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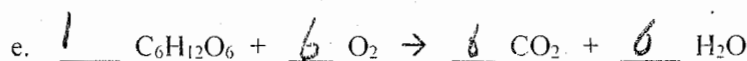
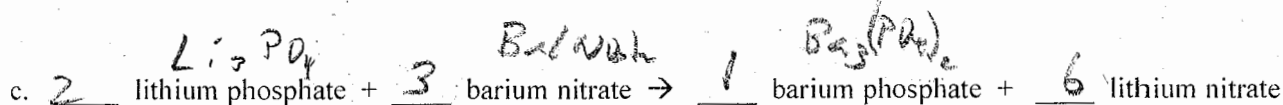
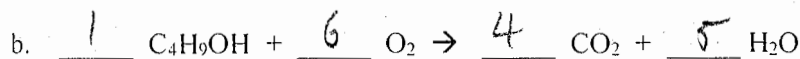
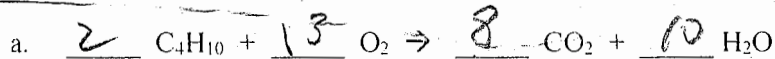
Ch. 8 accounting for mass & energy

test 50 points [5 ec]

ngss chem

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

1. Fill-in the below blanks using the lowest ratio of integers; write "1" as appropriate. [10 points]



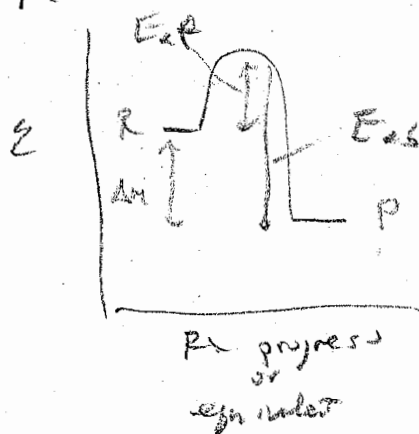
2. Regarding the reaction: 3 H₂ + N₂ → 2 NH₃, ΔH = -92 kJ and E_{a,b} = 150 kJ. [10 points] *energy level*

a. Sketch the reaction energy profile of this reaction and clearly label the axes, E_{a,b}, E_{a,f}, and ΔH. *R ≠ P*

2 pt

1 pt

3 pt



b. What is the numeric value of E_{a,f}?

2 pt

$$E_{af} - E_{ab} = \Delta H$$

2

$$\begin{aligned}
 E_{af} &= \Delta H + E_{ab} \\
 &= (-92 + 150) \text{ kJ} \\
 &= 58 \text{ kJ}
 \end{aligned}$$

3. In regards to a reaction, circle the appropriate choice(s). [10 points]

a. an endothermic reaction

2 pt free

i. generates heat

ii. consumes heat

iii. $\Delta H < 0$

iv. $\Delta H > 0$

b. an exothermic reaction

2 pt @

v. generates heat

vi. consumes heat

vii. $\Delta H < 0$

viii. $\Delta H > 0$

4. In regards to the melting of ice, describe the (i) experimental protocol to examine the validity of the conservation of mass, (ii) experimental data to be collected, and (iii) how to interpret the experimental results to confirm versus refute the conservation of mass. [15 points]

5 pt @

i) find # g ice

let ice melt

find # g H₂O; is melted ice

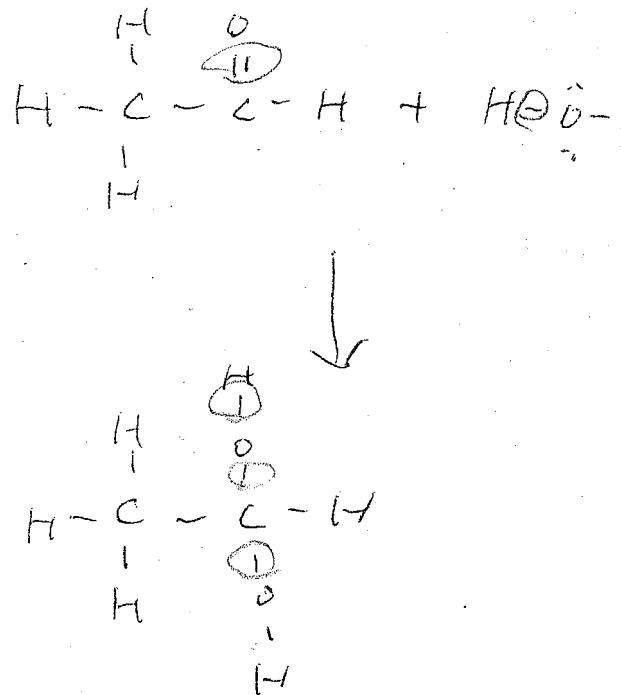
ii) # g ice - before melt

g H₂O liquid - after melt

iii) if # g ice = # g liquid, then support
if # g ice \neq # g liquid, then refute

5. Based on the information in the below table [10 points; weekly quiz problem]

Single Bonds				Multiple Bonds	
All values are for one bond, with units of 10^{-22} kJ					
N-H	6.49	H-H	7.17	F-F	2.56
N-N	2.66	H-F	9.38	F-Cl	4.20
N-F	4.52	H-Cl	7.09	F-Br	3.94
N-O	3.32	H-Br	6.03	Cl-Cl	3.97
N-Br	4.04	H-I	4.90	Cl-Br	3.62
N-I	3.34	O-H	7.75	Br-Br	3.20
O-H	6.86	O-O	2.42	I-I	2.47
O-O	5.76	O-F	3.16	I-Cl	3.45
O-F	5.06	O-Cl	3.37	I-Br	2.91
O-Cl	5.94	O-I	3.89	S-H	5.76
O-I	8.05			S-F	5.43
Si-Si	5.63	Si-Si	5.65	S-Cl	4.20
Si-H	4.58	Si-H	6.53	S-Br	3.62
Si-C	3.99	Si-C	5.98	S-S	4.42
Si-O	4.30	Si-O	7.51		
				O=O	8.22
				C=O	12.37
				*C=O	13.27
				C≡C	10.20
				C=N	10.21
				N=N	6.94
				N=O	10.08
				C=C	13.93
				C=O	17.80
				C#N	14.80
				N≡N	15.63



what is the change in enthalpy in the reaction: $\text{CH}_3\text{CHO} + \text{H}_2\text{O} \rightarrow \text{CH}(\text{CH}_3)(\text{OH})_2$

$$\Delta H = \sum D_{\text{break}} - \sum D_{\text{form}}$$

$$= [D(\text{C}=\text{O}) + D(\text{O}-\text{H})] - [2D(\text{C}-\text{O}) + 2D(\text{O}-\text{H})]$$

$$= 12.37 - 2(5.94)$$

$$= 12.37 - 11.88$$

$$= +0.49 \cdot 10^{22} \text{ kJ}$$