**Preparation and Standardization of 0.1 M NaOH solution**

1. **Preparing the NaOH Solution**
2. Tare a small beaker on a balance, and weigh out the calculated amount of NaOH as close as using whole pellets allows.

**Note:** Minimize the exposure of the NaOH pellets to air, because it quickly absorbs moisture (hygroscopic) and CO2. Don’t break up the pellets, the exact concentration of the NaOH solution will be determined by the titration. Make sure to close the NaOH container when done.

1. Rinse the surface of the pellets with a small amount of distilled water to remove any sodium carbonate that formed on the pellets and discard the washing into your waste beaker. Add about 30-40 mL distilled water to the beaker containing the NaOH pellets, and swirl/stir to make a solution.
2. Transfer the solution into a 500-mL volumetric flask. Rinse the beaker and stir rod a few times with small portions of distilled water and transfer to the flask, then fill the flask to the mark with distilled water. Close the opening of the flask with a cap, stopper, or piece of Parafilm, depending on the type of volumetric flask. Hold the top with your thumb, and mix the solution thoroughly by inverting the flask a few times.

**Note:** First fill the flask up to about an inch below the mark from a distilled water jug or squeeze bottle with the cap removed, then slowly fill to the mark with a squeeze bottle with the cap on or from a disposable pipet.

1. Transfer the solution into a plastic bottle.
2. Fill a clean, dry 150-mL beaker about halfway with the solution, and cover it with a watch glass to keep moisture and CO2 out. This is the stock solution.
3. **Setting up the Buret**
4. Check the cleanliness of the buret by rinsing with distilled water by seeing if water droplets form on the walls of the buret.
5. Rinse buret 3 times with small portions (few mL’s) of the NaOH solution.
6. Mount the buret with a clamp on a stand, making sure it is perpendicular to the benchtop. **Note:** The buret should be mounted by its lower third.
7. Make sure stopcock is closed (parallel to benchtop), then fill the buret with the NaOH stock solution, using a small funnel. The stock solution in the buret is the titrant.

**Note:** While filling buret, lift funnel to allow air to come out.

1. Have a waste beaker under the buret, open the stopcock (⏊ to bench top), and fill the buret tip, making sure there are no air bubbles left in the tip.

Note: Handle the stop cock on the bure gently. Too much force can eject the tip flooding the bench with NaOH solution. Also, stop the titration and call your instructor, if the stopcock leaks after opening it.

1. Fill buret to about, but below the 0 mL mark. Don’t need to start exactly at 0.00 mL, so don’t waste time trying to do so.
2. Remove any hanging drop before starting. Wipe the tip of the buret with a paper towel.
3. Read buret at bottom of meniscus at eye level and record the volume to the second decimal place (to nearest 0.01 mL).
4. Position the tip of the buret inside the neck of the flask, but not touching the solution.
5. Position a white paper towel so it is behind and underneath the flask for better contrast to observe the color change.
6. **Performing a test trial**
7. Weigh between 0.30 - 0.35 g potassium hydrogen phthalate (KHP) into a tared weighing dish, recording the exact mass dispensed.

**Note:** Exercise caution transporting the KHP from the balance room to the lab, preventing any loss of the sample.

1. Transfer the crystals into a 250-mL Erlenmeyer flask, and rinse the dish with small portions of distilled water a few times into the Erlenmeyer flask to ensure quantitative transfer.
2. Dissolve the crystals, adding enough water to have about 25 mL of solution in the flask.
3. Add 1-2 drops of phenolphthalein indicator.
4. Place the flask under the buret.
5. Add 1 mL of the titrant at a time while continuously swirling the solution in the Erlenmeyer flask.
6. When the solution turns pink-purple, read the volume from the buret.
7. Calculate the amount of NaOH solution used and subtract 2 mL from it. This is the rough volume.
8. **Performing the titration**
9. Refill the buret, read and record the initial reading.
10. Number three weighing dishes and weigh out between 0.30-0.35 g of KHP into each, recording the mass of each.
11. Make solutions from the three samples in Erlenmeyer flasks just like before (C.2-4). Number the flasks as well.

**Note:** Do not forget to add the phenolphthalein.

1. Place the first flask under the buret and add the calculated rough volume of NaOH in one shot, while swirling the solution in the Erlenmeyer flask.
2. After the addition of the rough volume, continue to add the titrant *one drop at a time* while swirling the solution until the solution turns pale “baby-pink”. This point is the end point, which is an estimation of the equivalence point.

**Note:** As the titration approaches the equivalence point, the temporary purple color where the titrant hits the solution persists longer before the solution is thoroughly mixed. Near the equivalence point, add half a drop by allowing half a drop hanging from the tip of the buret, and transferring the drop into the solution by touching the tip with the inner wall of the flask and washing the droplet into the solution by swirling or a small squirt of distilled water.

1. Read and record the final reading.
2. Perform the titration of the remaining two samples in the same way (D.1-6).
3. Calculate the exact concentration of the stock solution.
4. Label the plastic bottle, including the exact concentration. Collect the left over stock solution from the beaker and the buret, transfer it into the plastic bottle. Save the stock solution in your cabinet for the next lab.

**Note:** Generally, solutions/chemicals are NOT to be returned into the original container. Saving the unused titrant from the buret and the beaker is a precaution to make sure there will be enough titrant for the second part of the lab.

1. When done, rinse the buret and the volumetric flask well with distilled water 3 times and return.
2. Discard the waste as instructed.