



M. C. MILLER ELECTRODE CALIBRATION TEST

DERIVATION OF CALIBRATED ELECTRODE POTENTIAL VALUE

A particular test procedure is used for each manufactured reference electrode, regardless of the electrode type (Ag/AgCl or Cu/CuSO₄).

The test procedure involves measuring the potential difference between a manufactured electrode and a Fisher Scientific Ag/AgCl Standard Electrode. The filling solution in the Fisher Scientific electrode is 4M KCl (saturated with AgCl). The electrolyte that we use for the shop test is our facility's tap water (typical conductivity is 500 μ S/cm) and we keep the separation between the electrodes in the electrolyte "bath" at 2 inches. Also, the electrolyte temperature is maintained at 25°C, as are the solution temperatures in the manufactured electrodes and the Fisher Scientific reference electrode.

With regard to maintaining consistency of the half-cell potential of our "Standard" reference electrode, we replace the Fisher Scientific electrode every 6 months with a newly-purchased electrode.

Interpretation of Test Data:

Since the reference electrode used in the calibration test (Ag/AgCl electrode having a 4M KCl filling solution) has a half-cell potential of approximately 200mV versus a Standard Hydrogen Electrode (SHE) at 25°C, the half-cell potential of a manufactured electrode versus SHE at 25°C becomes the test result **plus** 200mV.

For example, if a test result of 115mV is obtained from a copper/copper sulfate reference electrode, the electrode potential will be indicated as, 315mV versus SHE at 25°C, on the Calibration Certificate.