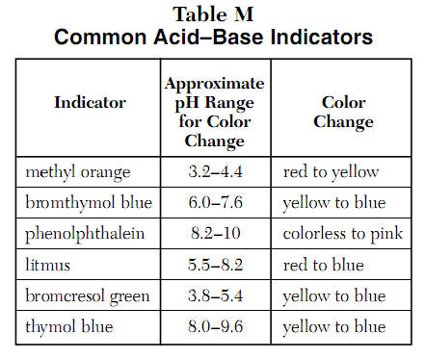
**Acid Base Indicators**

pH Indicators: Table M

* An indicator is a valuable tool for **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because its **\_\_\_\_\_\_\_\_\_\_** form and **\_\_\_\_\_\_\_\_\_\_\_\_** form have **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** in solution.

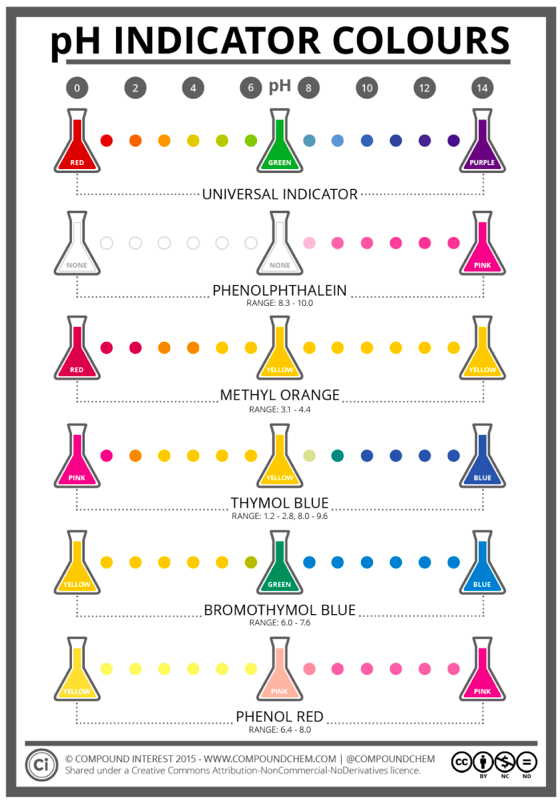
`pH Indicators: Methyl Orange

* Red: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Yellow: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

pH Indicators: Phenolphthalein

* Colorless: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Pink: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

pH Indicators: Litmus

* **\_\_\_\_\_\_\_\_\_\_\_** paper turns **\_\_\_\_\_\_\_\_\_** for **\_\_\_\_\_\_\_\_\_\_\_\_** solutions
* **\_\_\_\_\_\_\_\_\_\_\_** paper turns **\_\_\_\_\_\_\_\_\_** for **\_\_\_\_\_\_\_\_\_\_\_\_** solutions

pH Indicators: Bromcresol Green

* Yellow: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Blue: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

pH Indicators: Thymol Blue

* Yellow: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Blue: **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Using More Than One Indicator

* If you put bromcresol green in a solution and the solution turns blue, the pH is 5.4 or more.
* If you put bromthymol blue in another test tube with the same solution and it turns yellow, the pH is 6.0 or less
* Conclusion: the solution has a pH between 5.4 and 6.0
* Mystery solution #1 turns litmus red and is yellow when methyl orange is added.
* Mystery solution #2 is pink when phenolphthalein is added but turns litmus paper blue.

Summary

|  |  |
| --- | --- |
| Acids   * pH **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** * Litmus 🡪 **\_\_\_\_\_\_\_\_** * Phenolphthalein 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ * Bromthymol blue 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Methyl orange 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Bases   * pH **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** * Litmus 🡪 **\_\_\_\_\_\_\_\_** * Phenolphthalein 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ * Bromthymol blue 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Methyl orange 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Summary Questions

1. If an aqueous solution turns blue litmus red, which relationship exists between the hydronium ion and the hydroxide ion concentration?
   1. [H3O+] > [OH-]
   2. [H3O+] < [OH-]
   3. [H3O+] = [OH-] = 10-7
   4. [H3O+] = [OH-] = 10-14
2. In which 0.01M solution is phenolphthalein pink?
   1. CH3OH(aq)
   2. Ca(OH)2(aq)
   3. CH3COOH(aq)
   4. HNO3(aq)
3. The results of testing a colorless solution with three indicators are shown below

**Test – Result**

Red litmus – blue

Blue litmus – blue

Phenolphthalein - pink

Which formula could represent the solution tested?

* 1. NaOH(aq)
  2. HCl(aq)
  3. C6H12O6(aq)
  4. C12H22O11(aq)

1. Three samples of the same solution are tested, each with a different indicator. All three indicators, bromthymol blue, bromcresol green and thymol blue, appear blue if the pH of the solutions is
   1. 4.7
   2. 6.0
   3. 7.8
   4. 9.9
2. Which statement correctly describes a solution with a pH of 9?
   1. It has a higher concentration of H3O+ than OH- and causes litmus to turn blue
   2. It has a higher concentration OH- than H3O+ and causes litmus to turn blue.
   3. It has a higher concentration of H3O+ than OH- and causes methyl orange to turn yellow
   4. It has a higher concentration of OH- than H3O+ and causes methyl orange to turn red.