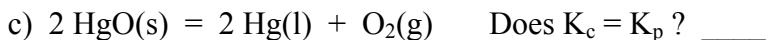
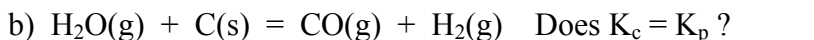
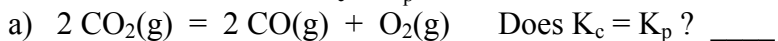


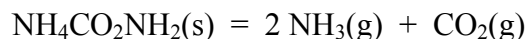
Name _____

1(09) Write the equilibrium constant expression, K_c , for each of the following reactions.

Indicate whether or not $K_c = K_p$.



2(08) Ammonium carbamate, $\text{NH}_4\text{CO}_2\text{NH}_2$, decomposes as follows:



Starting with only the solid, it is found that at 40°C the total gas pressure at equilibrium is 0.363 atm. Calculate the equilibrium constant K_p . Show all your work.

3(06) Consider the equilibrium process $\text{COCl}_2(\text{g}) = \text{CO}(\text{g}) + \text{Cl}_2(\text{g})$ which has an equilibrium constant, K_p , of 4.63×10^{-3} at 527°C . If a reaction mixture starts with the pressure of $\text{COCl}_2 = 0.050$ atm, the pressure of $\text{CO} = 0.075$ atm, and the pressure of $\text{Cl}_2 = 0.020$ atm, will the reaction proceed toward the left or the right? or is the system at equilibrium? Justify your answer.

4(12) The decomposition of ammonium hydrogen sulfide is an endothermic process.



If 1.0 g NH_4HS is in equilibrium with NH_3 and H_2S , will the following changes shift the equilibrium to the left (L), the right (R), or not at all(O)?

<u>Change</u>	<u>Position of Equilibrium</u>
a) Addition of NH_3	_____
b) removal of some NH_4HS	_____
c) decrease in temperature	_____
d) double the volume of the system	_____
e) increase the pressure of H_2S only	_____
f) addition of a catalyst	_____

5(05) Classify each of the following as either a strong acid, weak acid, strong base, or weak base.

a) $\text{HNO}_3\text{(aq)}$ _____ b) $\text{CH}_3\text{NH}_2\text{(aq)}$ _____ c) $\text{H}_3\text{PO}_4\text{(aq)}$ _____

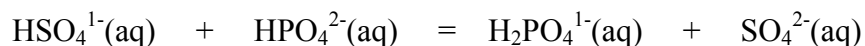
d) HI(aq) _____ e) KOH(aq) _____

6(06) Indicate whether the following solutions of the following substances would be acidic, basic, or neutral.

a) CO_2 _____ b) NaF _____ c) NH_4NO_3 _____

d) KClO_4 _____ e) BaO _____ f) $\text{C}_5\text{H}_5\text{NHCl}$ _____

7(04) For the following reaction identify each reactant or product as either the acid, base, conjugate acid, or conjugate base.



8(08) For each pair circle the strongest acid.

a) H_3PO_4 vs H_3PO_3

b) HCl vs HI

c) H_2CO_3 vs HCO_3^{1-}

d) H_3PO_4 vs HNO_3

9(06) Classify each of the following as either a Lewis acid or a Lewis base.

a) NH_3 _____ b) BH_3 _____ c) Fe^{3+} _____

10(06) Complete the following table.

<u>pH</u>	<u>pOH</u>	<u>$[\text{H}_3\text{O}^+]$</u>	<u>$[\text{OH}^{1-}]$</u>
_____	6.45	_____	_____
_____	_____	_____	8.4×10^{-10}

11(30) For each of the following write the chemical equation that represents the hydrolysis in water, set up the equilibrium table, and calculate the pH.

a) 0.033M LiOH(aq)

b) 0.25M HCN

c) 5.5×10^{-3} M HClO₄

d) 0.65M (CH₃)₂NH

e) 0.47M NaNO₂