氯离子电极操作指南

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氯离子电极可简便快速地测量水溶液或含水的有机溶液中的氯离子浓度， 同时也适用于地下水、饮用水、污水、药物、农药、饮料、食品、土壤以及尿液、汗水等生物液体中氯含量的测定。

电极性能

- 离子选择膜： NaCl 多晶片
- 测量范围： 5×10^{-5} ~1 mol/l Cl^-
- 温度范围： 0 ~ 80°C
- pH 范围： 2~11
- 电极内阻： < 50MΩ
- 响应时间：

当由低浓度到高浓度检测时，若 Cl^- 离子浓度 < 10^{-3} mol/l，响应时间约1分钟；若 Cl^- 离子浓度>10^{-3}mol/l，响应时间少于1分钟；当由高浓度到低浓度检测时，一般需时较长。

- 干扰离子：

不能有 S^{2-} 存在，以下几种离子的浓度与 Cl^- 离子浓度的摩尔比必须符合 CN^-<2×10^{-7}, I^-<5×10^{-7}, Br^-<3×10^{-3}, $S_2O_3^{2-}$<0.01, NH_3<0.12, OH^-<80

准备

a. 氯电极活化

电极使用前，需在0.001mol/l Cl^- 离子溶液中浸泡活化1小时，再用去离子水反复清洗至空白电位稳定，并用纸轻轻吸干。

b. 制备标准溶液

取分析纯的固体氯化钠在120°C烘2小时，称重5.844g NaCl (或1.648g)并溶解在1000ml去离子水中制得0.1mol/l Cl^- (或1g/l Cl^-)离子标准储备液。用去离子水逐级稀释标准储备液来配制不同浓度的标准氯离子溶液。

c. 参比电极

取下加液口的保护帽，轻轻旋开磨砂口接界隔膜，待外参比电解液全部流出后再旋紧接界隔膜(注意不能太紧)。从外参比电解质加液口充入1mol/l KNO_3 溶液，重新盖上保护帽，并用手指捏紧电极，上下震动，去除液络部的气泡。

标定及测量

—如果您使用**离子计**，可按下列步骤测定：

a. 两点标定

选择两个包括试样预期浓度范围且彼此浓度相差十倍的标准溶液。标准溶液可采用任何浓度单位来制备。根据离子计使用说明书将离子计设置在标定方式，设置浓度较小的标准溶液为第一个校正点，浓度较大的标准溶液为第二个校正点。

将 100ml 浓度较小的标准溶液与2ml ISA 溶液混合搅拌，然后将氯电极和参比电极一起插入溶液中，进行第一点校正。

将 100ml 浓度较大的标准溶液与2ml ISA 溶液混合搅拌,将两支电极插入溶液中，进行第二点校正。离子计将进自动显示电极斜率。

b. 试样测量

用去离子水冲洗电极。

将 100ml 的试样与 2ml ISA 溶液在测量杯中混合搅拌，然后将两支电极插入试样溶液中，测量试样浓度。

——如果您使用**pH/mV 计**，可按下列步骤测定：

a. 绘制工作曲线

选择两个或两个以上，能包括试样预期浓度范围的标准溶液。标准溶液可采用任何浓度单位来准备。根据pH/mV 计使用说明书将pH/mV 计设置在mV方式。分别将100ml 的各个标准溶液与2ml ISA 溶液混合，然后将两支电极置入溶液中。由稀到浓测定溶液的mV 值。

用上述测定的一系列mV值为y轴,以相应的标准溶液钾离子浓度为x轴，在半对数图纸上作图，即为工作曲线。

b. 试样测量

每次测量后用去离子水冲洗电极。

将100ml 试样与2ml ISA 溶液混合，按照上述方法测定试样的mV值，然后在工作曲线上读出该mV 值对应的氯离子浓度值。

在测定低浓度的氯离子时，也可以采用标准加入法。

维护

若发现晶片表面被污染或磨损，可用合适的抛光膏抛光，再用酒精棉球轻轻擦去，以更新单晶敏感表面。然后在 0.001mol/l Cl^- 离子溶液中浸泡活化1小时。

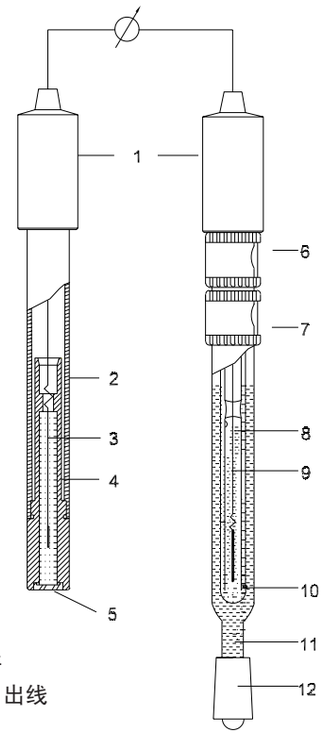
储藏

测量结束后，必须清洗电极，滤纸吸干，用保护盖将探测表面盖好并存放于干燥处。

附件

LE302 参比电极
（订货号：12107202 或12107204）
外盐桥电解质：1M KNO_3
ISA 离子强度调节剂：5M $NaNO_3$

产品订货号：12107070 或 12107080



1 电极帽
2 电极主杆
3 内信号引出线
4 屏蔽层
5 离子敏感膜
6 内参比电解液充液口
7 外参比电解液充液口
8 内参比电解液
9 Ag/AgCl参比电极
10 多孔陶瓷隔膜
11 外参比电解液
12 磨砂口接界隔膜

General information

Chloride electrode is intended for measuring chloride ion concentrations and activities in aqueous, partially aqueous organic solutions. Its preferred applications are to be found in the fields of ground-water, drinking-water, sewage, medicine, pesticide, beverage, food products and soil samples, as well as that of biological fluids (such as urine and perspiration, etc.).

Specifications

- Type of ion selective membrane: NaCl poly-crystal
- Membrane impedance: < 50MΩ
- Measurement range: 5×10^{-5} to 1 mol/l Cl^-
- Operating temperature range: 0 ~ 80° C
- Optimum pH range: 2~11
- Response time: when passing from lower to higher concentration sbelow 10^{-3} mol/l Cl^-, about 1minute, above 10^{-3} mol/l Cl^- less than 1 minute; whenpassing from higher to lower concentrations, several minutes.
- Interfering ions: S^{2-} must be absent; the molar proportions of the following ions to the chloride ion must lie below the following levels(ratios): CN^-<2×10^{-7}, I^-<5×10^{-7}, Br^-<3×10^{-3}, $S_2O_3^{2-}$ <0.01, NH_3< 0.12, OH^-<80

Preparatory operations

a. Activation

Before the chloride electrode was used, it should be soaked in 0.001mol/l chloride solution for 1 hour and rinsed repeatedly with deionized water till blank potential is steady. The chloride electrode should be dabbed off with paper tissue.

b. Preparation of standard solution

Dry AR grade sodium chloride at 120° C for 2 hours. Weight out 5.844g NaCl (for a 0.1 mol/l Cl^- solution), or 1.648g NaCl (for a 1.0 g/l CIsolution), dissolve in deionzed water in a 1000ml calibrated flask and make up to the mark.

Prepare solutions with different chloride concentrations by diluting the standard stock solution with deionized water as appropriate.

c. Reference electrode

Remove cap from electrolyte filling port. Slightly loosen the ground-joint diaphragm (by careful turning) so that out reference electrolyte flows out. Tighten up ground joint again (but not too tight). Top up with 1 mol/l KNO_3 electrolyte to filling port for out-mediate electrolyte and recover the cap. Clutch the electrode and shake up and down in order to reduce air bubbles.

Calibration and measurement

If you are using **ionic meter**, proceed as follows to measure chloride ion concentration:

a. 2 point calibration

Prepare two standards; one standard has 10 times

difference in concentration from another one. The standard solutions can be prepared with any concentration unit.

According to the menu setting process of your ionic

meter, set the lower concentration standard as the first calibration point, and the higher one as the second calibration point.

To 100ml the lower concentration standard add 2ml ISA solution, and stir. Place the chloride electrode and reference electrode together in the mixed

solution, start the first point calibration.

To 100ml the higher concentration standard add 2ml ISA solution, and stir. Place two electrodes in the mixed solution, start the second point calibration.

After 2 points calibration, the meter automatically determines the calibration slope.

b. Measurement Sample

Rinse electrodes with deionized water.

Take 100ml sample in a sample container; add 2ml ISA solution and stir. Place two electrodes in the mixed sample solution and start measurement.

If you are using **pH/mV meter**, proceed as-follows to measure chloride ion concentration:**a.**

Plotting calibration diagram

Select two or more standard solutions including the sample' s chloride concentration. The standard solutions can be prepared with any concentration unit. According to pH/mV meter instruction manual, select mV mode.

To 100ml standard solutions add 2ml ISA solution and stir, respectively. Place the chloride electrode and reference electrode together in the mixed solution and measure the mV of the mixed solution from lower to higher concentrations.

Plot measured mV values on a calibration diagram against the logarithm of the chloride concentration of the corresponding solution (use log graph paper).

b. Measurement Sample

Rinse electrodes with deionized water after each measurement.

To 100ml sample solutions add 2ml ISA solution and stir. According to above method measure the mV of sample solution. Use the calibration diagram to read off the chloride concentration of the sample solutions from the measured mV values.

It is advisable when carrying out lower chloride determination to apply a standard addition method.

Maintenance

If deposits and scratches were found on the crystal, it can be removed by polishing with a suitable abrasive paste and carefully wiping with alcohol cotton ball in order to renew the sensitive surface of the single crystal. Then the chloride electrode should be reactivated in 0.001mol/l chloride solution for an hour.

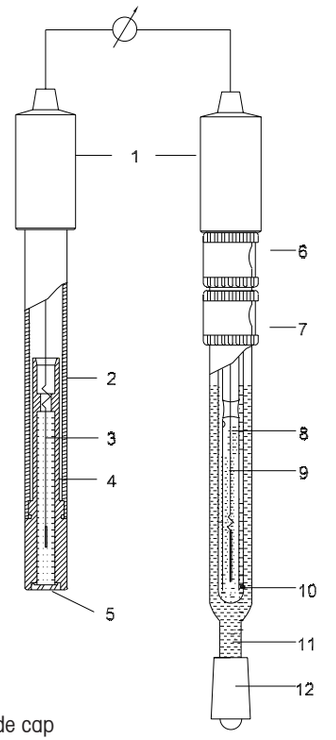
Storage

After measurement, chloride electrode must be rinsed. The chloride electrode should be stored dry in the air, preferably in the protective tube supplied with the electrode.

Accessories

LE302 Ref. electrode
(Order No. 12107202 Or 12107204)
Bridge electrolyte: 1M KNO_3
Ionic Strength Adjuster (ISA): 5M $NaNO_3$

Order No.: 12107070 or 12107080



1 Electrode cap
2 Plastic electrode body
3 Internal lead out
4 Electric screw
5 Ion-selective membrane
6 Filling port for inner electrolyte
7 Filling port for outer electrolyte
8 Internal reference electrolyte
9 Ag/AgCl reference element
10 Porous ceramic diaphragm
11 Outer reference electrolyte
12 Ground-joint diaphragm