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## **CALIBRATION STANDARDS AND PREPARATION**

### **TEMPERATURE**

Type: Mercury in glass or other reference thermometer with Accuracy:  $\pm 0.02^{\circ}\text{C}$  Resolution:  $\pm 0.01^{\circ}\text{C}$

### **CONDUCTIVITY 1413 us/cm referred to 25°C**

A solution preparation is based on the procedure in the HANDBOOK OF CHEMISTRY AND PHYSICS 1963 Chemical Rubber Publishing Company. Conductivity of Standard Solutions using KCl.

Preparation: Dissolve 0.7459 grams of potassium chloride (KCl) in distilled water made up to one litre of solution. At 25°C this has a conductivity of 1413 us/cm.

### **SALINITY 35ppt**

Preparation: Obtain clean seawater and standardise using a laboratory salinometer (eg Yeo-Kal Model 601MKIV) whose accuracy is:

Accuracy: 0.003ppt Resolution: 0.001ppt

Standardise against I.A.P.S Standard seawater service P101 and use the measured salinity of the clean seawater as the calibration solution.

**Alternatively**, dissolve 32.4356 grams of KCl in 1 kg of solution for a 35 ppt salinity. Conductivity is very dependent upon temperature. This solution of KCl will only give sufficiently accurate results when its temperature is within about 0.1deg C of 15degC.

### **pH**

Buffers 4.00 and 10.01 prepared using Standard Methods., Ref: Durst, R.A. 1975 Standard Methods; Reference Materials: Standardization of pH Measurements NBS Spec Publ. 260-53, National Bureau of Standards, Washington D.C.

pH	Weight of Chemicals needed/1000mls solution @ 25°C
4.004	10.12gm KHC8H4O4 (potassium hydrogen phthalate)
10.014	2.0992 gm NaHCO3 (sodium bicarbonate) 2.640gm Na2CO3 (sodium carbonate)

Alternatively, a chemical supply company can provide standard buffer solutions.

### **ORP STANDARD**

Reference: Innovative Sensors Inc. Technical Bulletin.

ORP or REDOX potential can be reported as either the direct potential or alternatively it can be reported as referred to the hydrogen electrode.

Prepare pH buffers of 4.0 and 7.0. Add a "pinch" of quinhydrone crystals to each of the buffers until saturated and stir for 30 seconds to obtain the two calibration points.

Buffer 7.0 with quinhydrone crystals gives a probe output of 86mV (or 295.2 mV when referred to the hydrogen electrode).

Buffer 4.0 with quinhydrone crystals gives a probe output of 263mV (or 472.2 mV when referred to the hydrogen electrode).

## **DISSOLVED OXYGEN**

When a new probe is installed it is advisable to do a two point calibration at 0% and 100%. Once this has been done correctly it is only necessary to calibrate the 100% point for field calibrations. The zero point will rarely change.

To obtain 0% use either nitrogen gas in a container (i.e. purge oxygen out) or dissolve 26gm of sodium sulphite and add 0.2 gm of cobalt chloride in 500mls of water. Discard solution oafter 30 minutes as it will not keep.

To obtain 100% saturated water aerate a sample of fresh water for about 2 hours. A fish tank air pump and aerator stone is ideal.

Note: Be sure that the 100% sample is not contaminated with the 0% solution. Wash the sensor before placing it in 100% saturated water.

## **FORMAZIN STANDARD 200 ntu's**

Preparation for 200 ntu using Standard Methods.

Solution 1: 10gm Hexamethylenetetramine  $C_6H_{12}N_4$  (analysis quality) is dissolved in distilled water. This solution is made up to 100mls with distilled water.

Solution 2: 1.0gm Hydrazinium sulphate  $N_2H_6SO_4$  (analysis quality) is dissolved in distilled water. This solution is made up to 100mls with distilled water.

Procedure: Mix 5mls of solution 1 with 5mls of solution 2. Allow to stand for 24 hours at  $25 \pm 3^\circ C$ , then make up this solution to 200mls with distilled water. This is 200 ntu. This solution has a shelf life of 4 weeks if kept in a dark place.