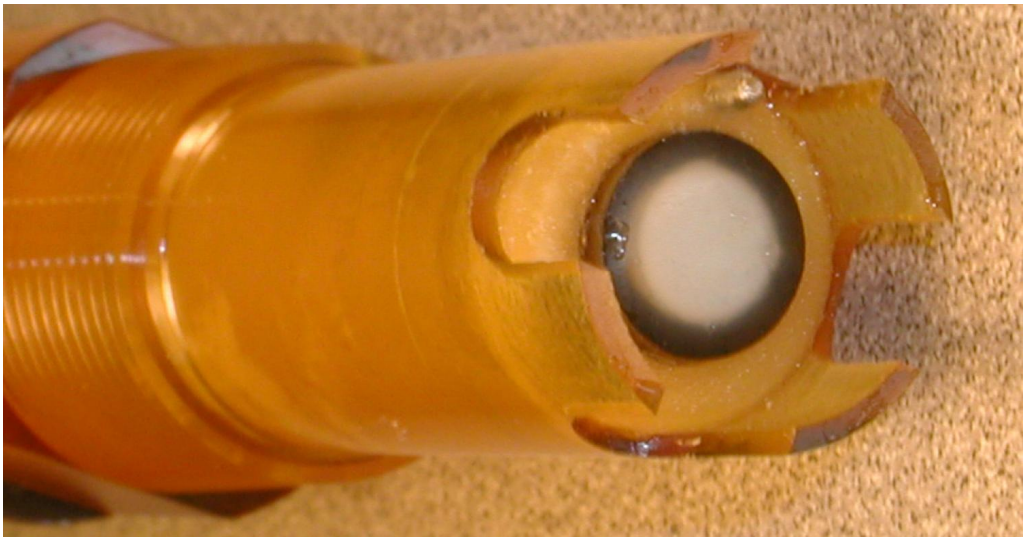
Advanced Sensor Technologies, Inc.
Superior pH / ORP / ISE Industrial Sensors Orange, California USA

## *Features*

- Guaranteed Longest Lasting Sensors Available with performance guarantee *
- Sensors are compatible with most existing pH/ORP Meters, Transmitters & Analyzers **
- Application Specific Engineering results in optimum Lifetime & Performance ***
- Integrated Temperature Compensation, Preamplifiers & Solution Ground Elements
- Solid State Reference System offers superior resistance to Fouling & Dehydration
- Applications such as Acid/Fluoride, Hi-Temp, Saturated Sodium and Sulfide Resistant are available as standard options
- Custom Applications are available, often at no additional charge
- Most Installation Styles are Supported Including: Immersion, Twist Lock, Valve Retractable & Sanitary
- Available in a wide range of plastics, from cost effective CPVC to thermally & chemically resilient ULTEM® and PEEK thermoplastic
- High Pressure Applications up to 100 psi for Valve Retractable & 150 psi for Inline Installations can be supported for continuous use
- Operating Temperatures from $^{-}30$ to $^{+}150$ ºC ($^{-}22$ to $^{+}302$ ºF) can be supported for continuous use



## Case Study No. 7 – Total Ammonia Analysis in Wastewater

Total Ammonia Determination through online ammonium ion and pH monitoring

- Industrial grade ammonium ion selective membrane and application engineered solid state conductive polymer reference can withstand the rigors of industrial process lines
- Ammonium calibration system has been optimized to yield reproducible results in a variety of wastewater systems
- Ammonia gas resistant pH sensor delivers the accuracy needed for total ammonia computation via a PLC or DCS from the ammonium ion and pH input values

### *The Problem*

A sweetener manufacturer wanted to control the total nitrogen content in their process. This was a difficult proposition since they had a mixture of dissolved ammonia gas and ionized ammonium ions in solution. Fluctuation of process pH did not allow for a simple mathematical correction or computation, and made real time control arduous. The complex process solution necessitated significant interaction between ASTI and the customer to develop the proper custom calibration solutions. The total nitrogen must be calculated based upon an equation whose variables are pH and ammonium activity. Creating an accurate calibration system is a challenge in a complex system, whose primary function is not to determine simple activity, but rather a computed or derived total concentration. Common TISAB (total ionic strength adjustment buffer) solutions are often inadequate ISE standards for industrial calibrations because they do not accurately reflect the ionic strength and pH of the process solution. This application then necessitated not only determining the proper multi-point calibration for both pH and ammonia/ammonium, but also developing an interactive curve and standard ion buffer background which accurately reflected the process. Getting agreement and consistency between laboratory titrations and on-line measurement or process values was accomplished by using custom calibration solutions as the common reference standard for both the laboratory and process measurements.

### *The Solution*

The solution was a ammonia gas resistant pH sensor and an industrial grade organic polymer ammonium ion selective sensor. Both the pH and ammonia sensor were sealed against any dissolved ammonia gas which may attack the reference element at lower pH. The reference element was designed to be insensitive to the interferences experienced by the ammonium polymer membrane. The ammonium ion analyzer, in combination with the PLC, was capable of

### *Features*

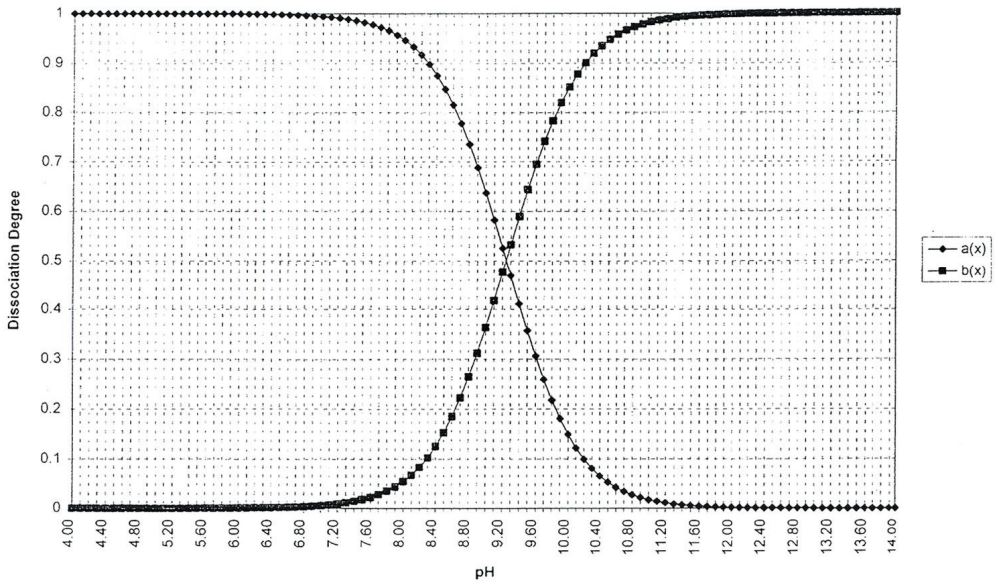
- Guaranteed Longest Lasting Sensors Available with performance guarantee *
- Sensors are compatible with most existing pH/ORP Meters, Transmitters & Analyzers **
- Application Specific Engineering results in optimum Lifetime & Performance ***
- Integrated Temperature Compensation, Preamplifiers & Solution Ground Elements
- Solid State Reference System offers superior resistance to Fouling & Dehydration
- Applications such as Acid/Fluoride, Hi-Temp, Saturated Sodium and Sulfide Resistant are available as standard options
- Custom Applications are available, often at no additional charge
- Most Installation Styles are Supported Including: Immersion, Twist Lock, Valve Retractable & Sanitary
- Available in a wide range of plastics, from cost effective CPVC to thermally & chemically resilient ULTEM® and PEEK thermoplastic
- High Pressure Applications up to 100 psi for Valve Retractable & 150 psi for Inline Installations can be supported for continuous use
- Operating Temperatures from $^{-}$30 to $^{+}$150 ºC ($^{-}$22 to $^{+}$302 ºF) can be supported for continuous use

computing the total nitrogen concentration via a multi-parameter algorithm. The multi-point calibration developed for this application allowed the PLC to create an accurate curve at any point along the operating pH range. The total ammonium analysis system was able to deliver reproducible and accurate results, replacing slow and inaccurate grab sample laboratory analysis.

The Ammonium Ion Sensor Used:
**Model:** AB 6410-873DPX-25 Ammonium Ion Sensor
**Description:** ¾”- 1” MNPT Immersion ULTEM Bodied Ammonium Ion Selective Sensor with integrated 100 Ohm Platinum Temperature Element, Stainless Steel Solution Ground and Foxboro 873DPX compatible preamplifier; 25 feet cable to connect directly to Foxboro 873DPX (Dual Channel Auto pH Compensation) pH/ISE Analyzer/Transmitter

The pH Sensor Used:
**Model:** PNA 6031-873DPX-25 pH Sensor
**Description:** ¾”- 1” MNPT Immersion ULTEM Bodied Dissolved Ammonia Gas Resistant General Purpose pH Sensor with integrated 100 Ohm Platinum Temperature Element, Stainless Steel Solution Ground and Foxboro 873DPX compatible preamplifier; 25 feet cable to connect directly to Foxboro 873DPX (Dual Channel) pH/ISE Analyzer/Transmitter

Ammonia Gas / Ammonium Ion Interconversion Dependance on pH




**Choosing the Correct pH/ORP Sensor**

1. Choose a sensor body type that suits the physical parameters of the installation (refer to the ***Configurations Portion of pH/ORP and Ion Selective webpages***).
2. Choose a sensor that suits the process application, temperature, chemistry, and physical parameters of the installation (refer to ***Sensor Selection Guides and call factory or local sales agent for support***)
3. Choose a sensor housing material that is compatible with the process chemistry, temperature & pressure (refer to ***Chemical Resistance Charts as posted under the Technical Documents portion of the website***).
4. Select suitable temperature compensation element, solution ground & integrated preamplifier based upon the mating pH/ORP Instrument (refer to ***Electrochemical Instrumentation Page & ask for factory support***).
5. Specify the required cable length based upon installation location (refer to ***Part Numbering Guide***).

* Subject to application qualification and review by an approved ASTI sales agent and/or factory. Performance guarantee is posted on the ASTI online application questionnaire page.
** See list of supported pH/ORP/ISE Instruments webpages as posted on the ASTI website.
*** Completion of Application Questionnaire form is required. Other restrictions may apply.


Advanced Sensor Technologies, Inc.
Tel: + 1-714-978-2837
Orange, California USA
Web: www.astisensor.com