

# High Level Calcium Measurements on the Thermo Scientific Orion 1820 Calcium Monitor

High level calcium measurement has proven to be a good new market application for the Thermo Scientific Orion 1820 calcium monitor. Please remember that a questionnaire should be filled out first and before a monitor is purchased for high level calcium samples. Calcium can be complexed or precipitated by other species in some samples and reliable measurement may be difficult or impossible.

The display on 1800 series monitors will read concentrations up to 20,000 ppm. The signal module, being fully programmable, can also be set to give outputs corresponding to these high ranges. However, the chemistry of the sample usually limits the upper range of online electrode measurements to a much lower level. Calcium measurements have been successfully done up to 500 ppm as  $\text{CaCO}_3$ .

For sample concentrations above 10 ppm  $\text{Ca}^{+2}$ , high level standard (Cat. No. 922006) must be used in place of the regular standards (Cat. No. 182040) that come with calibration kit. The high level standard is 0.1 M  $\text{CaCl}_2$ , which is equivalent to 10,000 ppm as  $\text{CaCO}_3$ . Each 0.5 mL aliquot of this solution will produce a 52.63 ppm addition to the flow cell during calibration.

If the monitor has the current software rev. 2.1, program values P2 and P3 should be reset to bracket the expected sample concentration. If the monitor has the older software rev. 0.2, values P1 and P2 are reset. The higher value must be reset first.

To prevent electrode slope errors, remember that the lower standard should be set equal to or higher than the background sample concentration. For example, suppose the sample is in the 100 ppm range. P2 should be set to 105 ppm and P3 set to 316 ppm. During calibration two 0.5 mL additions of standard are used for P2 and six additions of 0.5 mL for P3. To prevent slope errors, P3 should be set to be at least 3 or 4 times higher than P2. This calibration should produce normal test values after calibration: slope in the range of 22 to 33 mV and  $E_o$  of 0 mV  $\pm$  25 mV.

It must be remembered that the electrode senses only  $\text{Ca}^{+2}$  ions in the sample and not  $\text{Mg}^{+2}$  ions. A lab test comparison for total hardness will generally give a higher result than the monitor. Some customers have reported good results using the offline calibration procedure where the monitor reading is scrolled to the lab value and entered. This should work well in cases where the  $\text{Ca}^{+2}$  to  $\text{Mg}^{+2}$  ratio in the sample remains fairly constant.

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