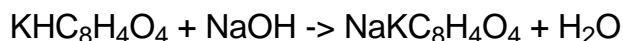


## Chem12 The Primary Standard : Notes/W.S. - 210

In order to perform a titration, we require that the concentration of one of the solutions, the **standard solution**, be known accurately, to a high degree of precision. For this, we use substances called **primary standards**. A primary standard has the following properties. It should :

- a) be a very pure solid.
- b) not react with air ( $O_2$ ,  $CO_2$ , or  $H_2O$  (it should be dry)).
- c) be stable in solution.
- d) have a high molar mass (to minimize weighing errors).

The following are examples of primary standards ;  $Na_2CO_3$ ,  $H_2C_2O_4$ , and  $KHC_8H_4O_4$  (potassium hydrogen phthalate). PHP is a weak monoprotic acid. It can be used to prepare a standard solution of NaOH. The reaction with NaOH during a titration is :



The equivalence point for this titration occurs when the number of moles of NaOH equals the number of moles of  $KHC_8H_4O_4$ . A suitable indicator for this titration would have an endpoint at a pH of about 8.0 to 10.0 (see titrations of strong bases by weak acids).

NaOH cannot be used as a primary standard as it absorbs water from the air. But, by doing a PHP titration, the concentration of any NaOH solution can be found very accurately.

Exercises :

- 1)a) Find the molar mass of potassium hydrogen phthalate.
- b) An NaOH solution is known to have a concentration of about 0.5 M. A titration is performed using a potassium hydrogen phthalate solution. It is found that 4.815 g of PHP is required to neutralize 50.00 mL of NaOH solution. Find an accurate and precise value for the concentration of the NaOH solution.

Answers : 1)a) 204.2g, b) 0.4715 M