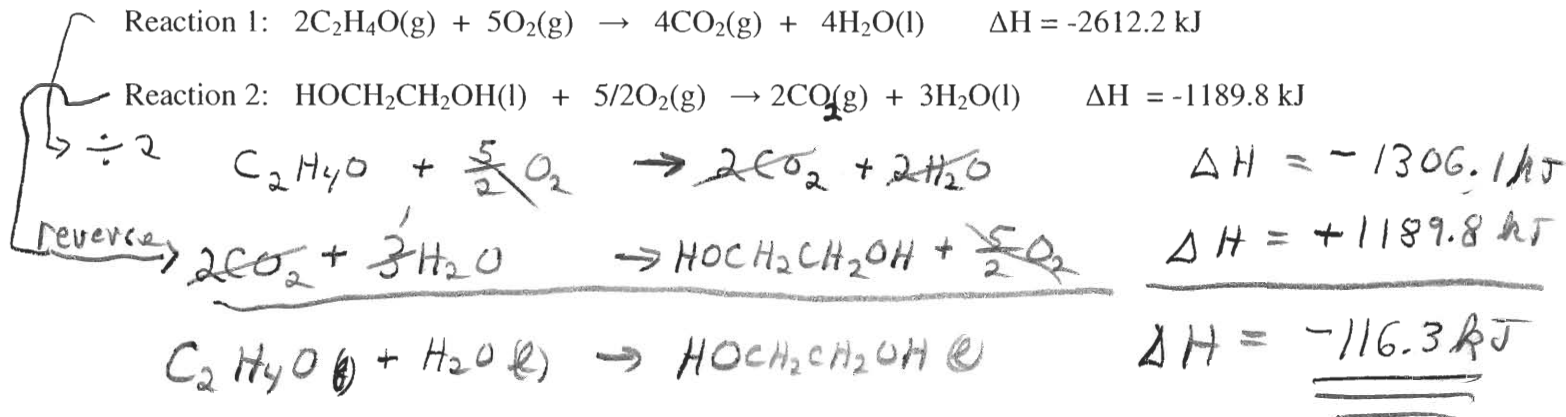
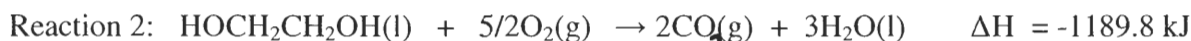


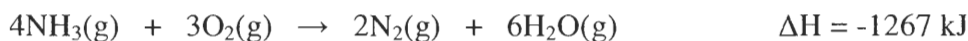
SHOW ALL WORK TO RECEIVE CREDIT.

Atomic Masses: N 14.01; H 1.008

1. (8 Pts) Use Hess's Law and the reactions below to determine the
- ΔH
- of:



2. (5 Pts) How
- ^{much}
- heat would be given off if 48.5 grams of ammonia are burned according to the following reaction carried out in the presence of a copper catalyst?



$$\frac{48.5 \text{ g NH}_3}{17.034 \text{ g/mol}} \times \frac{1267 \text{ kJ}}{4 \text{ mol NH}_3} = 901.9 \approx \underline{\underline{902 \text{ kJ}}}$$

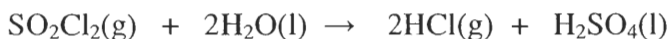
3. (4 Pts) Calculate the amount of heat needed to raise the temperature of 100 grams of ethanol from 25.0°C to 55.0°C. The specific heat of ethanol is 2.42 J/g·°C.

$$\frac{2.42 \text{ J}}{\text{g} \cdot ^\circ\text{C}} \times \frac{100 \text{ g}}{1} \times (55.0 - 25.0) = 7260 \text{ J}$$

4. (4 Pts) Determine the specific heat of a metal, if it takes 62.3 kJ to raise the temperature of a 165 gram metal sample from 298 K to 398 K.

$$\frac{62.3 \times 10^3 \text{ J}}{165 \text{ g} \times 100 \text{ K}} = \frac{3.78 \text{ J}}{\text{g} \cdot \text{K}}$$

5. (4 Pts) Determine the heat of the following reaction:



compound	ΔH kJ/mole
$\text{SO}_2\text{Cl}_2\text{(g)}$	-364
$\text{H}_2\text{O(l)}$	-286
HCl(g)	-92
$\text{H}_2\text{SO}_4\text{(l)}$	-814

$$\Delta H_{\text{rxn}} = \sum \Delta H_{\text{prod}} - \sum \Delta H_{\text{react.}}$$

$$[2(-92) + -814] - [-364 + 2(-286)]$$

$$-998 - -936$$

$$\Delta H_{\text{rxn}} = \underline{\underline{-62 \text{ kJ}}}$$