Dougherty Valley HS Chemistry - AP
Bonding – Bond Energies

Worksheet #5

Name: **Period:** **Seat#:**

Table 9.9 • Some Average Single- and Multiple-Bond Energies (kJ/mol)

	H	C	N	O	F	Si	P	S	Cl	Br	I
H	**436**	**413**	**391**	**463**	**565**	**318**	**322**	**347**	**432**	**366**	**299**
C		346	305	358	485			272	339	285	213
N			**163**	**201**	**283**				**192**		
O				146		452	335		218	201	201
F					**155**	**565**	**490**	**284**	**253**	**249**	**278**
Si						222		293	381	310	234
P							**201**		**326**		**184**
S								226	255		
Cl									**242**	**216**	**208**
Br										193	175
I											**151**

Multiple Bonds

N=N	418	C=C	602
N≡N	945	C≡C	835
C=N	615	C=O	732
C≡N	887	C≡O	1072
O=O (in O_2)	498		

Table 6.2 • Standard Enthalpies of Formation (kJ/mol)

$C_2H_6(g)$	ethane	-84.7
$H_2O(g)$	water vapor	-241.8
$CO_2(g)$	carbon dioxide	-393.5

1) Write the balanced chemical equation for the complete combustion of ethane, C_2H_6 (g)

2) Draw the structural formulas (Lewis Structures) for each of the species in Question 1

3) Calculate the energy needed to break the bonds in the reactants using Table 9.9 on the front of this sheet:

Calculate the energy released as the bonds in the products are formed using Table 9.9 on the front of this sheet:

4) What is the $\Delta Hc_{ombustion}$ based on bond energies?

5) Calculate the ΔHcombustion using the thermodynamical data from Table 6.2 on the front of this sheet.

6) What do you notice about the answer to Question 4 and Question 5? Identical, close, far apart? What might explain what you notice?