

# 技术指南 Technical Note

PA\_2022001\_00

## 电极的使用与维护

### Usage and maintenance of electrodes

#### 1. 目的

##### Purpose

随着玻璃配方不断改进和制作工艺的持续提高，pH 玻璃电极的性能越来越好。并且由于 pH 玻璃电极相比其它 pH 电极，性能稳定，不容易被干扰，所以 pH 玻璃电极是目前应用最广泛的电极之一。

但是 pH 玻璃电极的使用是有一定寿命的，它取决于被测物体的性质，被测物的温度，以及电极的使用维护情况。那么关于电极的使用维护保养就显得更加重要了，本文将介绍如何正确的使用维护保养电极和延长它们的使用寿命。

With the continuous improvement of glass formulation and the continuous improvement of the production process, the performance of pH glass electrodes is getting better and better. And because the pH glass electrode is stable compared to other pH electrodes and is not easily interfered with, the pH glass electrode is currently one of the most widely used electrodes.

However, the usage of pH glass electrodes has a certain lifespan, which depends on the nature of the object to be measured, the temperature of the analyte, and the use and maintenance of the electrode. Then the use and maintenance of electrodes is even more important, this article will introduce how to use and maintain the electrodes correctly and extend their service life.

### 2. 适用范围

#### Scope of Validity

赛多利斯科学仪器（北京）有限公司的所有 pH 电极

pH electrodes in SSIL

### 3. 电极的使用保养与维护

#### Usage and maintenance of electrodes

3.1 测量前后用蒸馏水对电极进行漂洗，然后用不含麻的拭布，将电极头上多

余的水吸去，不要擦，否则会产生静电，干扰 pH 玻璃膜精确测量。

Rinse the electrode with distilled water before and after the measurement, and then use a swab cloth without hemp to suck away the excess water on the electrode head, do not rub, otherwise it will generate static electricity and interfere with the accurate measurement of pH glass film.

3.2 pH 电极存储时，要保持湿润，建议要放在电极浸泡瓶里，并瓶内有特殊

的浸泡溶液，可起到保护测量电极与参比电极，千万不要将电极放在蒸馏水

或去离子水内存储，这会导致电极加速失效，如在存储时发现白色氯化钾

晶体积聚在电极上，白色晶体物质不会影响测量，只需用去离子水漂洗电极

去除晶体后吸干再用即可。

When store the pH electrodes, keep wet, it is recommended to put in the electrode soaking bottle, and there is a special soaking solution in the bottle, which can protect the measuring electrode and the reference electrode, do not put the electrode in distilled water or deionized water storage, which will lead to accelerated failure of the electrode, if in the storage found that there is a white potassium chloride crystal volume on the electrode, the white crystal substance will not affect the measurement, just use deionized water to rinse the electrode to remove the crystal after sucking dry and then use it.

3.3 使用可充式 pH 电极时，参比溶液应加到加液孔处，但不要超过，测量时加液孔塞需打开，确保参比溶液便于从盐桥流出。但是对于 tris 这种特殊结构的电极，建议在测量待测液体时不打开加液塞，避免流速过快，影响测量精度。

When using a rechargeable pH electrode, the reference solution should be added to the dosing hole, but not exceeded, and the filling hole plug should be opened during measurement to ensure that the reference solution is easy to flow out of the salt bridge. However, for the special structure of the tris electrode, it is recommended not to open the liquid filling plug when measuring the liquid to be measured, so as to avoid the flow rate being too fast and affecting the measurement accuracy.

3.4 pH 测量中最常见的问题是参比盐桥阻塞，其症状包括响应变慢、测量超出正常范围及产生噪音，电极参比的类型不同，维护方案也有所差异：

a: 凝胶填充型（不可充型）：将电极浸入一盛有 60 °C 温水的烧杯内 15 分钟，去除干涸在盐桥上的凝胶或盐，然后将电极放入盛有 4 mol 的 KCl 温溶液的烧杯内，直至恢复到室温。

b: 液体填充型（可充型），将电极内的电解液抽干，用蒸馏水清洗腔体，重新注入新鲜电解液，然后将电极浸泡在 60°C 填充液内 15 分钟即可。

The most common problem in pH measurements is reference salt bridge obstruction, whose symptoms include slow response, measurement out of normal range, noise generation, different types of electrode references, and different maintenance regimens:

a: Gel-filled (non-rechargeable): Immerse the electrode in a beaker filled with 60°C of warm water for 15 min, remove the gel or salt that dried up on the salt bridge, and then place the electrode into a beaker containing 4

mol of KCl warm solution until it returns to room temperature.

b: Liquid-filled type (rechargeable type), drain the electrolyte in the electrode, clean the cavity with distilled water, re-inject the fresh electrolyte, and then soak the electrode in 60 °C fillable liquid for 15 minutes.

3.5 时间久后如玻璃膜上有脏污，建议按下述方法进行清洗：

a: 如玻璃膜附着物是蛋白质，可用肥皂液清洗，用软布轻轻擦玻璃膜，擦拭时注意轻微均匀用力，球泡膜较薄容易破碎，注意保护。

b: 如是无机物，可用 0.1M 盐酸清洗，再用去离子水冲干净。

c: 如是油污，可用丙酮或甲醇清洗，勿浸泡，也可用肥皂液清洗，然后用去离子水冲洗干净。

以上任何方案清洗电极后，需将电极放在存储浸泡液中浸泡 15 分钟以上再用。

After a long time, if there is dirt on the glass film, it is recommended to clean it according to the following method:

A: If the glass film attachment is protein, it can be cleaned with soap liquid, gently rub the glass film with a soft cloth, pay attention to slight uniform force when wiping, the bubble film is thin and easy to break, pay attention to protection.

b: If it is an inorganic substance, it can be cleaned with 0.1mol hydrochloric acid and then rinsed with deionized water.

c: If it is oily, it can be cleaned with acetone or methanol, do not soak, or can 1000104603

be washed with soap liquid, and then rinsed with deionized water.

After cleaning the electrodes in any of the above schemes, the electrodes should be soaked in the storage soaking solution for more than 15 minutes before use.

3.6 电极在测试使用时，注意对 BNC 插头的保护，以防止有测试溶液或其它液体飞溅到插头上，要确保插头干燥，避免 BNC 插头外壳与内芯绝缘不良，导致影响测试性能。如有液体碰到，可及时吸干，也可用电风吹干潮气。

When the electrode is used in the test, pay attention to the protection of the BNC plug to prevent the test solution or other liquid from splashing on the plug, to ensure that the plug is dry, to avoid bad insulation between the BNC plug shell and the inner core, resulting in the impact of test performance. If the liquid is touched, it can be sucked dry in time, and the moisture can also be dried with a hair dryer.

#### 4. pH 缓冲液的正确使用和保存

##### Proper usage and storage of pH buffer

除了电极的正确使用与维护，与之配合的电极缓冲液也需要正确的使用与保存

In addition to the correct use and maintenance of the electrode, the electrode buffer that is matched with it also needs to be used and stored correctly

##### 4.1 pH 缓冲液配制后，应装在玻璃瓶或聚乙烯塑料瓶中

After the pH buffer is prepared, it should be packed in a glass bottle or polyethylene plastic bottle

##### 4.2 对于碱性的缓冲液，如 pH9.18、pH10.01、pH12.46 等，应保存在塑料瓶中

For alkaline buffers, such as pH 9.18, pH 10.01, pH 12.46, etc., should be stored in plastic bottles

##### 4.3 瓶盖应该严密盖紧

The cap should be tightly closed

##### 4.4 在冰箱中低温（5~10 °C）一般可使用 1 个月左右

In the refrigerator low temperature (5 ~ 10 °C) can generally be used for about 1 month

##### 4.5 如果发现缓冲液中有混浊、发霉、或沉淀等现象，不能继续使用

If you find that the buffer is cloudy, moldy, or precipitated, it can not be used anymore

4.6 在使用缓冲液校准前，在环境温度下放置 1~2 小时，以便温度平衡后使用

Before calibrating with buffer, leave at ambient temperature for 1 to 2 hours for use after temperature equilibration

4.7 缓冲液使用后不得再倒回，以免污染其他未使用过的缓冲液

Buffer should not be poured back after use to avoid contaminating other unused buffers

## 5. 常见问题及解决办法

### Common problems and solutions

5.1 同一样品，两次测量的 pH 值不一样？

Different pH of two same sample?

温度变化或样品本身发生了化学反应，都会引起 pH 值的变化。所以，应尽量保持温度一致，并且避免化学反应。

Changes in temperature or chemical reactions in the sample itself can cause changes in pH. Therefore, you should try to keep the temperature consistent and avoid chemical reactions.

5.2 为什么缓冲液在有效期内已经变质不能使用了？

Why is the buffer cannot be used within the validity period?

缓冲液的有效期是指未开封使用状态下的保存期。一旦开封使用后，由于空气中各种霉菌的作用，缓冲液较易变质。

注意：已使用过的缓冲液，千万不能倒回原装瓶中！

The expiration date of the buffer refers to the shelf life in the unopened state of use. Once opened and used, the buffer is more susceptible to deterioration due to the action of various molds in the air.

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Note: The buffer that has been used should never be poured back into the original bottle!

### 5.3 电极需多久校准一次?

How often do I need to calibrate my electrodes?

电极的校准频率取决于电极的使用、保养、样品性质以及测量精度等具体情况。

建议每天校准一次，最长不要超过每周一次校准。 更换电极以及长时间不使用，在使用前必须先校准。

The frequency of calibration of the electrode depends on the use, maintenance, nature of the sample, and measurement accuracy of the electrode. It is recommended to calibrate once a day, and do not exceed one calibration per week at the longest. Replacement of electrodes and prolonged non-use must be calibrated before use.

### 5.4 样品温度为 10°C，此时仪表显示的是 10°C 还是 25°C 下的 pH 值?

酸度计显示的是溶液在当前温度下的 pH 值,若在 10°C 测量，仪表显示的是溶液 10°C 的值,如果需要得到 25°C 的 pH，必须把溶液温度升/降温至 25°C，再进行测量。酸度计的温度补偿指的是补偿温度对 pH 电极的影响，但不能将任何温度下的 pH 值补偿到 25°C。

The sample temperature is 10°C, at this time the meter displays the pH value at 10°C or 25°C?

The acidity meter shows the pH of the solution at the current temperature, if measured at 10 °C, the instrument shows the value of the solution 10 °C, if you need to get a pH of 25 °C, you must raise/cool the solution temperature to 25 °C, and then measure. Temperature compensation for acidity meters refers to compensating for the effect of temperature on the pH electrode, but cannot compensate the pH value at any temperature to 25°C.

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