

ISE electrodes for ammonium ion (NH_4^+) measures

These electrodes are designed to measure ammonium ion (NH_4^+) in aqueous solutions in a wide range of concentrations. The electrode includes an internal electrode and a permeable membrane selective to ammonium ion. They are to be used in combination with a reference electrode series 301. Electrode body is made of plastic material and is typically suitable for laboratory applications, but can also be used in process installations.

Advantages

- Plastic body, high mechanical resistance
- Good selectivity
- Fast response
- Suitable for measures in wide concentration range
- Short conditioning time
- Standard dimensions: 12 mm \varnothing , 120 mm length

Operating principle and realization

Mod.201NH4 electrode, in combination with a reference electrode series 301, allows fast and accurate measure of ammonium ion in aqueous solution; the colour and the turbidity of the solution in measure do not influence the response.

The selective membrane is made of a plastic matrix in which an antibiotic is properly dispersed. The membrane is supplied mounted on a cartridge that makes replacement simple and fast. The membrane is soluble into organic solvents, so therefore Mod.201/NH₄ electrode can only be used for measures in aqueous solutions. The cartridge is filled with a proper filling solution.

The allowed concentration range is 10^{-5} M to 10^{-1} M (corresponding to 0.18 to 1800 ppm of NH_4^+ ions). The lower limit can be reached only if specific interfering substances are not present in the sample. The pH of the solution must be in the range 4÷7 pH. Main interference are given by K^+ , H^+ , Li^+ , Na^+ , Mg^{2+} , Ca^{2+} ions.

The Mod.201NH4 electrode can be used in combination with all the reference electrodes series 301, and especially with the calomel laboratory reference electrode Mod.301C0Z0Z0A0.

Calibration & Maintenance

If the electrode is not used for long periods it has to be dry stored. The electrode conditioning is obtained by immersing the sensor in distilled water or in a 0.01 M NH_4^+ solution for 2 hours. Never leave the electrode immersed into ammonium solutions with concentrations higher than 0.1 M. Before immersing the electrode verify that the cartridge is correctly screwed on the body so that the seal is assured. The electrode response is fast (some seconds) when the measure is performed first in low concentration solutions and after in higher concentration solutions, while it becomes slow if the measure is operated in the opposite order. For this reason it is recommended to operate the calibration first with the low concentration standard and later with the higher concentration standard. Calibration procedure depend upon the type of electronic instrument in use, but are always operated through standard solutions: if the electrode is connected to a ion meter with logarithmic scale the calibration can be directly performed in NH_4^+ concentration units; if the electronic unit has a mV reading (resolution should be 0.1 mV) the operator should plot a calibration curve on a semi logarithmic paper, with NH_4^+ concentration (mol/L) on X axis (logarithmic axis) and mV readings (voltage difference between measuring electrode and reference electrode) on the Y axis (linear axis).

The slope of this curve depends upon sample temperature.



201NH4

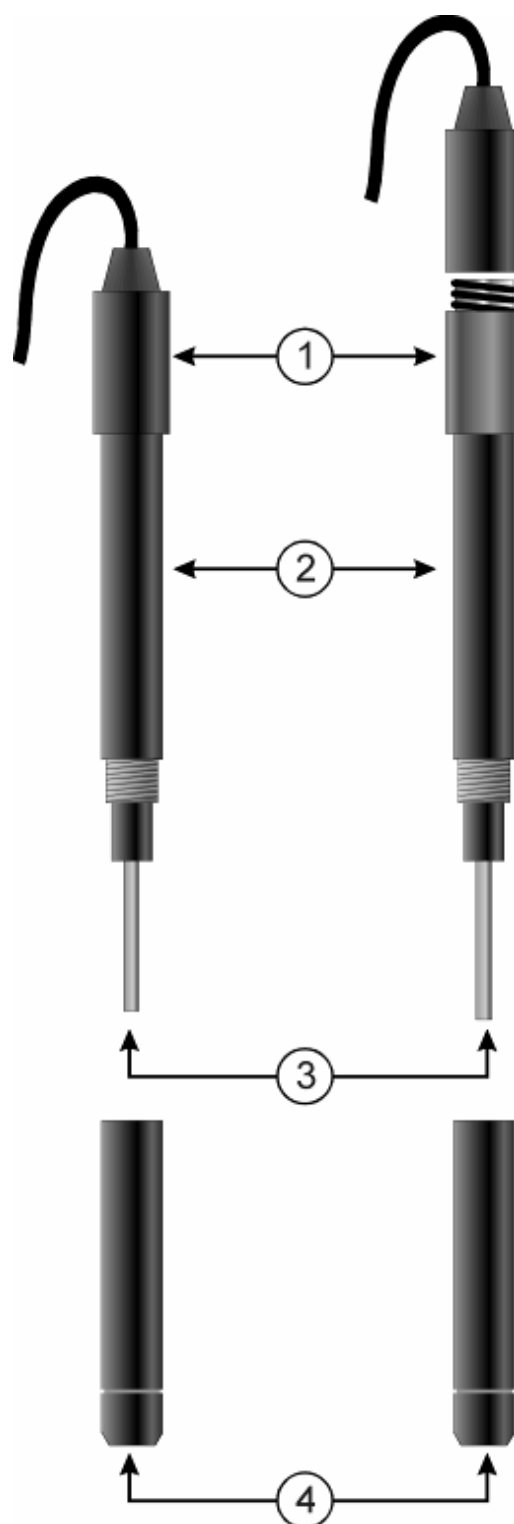
Technical Specifications

Signal generated by the electrode: .mV, proportional to $\log[\text{NH}_4^+]$
Measuring range:..... $10^{-5} \div 0,1$ M (0.18÷1800 ppm)
Measure conditions:..... 4.0<pH<7.0
Operating temperature limits: 0÷50 °C
Interference:..... K^+ , H^+ , Li^+ , Na^+ , Mg^{2+} , Ca^{2+}
..... $\text{K}^+/\text{NH}_4^+ < 0,05$; $\text{K}^+/\text{Na}^+ < 5$; $\text{K}^+/\text{Li}^+ < 5$; $\text{K}^+/\text{H}^+ < 0.3$;
..... $\text{K}^+/\text{Mg}^{++} < 1000$; $\text{K}^+/\text{Ca}^{++} < 350$
Response time:.....<20 sec. to reach 90 % of the value
..... at $[\text{NH}_4^+] = 10^{-3}$ M and from lower to higher concentrations
this time increases for lower concentrations and when measuring
more concentrated solution after the lower concentrated solutions
Sensitivity (slope):.....in direct potenziometria, at 20 °C,
..... 58 mV/decade ± 1 mV; slope depends upon temperature
Repeatability $\pm 0,5$ mV
Stability:2-3 mV /24h
Allowed samples:..... aqueous solutions
.....(membrane is dissolved by organic solvents)
Dimensions: $\varnothing 12$ mm x 120 mm
Materials: electrode body: PVC
.....membrane: PVC matrix including antibiotic dispersion
Life expectancy: electrode: higher than one year;
..... membrane: some weeks to some months, depending upon
.....measured ammonium concentrations
Cable:.....integral or with threaded connector, std length 1 m

Optional Accessories

Maintenance kit, composed of:
1 cartridge with membranes, 1 electrolyte solution bottle
.....201/NH3-CA

Cable c/w connector on electrode side.....CV/S7-x
where x = cable length, in meters (x = 1, 3, 5, 10, 15, 20)



ELECTRODE FOR AMMONIUM ION MEASUREMENTS
1 = CABLE/CONNECTOR
2 = ELECTRODE BODY
3 = MEASURING ELECTRODE
5 = MEMBRANE HOLDER