

Name: _____

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Chemistry 12

Acid Base Sections 5, 6, 7, 8 and 9

Worksheet #2

Directions: Answer in the space provided. Make sure you fully answer the questions.

Section 4.5

1. In fifty (50) words or less, explain why no one listens during the lesson?
2. In fifty (50) words or less, explain why Matty can not stop talking?
3. In fifty (50) words or less, explain why the boys are having a hard time put on a tie?
4. Write the appropriate species, taken from each conjugate pair, in the blanks provided.

	Conjugate pair	Conjugate acid	Conjugate base
(a)	$\text{CH}_3\text{COOH}/\text{CH}_3\text{COO}^-$		
(b)	$\text{HSO}_4^-/\text{SO}_4^{2-}$		
(c)	$\text{PH}_3/\text{PH}_4^+$		

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5. Write the formula for each of the following.

(a) the conjugate base of HSO_4^-

(c) the conjugate base of OH^-

(b) the conjugate acid of HSO_4^-

(d) the conjugate acid of OH^-

6. Write the conjugate acid of each of the following.

(a) F^-

(b) Te^{2-}

(c) HC_2O_4^-

(d) H^-

7. Write the conjugate base of each of the following.

(a) H_2CO_3

(b) HPO_4^{2-}

(c) HN_3

(d) HS^-

8. Write the Bronsted-Lowry acid-base equilibria which occur when the following pairs of substances are mixed in solution.

(a) HCN and F^-

(b) S^{2-} and HCOOH

(c) HPO_4^{2-} and SO_4^{2-}

(d) HIO_3 and $\text{C}_2\text{O}_4^{2-}$

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(e) NO_2^- and HSO_3^-

(f) HPO_4^{2-} and CH_3COO^-

Section 4.6

9. Which member of each of the following pairs is the stronger acid?

(a) HIO_3 or CH_3COOH

(b) H_2O_2 or HSO_3^-

(c) H_2PO_4^- or HCN

10. Which member of each of the following pairs is the stronger base?

(a) HCO_3^- or PO_4^{3-}

(b) HPO_4^{2-} or HS^-

(c) OH^- or NH_3

(d) HCOO^- or HSO_3^-

11. H_2Te is a stronger acid than H_2S .

(a) Write the formulae of the conjugate bases of the above two acids.

(b) Which conjugate base is the stronger?

12. Use the table "Relative Strengths of Acids" to write equations which show how the following reactions occur in water.

(a) F^- acts as a base

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(b) HNO_2 acts as an acid

(c) $\text{Fe}(\text{H}_2\text{O})_6^{3+}$ acts as an acid

(d) HCO_3^- acts as a base

(e) HCO_3^- acts as an acid

(f) $\text{Al}(\text{H}_2\text{O})_5(\text{OH})^{2+}$ acts as a base

13. Although HI is higher on the Table than HCl, explain clearly why 0.10 M $\text{HI}_{(\text{aq})}$ and 0.10 M $\text{HCl}_{(\text{aq})}$ both contain 0.10 M $\text{H}_3\text{O}^{+}_{(\text{aq})}$.

Section 4.7

14. What is $[\text{H}_3\text{O}^+]$ in pure, neutral water? What is $[\text{OH}^-]$? Show your work.

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15. (a) When water is heated, what happens to the $[\text{H}_3\text{O}^+]$? Explain.

(b) Is hot water acidic, basic, or neutral? Explain.

(c) What happens to the value of K_w when water is heated?

16. Determine both $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ in each of the following solutions.

(a) 10.0 M HCl

(b) 4.0 M NaOH

(c) 2.5×10^{-4} M HNO_3

(d) 6.00×10^{-3} M $\text{Ca}(\text{OH})_2$

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Section 4.8

17. Write the K_a expression for the reaction in which each of the following acts as an acid with water.

(a) HCN

(b) HPO_4^{2-}

(c) HNO_2

18. Write the K_b expression for the reaction in which each of the following acts as a base with water.

(a) HS^-

(b) CH_3NH_2

(c) F^-

19. You have a 1 M solution of an acid with $K_a = 1 \times 10^{-5}$ and a 1 M solution of an acid with $K_a = 1 \times 10^{-10}$. Which solution contains the greater concentration of H_3O^+ ?

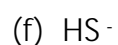
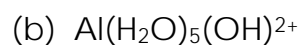
20. You have a 1 M solution of a base with $K_b = 5 \times 10^{-12}$ and a 1 M solution of a second base with $K_b = 7 \times 10^{-6}$. Which solution contains the greater concentration of OH^- ?

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Section 4.9

21. Use your table of Relative Strengths of Acids to calculate K_b for the following bases.



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22. Given that $K_b = 1.7 \times 10^{-6}$ M for N_2H_4 , what is K_a for $N_2H_5^+$?

23. If a substance has a K_b value of 2×10^{-10} , is the substance a weak acid, a strong acid, a weak base or a strong base? Explain your answer.