*Worksheet due dates:* <u>Mon, 11/18</u>, 1:10 PM (01), <u>Wed, 11/13</u>, 1:10 PM (H1) or 11:59 PM (W1, email). To complete, show *detailed steps* on how to get the given answer for each problem. *Failure to use this form for work and answers will result in a point penalty.* 

Name:

<u>Problem 1</u>: You take an aspirin tablet (which contains only carbon, hydrogen and oxygen) with a mass of 1.000 g and burn it in air to collect 2.20 g of carbon dioxide and 0.400 g of water. A molar mass experiment shows a value between 170 and 190 g/mol. What is the molecular formula for aspirin?

Answer to Problem #1: C9H8O4

<u>Problem 2</u>: The reaction of 23.1 g of NH<sub>3</sub> and 18.3 g of O<sub>2</sub> produces 4.10 g of NO. What is the percent yield for this reaction? The equation for this reaction is:  $4 \text{ NH}_3(g) + 5 \text{ O}_2(g) \rightarrow 4 \text{ NO}(g) + 6 \text{ H}_2\text{ O}(g)$  Note: Check both reactants for credit on this problem.

<u>Problem 3</u>: What volume of 0.300 M NaCl is required to precipitate all the Pb<sup>2+</sup> ion from 25.0 mL of aqueous 0.440 M Pb(NO<sub>3</sub>)<sub>2</sub>? The reaction is:  $Pb(NO_3)_2(aq) + 2 NaCl(aq) \rightarrow PbCl_2(s) + 2 NaNO_3(aq)$ 

Answer to Problem #3: 73.3 mL

<u>Problem 4</u>: If 1.00 mole of ethanol, CH<sub>3</sub>CH<sub>2</sub>OH, at 22.0 °C absorbs 1.45 kJ of heat, what is the final temperature of the ethanol? The specific heat capacity for ethanol is 2.44 J/gK.

Answer to Problem #4: 34.9 °C

<u>Problem 5</u>: The standard molar enthalpy of formation of  $NH_3(g)$  is -45.9 kJ/mol. What is the enthalpy change if 5.38 g of  $N_2(g)$  and 3.32 g of  $H_2(g)$  react to form  $NH_3(g)$ ? *Note:* Check **both** reactants for credit on this problem.