Name_____ Per._____ /25

Enthalpies of Reactions

Directions: Use the Average Bond Enthalpy table to determine the enthalpy change of each reaction.

Single Bonds (gaseous molecules) (kJ/mole)

C−H	413	N−H	391	O−H	463	F−F	155
C−C	348	N−N	163	O−O	146		
C−N	293	N−O	201	O−F	190	Cl−F	253
C−O	358	N−F	272	O−Cl	203	Cl−Cl	242
C−F	485	N−Cl	200	O−I	234		
C−Cl	328	N−Br	243			Br−F	237
C−Br	276			S−H	339	Br−Cl	218
C−I	240	H−H	436	S−F	327	Br−Br	193
C−S	259	H−F	567	S−Cl	253		
		H−Cl	431	S−Br	218	I−Cl	208
Si−H	323	H−Br	366	S−S	266	I−Br	175
Si−Si	226	H−I	299			I−I	151
Si−C	301						
Si−O	368						
Si−Cl	464						

Multiple Bonds (gaseous molecules) (kJ/mole)

C=C	614	N=N	418	O=O	495
C≡C	839	N≡N	941		
C=N	615	N=O	607	S=O	523
C≡N	891			S=S	418
C=O	799				
C≡O	1072				

1) a) Write and balance the reaction of hydrogen gas with oxygen gas to produce water vapor:

b) Draw a sketch of all of the molecules involved in the above reaction.

c) Determine the enthalpy change of the reaction. Show all of your work! Remember that you have to add energy to break a bond (positive) and you get energy back when a new bond is formed (negative).

d) Is the reaction endothermic or exothermic?

2) a) Write and balance the reaction of nitrogen tribromide gas with fluorine gas to produce nitrogen trifluoride gas and bromine gas:

b) Draw a sketch of all of the molecules involved in the above reaction.

c) Determine the enthalpy change of the reaction. Show all of your work! Remember that you have to add energy to break a bond (positive) and you get energy back when a new bond is formed (negative).

d) Is the reaction endothermic or exothermic?

3) a) Write and balance the combustion reaction of ethene gas (CH_2CH_2):

b) Draw a sketch of all of the molecules involved in the above reaction.

c) Determine the enthalpy change of the reaction. Show all of your work! Remember that you have to add energy to break a bond (positive) and you get energy back when a new bond is formed (negative).

d) Is the reaction endothermic or exothermic?