Name: _____ date: _____ period: _____

Ch. 8 Accounting for mass and energy test 50 points (2 ec) ngss chem

In problems involving calculations, show your work in an organized manner, include the appropriate formula / equation, conversion factors, and units in your answer.

1. Based on CW / HW ch. 8.1a – balancing a chemical equation: Fill-in the below blanks to "balance" the chemical equations using the lowest ratio of integers; enter "1" if it's "1"; otherwise, lost of point(s). [12 points]

   a. 2 C_4H_{10} + 13 O_2 → 8 CO_2 + 10 H_2O

   b. 2 C_3H_7OH + 7 O_2 → 6 CO_2 + 4 H_2O

   c. 2 Li_3PO_4 + 3 BaF_2 → 1 $Ba_3(PO_4)_2$ + 6 LiF

2. Based on CW / HW ch. 8.1b – moles: Solve. [10 points]

   a. 125 grams $Ca(NO_3)_2$ = ____ moles $Ca(NO_3)_2$

$125\text{ g } Ca(NO_3)_2 \times \frac{\text{mol}}{164\text{ g}} = 0.76\text{ mol } Ca(NO_3)_2$

3 2+4

   b. 0.125 mole CO_2 = ___ grams CO_2

$0.125\text{ mol } CO_2 \times \frac{44\text{ g}}{\text{mol}} = 5.5\text{ g } CO_2$

3. Based on CW / HW ch. 8.1b – moles & stochiometry: Solve. How many grams of the green house gases, water and carbon dioxide, is produced by the combustion of 175 grams of ethane ?

175 g C_2H_6 + excess O_2 → _____ g CO_2 + ___ g H_2O

2 pt i) $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

4 ii) $175\text{ g } C_2H_6 \dfrac{1\text{ mol } C_2H_6}{30\text{ g } C_2H_6} \dfrac{4\text{ mol } CO_2}{2\text{ mol } C_2H_6} \dfrac{44\text{ g } CO_2}{1\text{ mol } CO_2} = 513\text{ g } CO_2$

4 $175\text{ g } C_2H_6 \dfrac{1\text{ mol } C_2H_6}{30\text{ g } C_2H_6} \dfrac{6\text{ mol } H_2O}{2\text{ mol } C_2H_6} \dfrac{18\text{ g } H_2O}{1\text{ mol } H_2O} = 315\text{ g } H_2O$

4. Based on weekly quiz and CW / HW ch. 8.1c: heat & bond enthalpy: using the below table,

TABLE 8.4 • Average Bond Enthalpies (kJ/mol)

Single Bonds

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						

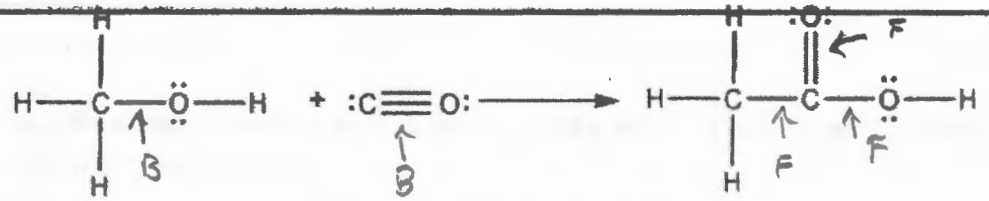
Multiple Bonds

C=C	614	N=N	418	O_2	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				

find ΔH for 125 grams of the first reactant (where there is excess of the second reactant) in the chemical equations on the next page. [20 points]

hints: balance chemical equation (2 points)
use above bond enthalpy table to find ΔH of the reaction (3 points)
identify bond(s) broken versus formed in the chemical reaction
convert 125 grams of first reactant to # moles of first reactant (2 points)
use preceding two calculations to obtain the answer (3 points)

a. $CH_3OH + CO \rightarrow CH_3COOH$



source: https://www.chegg.com/homework-help/questions-and-answers/use-bond-energies-ca1culate-heat-reactions-answer-kj-answer-kj-q6120769

$\Delta H = \Sigma D_{break} - \Sigma D_{form}$

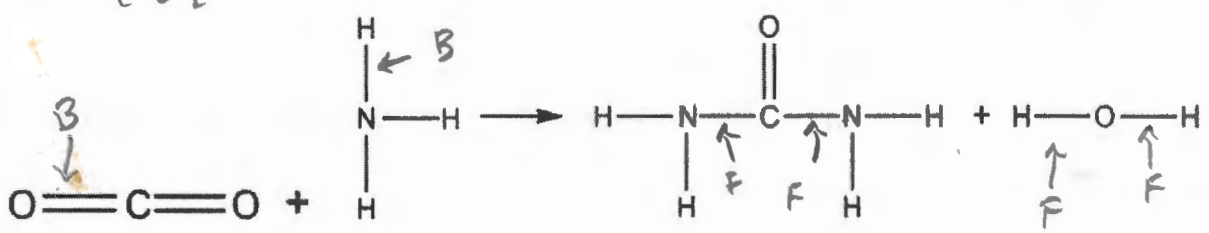
$= [D(C-O) + D(C\equiv O)] - [D(C-O) + D(C=O) + D(C-$

$= [(358 + 1072) - (358 + 799 + 348)]$ kJ

$= (1430 - 1505)$ kJ

$= -75$ kJ $\frac{}{\text{mol}}$ 125 g $\frac{\text{mol}}{32\text{ g}}$ = (-293 kJ)

b. $CO_2 + 2NH_3 \rightarrow (NH_2)_2CO + H_2O$



source: https://www.chegg.com/homework-help/questions-and-answers/use-bond-energies-calculate-heat-reaction-bond-enthalpy-kj-mol-c-n-305-c-o-358-c-o-745-c-o-q6362055

$\Delta H = \Sigma D_{break} - \Sigma D_{form}$

$= [D(C=O) + 2D(N-H)] - [2D(C-N) + 2D(O-H)]$

$= [(799 + 2(391)] - [2(293) + 2(463)]$ kJ

$= 1581 - 1512$

$= +69$ kJ $\frac{}{\text{mol}}$ 125 g $\frac{\text{mol}}{44\text{ g}}$ = (196 kJ)