

AP Chemistry – Acids & Bases – 47

Name _____ Per ____

1. Consider the reaction $\text{H}_{2(g)} + \text{F}_{2(g)} \rightarrow 2\text{HF}_{(g)}$. (a) Using thermochemical data, calculate ΔG° at 298 K.

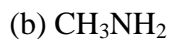
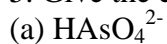
(b) Calculate ΔG at 298 K if the reaction mixture consists of 8.0 atm of H_2 , 4.5 atm of F_2 , and 0.36 atm of HF .

2. Write the equilibrium-constant expression and calculate the value of the equilibrium constant at 298 K for the reaction $\text{NaHCO}_{3(s)} \leftrightarrow \text{NaOH}_{(s)} + \text{CO}_{2(g)}$.

3. What is the difference between the Arrhenius and the Brønsted-Lowry definitions of a base?

4. When ammonia is dissolved in water, it behaves both as an Arrhenius base and as a Brønsted-Lowry base. Explain.

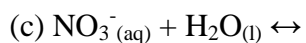
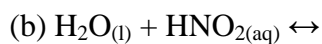
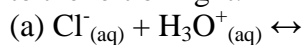
5. Give the conjugate acid of the following Brønsted-Lowry bases:



6. Write an equation for the reaction in which $\text{H}_2\text{C}_6\text{H}_7\text{O}_5^-$ (aq) acts as a base in H_2O (l). Designate the acid, base, conjugate acid and base.

7. Write an equation for the reaction in which $\text{H}_2\text{C}_6\text{H}_7\text{O}_5^-$ (aq) acts as an acid in H_2O (l). Designate the acid, base, conjugate acid and base.

8. Predict the products of the following acid-base reactions, and also predict whether the equilibrium lies to the left or right.



9. (a) Write a chemical equation that illustrates the autoionization of water. (b) Write the expression for the ion-product constant for water, K_w .

10. A solution is described as basic. What is meant by this statement?

11. The fermentation of glucose produces ethyl alcohol and carbon dioxide:

$C_6H_{12}O_{6(aq)} \rightarrow 2C_2H_5OH_{(aq)} + 2CO_{2(g)}$ (a) How many moles of carbon dioxide are produced when 0.400 moles of glucose reacts in this fashion?

(b) How many grams of glucose are needed to form 7.50 g of ethyl alcohol?

(c) How many grams of carbon dioxide form when 7.50 g of ethyl alcohol are produced?

12. When hydrogen sulfide gas is bubbled into a solution of sodium hydroxide, the reaction forms sodium sulfide and water. How many grams of sodium sulfide are formed if 2.00 g of hydrogen sulfide is bubbled into a solution containing 2.00 g of sodium hydroxide, if the sodium sulfide is produced at 92.0% yield?

13. How would you prepare 100.0 mL of 0.200 M $AgNO_3$ solution starting with pure solute?

14. An experiment calls for you to use 250. mL of 1.00 M HNO_3 solution. All you have available is a bottle of 6.00 M HNO_3 . How would you prepare the desired solution?