HONORS CHEMISTRY
WORK SESSION 9d. Name: _____

REVIEW PROBLEMS. **SHOW ALL WORK.** R = .0821 L atm / mole K

S.T.P. = standard temperature (273 K = 0^oC) and pressure (760 mm Hg = 1 atm)

For water (H_2O): Specific heat capacity = 1 cal /g ^oC

Heat of fusion = 80 cal /g K_{fp} = -1.86 kg K /mol = -1.86 ^oC /molal

Heat of vaporization = 540 cal /g K_{bp} = 0.51 kg K /mol = 0.51 ^oC /molal

1. Find the melting point of a solution made by mixing 14.8 g of Na_2CO_3 with 340.0 g water.

2. Given the values in the accompanying table, find the enthalpy change for the following reaction, and determine whether it is exothermic or endothermic:

C_6H_6 (benzene) (*l*) + 7½ O_2 (*g*) ----> 6 CO_2 (*g*) + 3 H_2O (*g*)

Substance	ΔH_f at 25° C
CO_2 (*g*)	- 393.5 kJ
C_6H_6 (*l*)	+ 49.1 kJ
H_2O (*g*)	-241.8 kJ

3. Find the amount of energy needed to change 650.0 g of ice at 0.0^oC into water at 28^oC.

4. According to the equation Zn + 2 HCl ----> $ZnCl_2$ + H_2 ,
what volume of H_2 gas at S.T.P. could be obtained from 180.0 ml of a 1.25 M HCl solution?

ADDITIONAL REVIEW PROBLEMS ON REVERSE SIDE!

5. A chemist has 24.5 ml of 6M KOH on hand. How much 0.650 M KOH can she make?

6. How many grams of $Sr(NO_3)_2$ are needed to make 250.0 ml of a 0.850 M solution?

7. What mass of CO_2 exerts 2.70 atm pressure when confined in a 7.50 L container at 12.0°C ?

8. A balloon is filled with 5.500 L of helium at 745 mm Hg and 21° C. It escapes upward to an altitude where the pressure is 298 mm Hg and the temperature is -18° C. Find the new volume.

9. A reaction has ΔH = -380 kJ and ΔS = -46 J/K.

a. Calculate ΔG at 25° C. Is the reaction spontaneous at this temperature?

b. Over what range of temperatures, if any, will this reaction be spontaneous?

10. For a particular reaction, ΔH = +140.0 kJ and ΔS = +238.3 J /K. For what temperatures, if any, will this reaction be spontaneous? Be careful with your units!