VALENCIA COLLEGE

Chemistry

Lab Technique 22: Titration

Titration is a quantitative technique that uses a solution of known concentration to react completely with an unknown to determine the unknown concentration or quantity.

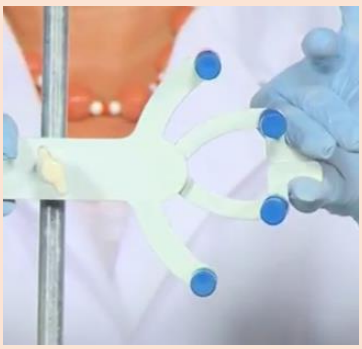
Titration Video link: **https://www.youtube.com/watch?v=F15cndxyO_A**

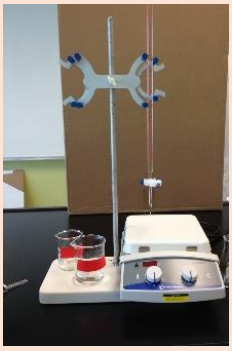
Setup:

Place the buret clamp on the stand.

If using an electric stirrer, position it so the clamp is as close as possible over its center. (If right-handed, place the stirrer to the right side of the stand. If left-handed, place it on left side.)

Squeeze both arms at the same time to open the clamp. Place the buret in between both arms and gently release the arms. Inspect it to make sure that it is securely held between the indentations of the rubber knobs. Reposition it if necessary.





Condition the Buret:

Notice the positions of the valve:

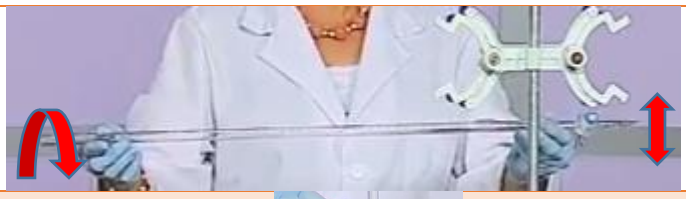
The valve is closed when its handle is perpendicular to body of the buret (picture on the left).

The valve is open when its handle is parallel to body of the buret (picture on the right).

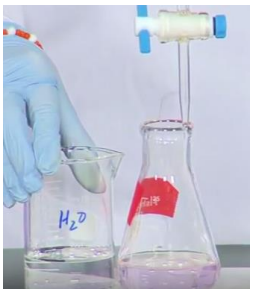
Double-check that the valve is closed (perpendicular to body).

Remove the buret, place the funnel on top, and pour a few milliliters of the titrant into it.

Remove the funnel (place in clean beaker or on watch glass to prevent contaminating bench top and funnel).

Turn the buret on its side and rotate it as you change its angle to rinse the inside walls of the buret with the solution.	
Place the buret in the clamp, and empty the solution, through the tip, into the waste beaker. Repeat this two or three more times to ensure that your titrant is the only species in the buret.	
Remove Air Bubbles:	
Close the valve, place the funnel back on top, and add several milliliters of titrant (about the width of your hand). Position the beaker containing titrant under the buret and open the valve so the tip fills with the solution. Do not allow it to completely empty out.	 
Look closely just below the valve. If there is an air bubble, tap the buret with the valve open, to see if it comes out. If not, ask your professor for help.	
Titrate Sample (Analyte):	
Fill the buret close to the 0 mL mark. Remove the funnel and wait a few seconds to allow drops on the wall to roll down. Do not waste time getting the meniscus exactly at zero; it just needs to be within the graduations.	
Read and record the initial value to two decimal places. Make sure you are at eye level when reading the meniscus. (Note: this <u>initial value is close to zero</u> since you filled the buret close to the 0 mL mark. You are not recording the volume in the buret, but the location of the meniscus.)	

Follow experiment's procedure on how to prepare the sample. Add two to three drops of the indicator if stated in the procedure.	
If using the electric stirrer, hold the Erlenmeyer flask on angle and slide a magnetic stir bar inside. Position the flask under the buret and turn the stirrer so that the magnet rotates as fast as it can without splashing. If mixing by hand, swirl the flask constantly throughout the titration. Make sure that the tip of the buret is slightly below the top of the flask regardless of the mixing method.	 
Open the valve and allow titrant to pour into the Erlenmeyer flask. Add slowly with the first titration so you do not pass the endpoint. Once you titrate the first sample, and have an idea of the volume needed, you can titrate the next sample more quickly.	
A small drop can reach the desired endpoint, whereas a big drop can overshoot the endpoint. If that happens, you will have to discard and repeat the trial. Practice delivering small drops. You can use several methods. • Rotate the valve very quickly. This works best when standing, with one of your hands holding the buret slightly above the valve. • Another is obtaining a half-drop by closing the valve before the drop falls. Rinse the drop into the flask using the wash bottle.	 

The titration is complete once the end point persists for at least 15 seconds (if using phenolphthalein as indicator in the titration of an acid with a base, the ideal color at the endpoint is a very pale pink color as shown in this picture). If the goal is a pale color, a beaker with water next to the sample may help by comparison to detect a pale color change.	
Read and record the final volume on the buret to two decimal places. Remember to read it at eye level.	
The volume delivered into the Erlenmeyer flask is the difference between the final and the initial volumes.	Volume delivered = Final volume – Initial Volume.
Typically, you perform several trials of the same sample to obtain good accuracy through averaging. You do not need to refill the buret to the 0 mL mark. Just make sure there is enough titrant in it for the next titration. If you are close to the last graduation and have not reached the endpoint, ask your instructor for further instructions.	The volume used must stay within the graduations.
When you are finished completely with the buret, place the waste beaker below the tip and open the valve. Once empty, rinse the buret, from the top, with your wash bottle. Collect the rinse in the waste beaker. Gently place the buret in the buret canister, tip up with the valve open. The stock room personnel will properly wash it.