

Name: _____

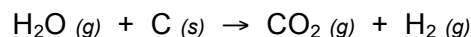
Date: _____

Chemistry
Thermochemistry WS 3 - Heat Change (ΔH)

Perform the following calculations, showing all work and reporting your answers with the **correct sign**:

1. When 20.0 g of solid NaOH ($\Delta H_{\text{soln}} = -44.51 \text{ kJ/mol}$) dissolves in 100.0 mL of water, how much heat should be released?
2. How much heat is released when an acetylene (C_2H_2) torch burns 263 grams of fuel ($\Delta H_{\text{comb}} = -1300. \text{ kJ/mol}$)?
3. How much heat is absorbed by a 58.3 g ice cube ($\Delta H_{\text{fus}} = 6.01 \text{ kJ/mol}$) as it melts?
4. ΔH for the fusion of ethanol ($\text{C}_2\text{H}_5\text{OH}$) at 158.7 K is 4.60 kJ/mol. How much energy is given off in the freezing of 54 g of ethanol?
5. ΔH_f° for the formation of rust (Fe_2O_3) is -826 kJ/mol. How much energy is involved in the formation of 5.00 g of rust?
6. Knowing that 65.2 kJ/mol are required, calculate the amount of heat evolved when 15.0 g of Ca(OH)_2 forms from the reaction of calcium oxide with water.

7. Calculate the amount of heat in kilojoules needed to convert 190.0 g of liquid water to steam at 100.0°C ($\Delta H_{\text{vap}} = 40.65 \text{ kJ/mol}$).
8. When propane (C_3H_8) is burned in oxygen gas (O_2), it forms carbon dioxide and water while releasing 2220 kJ/mol of heat energy. How much energy will be released when 55 L of propane is burned at STP?
9. The heat of formation for table salt, or sodium chloride, is -411.0 kJ/mol. If 2745 kJ of heat are released in a chemical reaction that forms salt, how many grams will be formed?
10. Urea ($\text{CO}(\text{NH}_2)_2$), the first organic compound artificially synthesized, is a common fertilizer that we sometimes use in Lab #3-2 if we run out of materials. Imagine that you've completed Lab #3-2 by dissolving urea in distilled water, resulting in the absorption of 273 kJ of heat. Knowing that ΔH_{soln} of urea is +15 kJ/mol, how many grams of urea were dissolved?
11. To produce the original "water gas" mixture, carbon is reacted with steam:



The ΔH for this reaction is +131.4 kJ/mol; calculate the amount of carbon dioxide gas that will be produced by applying 650. kJ of energy.