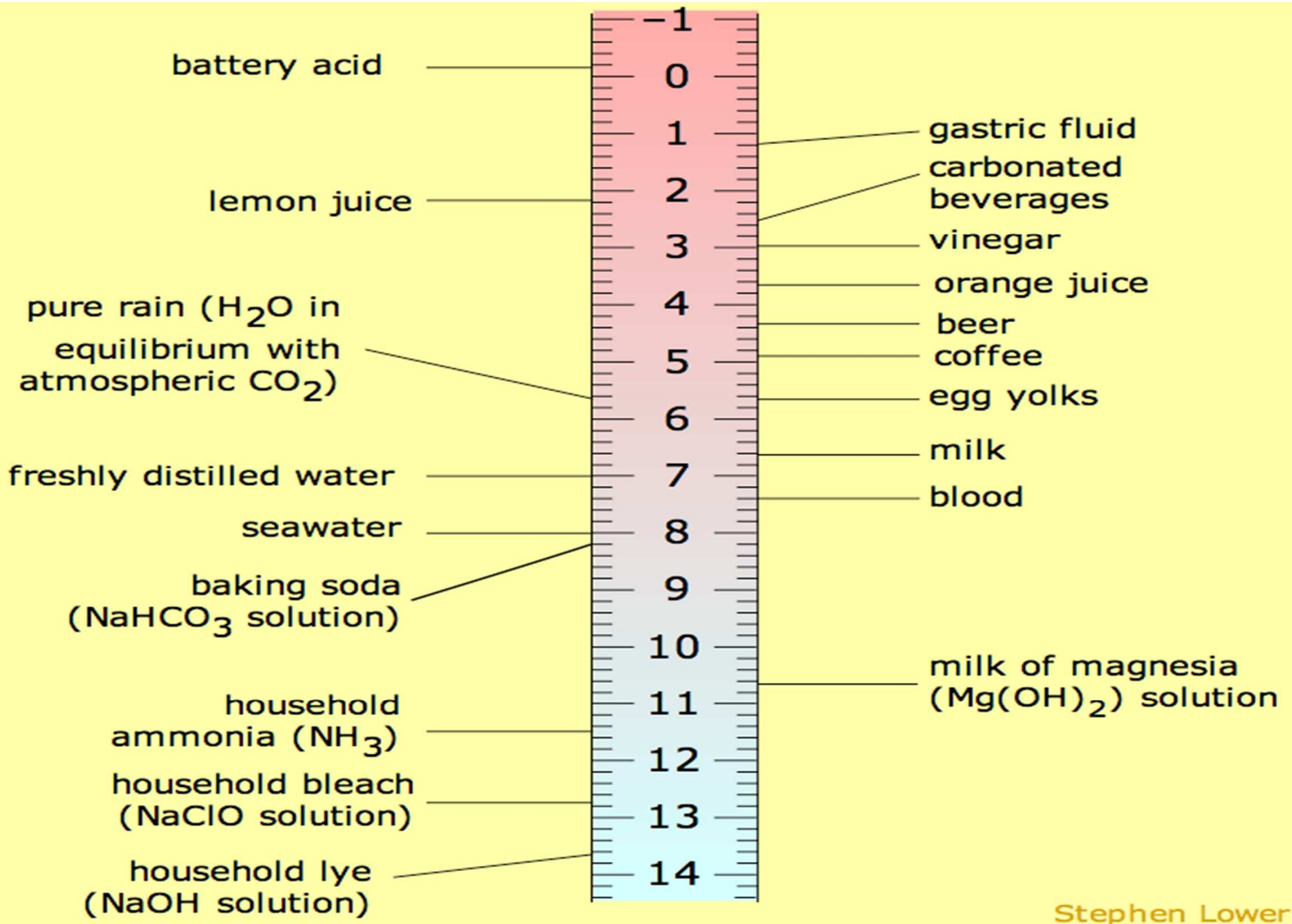


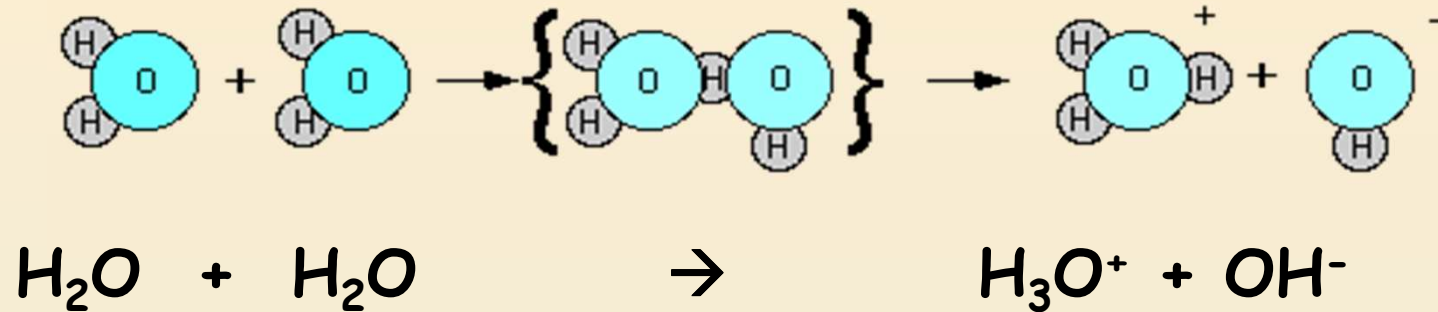
pH Calculations



Soren Sorensen



Self-Ionization of Water



Though pure water is considered a non-conductor, there is a slight, but measurable conductivity due to "self-ionization"

K_w - Ionization Constant for Water

In pure water at 25 °C:

$$[\text{H}_3\text{O}^+] = 1 \times 10^{-7} \text{ mol/L}$$

$$[\text{OH}^-] = 1 \times 10^{-7} \text{ mol/L}$$

K_w is a constant at 25 °C:

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$$

$$K_w = (1 \times 10^{-7})(1 \times 10^{-7}) = 1 \times 10^{-14}$$

Calculating pH, pOH

$$\text{pH} = -\log_{10}(\text{H}_3\text{O}^+)$$

$$\text{pOH} = -\log_{10}(\text{OH}^-)$$

Relationship between pH and pOH

$$\text{pH} + \text{pOH} = 14$$

Finding $[\text{H}_3\text{O}^+]$, $[\text{OH}^-]$ from pH, pOH

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}}$$

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$$\text{pH} + \text{pOH} = 14$$

