{ kJ}} \end{array}$$