pH Notes 10.1

Bio ING

**Dissociation of Water**

**1. define:**

**2. illustrate:**

ACID: A substance which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when dissolved in water.

BASE: A substance which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when dissolved in water.

**Acids Basics ;)**

|  |  |
| --- | --- |
| **Acids** | **Bases** |
|  |  |
|  |  |
|  |  |
|  |  |

Three ways to say the same thing: what makes an acid? \_\_\_\_\_\_\_\_\_\_\_\_\_, aka \_\_\_\_\_\_\_\_\_\_\_\_\_, aka \_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = H3O+. Higher concentration 🡪 more acidic solution 🡪 lower pH
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = -OH. Higher concentration 🡪 more basic solution 🡪 higher pH

**THE MATHEMATICAL BASIS OF pH**

pH = , where [H+] =

A change of 1 unit on the pH scale indicates a \_\_\_\_\_\_\_\_\_\_\_ change in ion concentration!

**Kw, The Ionization Constant of water**

It’s a constant… it doesn’t change, no matter what the pH is.

Kw = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = 10-14

In other words, as [H+] goes up, [-OH] goes down; This is an example of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ relationship.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Extra Credit pH Problems

EXAMPLE PROBLEMS

Type 1: What is the concentration of H+ in one sample compared to another.

A sample of water is pH 7. A sample of HCl has a pH of 1. How many times as much H+ ions are in the HCl?

7-1 = 6. Therefore, there is 106 times as much H+ in the acid.

Type 2: What is the concentration of H+ or –OH, if the other is known, using Kw.

A sample has a –OH concentration of 10-8. What is the pH of the sample?

Since Kw = 10-14 = [H+][10-8]

[H+] = 10-6

pH = -log [10-6] = 6

1. Classify the following as acids, bases, or neutral substances A, B, or N

\_\_\_\_\_ A. pH 7 \_\_\_\_\_ B. pH 12 \_\_\_\_\_ C. pH 3 \_\_\_\_\_ D. [H+] = 10-7

\_\_\_\_\_ E. [-OH] = 10-3 \_\_\_\_\_ F. [H+] = 10-4 \_\_\_\_\_ G. [-OH] = 10-9

2. Determine how many times higher the concentration of H+ is in the lower pH sample. Write your answer as a factor of 10.

|  |  |  |
| --- | --- | --- |
| Sample A | Sample B | How many times more H+ in low pH sample |
| pH 7 | pH 8 |  |
| pH 2 | pH 9 |  |
| [H+] = 10-7 | [H+] = 10-12 |  |
| [-OH] = 10-7 | [-OH] = 10-9 |  |
| pH 3 | [-OH] = 10-13 |  |

3. Determine [H+] or [-OH] from the information provided. Remember, Kw = 10-14.

|  |  |
| --- | --- |
| [H+] = 10-7 |  |
| [H+] = 10-2 |  |
|  | [-OH] = 10-7 |
|  | [-OH] = 10-9 |
| [H+] = 10-10 |  |