Vinmetrica SC-200™
User Manual

The Vinmetrica SC-200* is a simple and robust device that provides high accuracy in determination of pH and titratable acidity (TA) levels in wine. These are essential parameters to control in the effort to make high quality wines.

Materials provided in the kit:

1. Vinmetrica SC-200 pH/TA controller unit (Part number SC-200-1)
2. pH Electrode (Part number SC-200-3), red or blue polycarbonate housing, with storage bottle and storage solution
3. pH/TA reagent set (Part number SC-200-8)
   - pH 4.01 calibration solution
   - pH 7.00 calibration solution
   - TA titrant (0.133N NaOH)
4. One 5 mL syringe
5. One 5mL serological pipette
6. 100 mL polypropylene beaker

Figure 1. The SC-200 instrument

Things you will need:

1. Two standard AA batteries (alkaline type).
2. Distilled water, which usually can be found at your local grocery store. It's handy to have a wash bottle for rinsing. These are available from Vinmetrica (Part number SC-100-17)
3. (Optional) Deluxe Lab Accessory Kit which includes: magnetic stirrer, burette (10mL or 25mL), lab support stand and electrode holder. Available from Vinmetrica (Part Number SC-300-9, https://vinmetrica.com/product/the-deluxe-lab-accessory-kit/)

*US Patent pending

Why Test for pH and TA?

Monitoring your wine's pH is especially important for the first few months of the wine making process. Proper pH and Titratable Acidity (TA) levels influence mouth feel and provide wine stability. During malolactic fermentation, the pH can increase somewhat and should be monitored. Typically, wine pH and TA are inversely related; when pH goes up, TA goes down and vice versa. Adjustments may be made to your wine to prevent wine instability. See Appendix B for more information on adjustments.

Theory of operation:

The SC-200 kit provides a pH electrode and reagents for calibration and determination of pH and titratable acidity (TA) values in wines and other samples. The pH value is simply determined by placing the calibrated electrode into a sample and reading the value. TA is determined by titrating a 5 mL sample of wine to an endpoint pH of 8.2 with the TA titrant (0.13N NaOH) from the syringe in the kit. From the known concentration of the TA titrant and its volume required to reach the endpoint, the TA is simply calculated (results are in units of g/L tartaric acid).

Potential measurements: In versions 2.1.1 and higher (July 2014) of the firmware, the SC-200 can display the voltage reading of an electrode attached to the pH connector. This can be useful with probes for potassium, sodium dissolved oxygen, and others.

Setup:

Setting up the SC-200 for the first time:

1. The SC-200 (Figure 1) runs on two standard AA batteries (alkaline cells recommended). To insert the batteries, open the battery housing on the bottom of the back of the unit by removing the two screws and gently prying off the lid. Install the batteries as shown by the + and – markings, then close the housing. If desired, you can prop the unit up using its folding stand.

2. Low Battery Detection: When the battery level is getting low, the instrument shows a low battery icon on the upper left side of the display but continues to operate without impairment to any function. Replace the batteries as soon as practicable. When the battery level drops too far, the instrument does not operate. It rapidly flashes the low battery icon for 3.0 seconds, beeps and shuts itself off.

3. Auto Shut-off: The SC-200 shuts off after 30 minutes. If this happens unexpectedly, just press the POWER button to resume from where you were.

4. Attach the pH electrode via the BNC connector protruding from the top (Figures 2 & 3).

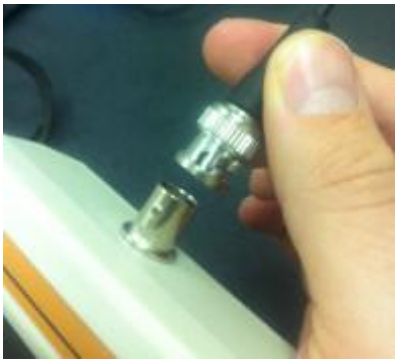

Figure 2. Attach the Electrode you are using to the BNC connector on the SC-200

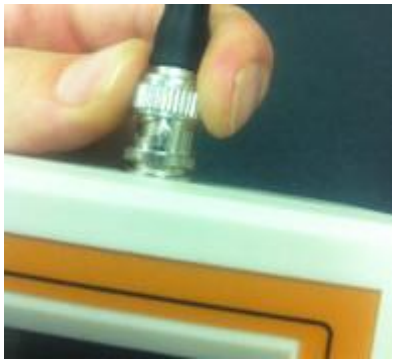

Figure 3. Be sure the Electrode attachment is screwed into place on the BNC connector.

5. <u>About the pH electrode:</u> The pH electrode is fragile and should always be handled carefully. Remove the liquid storage bottle by unscrewing the cap FIRST, then gently pulling the bottle, followed by the cap, off the electrode. Rinse the electrode in a little distilled water before each use. *Electrode care*: Do not touch the glass bulb, nor attempt to wipe it with anything. When necessary, you may gently blot excess liquid away from the electrode surface, but avoid directly touching it. The pH electrode should always be kept in the liquid storage bottle with plenty of storage solution (available from Vinmetrica) when not in use. Rinse the electrode with DI water and gently blot or shake off excess water. Push the electrode through the hole in the cap

about an inch, then gently screw the bottle onto the cap so that the electrode is in contact with the solution in the bottle.

Instrument Operation:

1. Turn on the instrument by pressing the POWER button briefly (Note: depressing the POWER button longer than two seconds at start-up will cause the instrument to enter *Test Mode*; see Appendix A). The instrument will go through a power-up sequence. After a few seconds the instrument will start in whatever mode was last selected. The mode is indicated by the yellow LED panel on the left. Select the desired mode by pressing the MODE button.

2. pH mode: In this mode, the meter measures the pH. The pH electrode must be attached. If the instrument has not yet been calibrated, the message "doCal" scrolls across the screen, and you need to do a calibration (see Calibration of pH below). We recommend re-calibrating the instrument for pH once each day of use.

3. Potential mode (Firmware version 2.1.1 and higher) (pH LED flashing) In this mode the instrument displays the voltage reading coming from an electrode attached to the pH connector. This can be used with certain electrodes, for example, galvanic oxygen probes, potassium, or sodium electrodes, or to view the raw voltage of a pH electrode. In this mode, when the red STOP LED is illuminated, the values on the screen are negative; otherwise the values are positive.

4. TA mode: This is for titration in determining titratable acidity. As in the pH mode, the pH is displayed and the pH electrode must be attached. The green ("PROCEED") LED is lit if the pH is below 8.2, while the red ("STOP") LED is lit if the pH is 8.2 or greater. (see below under Measuring TA by Titration)

5. CAL mode: This is for calibrating the pH electrode, which must be attached. The display initially shows **CAL** for a few seconds as it prepares to read pH and lets readings settle. Thereafter, the display shows the measured pH level with two decimal places.

6. Calibration works with one of the following calibration sets:
   pH 4.01 and 7.00 or "4/7"
   pH 7.00 and 10.00 or "7/10"
   pH 3.00 and 7.00 or "3/7"
   Vinmetrica recommends use of the 4/7 set provided with the kit.

7. *Optional*: The magnetic stirrer has two modes. Pressing the "light bulb" button on the magnetic stirrer activates a light underneath the sample and the stirrer. The power button activates just the stirrer. After pressing either button, the stirrer remains active for 60 seconds, a feature to conserve its batteries. If during the titration it turns off, simply press the button again for it to continue. We recommend using the light mode because it helps us indicate when the stirrer stops. Plus when doing TA titrations watching the wine turn from deep red to dark green is cool!

Note: When using the magnetic stirrer, be sure that the electrode does not touch the spinning stir bar as there is a chance that it can damage the glass bulb of the pH electrode. If you are using the Vinmetrica Electrode Holder, adjust the electrode's height so that its probe end is above the level of the stir bar.

Procedures:

Calibration of pH:

1. Be sure the pH electrode is attached to the unit, then select CAL mode by pressing the MODE button until the "CAL" LED illuminates.

2. Choose a calibration set that corresponds to the range you are working in. Usually for wine this will be at pH values below 4, so use the 4/7 set. If you have a source of a pH 3.00 reference solution, you can use this in place of pH 4.

3. Rinse the electrode with DI water, shake or blot off excess liquid gently, and place the electrode into a small vessel (like the pH 4 Reference Solution cap) containing one of the reference solutions (e.g. pH 4.01).

4. The instrument will determine which calibration solution is being used, and will display the apparent pH value. This may be different by as much as 0.40 from the value of the reference solution (e.g. the LCD may display 4.41 when the pH electrode is sitting in the pH 4.01 reference solution). When the pH level is sensed as stable, the nominal value is shown on the display, flashing, and the "CAL" LED flashes to convey that calibration for this value is ready. Press the ENTER button to accept the calibration.

5. The display stops flashing, scrolling the message '**Good CAL**', and four beeps are rapidly sounded to indicate success. [Note: if an error occurs during this process, the message '**bAd CAL**' will scroll and a single beep will sound; the instrument will then continue to wait for a stable pH level. Repeat step 4.] Following the '**Good CAL**' message, the display will now show the calibrated pH value.

6. Now rinse the electrode again and place it in the second member of the calibration set (e.g., pH 7.00 reference solution). Repeat the process to get a second **'Good CAL'** message. Exit into pH or TA mode.

7. "Force Calibrate" feature [firmware v2.0.6 and later]: if your instrument displays an apparently stable value that is within 0.5 pH value of the target (i.e., 3.5 to 4.5 for pH 4.01, or 6.5 to 7.5 for pH 7.00), but the CAL LED does not flash within a reasonable amount of time (1-2 minutes at most, typically), you can force the instrument to accept the calibration by following these steps:

    a. Use the MODE button to select TA mode.
    b. Press and hold the MODE until the display goes from "**CAL**" to "**cAL**" i.e., the 'C' will change to lower case 'c'.
    c. The display will then show **PH4**. Place your pH electrode in the pH 4.01 reference solution. Allow it to come to a stable reading, then press ENTER. If the reading is within the Cal tolerance range (default 0.5 pH as above, but see Appendix A for Cal tolerance settings), the **'Good CAL'** message will scroll and the four beeps will sound as usual. Otherwise the message **'bAd CAL'** will scroll and a single beep will sound. In that case you can return after the next step and try PH4 again
    d. The display will then show **PH7**. Place your pH electrode in the pH 7.00 reference solution and repeat the procedure in step c.

Measuring pH:

1. Make sure the pH electrode is attached. Calibrate it as described above if necessary. Select pH mode with the MODE button.

2. Rinse the pH electrode with DI water. Gently shake off or carefully blot away excess liquid.

3. Place the electrode in the solution to be tested. We recommend a 5 mL sample which can be obtained using the 5 mL sampling pipette provided in the kit. Be careful not to let the electrode strike any surfaces.

4. Allow the pH reading to stabilize. Typically this takes about 10-15 seconds. Read the pH value on the display. **Note: Once you've completed the pH test you can start the TA test. You can perform the TA test using the same 5 mL sample from the pH test. If you need another sample use the 5 mL pipette provided.**

Measuring Titratable Acidity (TA) by Titration:

1. If you are working with a sample of must, we recommend homogenizing your sample in a blender before proceeding; otherwise your TA values can be very inaccurate. Take 100 mL or more of your must and put it in a blender on high for 30 seconds. Allow solids to settle for 2 minutes before sampling or use a cheese cloth or mesh strainer to remove solids.

2. Fill the syringe by drawing up the TA Titrant (0.133N NaOH). Expel bubbles and set the plunger on the syringe to a readable point, preferably the 5.0 mL point. [Note: the 5.0 mL setting allows determination of up to 10 g/L TA in a standard 5 mL wine sample.] If you are using the burette, use the syringe to dispense the TA titrant into the top of the burette. Make sure the burette stopcock is in the closed (the red handle is horizontal) position. When filling the burette make sure the TA titrant has completely filled the bottom of the burette including the tip. Sometimes bubbles can be trapped in the tip of the burette but can usually be dislodged by opening and closing the stopcock while the burette is above a waste container. If you spill any TA titrant on the outside of the burette, be sure to clean it up with a paper towel or dry rag. If the spilled titrant is not cleaned from the outside of the burette you may introduce these spilled titrant droplets into the wine sample leading to an inaccurate reading. Be sure to record your starting burette or syringe volume. **Caution: the TA Titrant is caustic and can cause damage to clothing, skin and eyes. We recommend use of laboratory safety glasses and latex or nitrile gloves during this procedure. If any solutions contact skin or eyes, flush with plenty of water.**

3. Place 5.0 mL wine or must in the titration vessel (100 mL polypropylene beaker). We recommend using the 5 mL pipette provided in the kit: draw sample up to the 0 mL mark, then dispense the sample into your titration vessel by letting the tip of the pipette touch the side of the vessel while the sample drains. For best accuracy, do not blow out the liquid that remains in the tip. Add about 15 ml of deionized (DI) water (distilled water).

4. Turn on the instrument. Make sure the pH electrode is attached. If necessary, calibrate it as described above. Select TA mode with the MODE button.

5. If you are using a magnetic stirrer, turn it on to stir at a moderate rate. Be sure the stir bar will not strike the electrode in the following steps. If you have a Vinmetrica electrode holder, adjust the height.

6. Rinse the electrode briefly with DI water. Insert the electrode into the titration vessel so that the tip is fully submerged to just above the circulation gaps (cutouts at the tip of the electrode).

7. If you are stirring manually, begin now; use a moderate swirling motion. If the electrode is not held in a stand, hold it against the side of the vessel with one finger and grasp the vessel with the remaining fingers so that the two move together while swirling (See Figure 4).

Figure 4. Manual stirring technique. Hold the electrode against the side of the titration beaker and swirl gently; add TA Titrant with other hand.

8. Verify that the pH is less than 7 and the green ("PROCEED") LED is lit. If the pH is greater than this, and/or the red ("STOP") LED is lit, check your procedure.

9. Titrate the sample by adding the TA Titrant drop wise from the syringe or burette, being sure to note the starting volume mark on the syringe or burette. During the titration, the pH will gradually rise from its starting value (below 4 usually). As you approach pH 7, go slowly in adding successive drops of titrant so as not to overrun the endpoint. Be sure to mix thoroughly after each successive drop of titrant. Take the endpoint as the first addition of TA Titrant that causes the pH to stay above 8.2 for longer than 15 seconds. The red "STOP" LED and the beeper will provide additional indication of the endpoint. Read the endpoint volume off of the syringe or burette. To silence the beeper after the endpoint, select pH mode.

10. Calculate the TA value as:

$$\boldsymbol{TA}\ (\ \boldsymbol{g/L\ Tartaric}) = \frac{V * 0.133 * 75}{S}$$

where V = mL Titrant used to reach the endpoint; 0.133 = normality of the Titrant, S = mL sample. If you use 5 mL of sample as directed, and the Titrant is 0.133 N as supplied, then the calculation is simply

$$\boldsymbol{TA} = \boldsymbol{2} * \boldsymbol{V} \quad (i.e.\ 2\ times\ V)$$

Note: to express these values as ***% tartaric acid****, divide by ten; e.g. if the TA is 7.1 g/L, that is equivalent to 0.71 % tartaric acid.*

Finishing up:

1. Turn off the instrument.
2. Be sure to rinse and store the pH electrode in its storage solution as directed under 'Setting up the SC-200 for the first time' on page 3 of this manual (item 5).
3. Store all reagents tightly capped and away from heat and sunlight.

Technical assistance: info@vinmetrica.com tel. 760-494-0597

WARRANTIES AND LIABILITIES

1. The materials provided in the kit, as described on pages 1 and 2 above, ("Materials") are warranted as follows: The SC-200 instrument and non-reagent accessories are warranted against defects in workmanship for 24 months from date of purchase. The reagents are warranted to perform as described herein up until any stated expiration date or 6 months after purchase, whichever is later. The pH electrode is warranted for 12 months. THE WARRANTIES IN THESE TERMS AND CONDITIONS ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT, OR FITNESS FOR A PARTICULAR PURPOSE, SAID WARRANTIES BEING EXPRESSLY DISCLAIMED.

2. Buyer agrees that its sole and exclusive remedy against Vinmetrica shall be limited to the repair and replacement of Materials or parts of Materials, provided Vinmetrica is promptly notified in writing, prior to the expiration of the warranty period specified above, of any defect. Vinmetrica's liability for any damages due Buyer shall be limited to the purchase price of the Materials.

3. VINMETRICA'S MAXIMUM LIABILITY FOR ALL DIRECT DAMAGES, INCLUDING WITHOUT LIMITATION CONTRACT DAMAGES AND DAMAGES FOR INJURIES TO PERSONS OR PROPERTY, WHETHER ARISING FROM VINMETRICA'S BREACH OF THESE TERMS AND CONDITIONS, BREACH OF WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR OTHER TORT WITH RESPECT TO THE MATERIALS, OR ANY SERVICES IN CONNECTION WITH THE MATERIALS, IS LIMITED TO AN AMOUNT NOT TO EXCEED THE PRICE OF THE MATERIALS. IN NO EVENT SHALL VINMETRICA BE LIABLE TO BUYER FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES, INCLUDING WITHOUT LIMITATION LOST REVENUES AND PROFITS.

HAZARDS AND TOXICITY

All Materials offered by Vinmetrica are intended for use by individuals who are familiar with laboratory procedures and their potential hazards. The Materials contain chemicals which may be harmful if misused. Due care should be exercised with all Materials to prevent direct human contact. Glassware can break and chemicals can splash during experiments; ***Always use safety glasses***. We strongly recommend using nitrile or latex gloves and wearing long pants, long sleeves and closed toed shoes. Keep out of reach of children.

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Appendix A - Test Mode

Test Mode provides various special functions that may be useful in testing the device, for example, if troubleshooting is necessary.

4. Test Mode is entered when the POWER button is pressed longer than 2 seconds while turning the instrument on. Remove the pH electrode if it is attached.

5. Test Mode is organized into sections. Press the POWER button briefly to move to the next section. After the last section, Test Mode restarts the first.

6. Combinations of the yellow MODE LEDs are illuminated to indicate the section number as shown in the table below.

7. The Stop LED (red) is illuminated when an error is detected by the instrument The Proceed LED (green) is illuminated to indicate no error detected. The green LED does not guarantee proper functioning; it only indicates that no problem could be automatically detected. The user should make careful observations to discern proper operation.

8. To exit Test Mode, hold the POWER button down (5-10 seconds) until the instrument shuts off. If the device does not shut off after 10 seconds of holding down the button, move to the next section by releasing, then pressing again the POWER button briefly; then try to exit again.

Yellow LEDs	Section	Equipment Required	Description
	1. Version	None.	The version number of the instrument software is displayed.
	2. Burn-in	None	The instrument goes through a continuous “burn-in” cycle, exercising sound, LEDs, and display.
	3. pH	pH probe or precision voltage source. Do not exceed +/- 0.5 V.	An uncalibrated pH level is shown in two alternating parts. First, the integer portion of pH level is shown (1 to 14). Next, three decimal places are shown. Readings above 14.000 are shown as "---". Readings below 0.000 are shown as "___".
	4. SO2	SO2 probe or SO2 probe simulator (e.g., 500 kOhm resistor)	The SO2 current in nanoamperes is displayed. For values under 10, one decimal place is shown. (**N/A)**
	5. pH Voltage	pH probe or precision voltage source. Do not exceed +/- 0.5 V.	The raw voltage output from the instrument's pH amplifier is displayed as X.XX volts. Readings can range from 0.00 to 4.10.
	6. SO2 Voltage	SO2 probe or SO2 probe simulator.	The raw voltage output from the instrument's current amplifier is displayed as X.XX volts. (.XXX if less than 1.00) **(N/A)**

	7. DAC Test	None. Disconnect probe.	The Digital-Analog Converter (DAC) is cycled through its 32 levels. Note: Ignore red LED error indication.
	8. Battery Voltage	Install two AA batteries	The battery voltage is displayed as X.XX volts.
	9. Character Set	None.	Every ASCII character (space) to ~ is displayed. Due to the limitations of the 7-segment format, some characters are not used by the software.
	10. Number Display	None.	The display cycles through showing every possible digit and every decimal point.
	11. Sound Test	None.	The beeper is turned on continuously.
	12. pH CAL values [firmware 2.0.6 and later]	None	Displays current CAL values for pH 7 and 4, in mV. Pressing ENTER cycles between these. If a pH CAL reset has been done, displays CAL value for pH 3 rather than 4.
	13. pH CAL reset [firmware 2.0.6 and later]	None.	Displays “**PrESS EntEr**”; Press ENTER to reset pH CAL parameters to default values. Message “**Good CAL rSt**” then scrolls.
	14. CAL tolerance [firmware 2.0.6 and later]	None.	Displays “**Cal tol**” then displays the current value of the tolerance required to allow calibration. Default is 0.50 pH units i.e., the displayed pH must be within 0.50 units of the target pH to allow calibration. Pressing ENTER cycles between settings of 0.25 - 0.50 - 0.75 - 1.00 - 1.25 - 1.50

Appendix B - TA Adjustments

If your wine's pH is too high, and TA level is too low, you may want to increase the acidity. There are various ways to do this. We recommend adding tartaric acid; for non-grape wines, fruit acids are sometimes used. Use caution, for if overdosed with added acid, the wine becomes too tart. Remember it's always easy to add more acid, while it's not so easy to reduce acidity. By measuring TA, you can figure out how much tartaric acid to add without making your wine overly tart or sharp. As a rough rule of thumb, adding 1 g of tartaric acid per liter of wine will increase the TA by 1 g/L (0.1%) and reduce the pH by about 0.1 pH unit.

If your TA is too high before bottling, you can try "cold stabilization". This results in precipitation of potassium acid tartrate (potassium bitartrate) to decrease the tartness. Another method to decreasing your TA level is to add calcium carbonate or potassium carbonate ($CaCO_3$ or K_2CO_3). For the chemically inclined, we recommend Zoecklein's book "Wine Analysis and Production" which goes over theory and practice behind these adjustment techniques and many wine analytical techniques.

Appendix C - Troubleshooting: pH and TA Issues

I can't calibrate the pH on my SC-200

When calibrating your pH electrode, remember these points:

1. The displayed pH may not be correct until after you press ENTER.

2. If the instrument signals stable pH but displays "Bad Cal" after pressing ENTER, try laying it flat on the table; when the next stable signal is signaled, press the ENTER button quickly without handling the instrument. Sometimes the instrument may pick up noise from its environment, particularly if you handle it at the last second, while it's trying to achieve a stable reading. This sensitivity is usually only an issue during calibration.

3. If values appear to drift, leave the electrode in the pH 4.01 reference solution for 30 minutes.

4. If you intend to read pH values in samples that are at a different temperature than ambient, it's best to have your reference solutions at that temperature also before calibrating.

5. If the displayed pH value is within 0.5 pH units of the target, but the CAL light fails to flash in the expected "ready-to-calibrate" manner, you can try the "force calibrate" feature (available in firmware 3.0.6 and higher, described on page 6 of this manual)

6. If the displayed pH value is outside of the default tolerance of 0.5 pH (but not more than 1.5 pH units), you can temporarily broaden this tolerance to get calibration to go. See Test Mode, stage 14 in Appendix A. Call or Email us for help if you need it.

7. Finally, refer to the next FAQ question if these steps do not help.

What should I do if my pH electrode is acting sluggish, erratic and/or is difficult to calibrate?

Reconditioning and cleaning of pH electrodes:

Even in normal use and storage, performance of pH electrodes may show deterioration over time, which typically shows up as noisy, erratic or sluggish electrode readings, and/or difficulty calibrating. Assuming the meter itself is working (see "Meter test" below), then there are two main causes for this:

1. Clogging of the reference junction (most likely).

2. Fouling of the glass membrane (happens occasionally, or after prolonged service).

The following procedures will often provide renewed stability and pH sensitivity. If the electrode cannot be restored by one of these methods, it needs to be replaced.

Unblocking the reference junction:

The reference electrode junction is usually the problem when the electrode can't calibrate in its expected ranges. This junction is a fine-pored frit that allows electrical contact of a reference electrode with the solution being tested. It can become clogged over time.

1. Soak electrode in hot (NOT boiling!) water, about 60 °C, for 5 – 10 mins. Allow to cool to room temperature then place in pH 4 reference solution for 5 minutes. Try to recalibrate. If this does not work, try remedy 2.

2. Place the pH electrode into the pH storage solution (available from Vinmetrica part number SC-200-10 or a solution of 2.5M KCl with optionally added 0.01M KHP) at 60 °C and allow electrode and solution to cool to room temperature, then place in pH 4 reference solution for 5 minutes. Try to recalibrate. If this doesn't work, try remedy 3.

3. Soak in 0.1M HCl (note: this can be made by diluting 1 mL of the SO_2 Acid Solution with 20 mL DI water) or 0.1M nitric acid (HNO_3) for 1 hour. Rinse with DI water, then place in pH 4 reference solution for 5 minutes. Try to recalibrate. If this does not work, try remedy 4.

4. Soak in 1:10 dilution of bleach in a 0.1 – 0.05 % solution of liquid detergent in hot water with vigorous stirring for 15 mins. Rinse with DI water, then place in pH 4 reference solution for 5 minutes. Try to recalibrate.

Cleaning the pH electrode's glass membrane:

The glass bulb is a thin membrane of a special kind of glass that actually does the job of responding to the pH of the solution. It can sometimes become dirty and poorly responsive.

1. Immerse electrode tip in 0.1M HCl (see above for how to make) for about 15 secs., rinse with distilled water, then immerse in 0.1M NaOH (you can use a little of your TA Titrant for this) for another 15 sec. Cycle the electrode through these solutions several times (rinsing with DI water in between), then rinse and check for performance in pH buffer 4.00 and 7.00.

2. Some other tricks: protein deposits can be removed by soaking in 1 % pepsin in 0.1M HCl for 15 mins. Inorganic deposits may be removed by soaking in 0.1M tetrasodium EDTA solution for 15 mins. Grease and oil deposits may be removed by rinsing the electrode in mild detergent in methanol solution.

Instrument test:

You want to be sure that the instrument is responding correctly. A quick test is to simply short out the electrode connector:

1. Put the instrument in pH mode.

2. Remove the electrode to expose the BNC connector at the back of the instrument. Short out the terminals on the connector, using a paper clip or similar metal piece to touch the center pin of the connector to its outer metal sheath.

3. With the input shorted out, the reading should be pH 7.00 +/- 0.5. If out of this range, the meter is probably bad. Contact us at info@vinmetrica.com or tel. 760-494-0597.

4. Bear in mind that this test is not 100% fool-proof (the instrument might still have trouble reading pH values different from 7.00), but generally if this test passes, it is much more likely to be an electrode problem.

How stable are the reagents?

The pH/TA reagents are all warranted to last for 6 months. We have found that the pH 4.01 and 7.00 reference solutions are stable for well over 12 months if stored tightly capped and out of the heat and direct sunlight. If the solutions become cloudy or show signs of microbial growth, they should be replaced. The TA Titrant can pick up atmospheric CO_2 and lose potency over time, so we recommend that you replace it every six months.