Dr. N	ral Che 1. J. Wi nination	·		Name			
(4) 1.		Which one of the following species cannot function as a Brønsted-Lowry acid?					
		a) OH <sup>-1</sup>	b) HCO <sub>3</sub> -1	c) H <sub>2</sub> O	d) CO	e) NH3	
(4)	2.	Which one of the following species <i>cannot</i> function as a Brønsted-Lowry base?					
		a) BH <sub>3</sub>	b) H <sub>2</sub> S	c) PH <sub>3</sub>	d) N <sub>3</sub> -1	e) NO <sub>3</sub> -1	
(4)	3.	Which one of the following species <i>cannot</i> function as a Lewis base?					
		a) H <sup>-1</sup>	b) NH <sub>3</sub>	c) AlH <sub>3</sub>	d) CH <sub>3</sub> -1	e) H <sub>2</sub> Se	
(4)	4.	Which one of the following species <i>cannot</i> function as a Lewis acid?					
		a) BF <sub>3</sub>	b) AlBr <sub>3</sub>	c) H <sup>+1</sup>	d) CH <sub>3</sub> +1	e) CF <sub>4</sub>	
(4)	5.	On the basis of its structure, which one of the following species cannot function as either a Lewis acid or a Lewis base?					
		a) PH4 <sup>+1</sup>	b) PH <sub>3</sub>	c) PH <sub>2</sub> -1	d) CH <sub>3</sub> +1	e) CH <sub>3</sub> -1	
(4)	6.	Which one of the following is <u>not</u> a conjugate acid/base pair?					
		a) H <sub>2</sub> PO <sub>4</sub> -1/H <sub>3</sub> PO <sub>4</sub>			b) OH <sup>-1</sup> /O <sup>-2</sup>		
		c) H	N <sub>3</sub> /N <sub>3</sub> -1		d) HSO <sub>4</sub> -1,	/SO <sub>3</sub> -2	
		e) All o	f the above cl	hoices are co	njugate acid/l	oase pairs	
(4)	7.	The reaction	on, NH4 <sup>+1</sup> + I	NH <sub>2</sub> -1 —▶	NH <sub>3</sub> , rep	resents:	
		b) a Bro c) a Le d) an e	Arrhenius acionsted-Lowry wis acid/base xample of box ample of box amp	acid/base reaction that a and b			

As the ability of an acid to lose protons increases, the ability of its conjugate base to attract protons (increases, decreases, remains the same).

(4)

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(6)	9.	In the hydrolysis reaction of cyanide with water, as the $\%$ -			
` '		hydrolysis increases at constant temperature, the hydronium			
		ion concentration in the aqueous medium (increases,			
		decreases, remains the same), and the pH of the medium			
		(increases, decreases, remains the same).			

- (12) 10. The pH of pure water at  $25^{\circ}$ C is 7.00.
  - a) With an increase in temperature, the number of collisions between water molecules (increases, decreases, remains the same), and the percent ionization (increases, decreases, remains the same).
  - b) Relative to K<sub>W</sub> at 25°C, K<sub>W</sub> at 50°C would be (greater, smaller, unchanged) in magnitude.
  - c) The pH of pure water at 50°C would be a numerical value (less than, greater than, identical to) that at 25°C.
- (6) 11. At 25°C, the pH of a "Bloody Mary" (vodka + tomato juice) is 4.10. The hydronium ion concentration in this beverage is \_\_\_\_\_M. If the pH of pure vodka is 7.20, then tomato juice is (acidic, basic, neutral).
- (8) 12. Arrange the following species in order of decreasing basicity (weakest base last):
  - a) HSe<sup>-1</sup>, Br<sup>-1</sup>, AsH<sub>2</sub><sup>-1</sup>, GeH<sub>3</sub><sup>-1</sup> > >
  - b) P-3, N-3, Sb-3, As-3 > >
- (9) 13. Indicate what pH change (if any) would be expected by the:
  - a) addition of NaNO<sub>3</sub>(s) to an aqueous HNO<sub>3</sub> solution at 25°C (pH increases, pH decreases, no significant change)
  - b) addition of NaF(s) to an aqueous HF solution at 25°C (pH increases, pH decreases, no significant change)
  - c) addition of NH<sub>4</sub>NO<sub>3</sub>(s) to an aqueous NH<sub>3</sub> solution at 25°C (pH increases, pH decreases, no significant change)

(6) 14. What mass, in grams, of NaOH is required to react with 20.0 ml of a 0.30M H<sub>3</sub>PO<sub>4</sub> solution to produce Na<sub>2</sub>HPO<sub>4</sub>? Show all work in the space below.

(7) 15. What is the pH of an aqueous solution at 25°C that is prepared from 175 ml of 0.10M HCl and 125 ml of 0.10M Ba(OH)<sub>2</sub>? Assume that volumes are additive. Show all work in the space below.

- 16. The pH of a 0.02M aqueous solution of weak acid HZ is 5.00 at 25°C.
- (5) a) Determine the acid ionization constant, K<sub>a</sub>, for HZ. Show all work in the space below.
- (2) b) Determine the %-ionization. Show all work in the space below.
- (7) 17. Determine the pH, at 25°C, of a 500 ml aqueous solution that contains 6.90 g of NaNO<sub>2</sub>. K<sub>a</sub> for HNO<sub>2</sub> at 25°C is 4.5x10<sup>-4</sup>. Show all work in the space below.