

# pH Calculations

Chemistry

Calculating pH for strong and weak acids.

**pH is the negative logarithm of hydrogen ion concentration.**

$$\text{pH} = -\log[\text{H}^+] \cdot K_a = [\text{H}^+][\text{A}^-] \div [\text{HA}]$$

**0.01 M HCl**

Fully dissociated.

**pH 2**

**0.1 M weak acid,  $K_a = 1.8 \times 10^{-5}$  ( $K_a \times c$ )  $\approx 1.3 \times 10^{-3}$ , pH 2.87**

**K<sub>w</sub> at 25°C**

pH + pOH = 14.

**$1.0 \times 10^{-14}$**

## THE COMMON MISTAKE

✗ **Treating a weak acid like a strong one**

✓ **Using  $K_a$**

A weak acid barely dissociates; assuming full dissociation overestimates  $[\text{H}^+]$  by orders of magnitude.

**Buffers:  $\text{pH} = \text{p}K_a + \log([\text{A}^-]/[\text{HA}])$ . A buffer works best when pH is within one unit of pK<sub>a</sub>.**