

1. (6 Pts) When 45.0 g of an alloy at 100.0 °C is dropped into 100.0 g of water at 25.0 °C, the final temperature is 37.0 °C. What is the specific heat of the alloy? (Specific Heat of Water = 4.18 J/g·K)

Sp Ht units: $\frac{J}{g \cdot ^\circ C}$ so find each quantity
Assume Heat lost by Alloy = Heat gained by H₂O
for H₂O: $\frac{4.18 J}{g \cdot ^\circ C} \times 100.0 g \times 12.0 K = 5016 J$ for Alloy: $\frac{5016 J}{45.0 g \times 63 K} = 1.77 \frac{J}{g \cdot K}$

2. (6 Pts) The heats of formation, ΔH_f° in are shown in the table. What is ΔH in kJ for the reaction



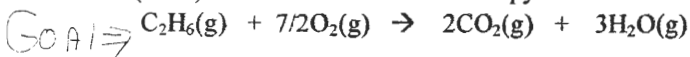
Compound	ΔH_f° kJ/mole
C ₂ H ₂ (g)	+227
H ₂ O(g)	-242
CO ₂ (g)	-393

$$\Delta H_{rxn} = \sum n \Delta H_{products} - \sum n \Delta H_{Reactants}$$

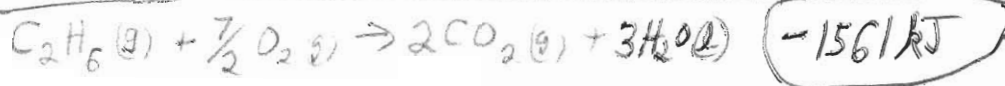
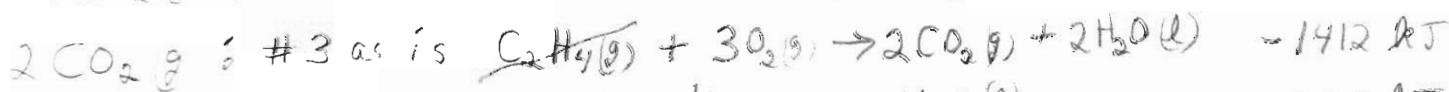
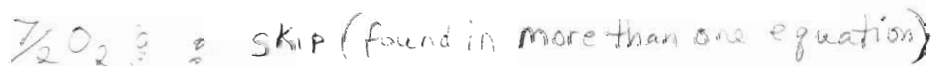
$$= [4(-393) + 2(-242)] - [2(227) + 0]$$

$$= -2056 - 454 = -2510 \text{ kJ}$$

3. (7 Pts) What is the standard enthalpy of combustion of C₂H₆ in kJ·mol⁻¹?



Thermochemical Data	
1. H ₂ (g) + 1/2 O ₂ (g) → H ₂ O(l)	$\Delta H^\circ = -286 \text{ kJ}$
2. C ₂ H ₄ (g) + H ₂ (g) → C ₂ H ₆ (g)	$\Delta H^\circ = -137 \text{ kJ}$
3. C ₂ H ₄ (g) + 3O ₂ (g) → 2CO ₂ (g) + 2H ₂ O(l)	$\Delta H^\circ = -1412 \text{ kJ}$



4. (6 Pts) Given the equation: 2SO₂(g) + O₂(g) → 2SO₃(g) $\Delta H = -200 \text{ kJ}$ Calculate the value of ΔH when 45 grams of SO₃(g) are formed. (molar masses S = 32.06, O = 16.00)

45 g SO₃ $\frac{1 \text{ mol}}{80.06 \text{ g}}$ $\frac{-200 \text{ kJ}}{2 \text{ mol SO}_3}$ = -56.2 kJ = ΔH