Technical Specifications for the Ammonium Ion-Selective Electrode ELIT 8051

Introduction

In aqueous solution there is an equilibrium between NH4+ and NH3 which is dependent on pH. Below pH 6.5 there is 100% NH4+; above pH 11.5 there is 100% NH3. Thus many suppliers of electrodes for ammonium measurement use an ammonia gas-sensing electrode to measure the NH3 gas liberated after the sample has been treated with strong alkali. The ELIT ammonium electrode measures the NH4+ ion directly in solution and there is no need for any pre-treatment with caustic chemicals, and no noxious gases are liberated.

The Ammonium ISE has a solid-state PVC polymer matrix membrane which is suitable for both field and laboratory applications. The Ammonium Ion is a monovalent cation.

One mole of NH_4^+ has a mass of 18.038 grams; 1000 ppm is 0.055 Molar Dissolve 2.965g anhydrous ammonium chloride (NH4Cl) in 1 litre water.

Physical Specifications	
Length of body excl. gold contact	130 mm
Length of body incl. gold contact	140 mm
Diameter of body	8 mm
DC resistance at 25° C	< 2.5 MOhm
Minimum feasible sample volume	5 ml
Chemical / Operational Specifications	
Preconditioning / Standard solution	Normally 1000 ppm NH ₄ ⁺ as NH ₄ Cl
(But see General Operating Instructions)	
Preconditioning time	at least 5 minutes
Optimal pH range	pH 0 to pH 8.5
<i>Note:</i> this is the range in which the electrode response to NH4+ is not affected by changes in pH.	
For accurate measurements of total Nitrogen, pH should be kept below 7 to ensure 100% ionisation.	
Temperature range	0 to 50° C
Recommended ISAB	1M MgSO4 OR 1M CuSO4 (Add 10% v/v)
Recommended reference electrode	double junction (ELIT 003)
Reference electrode outer filling solution	0.1M CH3COOLi
Electrode slope at 25° C	$54 \pm 5 \text{ mV/ decade}$
Concentration range	0.03 to 1,800 ppm (2x10-6 to 0.1 Molar)
Response time	< 10 seconds
(Defined as time to complete 90% of the change in potential after immersion in the new solution.)	
Potential drift (in 1000 ppm)	< 3 mV / day (8 hours)

(Measured at constant temperature and with ISE and Reference Electrode continually immersed)

Interference

The following ions interfere with the ammonium measurement - Selectivity Coefficients (SC) in brackets: Potassium (0.1), Sodium (0.002), Magnesium (0.0002), Calcium (0.00006), Lithium (0.00003). The SC is the approximate apparent increase in the measured concentration caused by 1 unit of the interferent. Thus the likely effect of any interfering ion (% increase) can be calculated as follows: ((expected concentration) x (SC) / (expected NH4 concentration)) x 100.

On this basis, only the K interference is likely to cause a significant error.

However it must be noted that if MgSO4 is used as ISAB it can cause interference on low-level samples. Direct measurements have shown that the SC for 0.1M Mg can be considerably higher than quoted (giving an apparent NH4 signal of up to 2ppm) so it is recommended that CuSO4 should be used instead for samples with less than about 50 ppm NH4.

For more information visit: www.nico2000.net.