**Acid Unit: Ka, Kb, pH**

1. An acid has a Ka = 5.3 x 10-10 .Choose a statement that is **TRUE** for this acid.

|  |  |
| --- | --- |
| a | This is a strong dilute acid. |
| b | The Kb  for the conjugate base is 1.1 x 10-4 |
| c | This acid is a weaker acid than hydrocyanic acid. |
| d | This acid is a stronger acid than benzoic acid. |

1. Unlike other hydrogen halides, HF(aq) is a weak acid. It has special properties that make it an excellent acid for etching glass. The pH of a 2.0 x 10-2 solution of HF(aq) at 25oC is \_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 2.49 |
| b | 1.70 |
| c | 2.40 |
| d | 11.52 |

1. A weak acid has a \_\_\_\_\_\_\_ Ka and its conjugate base has a ­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_ Kb.

|  |  |  |
| --- | --- | --- |
| a | Small | Large |
| b | Small | Small |
| c | Large | Small |
| d | Large | Large |

1. A weak base has a \_\_\_\_\_\_\_\_\_\_\_ Kb and its conjugate acid a ­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_ Ka

|  |  |  |
| --- | --- | --- |
| a | Small | Small |
| b | Small | Large |
| c | Large | Small |
| d | Large | Large |

1. Choose the base and conjugate acid pair that have a Kb of 5.6 x 10-10 \_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | C6H5COO- and C6H5COOH |
| b | CH3COO- and CH3COOH |
| c | HSO3- and H2SO3 |
| d | HOOCCOO- and HOOCCOOH |

1. Choose the base and conjugate acid pair that have a Kb of 2.5 x 10-8 \_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | C6H6O62-(aq) and C6H6O6- |
| b | C3H5O(COO)33-(aq) and C3H5OCOOH(COO)22-(aq) |
| c | HF(aq) and F-(aq) |
| d | HOCl(aq) and OCl-(aq) |

1. A solution of hydrocyanic acid has a pH of 4.80. The concentration of the HCN(aq) solution is \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.16 |
| b | 0.25 |
| c | 0.41 |
| d | 0.65 |

1. A solution of formic acid has a pH of 2.03. The concentration of the HCOOH(aq) solution is \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.49 |
| b | 0.0093 |
| c | 0.60 |
| d | 0.0087 |

1. A solution of lactic acid has a pH of 2.97. The concentration of the C2H5OCOOH(aq) solution is \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 1.1 x 10-3 |
| b | 5.3x10-3 |
| c | 6.5 x 10-2 |
| d | 9.3 x 10-3 |

1. A solution of oxalic acid has a pH of 0.58 The concentration of the HOOCCOOH(aq) solution is \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.26 |
| b | 1.5 |
| c | 1.1 |
| d | 0.75 |

1. A student sampled four different acids, each at 0. 10 and recorded the following observations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Acid** | Volume (mL) | pH | Conductivity |
| I | 25.0 | 4.50 | Poor |
| II | 25.0 | 3.25 | Poor |
| III | 25.0 | 1.50 | Good |
| IV | 25.0 | 5.50 | Poor |

The acid that would be expected to have the lowest ka value would be \_\_\_\_\_\_

|  |  |
| --- | --- |
| a | I |
| b | II |
| c | III |
| d | IV |

1. . As the pH of a solution increases, the

|  |  |
| --- | --- |
| a | [OH-(aq)] decreases |
| b | [H3O+(aq)] decreases |
| c | solution becomes more acidic |
| d | conductivity must decrease |

1. If a base is added to a neutral aqueous solution, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | [OH-(aq)] will decrease |
| b | [H3O+ (aq)] will decrease |
| c | pH of the solution will decrease |
| d | Protons will be donated to another substance in the solution. |

1. The pH of a 0.10 solution of benzoic acid (C6H5COOH(aq)) is\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | 2.30 |
| b | 1.00 |
| c | 1.40 |
| d | 2.61 |

1. The pH of a 0.10 solution of ascorbic acid (H2C6H6O6(aq) is\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | 4.04 |
| b | 2.53 |
| c | 2.03 |
| d | 2.43 |

1. The pH of a 0.10 solution of formic acid (HCOOH(aq)) is\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | 2.41 |
| b | 3.74 |
| c | 2.38 |
| d | 2.13 |

1. The pH of a 0.10 solution of carbonic acid (H2CO3(aq)) is\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | 3.67 |
| b | 6.35 |
| c | 2.94 |
| d | 3.70 |

1. The [H3O+(aq)] in 100 mL of 0.10HF(aq) at 25 oC is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.0076 |
| b | 0.076 |
| c | 0.010 |
| d | 0.10 |

1. The [H3O+(aq)] in 100 mL of 0.10HNO2 (aq) at 25 oC is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.024 |
| b | 0.010 |
| c | 0.0072 |
| d | 0.10 |

1. The [H3O+(aq)] in 100 mL of 0.10H2CO3(aq) at 25 oC is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 2.1 x 10-4 |
| b | 4.5 x 10-7 |
| c | 1.0 x 10-1 |
| d | 6.7 x 10-4 |

1. The [H3O+(aq)] in 100 mL of 0.10C6H5COOH(aq) at 25 oC is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 1.2 x 10-3 |
| b | 7.9 x 10-3 |
| c | 1.0 x 10-1 |
| d | * 1. x 10-3 |

1. Predict which 0.10  solution would have the lowest pH.

|  |  |
| --- | --- |
| a | NaHSO4(aq) |
| b | HNO3(aq) |
| c | HOOCCOOH(aq) |
| d | NaHSO3(aq) |

1. In a 0.10 HCOOH(aq) solution, the species present in highest concentration is

|  |  |
| --- | --- |
| a | HCOOH(aq) |
| b | HCOO-(aq) |
| c | H3O+(aq) |
| d | OH-(aq) |

1. Consider the list of 0.10 solutions given below. The weakest electrolyte from this list would be \_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | HCl(aq) |
| b | NaCl(aq) |
| c | HOCl(aq) |
| d | HNO2(aq) |

1. A 0.100  of an unknown acid has a pH of 2.95.

Based on this information, the Kb for the unknown acid is \_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 7.9 x 10-10 |
| b | 8.7 x 10-12 |
| c | 1.3 x 10-5 |
| d | 1.1 x 10-3 |

1. Which concentration of HCl(aq) would yield the same pH as 0.10CH3COOH(aq)?

|  |  |
| --- | --- |
| a | 1.3 |
| b | 0.10 |
| c | 0.013 |
| d | 0.0013 |

1. The Kb for the ion HCOO-(aq) is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 1,8 x 10-11 |
| b | 1.8 x 10-4 |
| c | 6.7 x 10-11 |
| d | 5.6 x 10-11 |

1. The Kb for the ion HSO3-(aq) is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 1.4 x 10-2 |
| b | 7.1 x 10-13 |
| c | 6.3 x 10-8 |
| d | 1.6 x 10-7 |

1. The Kb for the ion HCO3-(aq) is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 2.1 x 10-4 |
| b | 4.5 x 10-7 |
| c | 2.2 x 10-8 |
| d | 4.7 x 10-11 |

1. The Kb for the ion HPO42-(aq) is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 1.6 x 10-7 |
| b | 4.8 x 10-13 |
| c | 2.1 x 10-2 |
| d | 6.2 x 10-8 |

1. The Kb for the ion HOOCCO-(aq) is \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 1.8 x 10-13 |
| b | 5.6 x 10-2 |
| c | 1.5 x 10-4 |
| d | 7.1 x 10-11 |

1. The Kb and conjugate acid for CN- (aq) will be \_\_\_\_\_\_ and \_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 6.2 x 10-10 | CN- (aq) |
| b | 6.2 x 10-10 | HCN(aq) |
| c | 1.6 x 10-5 | HCN(aq) |
| d | 1.6 x 10-5 | CN- (aq) |

1. The Ka and conjugate base for NH4 +(aq) will be \_\_\_\_\_\_ and \_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 5.6 x 10-10 | NH3(aq) |
| b | 1.8 x 10-5 | NH3(aq) |
| c | 5.6 x 10-10 | NH+(aq) |
| d | 1.8 x 10-5 | NH2+(aq) |

1. The Ka and conjugate base for HSO3-(aq) will be \_\_\_\_\_\_ and \_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 1.4 x 10-2 | H2SO3(aq) |
| b | 1.6 x 10-7 | SO32-(aq) |
| c | 7.1 x 10-13 | H2SO3(aq) |
| d | 6.3 x 10-8 | SO32-(aq) |

1. The Ka and conjugate base for HOOCCOO-(aq) will be \_\_\_\_\_\_ and \_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 6.7 x 10-11 | OOCCOO2-(aq) |
| b | 5.6 x 10-2 | HOOCCOOH(aq) |
| c | 1.5 x 10-4 | OOCCOO2-(aq) |
| d | 1.8 x 10-13 | HOOCCOOH(aq) |

1. An unknown acid with a concentration of 1.2 x 10-1 , has a pH of 2.50. the value of the Ka for this acid is \_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 3.6 x 10-1 |
| b | 8.6 x 10-5 |
| c | 8.3 x 10-5 |
| d | 4.8 x 10-5 |

1. A 2.5 solution of lactic acid dissociates at 25oC. the pH of this acid will be \_\_\_

|  |  |
| --- | --- |
| a | 1.93 |
| b | 1.73 |
| c | -0.40 |
| d | 1.50 |

1. An unknown concentration of carbonic acid has a pH of 4.20 The concentration of the acid will be \_\_\_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 7.1 x 10-3 |
| b | 6.3 x 10-5 |
| c | 8.9 x 10-3 |
| d | 4.0 x 10-3 |

1. A 0.10 solution of acetic acid dissociates at 25oC. Its pH is \_\_\_\_

|  |  |
| --- | --- |
| a | 2.88 |
| b | 3.74 |
| C | 4.74 |
| d | 1.00 |

1. A 0.10  solution of phosphoric acid dissociates at 25oC. Its pH is \_\_

|  |  |
| --- | --- |
| a | 1.50 |
| b | 2.16 |
| c | 3.16 |
| d | 1.64 |

1. C 21. d
2. A 22. b
3. A 23. a
4. B 24. c
5. B 25. a
6. B 26. d
7. C 27. d
8. A 28. b
9. D 29. c
10. B 30. a
11. D 31. a
12. B 32. c
13. B 33. a
14. D 34. d
15. A 35. c
16. C 36. b
17. A 37. b
18. A 38. c
19. C 39. a
20. A 40. d