

Quiz: Ch 15 – 16
AP Chem (30 pts)
Version D

Name:
I have neither given nor received aid on this quiz.
Period: 6 7 Date: _____

Complete in pencil. Erase mistakes completely. If you need more space, use the back of this sheet or attach further sheets as is necessary. For problems involving calculations, no credit will be given if work is not shown.

1. (18 pts) K_p for this endothermic reaction at 450°C is 4.51×10^{-5} : $3 \text{H}_2(\text{g}) + \text{N}_2(\text{g}) \leftrightarrow 2 \text{NH}_3(\text{g})$
- a. (3 pts) Write the K_p expression for this reaction.

For each of the mixtures listed below, determine whether the mixture is at equilibrium at 450°C ; if not at equilibrium, determine which direction the mixture must shift to achieve equilibrium.

- b. (3 pts) 495 atm H_2 , 35 atm N_2 , 105 atm NH_3 .
- c. (3 pts) 595 atm H_2 , 0 atm N_2 , 35 atm NH_3 .
- d. (3 pts) 42 atm H_2 , 202 atm N_2 , 26 atm NH_3 .
- e. (3 pts) Explain two changes that would cause this reaction to shift forward (one must involve T.)
- f. (3 pts) Explain one change that would affect the equilibrium constant of the above reaction, and one that would not

2. (12 pts) What are the concentrations of H^+ , $\text{H}_2\text{PO}_4^{1-}$, HPO_4^{2-} , and PO_4^{3-} in a 0.100 M H_3PO_4 solution?
 $K_{a1} = 7.5 \times 10^{-3}$; $K_{a2} = 6.2 \times 10^{-8}$; $K_{a3} = 4.2 \times 10^{-13}$