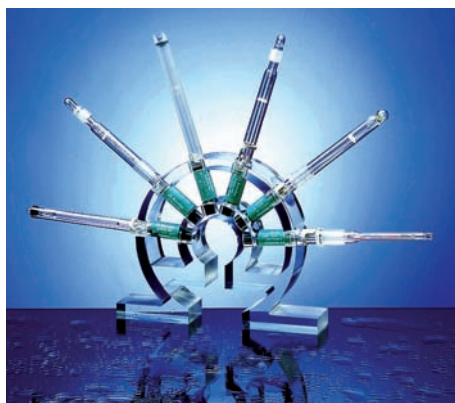


Tips for handling the Solvotrode



Metrohm offers a wide range of combined pH electrodes and will be pleased to help you choosing the right electrode.

The new videos on the Metrosensor DVD show you step by step how to extend the working life of your Metrohm electrodes and always obtain precise results. More information about the **Metrosensor DVD** is provided in another article of this journal.

Response is everything!

The demands placed on a combined pH glass electrode (e.g. Solvotrode) depend on the particular application. Various properties such as response time, thermal resistance, chemical stability, shape, size and electrical properties of the electrode have to be taken into account. With acid-base titrations the response time of an electrode determines how quickly it reacts to a pH change of the sample solution and again reaches a stable reading. The response of a pH electrode is primarily dependent on unhindered contact between the reference electrolyte and the sample solution. However, it is also influenced by the composition of the pH-sensitive glass membrane of the measuring electrode and by the storage conditions. The longer the electrode is stored in an aqueous solution, the thicker the solvated layer at the outside of the membrane becomes. Protons and – to a lesser extent – alkali ions (e.g. sodium and potassium ions that account for the alkali error at pH values above 11...12) penetrate into the solvated layer. The thicker this layer, the longer the adjustment time and the poorer the response of the glass membrane. Long adjustment times also result from excessive dehydration of the solvated layer, for example, when the electrode dries out as a result of incorrect storage or during titration in anhydrous solvents. In order to obtain reliable results at any time, the response of pH electrodes must be regularly checked.

The amount of cleaning and maintenance work can be considerably reduced by choosing the correct pH electrode and thus the optimal type of diaphragm. Measuring problems are primarily caused by contamination of the reference electrode diaphragm. Therefore, maintenance of pH electrodes concentrates on the diaphragm with the pH membrane being of secondary importance. When in doubt, the reference electrode should be cleaned/regenerated first and the very sensitive measuring electrode second.

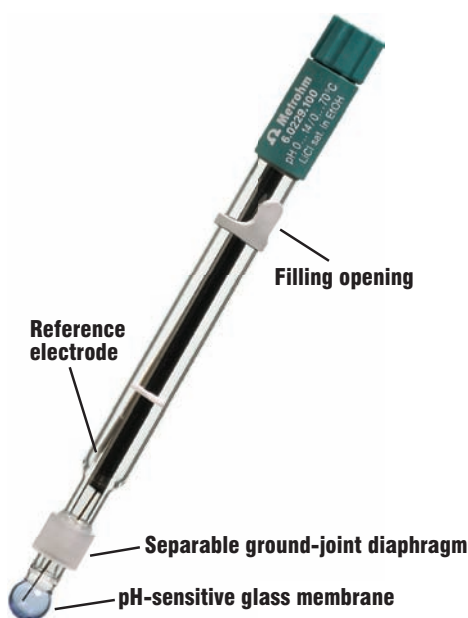
Solvotrode for non-aqueous media

The Solvotrode is the optimal choice for acid-base titrations in non-aqueous media such as oils, dimethylformamide, ethanol, glacial acetic acid and isopropanol. For example, it can be used in the pharmaceutical industry for the titration of amino acids or amino hydrochlorides in non-aqueous media, in the petrochemical industry for determining the acid or base number in crude oil products or in the food industry for determining saponification or hydroxyl numbers.

It has a robust ground-joint diaphragm made of PCTFE (polychlorotrifluoroethylene) that guarantees a constant flow of electrolyte (usually 2 mol/L LiCl in ethanol) and can be easily cleaned. Together with the electrical shielding of the measuring electrode this largely prevents interference from electrostatic charges and results in low-noise titration curves. In poorly-conducting organic solvents the Solvotrode has a rapid response and provides stable readings.

Basic information about handling the Solvotrode

If you observe a few basic rules before, during and after a titration, your Solvotrode will have a long working life, will not require complicated regeneration procedures and always provide precise results. These rules are based on the physicochemical properties of the Solvotrode and the above-mentioned requirements for error-free measurements.



The Solvotrode is the combined pH glass electrode for titrations in non-aqueous media.



Preparing the Solvotrode for a titration

- Immerse the pH-sensitive glass membrane (but not the ground-joint diaphragm) in distilled water for one minute to hydrate it.
- Then, open the filling opening for the reference electrolyte.
- Slightly lift the ring-shaped sleeve of the ground-joint diaphragm and allow a little electrolyte to flow out. Carefully slide the sleeve back into its original position without exerting too much pressure.
- Rinse the Solvotrode with distilled water without letting any water enter its interior.
- Fill up the reference electrode to the correct level with electrolyte.
- Immediately before the titration rinse the Solvotrode with the solvent used to dissolve the substance to be titrated.



Between titrations

- Rinse the Solvotrode with the solvent used to dissolve the substance to be titrated.
- Rinse the Solvotrode with distilled water.
- Check whether the ground-joint diaphragm is blocked, i.e. whether you can see any deposits in the ground joint.
- Rinse the Solvotrode again with the solvent used to dissolve the substance to be titrated.

The solvated layer of the pH-sensitive membrane must be intact. Non-aqueous solvents dehydrate the glass membrane and as a result increasingly longer response times and flatter titration curves are obtained, i.e. the pH jumps become less pronounced. The precision and reproducibility of the results also decrease. If necessary, the steps mentioned above for preparing the Solvotrode for the titration can be repeated at any time between titrations.



Cleaning after the end of the titration

- Loosen the ring-shaped sleeve of the ground-joint diaphragm of the Solvotrode.
- Remove any contamination of the Solvotrode caused by the sample with a suitable solvent.
- Rinse the Solvotrode with distilled water.
- Fill up the reference electrode to the correct level with electrolyte.

Titration in completely anhydrous solvents as well as long storage times can cause the ground-joint sleeve to seize up. In this case you should immerse the ground-joint diaphragm in hot water for about one minute before you again very carefully try to loosen the sleeve.



Storing the Solvotrode

Storage periods of several days:

- Close the electrolyte filling opening.
- Store the electrode in the corresponding reference electrolyte.

Shorter storage periods:

- Close the electrolyte filling opening.
- Immerse the pH-sensitive glass membrane (but not the ground joint diaphragm) in distilled water.

Our tip: PACs facilitate your work

The Potentiometric Application Collections «PACs» from Metrohm make the titrimetric analysis of your products easier. The necessary know-how for carrying out the most common titrimetric determinations in your branch is supplied in a clear and understandable way. The custom-made packages consist of an application collection (printout and PDF files) based on the latest standards, together with a method memory card with the complete parameter sets for configuring your Titrinos/Titrandos and evaluating the analytical results.

To find out which PACs and electrodes we offer for your branch, please consult www.metrohm.com/products/titration.html.