

Titration SOP

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Statement of Understanding.

Make sure you read this form entirely and the attached materials. Be sure to ask questions that may arise while reading this document. Only after you have had all your questions answered, and located the necessary items, should you sign the appropriate the area of your safety training sheet.

Precautions.

- Do not use titrator without being trained first. Review MSD's of chemicals being used.
- Wear safety glasses and gloves when handling acids and bases.
- All chemicals must be well labeled, that includes water as well.
- Ask your supervisor before disposing of chemicals or empty bottles.
 - Empty bottles must be rinsed three times and the labels must be removed.
 - Acids and bases must be neutralized before disposal.
 - Juice samples titrated to a neutral pH can be safely disposed down the sink.

Sample Preparation.

1. Obtain at least 10 milliliters of clear juice by cutting fruit, pressing with a hand press, and filterfiltering through cheesecloth. Sugar levels often vary within the fruit, being higher at the stem-end and lower at the calyx-end. For this reason, it is important to use longitudinal slices of fruit (from end to end) when sampling.
2. Make sure samples are at room temperature before taking measurements.

3. For each sample, weigh out 3 grams of juice into a titration vessel.
4. To each sample, add 25 milliliters of water.
5. Place in automatic titrator turntable and titrate following the procedure below.

Automatic Titrator Operation.

1. At the beginning of each week, change both buffers (pH 7 and 10).
2. Check the molarity of the NaOH to be sure that it is the right concentration for the juice being titrated. When checking the molarity also fill the NaOH reservoir. If you are doing several samples consecutively, you do not want to run out of titrant in the middle of a set.
3. Empty the burette. (First raise the electrode out of the pH. Do this manually by lifting the arm.). Press the "burette" button. The screen will go to a menu. Press the ↓ until the cursor is beside the burette functions at the bottom of the screen. Press the → until the screen reads "Flush". Press the √. The titrator will empty. Be sure an empty beaker is under the electrode to collect liquid.
4. Calibrate. Press the "pH/mV" button. Place the electrode manually in the pH 7 or pH 10 solution. The titrator will read the pH, if the pH is within the range of 6.95-7.05 or 9.95-10.05 the pH is calibrated. Press the √. If not within range, consult supervisor.
5. Standardize titrant. This is only done once a day, just before the first set is run. This standardizing sample is run separately from all of the other sets.
 - Use 1g HCl (0.1N) dilute and titrate.
 - If using 0.1 N NaOH, the titrator should add about 1ml.
 - If using .02N NaOH, the titrator should add about 5ml.
 - If the titration is within (+/-) .01 ml is OK; if > .01 ml, stop the titrator by pressing the "Stop" key and talk to supervisor.
6. Prepping the printer, always scroll one page of paper prior to printing and let the paper fall forward toward the floor. If it is not folded forward the paper will get caught in the paper feed mechanism.
7. Titrate samples. Check that the method is number 40. (If it is 39 it will take the pH of the samples rather than titrating the juice.) Begin titrations by pressing the "Run" button. Consult supervisor on proper juice weights and amount of deionized water required to dilute the samples.
8. If you need to add titrant during the day, be sure that a set is not in progress. Add the NaOH and standardize once again, as explained in steps 1-4.
9. Log equipment use. Beside the titrating unit is a logbook. In the log enter date, name, beginning sample number, ending sample number and the title of the project.
10. When finished titrating or when there is a long pause in titrations, i.e. during lunch, immerse the probe in the 7 pH buffer. Do not let the probe dry out.
11. Clean area. Wipe counters, wipe equipment, put equipment away and take out the trash. At the end of the day wash the dishes. Using warm soapy water, scrub the cups with a bottlebrush, rinse with deionized water, and hang to dry.
12. Data organization. Record all sample numbers on the printout; indicate project title and your name.

Calculation of Titratable Acidity.

Calculate the titratable acidity using the following formula:

$$\% \text{ acid} = \frac{[\text{milliliters NaOH used}] \times [0.1 \text{ N NaOH}] \times [\text{milliequivalent factor}] \times [100]}{\text{grams of sample}}$$

Commodity	Predominant Acid	Milliequivalent Factor
Stone fruit, apples, kiwifruit	Malic Acid	0.067
Citrus	Citric Acid	0.064
Grapes	Tartaric Acid	0.075

Titrator Policy.

1. When using the automatic titrator, two logbooks need to be filled out. One summarized use of the machine (name, date, total number of samples titrated) and the other is a complete record of all the titration results (see attached log book page).
2. The completed data sheets (results) need to be photocopied and placed in the "Titration Log 20XX" binder. The original data sheets, as well as the printouts are to be given to the researcher.
3. Record titrator use in the log book that is located next to the titrator.

Titration Log Sheet

Commodity _____ Researcher _____ Name of Titrator _____
 Cultivar _____ Experiment _____ NaOH Normality _____

Date						
Sample #	Sample Description	SSC	Sample Weight	mls NaOH used	Calculated TA	pH
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						