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Electrode Cleaning

1 Introduction

During the normal operation of a pH electrode system, the performance will gradually deteriorate due to fouling on the electrode surface. The degree and type of fouling will depend on the specific application in which the system is used. To maintain good performance and accurate results the electrodes need to be as clean as possible. The accuracy of measurement required will dictate the frequency of cleaning for that application.

2 Cleaning

Glass Electrodes

Wiping electrode membrane with a soft cloth or tissue, or washing with a strong jet of water are preferred methods of cleaning. It is imperative that the membrane is not damaged, i.e. scratched, as this will seriously affect the performance of the electrode.

Methods for removing various types of deposits are given below. If the cleaning procedure described does not improve the performance of the electrode pair, then it would be necessary to replace either the glass or reference electrodes, or both.

1. General sludge and loosely adhering matter:

   Rinse off excess matter with water and wipe the electrode with a soft cloth or tissue.

2. Heavy non greasy deposits:

   For more stubborn non-greasy deposits, e.g. iron or lime deposits, the electrode should be dipped in concentrated hydrochloric acid until the deposit has been removed. The electrode should then be rinsed thoroughly with water before recalibration. 1M - 2M hydrochloric acid may be used, but may take longer to remove the deposits.

3. Greasy or organic deposits:

   For greasy or organic deposits wipe the glass membrane with a detergent or acetone based solvent. The electrode should then be rinsed thoroughly with water before recalibration.

4. Protein deposits:

   In samples where protein is present, the protein deposit needs to be digested with an enzyme such as pepsin. Soak the electrode in 0.1M hydrochloric acid with the enzyme added, until the deposit has been removed. (Consult suppliers data sheet for suitable quantity of enzyme). The electrode should then be rinsed thoroughly with water before recalibration.

There may be occasions when layers of greasy and non-greasy deposits will build up on the electrode membrane. It may necessary to carry out cleaning options 2 and 3 consecutively, and possibly repeated several times. This procedure is necessary, as the acid will not remove or penetrate the grease and the detergent/acetone will not remove the other solid deposits.

On some applications, mainly industrial effluent plants, where the electrodes are not regularly cleaned, the deposition may be very severe. As a **last resort**, it may be necessary to physically remove the deposit by scrapping it off with a knife or screwdriver. Care must be taken, however, not to damage the membrane surface, as this will affect the performance of the electrode.

Once the electrodes have been cleaned, the performance may still be sluggish. To possibly improve this, the glass electrode membrane should be soaked for several hours, preferably overnight, in 0.1M hydrochloric acid and then rinsed thoroughly in water prior to recalibration.

Reference Electrodes

The Reference Electrode can be cleaned by using the same methods as above. However, the prolonged soak in acid will not be necessary. If the performance of the electrode pair is erratic or drifting then the junction is probably blocked and if it is possible, the junction should be replaced, topping up or replacing the filling solution at the same time.

3 Operation or Storage

It is essential that both electrodes should not be allowed to dry out **UNDER ANY CIRCUMSTANCES**.

In the case of the glass electrode, the membrane must be kept immersed in water to maintain its performance. Once dry, the electrode response will become slow or short scale, which can be improved by in soaking in 0.1M hydrochloric acid for several hours, but full recovery is not always achieved.

The effect of leaving the reference electrode out of water will be to dry out the junction, causing blockage or open circuit. In both these cases, the readings will be subject to drift or instability. Soaking the electrode in clean water may recover the situation, but replacing the junction is usually necessary. If the electrode has been left out of water for very long periods, so the filling solution chamber has dried out, the electrode will require replacement.

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