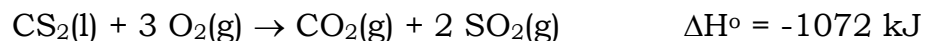


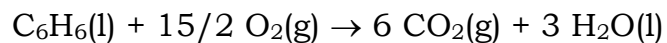
**CHEM-1105****TEST # 2****NAME:** \_\_\_\_\_

Show all work. Work independently.

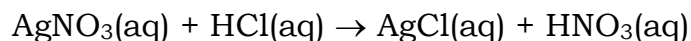
1. Calculate the standard enthalpy of formation,  $\Delta H^\circ_f$ , of carbon disulfide,  $\text{CS}_2(\text{l})$  from the information given below. **[4]**



2. The standard enthalpy of formations (in kJ/mol) of  $\text{CO}_2(\text{g})$ ,  $\text{H}_2\text{O}(\text{l})$ , and benzene,  $\text{C}_6\text{H}_6(\text{l})$ , are  $-393.5$ ,  $-285.8$ , and  $+49.04$ , respectively. Calculate the enthalpy of combustion reaction of benzene. **[4]**



3. A 50.0 mL solution of 0.100 M AgNO<sub>3</sub> was mixed with 52.0 mL solution of 0.100 M HCl. The two solutions were initially at 22.60°C. The final temperature of the reaction mixture was 23.40°C. assuming that the density of each solution is 1.00 g/mL and that the specific heat is 4.184 J/g °C. Calculate ΔH for the following reaction. **[4]**

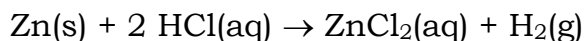


4. Write the complete thermochemical equation that corresponds to: **[2]**

$$\Delta H_f^\circ \text{ of CaCO}_3(\text{s}) = -1207 \text{ kJ/mol}$$

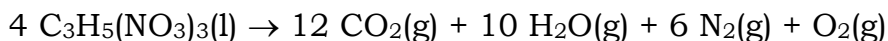
5. Calculate the density of COCl<sub>2</sub>, a poisonous gas at 27.0°C and 733 Torr. **[3]**

6. A 25.0 g impure sample of zinc is allowed to react with excess HCl:



7.80 L of  $\text{H}_2\text{(g)}$  is collected by displacement of water at  $25.0^\circ\text{C}$  and a pressure of 0.980 atm. Calculate the percent purity, by mass, of the zinc sample. Vapor pressure of water at  $25.0^\circ\text{C}$  is 23.8 Torr. **[5]**

7. Nitroglycerin,  $\text{C}_3\text{H}_5(\text{NO}_3)_3$ , an explosive compound decomposes according to the reaction:

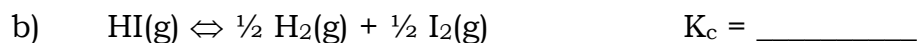


a) What is the maximum pressure that a 10.0 L container will be able to withstand if 5.00 g of nitroglycerin was decomposed and the temperature reached  $1250^\circ\text{C}$ . **[4]**

b) What are the partial pressures of the gases under these conditions? **[4]**

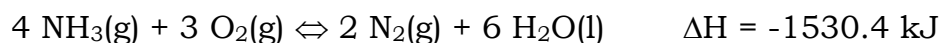
8. At 520°C,  $K_c$  is 67 for the equilibrium ,  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$

Calculate  $K_c$  at the same temperature for **[2]**



9. For the equilibrium,  $2 \text{HI}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{I}_2(\text{g})$   $K_c = 0.0025$  at 800°C. 0.80 mole of HI, 0.26 mole of  $\text{H}_2$ , and 0.26 mole of  $\text{I}_2$  were placed in a 20.0 L container at 800°C. Calculate the concentrations of all the species at equilibrium. **[5]**

10. Consider the following equilibrium system:



by using Le Chatelier's principle. indicate the following: (**I** = increase, **D** = decrease, **NC** = no change) **[3]**

	<b>[N<sub>2</sub>]</b>	<b>K<sub>c</sub></b>
a) O <sub>2</sub> is removed	_____	_____
b) NH <sub>3</sub> is added	_____	_____
c) volume of container is increased	_____	_____
d) temperature is increased	_____	_____
e) water is added ( no volume change)	_____	_____

