Titration Sensors

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DS800-TwoPhase

DS500

DP5 Phototrode™

Titration of a large variety of surfactants

Fast, accurate and reliable

METTLER TOLEDO

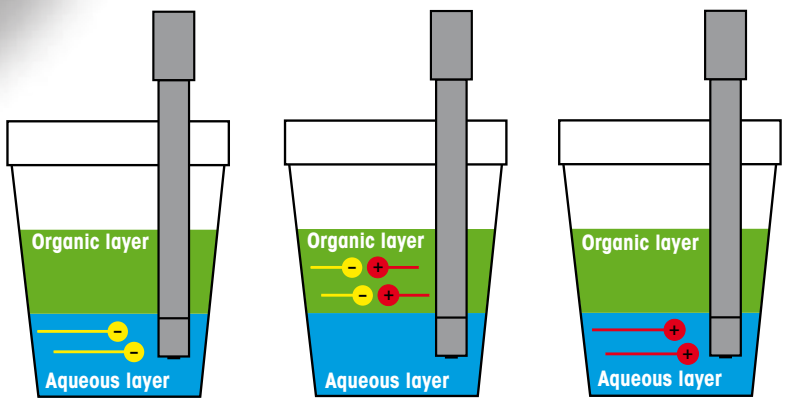
DS800-TwoPhase

Superior performance for Two-Phase titrations

The DS800-TwoPhase is suitable for the indication of anionic and cationic surfactants in pure aqueous solutions as well as the two-phase titration according to the standards DIN EN14480, 14668 and 14669. The electrode is resistant to ketones (methyl isobutylketone MIBK, recommended in the standards), hexane, toluene or ethanol and can be operated in a wide pH range from 1 to 12. The membrane containing the immobilized surfactant-sensitive ionophores is highly durable and requires very little maintenance.

High durability in a wide scope of applications

Undesired matrix effects induced by formulation compounds or non ionic surfactants are excluded by the two-phase titration technique. Large concentration ranges of anionic as well as cationic surfactants in formulations, raw products, liquid detergents and shampoos can be determined with excellent accuracy and precision. The performance of the membrane is not affected even after hundreds of titrations: reliable results are therefore ensured over the whole lifetime.



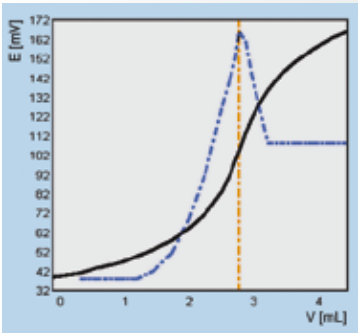
Before the EQP | At the EQP | After the EQP

Quick and secure: Two-phase titration according to DIN EN 14480/14468/14669 standards

In a two-phase mixture consisting of water/methyl-isobutylketone/ethanol an anionic surfactant is titrated with a cationic surfactant (e.g. Hyamine® 1622) under vigorous stirring. The ion pair is extracted into the organic phase. A clear, distinct jump is obtained at the equivalence point, which facilitates evaluation tremendously and ensures high quality results with the following advantages:

- Use of environment-friendly, non-poisonous solvents
- Short titration time and straightforward method parameters
- Can be automated on a Rondo sample changer and Rondolino automated titration stand

Raw materials and formulations containing anionic surfactants, soaps in detergents, cleaners as well as quaternary ammonium surfactants can be simply and securely titrated according to the DIN EN standards.



Superior accuracy for cosmetics

One of many examples demonstrating the extraordinary reliability of the DS800-TwoPhase: In the two-phase titration of an anionic surfactant in a shower gel at pH 3 the overall relative standard deviation of 5 series each consisting of 5 samples is 0.96%. The average result of 0.260 ±0.003 mmol/g compared to the reference value range from 0.250 to 0.280 mmol/g shows the high result accuracy. This is enabled by an excellent response and a very pronounced jump at the equivalence point.

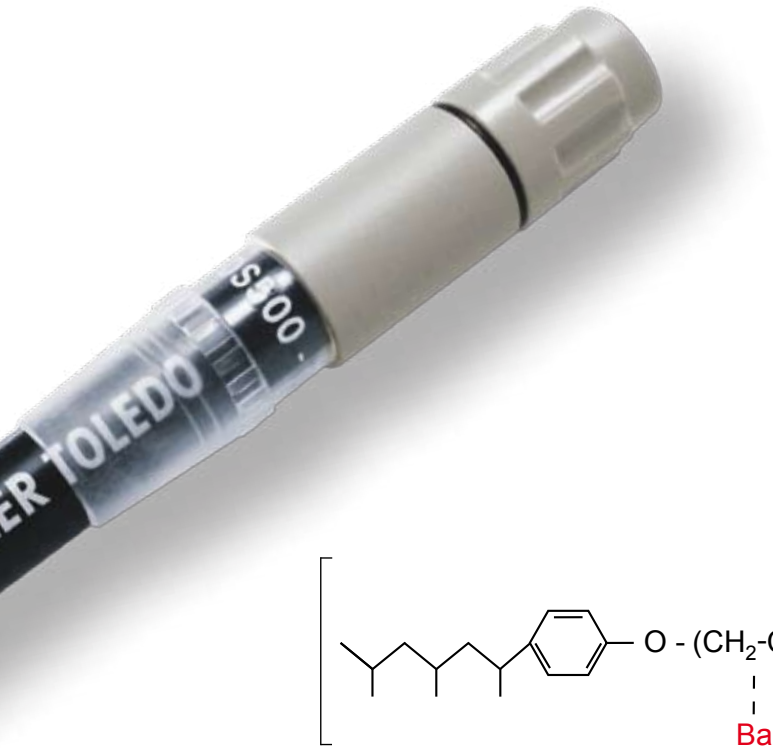
DS500

The Specialist for Aqueous Solutions

The DS500 is a surfactant sensitive electrode which has been optimized for the titration of anionic as well as cationic surfactants in aqueous solutions. Excellent response is ensured thanks to immobilized ion carriers in the highly durable membrane. Furthermore, the DS500 can be used for the titration of non-ionic surfactants in raw materials.

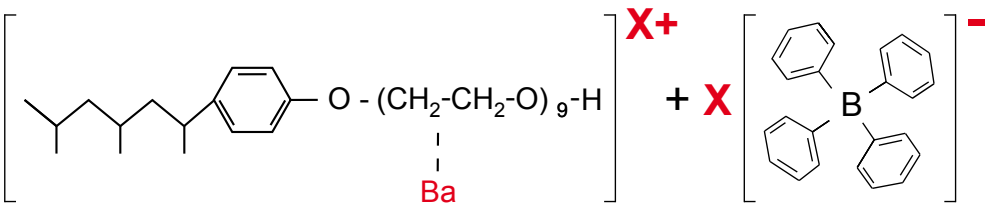
Easy ionic surfactant titration in aqueous matrices

Titrating ionic surfactants in aqueous matrices with the DS500 is carried out in a straightforward way. One method is very frequently suitable for a large variety of surfactants. Anionic surfactants are titrated with cationic surfactants and vice versa. At the equivalence point an ion pair precipitate is formed, which causes the solution to become turbid. This characteristic titration can be performed in a multitude of sample matrices such as liquid detergents, household cleaners, galvanic baths, etc. including colored solutions or non-transparent suspensions in a pH range from 2-10.



Non-ionic Agents in Pharmaceutical Industry

The DS500 opens the way to reliable content determination of non-ionic pharmaceutical agents. In this titration, a barium salt is added to the non-ionic analyte in order to form a positively charged complex (known as a "pseudo-cationic" complex), which is then titrated with sodium tetraphenyl borate (Na-TPB) in a similar way to a classical ionic surfactant titration: an ion pair between the non-ionic surfactant and Na-TPB is formed and precipitated during titration.



Activated Non-Ionic Surfactant

Tetraphenyl Borate

Precipitation

Fast quats titration in wood preservatives

The DS500 is the electrode of choice for the determination of quatenary ammonium compounds in wood preservative solutions using a precipitation titration with Na-TPB as the titrant in an ethanol/water mixture. The design of the DS500 has been optimized for good resistance against ethanol. The smooth measuring surface texture is effectively prevented from clogging with the precipitate using a small portion of a non-ionic surfactant. Together with the sharp response of the DS500 and the flexible method parameters of the Excellence titrators, accurate results are quickly obtained.

DP5 Phototrode™

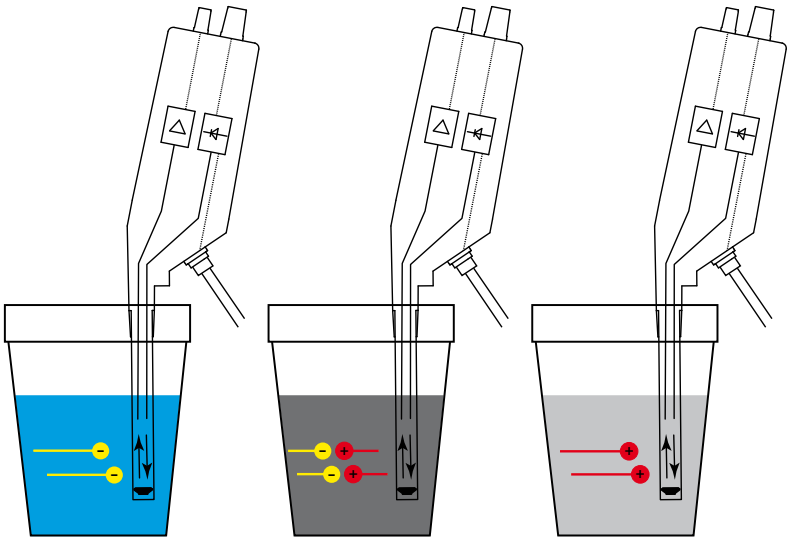
Application Flexibility for Classical Surfactant Titrations

The DP5 Phototrode™ is an excellent probe for photometric-indicated titrations involving for instance the classical colorimetric two-phase titration of ionic surfactants according to Epton. In addition, it can be used for the turbidimetric titrations of ionic surfactants in raw materials. The DP5 Phototrode™ does not need conditioning and the maintenance is reduced to a minimum.

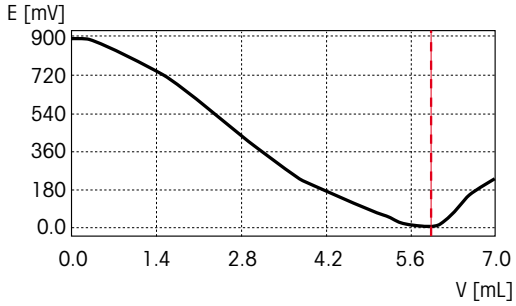
When Two-Phase titration according to Epton is a must

In this method an ion pair between surfactant and counter-ionic surfactant is formed which is then extracted into the chloroform phase. Before adding the next increment a waiting time is required to allow for the separation of the two immiscible phases. At the equivalence point, the color of the mixed indicator dissolved in the chloroform phase changes, which is detected by the DP5 Phototrode™.

This sequence can easily be automated with the titration method function 'Two-Phase titration' of the Titration Excellence titrators. The dedicated two-phase titration beaker is ideal for reliable detection of the end point. It allows the DP5 Phototrode™ to be arranged in a lateral position thus avoiding the trapping of air and water bubbles in the measuring cell of the probe.



Before the EQP At the EQP After the EQP



Quick results in Turbidimetric Titration

Clear, non-turbid aqueous or mixed phase sample solutions can be easily and quickly titrated with the DP5 Phototrode™ by measuring the light transmission. A precipitate between analyte and titrant is formed, and the solution becomes turbid. When a clear minimum in light transmission is detected, the equivalence point is recognized with a dedicated evaluation procedure provided by the Excellence titrators. Even in the case where no clear minimum in light transmission is indicated, the equivalence point can still be determined by applying the corresponding evaluation procedure.

Ensuring quality of dietary supplements

Chondroitin sulfate, a dietary supplement to slow down osteoarthritis, can be easily analysed according to the US Pharmacopeia method, which requires a turbidimetric titration with cetyl pyridinium chloride and photometric indication. Results quality is ensured by the very good recovery rate and repeatability achieved with the DP5 Phototrode™

Fast and Accurate Ion Analysis

METTLER TOLEDO offers a unique, comprehensive range of ion-selective electrodes and accessories. Depending on the sample, it is often possible to measure from less than 1 ppm up to a few grams per liter. This can be achieved either by direct measurement or by incremental techniques such as standard addition or subtraction. These methods are easily automated using the Excellence titrators.

List of available half-cell electrodes (exception: Sodium-selective electrode) selective for inorganic anions and cations

Description	Designation
Lithium selective electrode (Li^+)	DX207-Li^+
Ammonia selective gas sensing electrode (NH_3)	Ammonia
Ammonium selective electrode (NH_4^+)	DX218-NH_4^+
Fluoride selective electrode (F^-)	DX219-F^-
Sodium selective electrode (Na^+)	DX223-Na^+
Magnesium selective electrode (Mg^{2+})	DX224-Mg^{2+}
Cyanide selective electrode (CN^-)	DX226-CN^-
Sulfide selective electrode (S^{2-})	DX232-S^{2-}
Chloride selective electrode (Cl^-)	DX235-Cl^-
Potassium selective electrode (K^+)	DX239-K^+
Calcium selective electrode (Ca^{2+})	DX240-Ca^{2+}
Thiocyanate selective electrode (SCN^-)	DX258-SCN^-
Nitrate selective electrode (NO_3^-)	DX262-NO_3^-
Copper selective electrode (Cu^{2+})	DX264-Cu^{2+}
Bromide selective electrode (Br^-)	DX280-Br^-
Tetrafluoroborate selective electrode (BF_4^-)	DX287-BF_4^-
Cadmium selective electrode (Cd^{2+})	DX312-Cd^{2+}
Iodide selective electrode (I^-)	DX327-I^-
Barium selective electrode (Ba^{2+})	DX337-Ba^{2+}
Lead selective electrode (Pb^{2+})	DX407-Pb^{2+}
Double junction glass reference electrode	DX200
Double junction plastic reference electrode	DX202-SC

List of available combined electrodes selective for inorganic anions and cations

Description	Designation
Ammonium selective electrode (NH_4^+)	DC218-NH_4^+
Fluoride selective electrode (F^-)	DC219-F^-
Chloride selective electrode (Cl^-)	DC235-Cl^-
Potassium selective electrode (K^+)	DC239-K^+
Calcium selective electrode (Ca^{2+})	DC240-Ca^{2+}
Nitrate selective electrode (NO_3^-)	DC262-NO_3^-
Bromide selective electrode (Br^-)	DC280-Br^-

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