

Lab Session 7, Experiment 6: Acid-Base Titration

Molarity (M) and normality (N) are two means of expressing solute concentrations. Molarity is defined as moles of solute per liter of solution, and in a similar way, normality is defined as equivalents (eq) of solute per liter of solution. From these definitions we may write the following:

$$M = \frac{\text{moles}}{L}, \text{ or by rearrangement, } M \times L = \text{moles}$$

$$N = \frac{\text{eq}}{L}, \text{ or by rearrangement, } N \times L = \text{eq}$$

$$N = \frac{\text{millequivalents (or meq)}}{\text{mL}}, \text{ or by rearrangement, } N \times \text{mL} = \text{meq}$$

In this experiment, we will consider only acid-base reactions. Your instructor will define the quantity of an acid that is an equivalent and the quantity of a base that is an equivalent. Let us stress here that one eq (or meq) of an acid reacts exactly with one eq (or meq) of a base. Whatever the number of eq (or meq) of acid, the same number of eq (or meq) of base will be consumed in the reaction. Thus,

$$\text{meq}_{\text{acid}} = \text{meq}_{\text{base}}$$

$$\text{mL}_{\text{acid}} \times N_{\text{acid}} = \text{mL}_{\text{base}} \times N_{\text{base}}$$

Assume that 20.00 mL of 0.3000 N acid requires 30.00 mL of base. Then,

$$N_{\text{base}} = \frac{\text{mL}_{\text{acid}} \times N_{\text{acid}}}{\text{mL}_{\text{base}}} = \frac{20.00 \times 0.3000}{30.00} = 0.2000 \text{ N}$$

Our assumed case may be stated as follows: The titration of 20.00 mL of 0.3000 N acid requires 30.00 mL of 0.2000 N base.

Titration is the precise measurement of the volume of one reagent required to react with a mass or volume of another reagent. As in the titration described above, the solution of base would be added from a burette to the acid until the acid is just neutralized. You will use the indicator phenolphthalein, which is colorless in acid and pink in base, to indicate when the acid is just neutralized. Two or three drops of phenolphthalein are added to the acid before the titration is begun. This colorless solution turns pink when, as a result of base addition from the burette, the solution changes from acidic to barely basic. When the color change appears, the burette is read to obtain the volume of base added.

6A Experiment

In this experiment, you will use a standardized NaOH solution to titrate against an aqueous acetic acid unknown in order to determine the normality of the acetic acid solution.

1. You will be provided with three chemicals:
 - (1) An NaOH standard solution of known normality (approximately 0.21 N). The exact

Report Form 6: Acid-Base Titration Name _____

Partner _____ Section # _____

6A Experiment

				Titrations		
				1	2	3
N_{base}						