

# Laboratory Solutions



## Laboratory Solutions

pH Buffers

Conductivity Standards

Solutions for ORP and DO

Solutions for ISE

Maintenance Solutions



## Solutions for Calibration & Care

Comprehensive Range of Indispensable Utilities

**METTLER TOLEDO**

# Genie in a Bottle

## a Full Pack of Competence

The determination of pH, conductivity, ion concentration, redox potential and dissolved oxygen are common analyses in most laboratories. The measurement accuracy highly depends on the quality and operation of the solutions used for sensor calibration and maintenance. METTLER TOLEDO takes pride in a long tradition of producing complete measurement systems, including a comprehensive range of top quality solutions.

### Top sellers for the most common use



All METTLER TOLEDO calibration and cleaning solutions are available in handy bottles with no-fuss labels. If larger quantities are required, then our 6-packs are the right choice. Electrolytes come with special caps that make refilling your electrode a child's play.

### Specialties for specific requirements



Using our sachets guarantees fresh solution for every calibration as well as maximum ease of use. Every sachet box comes with a printed certificate. Rely on METTLER TOLEDO's expertise to meet your specific needs with our expanded offering.

### Maximum traceability and compliance



To guarantee maximum traceability, an individual test certificate exists for every calibration solution. Furthermore, compliance with regulations is key for us. All SDS and labels contain information according to GHS (Globally Harmonized System) in local languages. Simply download all required documents from our online database: [www.mt.com/buffer](http://www.mt.com/buffer)



## Good Electrochemistry Practice™ for calibration solutions

The quality of a solution is only guaranteed for unopened bottles that have not yet expired. The following tips shall help optimize the use of calibration solutions after opening and while in use in the laboratory. Fresh calibration solutions minimize the measurement uncertainty and thus optimize the reproducibility of results:

- Note the date on the bottle when the calibration solution is opened for the first time.
- Keep the bottles sealed tightly at all times and use any dispensed calibration solution promptly.
- Never pour dispensed calibration solution back into the original bottle.
- Ensure that bottles containing calibration solution are not contaminated.
- Store calibration solutions at ambient temperatures and avoid direct sunlight.
- Clean your sensors properly prior to calibration and do not calibrate directly in the original bottle (unless there is an instruction to do so).
- Replace calibration solutions that have reached the expiry date or may be contaminated.

► [www.mt.com/GEP](http://www.mt.com/GEP)

# pH Measurement Precision Starts with a Precise Calibration

**pH measurements are only as accurate as the buffer solutions used for calibration purposes. METTLER TOLEDO offers a selection of quality pH buffers to match your specific requirements. No matter if you look for traceable technical buffers or buffers that are certified by an accredited body, you will find the right solution. Maximum precision is guaranteed with our NIST/DIN buffers!**

## Reliable all-rounders: Technical pH buffers



The internationally recognized pH scale is based on standard reference materials (SRM) selected by NIST (National Institute of Standards and Technology, USA). METTLER TOLEDO buffer solutions are traceable to these primary standards. The quality inspection certificate, that is available for every bottle and sachet, guarantees stated values and traceability.

## Traceable to an accredited body: DKD certified buffers



The DKD (Deutscher Kalibrierdienst, German Calibration Service) certified buffers are the perfect product for regulated industries. DKD is accepted by other accreditation bodies within the scope of the European Cooperation for Accreditation (EA) and the International Laboratory Accreditation Cooperation (ILAC).

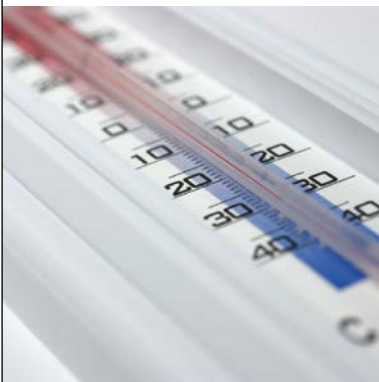
## Top Precision: NIST/DIN 19266 buffers



The NIST/DIN pH buffers are specified to three decimal places, e.g. 9.180, offering the highest possible pH precision. A detailed test certificate is available for every bottle and guarantees the tested values and traceability. Calibration cannot get better than this!



### Automatically compensated temperature



The pH value of a buffer solution changes with temperature. Several international standards state the pH values at different temperatures in steps of 5 °C. Thus, all METTLER TOLEDO buffer solutions come with a temperature table printed on the label. The same tables are stored in all METTLER TOLEDO pH meters which allows for easy automatic temperature compensation.



### Good Electrochemistry Practice™ for reliable pH calibrations

pH electrodes must be calibrated regularly; at least once a day prior to measurements and after every cleaning, regeneration or long-term storage. The calibration adjusts slope and offset of an electrode to their true values. Since an electrode is characterized by both its slope and its offset, it is advisable to do a minimum of a two point calibration for reliable measurements and better precision. For a wider measurement range three or more calibration points are recommended. Important is that the following measurements are within the calibration range.

# Optimal Care For Hard-Working pH Electrodes

The pH electrode is the main actor of the measurement, requiring, therefore, special care and attention. METTLER TOLEDO provides the necessary maintenance solutions. For an easy start the All-in-One kits offer an optimal selection of solutions for calibration and maintenance. Your electrode stays ready for whatever task is due. Reliable pH results guaranteed!

## The right electrolyte for every application



Thanks to the ARGENTHAL™ reference system most METTLER TOLEDO pH sensors are filled with 3 mol/L KCl electrolyte solution. There is no more risk of contaminating your samples with silver ions. For measurements in non-aqueous samples or samples with low ionic strength a special bridge electrolyte is needed. Always make sure that your electrode is completely filled with clean electrolyte solution.

## Maintenance solutions for peace of mind



When rinsing with deionized water is not sufficient, a special cleaning solution can be used to remove sample residues. Depending on the contamination, Pepsin-HCl or Thiourea is recommended. The InLab® storage solution provides optimal conditions for sensors during the time between measurements, be it short- or long-term storage. Find more helpful maintenance tips on [www.electrodes.net](http://www.electrodes.net).

## Quick and easy performance verification



The VPac™ pH verification kit provides a quick and easy performance verification of your pH system. Measure two test solutions of unknown pH value and get an immediate online evaluation of your results including certificate! Never has it been easier to verify your system after installation or any setup change or simply for extra peace of mind. [www.mt.com/pH-VPac](http://www.mt.com/pH-VPac)



| pH Buffers  | pH value at 25 °C   | Order number<br>250 mL | Order number<br>6 x 250 mL | Order number<br>30 sachets 20 mL |          |
|---|---|------------------------|----------------------------|----------------------------------|----------|
| <b>Technical pH<br/>buffer solutions</b>                      | 2.00  | 51350002               | 51350016                   | 30111134                         |          |
|   | 4.01  | 51350004               | 51350018                   | 51302069                         |          |
|   | 7.00  | 51350006               | 51350020                   | 51302047                         |          |
|   | 9.21  | 51350008               | 51350022                   | 51302070                         |          |
|   | 10.00   | 51350010               | 51350024                   | 51302079                         |          |
|   | 11.00   | 51350012               | 51350026                   | 30111135                         |          |
|   | Rainbow bottles I (3 x 2 bottles 250 mL 4.01 / 7.00 / 9.21)   |                        |                            | 30095312                         |          |
|   | Rainbow bottles II (3 x 2 bottles 250 mL 4.01 / 7.00 / 10.00) |                        |                            | 30095313                         |          |
|   | Rainbow sachets I (3 x 10 sachets 20 mL 4.01 / 7.00 / 9.21)   |                        |                            |                                  | 51302068 |
| Rainbow sachets II (3 x 10 sachets 20 mL 4.01 / 7.00 / 10.01) |   |                        |                            | 51302080                         |          |
| <b>NIST/DIN pH buffer solutions</b>                           | 4.006   | 51350052               |                            | 30111136                         |          |
|   | 6.865   | 51350054               |                            | 30111137                         |          |
|   | 9.180   | 51350056               |                            | 30111138                         |          |
|   | 10.012  | 51350058               |                            | 30111139                         |          |
| <b>Certified pH<br/>buffer solutions</b>                      | 4.01  | 51350032               | 51350042                   |                                  |          |
|   | 7.00  | 51350034               | 51350044                   |                                  |          |
|   | 9.21  | 51350036               | 51350046                   |                                  |          |
|   | 10.00   | 51350038               | 51350048                   |                                  |          |

| Electrolytes for reference electrodes  | Order number<br>25 mL | Order number<br>250 mL | Order number<br>6 x 250 mL | Order number<br>6 x 30 mL |
|--|-----------------------|------------------------|----------------------------|---------------------------|
| KCl-solution 3 mol/L for ARGENTHAL™ reference systems  | 51343180              | 51350072               | 51350080                   |                           |
| KCl-solution 3 mol/L, AgCl saturated, for Ag/AgCl reference systems  | 51343184              | 51350074               | 51350082                   |                           |
| FRISCOLYT-B®, for measurement at low temperature and for media with organic compounds (oil, proteins etc.) | 51343185              | 51350076               | 51350084                   |                           |
| LiCl Solution 1 mol/L in ethanol, for measurement in non-aqueous media                                     |                       |                        |                            | 51350088                  |

| Maintenance solutions  | Order number<br>250 mL             | Order number<br>6 x 250 mL | Order number<br>25 mL |
|--|------------------------------------|----------------------------|-----------------------|
| Pepsin-HCl for cleaning junctions with protein contamination. Treatment time about 1 h.                    | 51350100                           | 30045061                   |                       |
| Thiourea solution for cleaning junctions with silver sulfide contamination. Treatment until discoloration. | 51350102                           | 30045062                   |                       |
| Reactivation solution for regeneration of glass electrodes. Treatment time about 1 min.                    |                                    |                            | 51350104              |
| InLab® storage solution for pH and ORP electrodes  | 30111142                           |                            |                       |
| pH All-in-One Kit I (pH buffer 4.01 / 7.00 / 9.21, 3 mol/L KCl, cleaning solution, storage solution)       |                                    | 30095314                   |                       |
| pH All-in-One Kit II (pH buffer 4.01 / 7.00 / 10.00, 3 mol/L KCl, cleaning solution, storage solution)     |                                    | 30095315                   |                       |
|  | <b>Order number<br/>2 x 100 mL</b> |                            |                       |
| VPac™ pH verification kit  | 30090849                           |                            |                       |

# Conductivity Standards and More

## It's all About Correct Handling

Depending on the type of sensor, conductivity standards are used for calibration or verification. Low conductivity standards require special handling and are mostly used for verification purposes. In this case the cell constant has been determined with a standard of higher conductivity or is stated on the sensor certificate. Conductivity standards are available in sachets to guarantee fresh solution for every calibration as well as maximum ease of use.



### Low conductivity standards – the influence of air

Conductivity standards are directly affected by the influence of carbon dioxide (CO<sub>2</sub>) when in contact with air. Thus, especially the lower conductivity standards have a limited lifespan. Measurements of samples with conductivity lower than 10 µS/cm need a special procedure, such as protection with inert gas or the usage of a flow cell. These standards are only intended for verification and not for calibration.



### Temperature dependence

A slight change in temperature usually has a big impact on the conductivity value of a standard solution. A table on every bottle label indicates the conductivity values at the most common measurement temperatures. During calibration the meter automatically references to this table for temperature compensation. If possible, calibration and measurements should be performed at the same temperature.

| Conductivity standards                 | Order number<br>250 mL | Order number<br>6 x 250 mL | Order number<br>30 sachets 20 mL |
|--|------------------------|----------------------------|----------------------------------|
| 1.3 µS/cm (single-use check solution)* | 30090847               |                            |                                  |
| 5 µS/cm**                              | 30094617               |                            |                                  |
| 10 µS/cm                               | 51300169               |                            |                                  |
| 84 µS/cm                               | 51302153               |                            |                                  |
| 500 µS/cm                              | 51300170               |                            |                                  |
| 1413 µS/cm                             | 51350092               | 51350096                   | 51302049                         |
| 12.88 mS/cm                            | 51350094               | 51350098                   | 51302050                         |

\* Maximum storage: 1 month

\*\*Maximum storage: 3 months





## Redox Buffer Solutions and Tablets for Dissolved Oxygen Sensors



### Redox buffer solutions for verification purposes

Redox buffer solutions are used for verification of all common redox sensors. They are not used for calibration purposes. Similar to other solutions they are temperature dependent. It is therefore important to know the measurement temperature of the buffer. A table on every bottle label indicates redox values at different temperatures.



### Zero oxygen tablets

Zero oxygen tablets make the preparation of a solution with zero oxygen content very easy. This solution can be used for calibration, verification or conditioning purposes if measurements are performed at low dissolved oxygen levels.

| Redox buffer solutions        | E (Ag/AgCl) 25 °C                | Order number | Order number | Order number |
|-------------------------------|----------------------------------|--------------|--------------|--------------|
|                               |                                  | 250 mL       | 6 x 250 mL   | 6 x 30 mL    |
|                               | 220 mV, pH 7 ( $U_H = 427$ mV)   | 51350060     | 51350062     |              |
|                               | 468 mV, pH 0.1 ( $U_H = 675$ mV) |              |              | 51350064     |
| DO Accessories                |                                  | Order number |              |              |
| Zero oxygen tablets (20 pcs.) |                                  | 51300140     |              |              |

# Solutions for Ion-Selective Electrodes

## The Proper Mix for Accurate Results

Measuring with ion-selective electrodes (ISE) is the easiest and most affordable way to determine ion concentration. However, ISEs require careful handling and the use of the correct solutions. METTLER TOLEDO offers all solutions that are needed for successful ion measurements.

### Ready to use ion calibration standards



High precision ion calibration standards can be ordered at concentrations of 1000, 100 and 10 mg/L (ppm). In case a lower concentration is needed it can easily be prepared with serial dilution that is explained in the electrode manual.

### Ionic Strength Adjustors for high repeatability



In all analytical procedures using an ISE, the correct amount of ISA (Ionic Strength Adjustor) must be added to all samples and standards prior to measurement or calibration. This solution ensures that samples and standards have similar and constant ionic strength. Instructions for type and amount of ISA can be found in the manual of every ISE.

### Electrolytes for any application



It is important to fill the reference electrode of every ISE with the recommended electrolyte solution. The correct electrolyte will minimize junction potentials and provide optimum temperature and time response. The electrolyte must be refilled or replaced regularly in order to achieve good electrode performance. For more information please refer to the electrode manual.



## Solutions for perfectION™ combined ISE

| Reference electrolyte solutions                             | Order number<br>5 x 60 mL |
|---|---------------------------|
| Ion Electrolyte A (calcium, fluoride, sulfide)              | 51344750                  |
| Ion Electrolyte B (chloride, cyanide, lead, silver/sulfide) | 51344751                  |
| Ion Electrolyte C (silver)                                  | 51344752                  |
| Ion Electrolyte D (copper, iodide)                          | 51344753                  |
| Ion Electrolyte E (potassium)                               | 51344754                  |
| Ion Electrolyte F (nitrate)                                 | 51344755                  |

| ISA solutions  | Order number<br>475 mL | Order number<br>3790 mL |
|--|------------------------|-------------------------|
| ISA solid state ISE (chloride, copper, iodide, silver) | 51344760               |                         |
| Calcium ISA  | 51344761               |                         |
| Potassium ISA  | 51344762               |                         |
| Nitrate ISA  | 51344763               |                         |
| Nitrate ISS (for suppressing interference)             | 51344764               |                         |
| Fluoride TISAB II with CDTA                            |                        | 51344765                |
| Fluoride TISAB III with CDTA (concentrate)             | 51344766               |                         |

## Solutions for DX series ISE half-cells

| Bridge electrolyte       | Order number<br>25 mL | Order number<br>250 mL | Order number<br>6 x 250 mL |
|--------------------------|-----------------------|------------------------|----------------------------|
| 1 mol/L KNO <sub>3</sub> | 51343182              | 51350078               | 51350086                   |
| 3 mol/L KCl              | 51343180              | 51350072               | 51350080                   |
| 1 mol/L KCl              | 51343181              |                        |                            |

### ISA solutions

|   |  |          |
|---|--|----------|
| TISAB 3, for fluoride determinations                      |  | 51350106 |
| 0.9 mol/L Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> |  | 51350108 |

## Ion calibration standards

|                                 | Order number<br>500 mL | Order number<br>500 mL | Order number<br>500 mL |
|---------------------------------|------------------------|------------------------|------------------------|
|                                 | 1000 mg/L              | 100 mg/L               | 10 mg/L                |
| Silver ISE standard solution    | 51344770               |                        |                        |
| Calcium ISE standard solution   | 51344771               | 30090855               | 30090856               |
| Chloride ISE standard solution  | 51344772               | 30090853               | 30090854               |
| Cyanide ISE standard solution   | 51344773               |                        |                        |
| Copper ISE standard solution    | 51344774               |                        |                        |
| Fluoride ISE standard solution  | 51344775               | 30090851               | 30090852               |
| Iodide ISE standard solution    | 51344776               |                        |                        |
| Potassium ISE standard solution | 51344777               |                        |                        |
| Sodium ISE standard solution    | 51344778               | 30090857               | 30090858               |
| Ammonium ISE standard solution  | 30090859               | 30090860               |                        |
| Nitrate ISE standard solution   | 51344779               |                        |                        |
| Lead ISE standard solution      | 51344780               |                        |                        |
| Sulfide ISE standard solution   | 51344781               |                        |                        |

# Discover the Safest Path to the Top with Good Electrochemistry Practice™

Various factors can affect your pH, redox, conductivity, dissolved oxygen or ion measurements. Take 5 minutes to localize your risks and get the necessary support:

► [www.mt.com/GEP](http://www.mt.com/GEP)



[www.mt.com/BuffersAndMore](http://www.mt.com/BuffersAndMore)

For more Information

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**Quality certificate.** Development, production and testing according to ISO 9001.



**Environmental management system** according to ISO 14001.



**"European conformity".** The CE conformity mark provides you with the assurance that our products comply with the EU directives.