Vinmetrica SC-100A™
User Manual

The Vinmetrica SC-100A* is a simple and robust device that provides high accuracy in determination of sulfite (SO_2) 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-100A SO_2 controller unit (Part number SC100A-1)
2. SO_2 Electrode (Part number SC-100-3), blue polycarbonate housing
3. SO_2 Reagent set (Part number SC-100-2):
   - SO_2 Titrant solution (0.0156N)
   - Acid Reagent
   - Reactant solution
4. One 5 mL syringe
5. Two 3 mL polyethylene transfer pipettes
6. One 25 mL serological pipette
7. One 100 mL polypropylene beaker

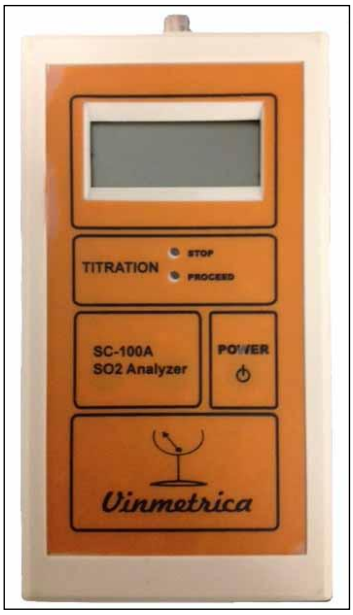


Figure 1. The SC-100A instrument

Things you will need:

1. Two standard AA batteries (alkaline type).
2. Distilled water, which usually can be found at your local grocery store. Its handy to have a wash bottle for rinsing. Rinse bottle available from Vinmetrica (Part number SC-100-17)
3. (Optional) Sodium Hydroxide solution, 1N concentration (if you want to do <u>total</u> SO_2). Available from Vinmetrica (Part number SC-100-7, http://vinmetrica.com/wine-analysis-products/)
4. (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 and international patents pending

Why Test for SO_2?

Testing for sulfite (SO_2) is crucially important for making sure your wine does not spoil by oxidation or from microbial growth. Having the proper SO_2 level in your wine gives you this protection. By monitoring your SO_2 levels, you can make adjustments when needed, especially before starting primary fermentation, after malolactic fermentation has completed, after racking or when ready to bottle. To correctly adjust sulfite, you need values for your current "Free SO_2" level and your wine's pH. The SC-100A analyzer will help measure your current "Free $S0_2$. You will need to obtain a value for your pH.

The key parameter in protecting your wine is "Molecular SO_2" which for most wines should be at 0.8 ppm (mg/L) following primary fermentation. This in turn depends on the "Free SO_2" (it can also be referred to as "unbound" SO_2) and the pH. Overall, you can reach your target Molecular SO_2 by measuring and adjusting your free SO_2 levels and considering your wine's particular pH. See Table 1.

Table 1. Free SO_2 concentrations necessary to attain 0.8 mg/L Molecular SO_2 at a designated pH.

Free SO_2 (ppm)	13	16	21	26	32	40	50	63	79	99	125
pH	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0

We recommend using a sulfite calculator for determining how much sulfite to add to your wines after taking a sulfite measurement with the SC-100A SO_2 Analyzer. Winemaker Magazine's Sulfite Calculator at http://winemakermag.com/guide/sulfite can walk you through the process. See Appendix B for more information on how to adjust your wine for sulfite.

Theory of operation:

Sulfite (SO_2): The SC-100A, with the SO_2 electrode and reagents provided, can be used to determine sulfite (or SO_2) levels in wine, musts, and other samples. It relies on the Ripper titration based on the quantitative reaction of the SO_2 with iodine (generated during the titration) which oxidizes the SO_2 in the sample under acid conditions.

$$IO_3^- + 5I^- + 6H^+ \rightarrow 3I_2 + 3H_2O \qquad \text{generation of iodine from iodate}$$

$$SO_2 + I_2 + H_2O \rightarrow 2I^- + SO_3 + 2H^+ \qquad \text{reaction of } SO_2 \text{ and iodine}$$

When all the SO_2 is titrated at the endpoint, excess iodine appears in solution. This is detected as current with the SO_2 electrode and signaled by audible and visual indicators. The endpoint is much more sensitive than the starch color change commonly employed for Ripper titration, and it is sharp and clear, even when titrating red wines and musts. From the known concentration of the titrant and its volume required to reach the endpoint, the free SO_2 is simply calculated.

Setup

Setting up the SC-100A for the first time:

1. The SC-100A (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 (the springs are the (-) terminals and the metal contacts are the (+) terminals), 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-100A shuts off after 30 minutes. If this happens unexpectedly, just press the POWER button to resume from where you were.

4. When directed to do so (see "Procedures" section below), attach the SO_2 electrode via the RCA phono plug connector protruding from the top. Avoid any twisting motion; just gently, but firmly, push the electrode plug straight onto the RCA connector to ensure proper function. (Figures 2 & 3).

Figure 2. Attach the Electrode to the RCA connector on the SC-100A

Figure 3. Be sure the Electrode attachment is secure on the RCA connector.

5. Remove any protective cover from the electrode tip (some electrodes are shipped without one). This cover is for shipping protection and need not be used routinely. Put the electrode on its side, or hang it from an electrode stand if you have one. The SO_2 electrode is sturdy with its plastic housing, but do take care not to let things touch or strike the platinum wires; they are somewhat fragile and will break if bent and straightened repeatedly. *Electrode care:* When done, always rinse with DI water and let air dry. There is no need to store the electrode in any kind of solution, and the protective cap should not be replaced.

Instrument Operation

1. Disconnect the electrode. 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 display will show a value less than 50 (usually 0.0) and the green (Proceed) LED should be on.

2. [**Optional]** Pre-condition the SO_2 Electrode**:** *All SO_2 electrodes are pre-conditioned at Vinmetrica before shipment. Therefore normally you should skip this step. If you think your electrode is not functioning properly you may try pre-conditioning the electrode. See Appendix C2 for more information on preconditioning the SO_2 electrode.

Procedures

Measuring Free SO_2 by Titration:

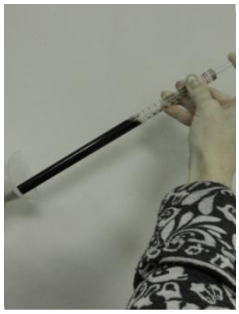
1. With the electrode disconnected, turn on the instrument. The display should show a value less than 20, usually 0.0. Now attach the SO_2 electrode.

2. Fill the syringe by drawing up the SO_2 Titrant (the bottle with the blue label) (Figure 4). Expel bubbles and set the plunger on the syringe to a readable point, preferably the 5.0 mL point. This is your starting volume. Make sure the outside of the syringe is dry to minimize inaccuracies. [Note: the 5.0 mL setting allows determination of up to 100 ppm SO_2 in a standard 25 mL wine sample.] If you are using a buret instead, fill it now.

Figure 4. Withdraw the titrant from its bottle using a clean 5 mL syringe.

3. Place 25 mL wine or must in the titration vessel (Figure 5). We recommend using the 25 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. **NEVER pipette any reagents by mouth! Also make sure the pipette you are using is completely clean before submerging into your wine sample.** –Do not use sulfite to sanitize it! Use 25% ethanol or other sterilant.

Figure 5. Dispense 25 mL of your wine into the titration beaker using the 25 mL sampling pipette. Make sure this is clean before putting the pipette into your wine container!



4. Using the transfer pipettes, add about 2 mL Acid Solution and 2 mL Reactant solution to the titration beaker (Figure 6 - the two transfer pipettes should come with red and yellow labels, with red for the Acid Reagent and yellow for the Reactant). It is not necessary to be extremely accurate in this step; with these pipettes, 2 mL indicated on the neck of the pipette. To preserve the shelf life of these reagents take care not to cross contaminate the transfer pipettes. If they do get contaminated rinse them off with distilled water and let air dry. **Caution: the Acid reagent is corrosive and can cause damage to clothing, skin and eyes. All of the reagents are not to be ingested. 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.**

5. Rinse the electrode briefly with distilled water before inserting it into your wine sample.

6. If you are stirring manually, begin now; use a constant 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. (Figure 7).

7. 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 next step. Insert the electrode into the titration beaker so that the tip is completely submerged to just above the circulation gaps (cutouts at the tip of the electrode) but above the level of the stir bar (approximately a half an inch from the bottom of the titration beaker). If you are using the Vinmetrica Electrode Holder, adjust it to a similar level.

8. Verify that the current is less than 50 and the green ("PROCEED") LED is lit. If the current is greater than this, and/or the red ("STOP") LED is lit and the buzzer sounds, your sample has less than 2 ppm SO_2 and there is no need to proceed.

9. Titrate the sample by adding the SO_2 Titrant dropwise from the syringe or burette, being sure to note the starting volume mark on the syringe or burette (Figure 7). Try to accomplish the titration as rapidly as possible (in 2 minutes or less), but be careful near the endpoint so as not to overrun it – here, dispense one or two drops at a time. Be sure to maintain stirring or swirling throughout the entire procedure.

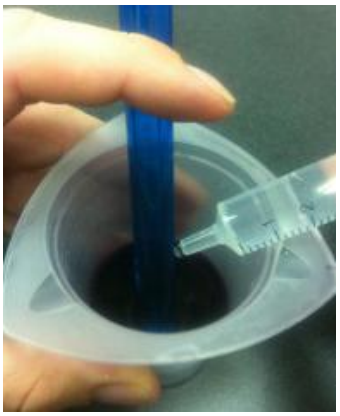


Figure 7. Manual stirring technique. Hold the electrode against the side of the titration beaker and swirl gently; add SO2 Titrant with other hand.

10. During the titration, the LCD display will show transient currents, the red STOP LED will briefly illuminate, and the beeper will sound ("beep-beep!"). These transient indicators will last longer and longer as you approach the endpoint. Take the endpoint as the first addition of Titrant that causes the display to exceed 50, and the red LED and beeper to stay on, for longer than 15 seconds (or a count of 20 "beep-beeps"). It is important to maintain stirring or swirling to detect the endpoint well. Read the endpoint volume off of the syringe or burette. This is your final volume.

11. Calculate the volume of titrant used "V" (using the syringe or burette: Starting volume minus final volume, e.g.: V = 5.0 mL - 3.5 mL = 1.5 mL).

12. The free SO_2 content is calculated as

$$\text{ppm } SO_2 = \frac{64 * V * N * 1000}{2 * S}$$

Where V = mL Titrant used to reach the endpoint; N = normality of the Titrant, S = mL sample. [1] If you use 25 mL of sample as directed, and the Titrant is 0.0156 N as supplied, then the calculation is simply

ppm SO_2 = 20 * V (i.e. 20 times V)

Measuring <u>Total</u> SO_2 by Titration (optional - requires 1N NaOH):

1. Place 25 mL wine or must in the titration vessel (See Figure 5).

2. Add 10ml 1N sodium hydroxide (Vinmetrica Part number SC-100-17) and mix well. Let stand approximately 10 minutes.

3. Using the transfer pipettes, add approximately 8 mL of the Acid Reagent and 2 mL of the Reactant solution to the vessel. Remember that if you are using the transfer pipettes in the kit, 2 mL is marked on the side of the neck of the transfer pipette, so dispense four of these for the Acid Reagent.

4. Proceed from step 5 in the Free SO_2 procedure above. The result calculated will be total SO_2, rather than free SO_2 in parts per million (ppm).

Finishing up:

1. Turn off the instrument and unplug the electrode.

2. Rinse the SO_2 electrode and syringe with distilled water. Let air dry.

3. Store all reagents tightly capped and away from heat and sunlight.

4. Discard waste samples and solutions in accordance with local regulations. Acidic solutions can be neutralized by slow addition of baking soda (sodium bicarbonate) with stirring until effervescence ceases.

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

[1] $\frac{64\ [\text{mg } SO_2/\text{mmol } SO_2]\ * V\ [\text{mL}] * N\ [\text{meq/mL}] * 1000\ [\text{mL/L}]}{2\ [\text{meq/mmol } SO_2] * S\ [\text{mL}]}$

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-100A instrument, electrode 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 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.

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

- 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 relay, 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. SO_2	SO_2 probe or SO_2 probe simulator (e.g., 500 kOhm resistor)	The SO_2 current in nanoamperes is displayed. For values under 10, one decimal place is shown.
 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.

Yellow LEDs	Section	Equipment Required	Description
	6.SO_2 Voltage	SO_2 probe or SO_2 probe simulator.	The raw voltage output from the instrument's current amplifier is displayed as X.XX volts. (.XXX if less than 1.00)
	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	None. [only firmware v3.0.6 and later]	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	None. [only firmware v3.0.6 and later]	Displays "**PrESS EntEr**"; Press ENTER to reset pH CAL parameters to default values. Message "**Good CAL rSt**" then scrolls.
	14. CAL tolerance	None. [only firmware v3.0.6 and later]	Displays "**Cal tol**" then displays the current value of the tolerance required to allow calibration. Default is 0.5 pH units i.e., the displayed pH must be within 0.5 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
	15. SO_2 Baseline	None. Disconnect SO_2 electrode [only firmware v3.1.0 and later]	Sets baseline value for SO2 mode. Let message scroll 5 sec., then press ENTER

Appendix B - Sulfite Adjustments

Using the Winemaker Magazine Sulfite Calculator:

Winemaker Magazine's Sulfite Calculator at http://winemakermag.com/guide/sulfite is an excellent tool for calculating how much sulfite should be added to your wine. We will briefly go over the process here for some clarification.

1. Select a 'Preferred method of Sulfite addition:'; we recommend using a 10% solution of Potassium metabisulfite (KMBS). [You can prepare this solution by weighing out 10g of KMBS and dissolving it in a FINAL volume of 100 mL DI water.]
2. Next choose the wine type (red or white).
3. Keep the 'Desired Molecular SO_2 ' at 0.8 mg/L and enter your wine's pH value (hit your keyboard's 'Enter' button after entering the value).
4. After entering in your 'Desired molecular SO_2' and your wine's pH, the calculator will ask you to enter the 'Desired level of free SO_2'. The calculator already 'knows' what this value is (based on the data you entered), and it should appear in the 'Notes:' section below the entry fields, but the one fault of this app is that, at least when we run it, it won't tell you until you go through the calculation once! So, for now, just enter "100" for the 'Desired level of free SO_2' and proceed; you will come back to this step in a moment to get the right answer. (see below).
5. Now input the "Current level of Free SO_2" which you determined from measuring Free SO_2 with the Vinmetrica SC-100.
6. Finally, enter the "volume of wine to be corrected". Choose liters or gallons; we prefer "liters" because the answer is returned in mL. The 'Amount of sulfite to be added:', should be in mL or fluid ounces of 10% sulfite solution or in grams if you use sulfite powder as your sulfite additive.
7. Now press the blue 'Calculate' button. Ignore the answer below the "Amount of sulfite to be added:" and look below to the 'Notes:' section. You should now see the message "1. The recommended level of free SO_2 for this type of wine, molecular SO_2 & pH is: [your value] mg/L";
8. Go back to step 4. and enter this value for the 'Desired level of free SO_2'.
9. Press 'Calculate' again to get the correct amount of sulfite to add.

We recommend double checking your calculations. Also, be sure you are using fresh KMBS! Once you have added the recommended amount of sulfite, stir your wine thoroughly and take another SO_2 measurement after waiting at least 30 minutes. If the measurement matches the 'Desired level of free SO_2' then you are done, otherwise make incremental additions and repeated SO_2 measurements until you reach your desired level.

Appendix C - Troubleshooting: SO_2 Issues

How stable are the reagents?

The SO_2 reagents and the pH/TA reagents are all warranted to last for 6 months. We have found that, in fact, except the TA Titrant, our reagents are stable for well over 12 months if stored tightly capped, out of the heat and direct sunlight. And of course, these reagents will last much longer if not cross-contaminated with each other!

How can I check the accuracy of my reagents?

It's rare that the SO_2 reagents go bad, but if you are concerned about it, run the 'Ascorbic Acid Test' method located in the FAQ section of the website to check your SO_2 reagents. If you are worried about your TA Titrant, you can run the 'KHP test', also located on the Vinmetrica website in the FAQ section under 'Manuals, Tests and How To Videos' at vinmetrica.com/FAQ/

I added the calculated amount of sulfite to my wine but the numbers are still low!

This is a common occurrence with several explanations, any or all of which may be happening.

1. Make sure you are using fresh sulfite powder. Potassium metabisulfite degrades over time and that stuff you bought 2 years ago is probably bad now!
2. Make sure that you stir your wine thoroughly when you add sulfite. If you pour a 10% solution of KMBS into your wine, it sinks like a battleship!
3. A significant portion of the sulfite you added may have ended up 'bound', particularly if your free SO_2 was very low to begin with. This bound SO_2 does not show up when you measure free SO_2, and it is not protecting your wine. You will need to add more sulfite until your free SO_2 comes up to the right level. Sometimes you must add two or even three times more sulfite than you first calculated.

I'm getting strange results in SO_2 mode; how do I know if my instrument is working correctly?

For SO2 measurements with the SC-100A, there are several quick tests you can do to make sure the instrument is not faulty.

1. Be sure the battery is good per the manual's instructions.
2. Remove the electrode to expose the RCA connector at the back of the instrument. Turn on the instrument and select SO_2 mode. 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. The device should indicate "STOP" with its red LED and buzzer or beeper. If this does not happen there may be a problem with the instrument; contact us for more information.
3. Connect the electrode and put it in about 20 mL of distilled water; add about 1 ml (half a bulb squeeze) of each of the acid solution and the reactant and swirl in the usual way keeping

constant motion. The instrument may or may not indicate STOP as above. If it does not, add a drop of the SO_2 Titrant solution. This should make the STOP condition occur. [If it doesn't you may have an electrode problem read in the next section below how to fix this.] Now add one drop of a concentrated sulfite solution (1-10% is fine) and verify that the STOP signal ends and the PROCEED light illuminates. If this happens, your electrode is probably OK as well.

4. Finally, you can check your SO_2 reagents with the ascorbic acid (vitamin C) test located on our website vinmetrica.com/FAQ.

Preconditioning of the electrode ***Note: as of October 2013, all SO_2 electrodes are shipped pre-conditioned, so this procedure should not normally be needed.*** Sometimes when the SO_2 electrode is first shipped it can be shipped "hot". A hot electrode is one that is overly sensitive as indicated by high readings (and STOP conditions) when inserted into solutions that should be giving no signal, like pure water or water plus reactant and acid with a drop of 10% KMBS added. If your electrode shows this behavior it generally can be fixed by pre-conditioning as follows:

1. First, turn the power on and press the MODE button until the instrument is in SO_2 mode, then press ENTER. Attach the SO_2 electrode to the SC-100 analyzer. Put 20 mL of distilled water (deionized water) in a beaker and add half a bulb squeeze of the acid solution, half a bulb squeeze of the reactant solution and let the SO_2 electrode sit in this solution.

2. Then add one drop of 10% potassium metabisulfite solution (KMBS) to the beaker with the electrode in it. Swirl gently. The instrument LCD should now read 0.0 (in units of nanoamps) or close to it. If it is reading significantly higher than 20 on the screen, let the electrode sit in the solution for half an hour.

3. After half an hour rinse the electrode with distilled water. Put it in about 20 mL of distilled water. Again add half a bulb squeeze of each of the acid solution and the reactant and swirl in the usual way keeping constant motion. The instrument may or may not indicate STOP as above. If it does not, add a drop of the SO_2 Titrant solution. This should make the STOP condition occur. [If it doesn't you may have an electrode problem]

4. Now add one drop of KMBS solution (1-10% is fine), swirl and verify that the STOP signal ends and the PROCEED light illuminates. If this is the case, your electrode has been conditioned. If the electrode is still "hot" and the PROCEED light does not illuminate, let it sit in 20 mL of distilled water with a half bulb full of the acid solution for a few hours. Now repeat the test from step 3. If it works, great! If not, call us and we will try to troubleshoot or replace your electrode.