

CHM 130: Chapter 15 Blackboard Homework Problems

1. Check all of the following that are **properties of acids**:
 - a) produce hydrogen ions, H^+ , in solution
 - b) produce hydroxide ions, OH^- , in solution
 - c) taste bitter
 - d) taste sour
 - e) feel soapy or slippery
 - f) turn red litmus paper blue
 - g) turn blue litmus paper red
2. Check all of the following that are **properties of bases**:
 - a) produce hydrogen ions, H^+ , in solution
 - b) produce hydroxide ions, OH^- , in solution
 - c) taste bitter
 - d) taste sour
 - e) feel soapy or slippery
 - f) turn red litmus paper blue
 - g) turn blue litmus paper red
3. Check all of the substances below that are **strongly acidic**:

a) egg white, pH=7.9	f) oven cleaner, pH=13.5
b) champagne, pH=3.7	g) stomach acid, pH=1
c) lime juice, pH=1.8	h) carbonated soda, pH=4.0
d) NaCl, pH=7.0	i) drain cleaner, pH=13
e) baking soda, pH=8.3	
4. Check all of the substances below that are **weakly acidic**:

a) egg white, pH=7.9	f) oven cleaner, pH=13.5
b) champagne, pH=3.7	g) stomach acid, pH=1
c) lime juice, pH=1.8	h) carbonated soda, pH=4.0
d) NaCl, pH=7.0	i) drain cleaner, pH=13
e) baking soda, pH=8.3	
5. Check all of the substances below that are **neutral**:

a) egg white, pH=7.9	f) oven cleaner, pH=13.5
b) champagne, pH=3.7	g) stomach acid, pH=1
c) lime juice, pH=1.8	h) carbonated soda, pH=4.0
d) NaCl, pH=7.0	i) drain cleaner, pH=13
e) baking soda, pH=8.3	
6. Check all of the substances below that are **weakly basic**:

a) egg white, pH=7.9	f) oven cleaner, pH=13.5
b) champagne, pH=3.7	g) stomach acid, pH=1
c) lime juice, pH=1.8	h) carbonated soda, pH=4.0
d) NaCl, pH=7.0	i) drain cleaner, pH=13
e) baking soda, pH=8.3	
7. Check all of the substances below that are **strongly basic**:

a) egg white, pH=7.9	f) oven cleaner, pH=13.5
b) champagne, pH=3.7	g) stomach acid, pH=1
c) lime juice, pH=1.8	h) carbonated soda, pH=4.0
d) NaCl, pH=7.0	i) drain cleaner, pH=13
e) baking soda, pH=8.3	

For problems 8-10 below, refer to your Chapter 15 notes:

8. An acid-base _____ is a solution that is pH sensitive and changes color with changes in the pH.
9. An acid-base _____ is the gradual addition of a standard solution to another solution of unknown concentration until the reaction between the two is complete as signaled by the indicator changing color.
10. The _____ of an acid-base neutralization reaction corresponds to the point when one reactant has completely reacted with the other as evidenced by the indicator changing color.
11. Determine the pH for the following: shampoo, $[H^+] = 0.000001 \text{ M}$
12. Determine the pH for the following: egg white, $[H^+] = 0.00000001 \text{ M}$
13. Determine the pH for the following: soda, $[H^+] = 0.001 \text{ M}$
14. Determine the pH for the following: coffee, $[H^+] = 0.00001 \text{ M}$
15. Calculate the pH of urine which has a pOH of 9.25.
16. Calculate the pOH of saliva which has a pH of 6.55.
17. Calculate the pOH of blood which has a pH of 7.50.
18. Pure water has a pH of _____.
19. Consider the following reaction: $H_2O(l) + NH_3(aq) \rightarrow NH_4^+(aq) + OH^-(aq)$.
Check all the statements below that are correct.
 - a) $H_2O(l)$ is an Arrhenius acid and a Bronsted-Lowry acid.
 - b) $H_2O(l)$ is an Arrhenius base and a Bronsted-Lowry base.
 - c) $H_2O(l)$ is an Arrhenius acid but not a Bronsted-Lowry acid.
 - d) $H_2O(l)$ is a Bronsted-Lowry base but not an Arrhenius base.
 - e) $NH_3(aq)$ is an Arrhenius acid and a Bronsted-Lowry acid.
 - f) $NH_3(aq)$ is an Arrhenius base and a Bronsted-Lowry base.
 - g) $NH_3(aq)$ is an Arrhenius acid but not a Bronsted-Lowry acid.
 - h) $NH_3(aq)$ is a Bronsted-Lowry base but not an Arrhenius base.
20. Consider the following reaction: $HBr(aq) + H_2PO_4^-(aq) \rightarrow H_3PO_4(aq) + Br^-(aq)$.
Check all the statements below that are correct.
 - a) $HBr(aq)$ is an Arrhenius acid and a Bronsted-Lowry acid.
 - b) $HBr(aq)$ is an Arrhenius base and a Bronsted-Lowry base.
 - c) $HBr(aq)$ is an Arrhenius acid but not a Bronsted-Lowry acid.
 - d) $HBr(aq)$ is a Bronsted-Lowry base but not an Arrhenius base.
 - e) $H_2PO_4^-(aq)$ is an Arrhenius acid and a Bronsted-Lowry acid.
 - f) $H_2PO_4^-(aq)$ is an Arrhenius base and a Bronsted-Lowry base.
 - g) $H_2PO_4^-(aq)$ is an Arrhenius acid but not a Bronsted-Lowry acid.
 - h) $H_2PO_4^-(aq)$ is a Bronsted-Lowry base but not an Arrhenius base.