**5.2 HONORS CLASS WORKSHEET – ACIDITY, ALKALINITY AND THE PH SCALE**

1. **Acidity and Alkalinity**

The ion which makes solutions acidic is ……………

The ion which makes solutions alkaline is …………

Water dissociates very slightly to produce H+ and OH- ions. Equation: ………………………………………

As a result, all aqueous solutions contain both H+ and OH- ions.

In pure water, the concentration of H+ and OH- is around ……………………….. mol/L

Any solution which contains equal concentrations of H+ and OH- ions is said to be ……………………

In solutions which contain acids, how will the concentrations of H+ and OH- compare to those in pure water, and therefore to each other?

In solutions which contain alkalis, how will the concentrations of H+ and OH- compare to those in pure water, and therefore to each other?

The product of the concentrations of H+ and OH- ions in a solution is always equal to 1 x 10-14

|  |  |  |
| --- | --- | --- |
| Concentration of H+ ions (mol/L) | Concentration of OH- ions (mol/L) | Type of solution |
| 0.1 (1 x 10-1) | 1 x 10-13 | acidic |
| 0.001 (1 x 10-3) |  |  |
| 1 x 10-5 |  |  |
| 1 x 10-7 |  |  |
| 1 x 10-9 |  |  |
| 1 x 10-11 |  |  |
| 1 x 10-13 |  |  |

1. **The pH scale**

The level of acidity or alkalinity of a solution (ie the relative concentrations of H+ and OH- ions)

is measured on a scale called the **pH scale**

The pH of a solution is defined as ………………………………………………………………………………….

(pH stands for power of hydrogen)

pH is a logarithmic scale. What does this mean?

* If the H+ concentration is 0.1 (ie 1 x 10-1) mol/L, the pH of the solution is 1
* If the H+ concentration is 0.001 (ie 1 x 10-3) mol/L, the pH of the solution is ………..
* If the H+ concentration is 1 x 10-7 mol/L, the pH of the solution is ………..
* If the H+ concentration is 1 x 10-11 mol/L, the pH of the solution is …………
* If the H+ concentration is 1 x 10-13 mol/L, the pH of the solution is ……..….

What does a low pH tell you about the solution?

What does a high pH tell you about the solution?

The relationship between pH, acidity and alkalinity is summarised in the table below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH | -1 | 1 | 3 | 5 | 7 | 9 | 11 | 13 | 15 |
| Acidity |  | |  | |  |  | |  | |
| [H+] |  | |  | |  |  | |  | |
| [OH-] |  | |  | |  |  | |  | |

Examples of the pH of common solutions are:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| solution | pH | Solution | pH | solution | pH |
| 1 mol/L HCl |  | lemon juice |  | vinegar |  |
| orange juice |  | pure water |  | household bleach |  |
| 1 mol/L NaOH |  |  |  |  |  |