N4 – Thermochemistry –
Heat of Formation
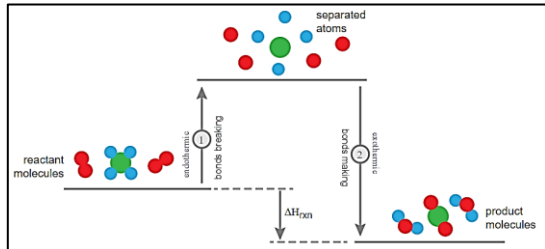
Practice #1 - Calculate ΔH for the combustion of methane, CH_4 **$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$**

Formula	ΔH_f (kJ)
CH_4	-74.80
O_2	0
CO_2	-393.50
H_2O	-285.83
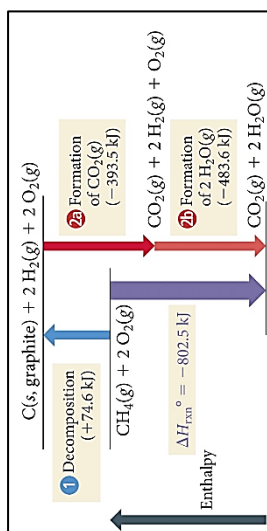
Practice #2 - Ethanol is used as an additive in many fuels today. What is $\Delta H°_{rxn}$ (kJ) for the combustion of ethanol?

$2\ C_2H_5OH\ (l) + 6\ O_2\ (g) \rightarrow 4\ CO_2\ (g) + 6\ H_2O\ (l)$

Formula	$\Delta H°_f$
C_2H_5OH (l)	−277.6
CO_2 (g)	−393.5
H_2O (g)	−241.8
H_2O (l)	−285.8
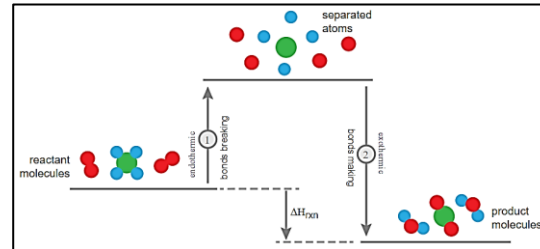
Practice #3 – What is the enthalpy of formation for the equation below, using the table of bond energies provided.
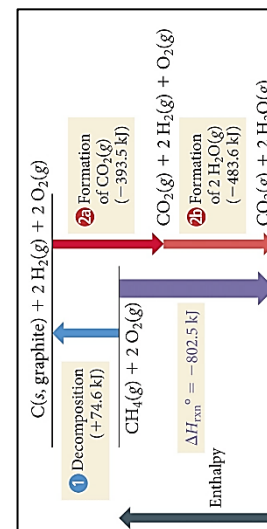
Single Bond Energies (kJ/mol of bonds)

	H	C	N	O	S	F	Cl	Br	I
H	436								
C	413	346							
N	391	305	163						
O	463	358	201	146					
S	347	272	—	—	226				
F	565	485	283	190	284	155			
Cl	432	339	192	218	255	253	242		
Br	366	285	—	201	217	249	216	193	
I	299	213	—	201	—	278	208	175	151

Multiple Bond Energies (kJ/mol of bonds)

C=C 602	C=N 615	C=O 799
C≡C 835	C≡N 887	C≡O 1072
N=N 418	N=O 607	
N≡N 945	O=O 498	