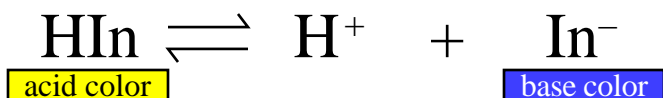
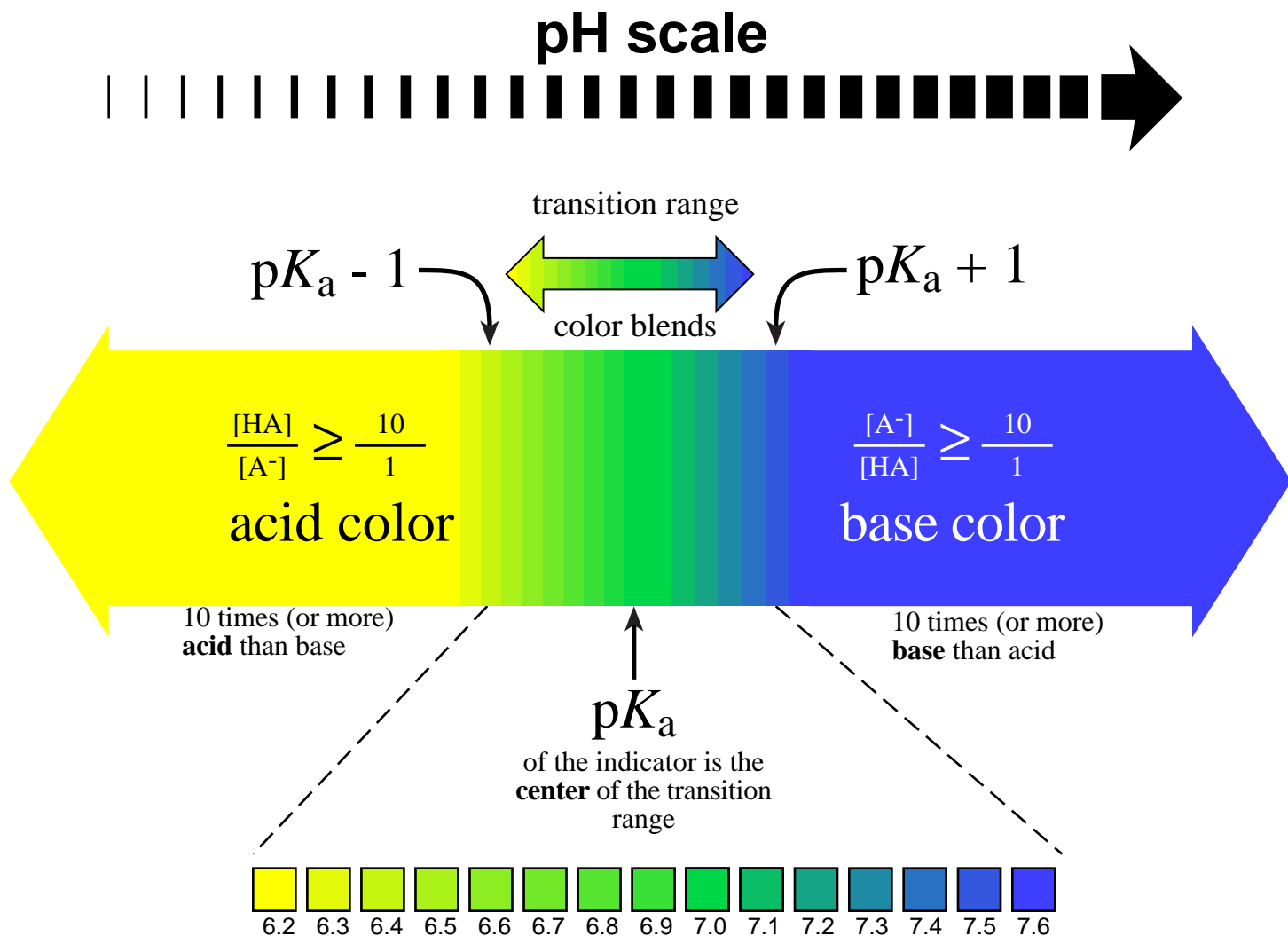


# Acid / Base Indicators and their useful ranges.

Remember that indicators are weak acids (or bases) themselves and follow the same rules of equilibria as weak acids:



The difference between “plain” weak acids and indicators is that the COLOR of the two conjugates (acid form and base form) are different. Please realize that on this help sheet I have chosen yellow and blue for the acid and base colors (like bromothymol blue). In general, ANY color can be the acid or base and you must know how the colors blend to make new colors in the transition range. The transition range is the  $\text{pK}_a \pm 1$ . In that range you will see a blend of the acid and base colors. Outside that range you will only see either the acid color or the base color. By using a good calibration color wheel you can match the color in the transition range and get very good approximations of the pH based completely on the color of the indicator.



Within the transition range a color chart can easily be printed for comparison. Many applications put the chart directly on the measuring device (think swimming pool pH kit). The color of your test solution can easily be matched to a color swatch and the pH is narrowed down to a pH with error of no more than  $\pm 0.1$  pH units. Paper can be impregnated with the indicator and you have pH-paper. Papers can be printed to be very accurate in certain narrow ranges. Other papers have several indicators and they give a broader pH range such as universal pH paper which is useful from a pH of 1 up to 12. Universal pH paper is only accurate to  $\pm 1$  pH unit though.