

Lesson # \_\_\_\_\_ Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period # \_\_\_\_\_

**The pH Scale and Powers of 10**

The pH scale measures acidity and alkalinity (basicity). Each pH value on the scale differs from another by a power of 10.

Examples:

A solution with a pH of 6 is 10 times more acidic than a neutral solution which has a pH of 7.

A solution with a pH of 5 is 100 times less acidic than a solution with a pH of 3.

A solution with a pH of 3 is 100,000 times more acidic than a solution with a pH of 8.

pH (Power of Hydrogen) Value	Acidity by Powers of 10. Ration of H+ ions to OH ions	
Acidic 0	10,000,000	There is 10,000,000 times as much H+ as there is OH- ←
1	1,000,000	There is 1,000,000 times as much H+ as there is OH-
2	100,000	There is 100,000 times as much H+ as there is OH-
3	10,000	There is 10,000 times as much H+ as there is OH-
4	1,000	There is 1,000 times as much H+ as there is OH-
5	100	There is 100 times as much H+ as there is OH-
6	10	There is 10 times as much H+ as there is OH-
Neutral 7	1	The ratio of H+ and OH- ions are equal. ←
8	0.1	There is 10 times as much OH- as there is H+
9	0.01	There is 100 times as much OH- as there is H+
10	0.001	There is 1,000 times as much OH- as there is H+
11	0.0001	There is 10,000 times as much OH- as there is H+
12	0.00001	There is 100,000 times as much OH- as there is H+
13	0.000001	There is 1,000,000 times as much OH- as there is H+
Alkaline 14	0.0000001	There is 10,000,000 times as much OH- as there is H+ ←

Note: There is over 1,000 more times the amount of water molecules than Hydrogen Ions at this moment

Note: There is 10,000,000 more times the amount of water molecules than either Hydrogen or Hydroxide at this moment.

Note: There is 1,000 more times the amount of water molecules than either Hydroxide at this moment.

- 1) The pH of a soda is 3. Is the soda an acid or base? The pH of stomach acid is 2. How many more times acidic is stomach acid than a soda drink?
- 2) Some of the ponds in Dallol have a pH of 5. Battery acid has a pH of 0. How many times more acidic is battery acid than those ponds?
- 3) The pH of pure water is 7. Detergent is 10,000 times more basic than pure water. Calculate the pH of detergent.
- 4) The pH of oven cleaner is 14. The pH of milk of magnesia is 10. How many times more alkaline is oven cleaner than milk of magnesia?
- 5) Coffee is 100 times more acidic than pure water. Ammonia is 1,000,000 times less acidic than coffee. Find the pH of ammonia (hint: first find the pH of coffee).
- 6) Is the pH of coffee more or less acidic than Dallol's ponds, which often have a pH of 5?

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