Review #7: Acids, Bases and Salts

1.	Know the meanings of and be a	able to apply the fo	llowing terms:			
Br	onsted-Lowry acid	strong acid	concentrated	chemical indicator		
Br	onsted-Lowry base	strong base	dilute	titration		
am	njugate acia/base pair phiprotic (amphoteric)	weak acia weak base	equivalence point endnoint	butter salt		
am		weak base	Chaponn	3411		
2.	Consider these acids: HClO2	, HCN, HF, HCI				
a)	Arrange these acids from we	akest to strongest:				
b)	Arrange these acids from low	est to highest pH: _				
c)	Arrange these acids from poorest to best electrolytes:					
d)	Which of these acids will ionize the most in water?					
e)	Which one of these acids will produce the solution with the highest concentration of H $_3O^{\star}$ (aq)?					
f)	Which acid will react most slowly with zinc metal?					
g)	Write the chemical formula f	or the conjugate ba	se of each acid:			
h)	Arrange the conjugate bases	from weakest to st	rongest:			
3.	Calculate the pH of 0.10 M so	lutions of HCl and H	1ClO2. (pH of HCl is 1.00,	pH of HClO2 is 1.55)		
4.	Write the chemical formula f NH3 OCl ⁻	or the conjugate ac HSO4 ⁻	ids of these basic species: H ₂ O OH ⁻ _	HBO3 ²⁻		
5.	Write chemical formulas show Bronsted-Lowry acids and Bro	ving the following sp onsted-Lowry bases	pecies ionizing (hydrolyzing) for each reversible reaction	in water. Identify all n.		
a)	N_2H_4 (I) + H_2O (I) \leftrightarrow					
b)	HCOOH + $H_2O(I) \leftrightarrow$					
c)	OCN^{-} (aq) + H ₂ O (I) \leftrightarrow					
d)	HSO4 ⁻ (aq) (as a base) +	H₂O (I) ↔				
e)	HSO4 ⁻ (aq) (as an acid) +	H₂O (I) ↔				
f)	PO_4^{3-} (aq) + $H_2O(I) \leftrightarrow$					
g)	$NH_4^+(aq)$ + $H_2O(I) \leftrightarrow$					
6.	Write the neutralization reac salt. Based on the salt, descr	tion that occurs wh bibe the pH of the f	en the following acids and b inal solution.	ases are mixed. Identify the		
a)	HCN (aq) + NaOH (aq) \rightarrow			pH of salt:		
b)	HClO3 (aq) + NH4OH (aq)	\rightarrow		pH of salt:		
c)	HF (aq) + Ca(OH) ₂ (aq) \rightarrow			pH of salt:		
d)	Co(OH)₃ (aq) + HI (aq) →			pH of salt:		

- e) CH₃COOH (aq) + KOH (aq) →
- f) $Ba(OH)_2$ (aq) + HNO_3 (aq) \rightarrow pH of salt: _____
- g) $H_2SO_4(aq) + Be(OH)_2(aq) \rightarrow pH of salt: _____$

pH of salt: _____

7. Calculate the value of Kb for the following conjugate bases:

1.	calculate the value of Kb for the following conjugate bases.				
a)	HCO ₃ ¹⁻				
b)	CO ₃ ²⁻				
c)	SO4 ²⁻				
d)	H ₂ PO ₄ ¹⁻				
e)	PO4 ³⁻				
8.	Calculate the $[H_3O^*]$ concentration of the final solution, if:				
a)	28.0 mL of 15.0 M HNO $_3$ is diluted to 1.0 L	(0.42	M)		
b)	a solution of HF has a pH of 2.56	(2.8 × 10 ⁻³ M)			
c)	the pOH of a solution is 5.15	(1.4 × 10 ⁻⁹ M)			
d)	3.50 g of KOH is dissolved in 500.0 mL of distilled water	(8.02	× 10 ⁻¹⁴ M)		
9.	How much 12.0 M HCl must be diluted to make 1.50 L of 1.00 M HCl solution?	(0.125 L)			
10.	Calculate the pH of a 1.25 M solution of acetic acid.	(2.32))		
11.	If the pH of a 2.00 M solution of cyanic acid (HOCN) is 1.58, calculate the K_a for this ac	cid.	(3.5 × 10 ⁻⁴)		
12.	A 0.0125 M solution of hypobromous acid has a pH of 5.23 at 25°C. Calculate the K_a for this acid. (2.8 \times 10 $^{-9}$)				
13.	6.83 mL of a solution of NaOH is standardized against 3.06 g of potassium hydrogen phthlate $(KHC_8O_4H_4)$. Calculate the concentration of the base. (2.19 M)				
14.	What volume of 0.765 M $\rm H_3PO_4$ is required to exactly neutralize 2.000 g of calcium hydroxide? (0.0235 L of $\rm H_3PO_4)$				
15.	What is the concentration of a solution of hydroiodic acid if it takes 13.16 mL of 0.508 to exactly titrate 25.00 mL of the hydroiodic acid?	M KOF (0.26	l solution 7 M)		

16. 9.88 mL of 1.244 M sodium hydroxide solution is required to exactly titrate 10.00 mL of sulfuric acid. Calculate the concentration of the sulfuric acid solution. (0.615 M)