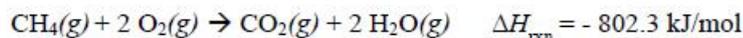
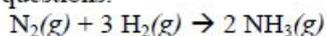


Bond Enthalpy problems

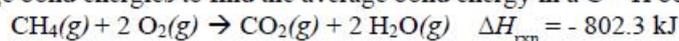
- 1) Using only the information given in the thermochemical equation below, make a comparison between the sum of the bond enthalpies of the reactants and the sum of the bond enthalpies of the products. Explain why one value is greater than the other.



- 2) The following questions pertain to the bonds between the carbon atoms in C_2H_6 and C_2H_4 .
- Draw visual representations that show the relative differences in bond lengths between the carbon atoms in C_2H_6 and C_2H_4 .
 - Which carbon-carbon bond contains the least amount of potential energy? Justify your answer.
 - Which carbon-carbon bond requires the greatest input of energy in order to be broken? Justify your answer.
- 3) Determine the enthalpy change, ΔH_{rxn} , that occurs when two gaseous oxygen atoms combine to form a gaseous oxygen molecule ($2 \text{O}(g) \rightarrow \text{O}_2(g)$) using the table of average bond energies.
- 4) Use the chemical equation below and the table of average bond energies to answer the following questions.



- Draw Lewis structures for all three species represented in the reaction above.
 - Calculate the enthalpy change, ΔH_{rxn} , that occurs in the reaction.
 - Draw a symbolic representation that demonstrated the flow of energy between the system and the surroundings.
 - Is the process endothermic or exothermic?
- 5) Use the thermochemical equation for the combustion of methane and the table of average bond energies to find the average bond energy in a C – H bond.



- 6) Use the chemical equation and the table of average bond energies to answer the following questions.



- Draw Lewis structures for all four species represented in the reaction above.
- Calculate the enthalpy change, ΔH_{rxn} , that occurs in this reaction.

- 7) Use the chemical equation and the table of average bond energies to answer the following questions.



- Draw Lewis structures for all four species represented in the reaction above.
- Calculate the enthalpy change, ΔH_{rxn} , that occurs in this reaction.

Bond	Average Bond Enthalpies
O – C	351 kJ/mol
O = C	799 kJ/mol
O – O	142 kJ/mol
O = O	499 kJ/mol
C – C	348 kJ/mol
C = C	612 kJ/mol
C \equiv C	960 kJ/mol
H – H	436 kJ/mol
H – C	412 kJ/mol
H – O	467 kJ/mol
N – N	193 kJ/mol
N = N	418 kJ/mol
N \equiv N	941 kJ/mol
N – H	393 kJ/mol