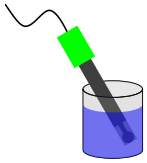
pH Calculator



This program has been designed to be small and simple, it calculates the concentration of $[H]^+$ or $[OH]^-$ ions in the pH adjustor you are using and the concentration in your current sample solution and informs you how much of the adjustor would be required to adjust the sample to a particular pH. As it is anticipated that a highly concentrated adjustor will be used effects due to dilution are ignored, as are any buffering properties that the sample solution may posses, however these both of these factors are working for you as it is always easier to add more adjustor than to neutralise it.

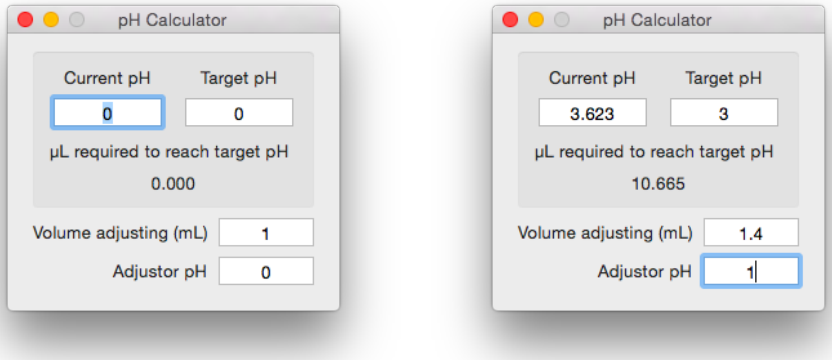
$$[H]^+ = 10^{-pH} \quad \text{or} \quad [OH]^- = 10^{-(14-pH)} \tag{1}$$

Using equation 1 the number of $[H]^+$ or $[OH]^-$ present in both the adjustor and sample can quickly be determined, as well as the target ion concentration. From here simply subtracting the target ion concentration from the current ion concentration, divided by the adjustor ion concentration will reveal the ratio required. Multiplying this by the sample volume and subsequently by a thousand, to convert from mL to µL, it is possible to work out the required volume of adjustor to change the sample pH to the desired pH, as outlined in equation 2. Naturally, $[H]^+$ can be substituted for $[OH]^-$ in equations 2 and 3.

$$\text{Adjustor Volume} = \left(\frac{[H]^+_{\text{Target}} - [H]^+_{\text{Current}}}{[H]^+_{\text{Adjustor}}} \right) \times \text{Volume} \times 1000 \tag{2}$$

As one might imagine, if neutralisation should be required before the adjustment shown in equation 2 this will increase the amount of adjustor required. This can be determined by equation 3 and the program will, depending on the numbers input, work out whether only neutralisation is required or whether neutralisation is required in addition to further alteration of the pH. For full details on how this is implemented review the program comments in the source code.

$$\text{Adjustor Volume} = \left(\frac{[H]^+_{\text{Target}} + [OH]^-_{\text{Neutralisation}}}{[H]^+_{\text{Adjustor}}} \right) \times \text{Volume} \times 1000 \tag{3}$$



The figure on the left shows the program startup screen. Simply entering numbers, as shown on the figure on the right, will provide the volume of adjustor, in µL, required to change the given volume of sample solution, in mL, depending on parameters entered by the user. The numbers given here can also be scaled by thousands, *e.g.* the volume, in mL, required to adjust the pH of a sample, in L.

Requirements and License

This software should work work with any Macintosh computer running Mac OS 10.10 or later and is released under the BSD 3-Clause license, as follows: