

HONORS CHEMISTRY  
WORK SESSION 9d.

Name: \_\_\_\_\_

REVIEW PROBLEMS. **SHOW ALL WORK.**  $R = .0821 \text{ L atm / mole K}$

S.T.P. = standard temperature ( $273 \text{ K} = 0^\circ\text{C}$ ) and pressure ( $760 \text{ mm Hg} = 1 \text{ atm}$ )

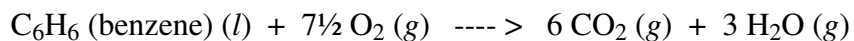
For water ( $\text{H}_2\text{O}$ ): Specific heat capacity =  $1 \text{ cal / g }^\circ\text{C}$

Heat of fusion =  $80 \text{ cal / g}$   $K_{\text{fp}} = -1.86 \text{ kg K / mol} = -1.86^\circ\text{C / molal}$

Heat of vaporization =  $540 \text{ cal / g}$   $K_{\text{bp}} = 0.51 \text{ kg K / mol} = 0.51^\circ\text{C / molal}$

1. Find the melting point of a solution made by mixing  $14.8 \text{ g}$  of  $\text{Na}_2\text{CO}_3$  with  $340.0 \text{ g}$  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:



<u>Substance</u>	<u><math>\Delta H_f</math> at <math>25^\circ\text{C}</math></u>
$\text{CO}_2 (g)$	$- 393.5 \text{ kJ}$
$\text{C}_6\text{H}_6 (l)$	$+ 49.1 \text{ kJ}$
$\text{H}_2\text{O} (g)$	$-241.8 \text{ kJ}$

3. Find the amount of energy needed to change  $650.0 \text{ g}$  of ice at  $0.0^\circ\text{C}$  into water at  $28^\circ\text{C}$ .

4. According to the equation  $\text{Zn} + 2 \text{HCl} \text{ ---- } > \text{ZnCl}_2 + \text{H}_2$ ,

what volume of  $\text{H}_2$  gas at S.T.P. could be obtained from  $180.0 \text{ ml}$  of a  $1.25 \text{ M}$   $\text{HCl}$  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  $\text{Sr}(\text{NO}_3)_2$  are needed to make 250.0 ml of a 0.850 M solution?

7. What mass of  $\text{CO}_2$  exerts 2.70 atm pressure when confined in a 7.50 L container at  $12.0^\circ\text{C}$  ?

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

9. A reaction has  $\Delta H = -380 \text{ kJ}$  and  $\Delta S = -46 \text{ J/K}$ .

a. Calculate  $\Delta G$  at  $25^\circ\text{C}$ . 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,  $\Delta H = +140.0 \text{ kJ}$  and  $\Delta S = +238.3 \text{ J/K}$ . For what temperatures, if any, will this reaction be spontaneous? Be careful with your units!