

A Novel Approach to
pH, ORP & Ion Selective Industrial
Sensor Design and Manufacture -
Application Oriented IOTRON™
Customized Analytical Sensors

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Revision - April 2004 – SECTION II CASE STUDIES

This Presentation Shall Consist
of Four Main Sections:

I: Introduction to ASTI

II: Case Studies - Application Bulletins

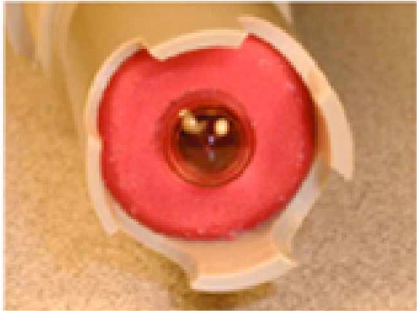


III: Sensor Design Overview

IV: Contacting ASTI about your
Application



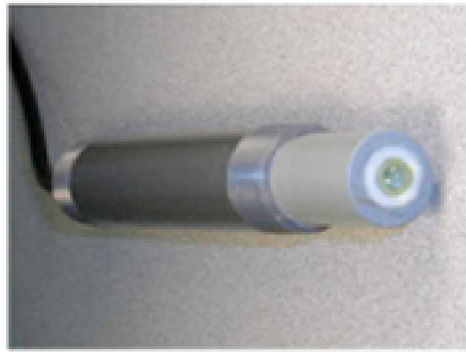


II: Case Studies - Application Bulletins

ASTI offers solutions to many of the most persistent and difficult aqueous measurement problems experience by a wide array of industries. Our solutions to some of these problems have been formalized into detailed case studies that are readily available from our website or by contacting the factory.

<u>Proven Solutions for the Toughest Processing Applications</u>		
Chemical Processing	Acid Etching	Ion Analysis
		
Solutions for difficult pH & ORP Process Measurement Applications.	Solutions for pH & Fluoride Ion Measurement in Acid Etching Processes.	Complete Line of Online and Laboratory Ion Selective Sensors & Electrodes.

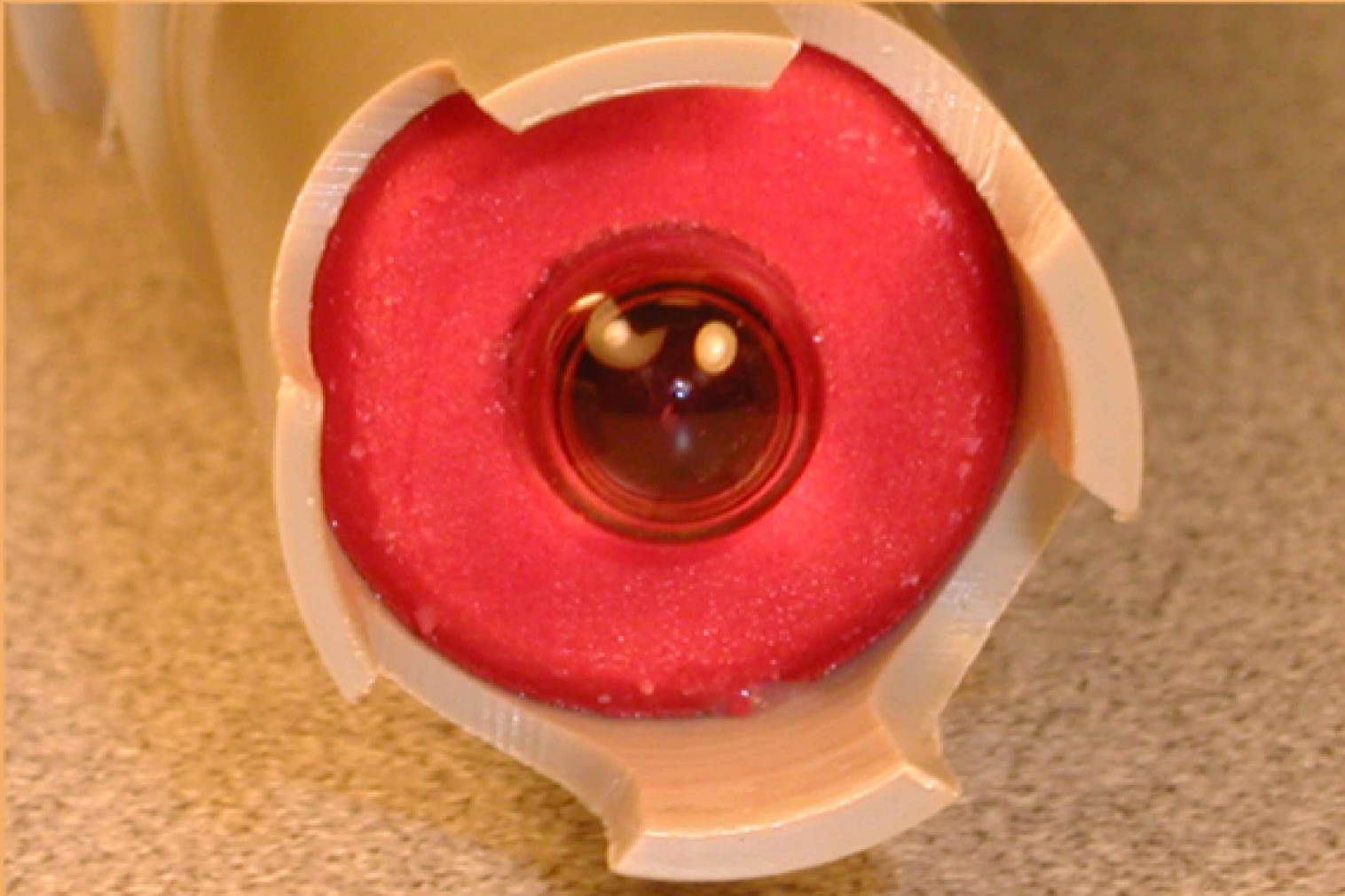
These case studies describe the measurement problems experienced by customers with their previous sensors and define the engineered solution provided by ASTI to alleviate those problems.

<u>Proven Solutions for the Toughest Processing Applications</u>		
Mining	Pulp & Paper	Water & Wastewater
		
Best Performing Sensors in Slurry/Viscous Media with High Temperature, Pressure & Sulfide Containing Ore	Superior Performance in Bleaching and Digester Applications & High Pressure Valve Retractable Installations.	pH and ISE Solutions for EPA compliance related measurements. Cost Effective replacement pH Sensors.

Case studies have been written about the needs of a wide variety of industries including chemical processing, acid/etching systems, ion analysis, mining, pulp and paper as well as the varied needs of the water and wastewater treatment and analysis fields.

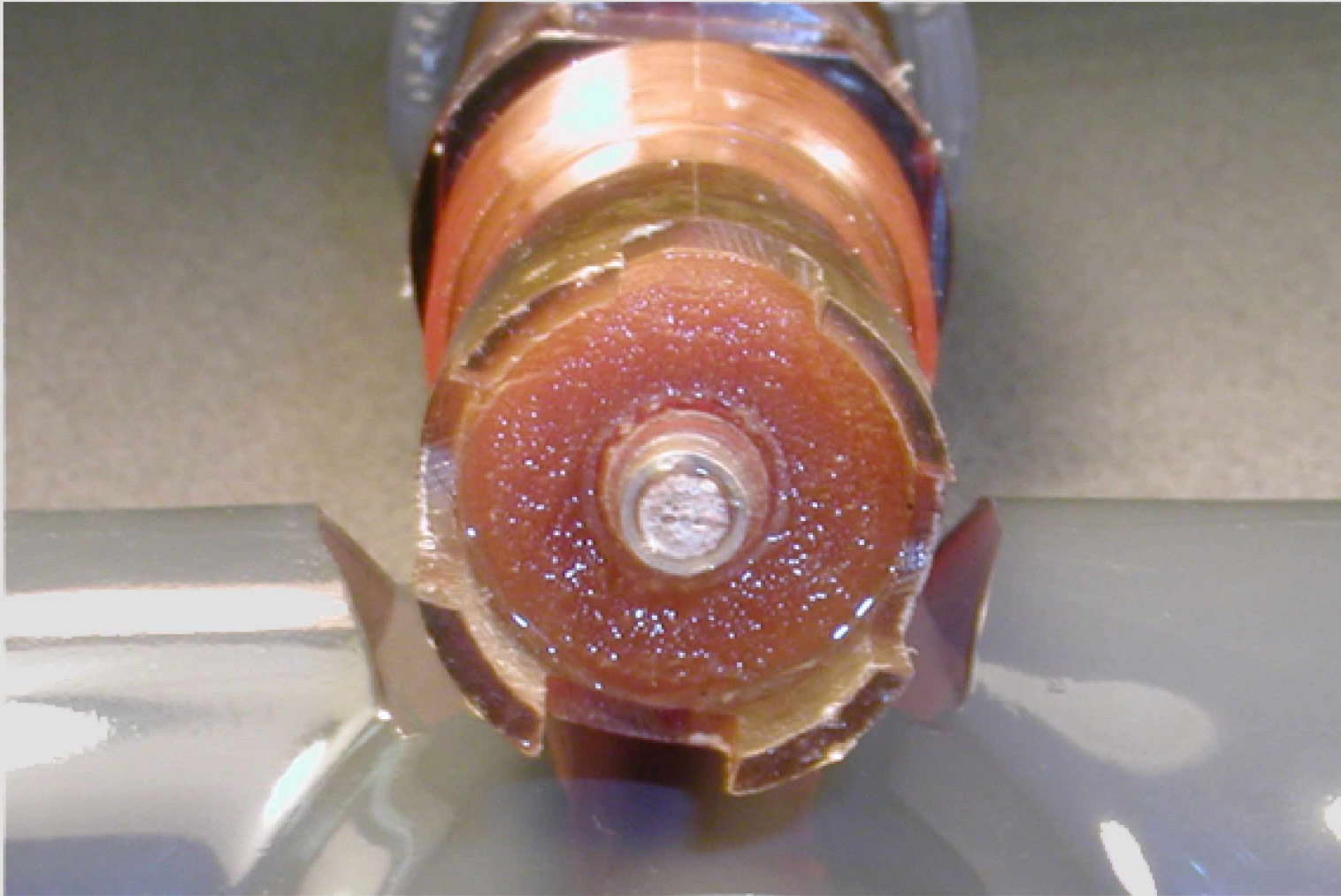
In Chemical Processing Applications:

ASTI has successfully designed specialized pH sensors for ultra high temperature ammonium nitrate manufacturing that can function continuously at temperatures up to 150 degree Celsius. This is the highest temperature pH sensor commercially available.



We have worked in mixtures from solvent recovery systems containing less than 1% water with pure hydrocarbons, ketones and other organic solvents.

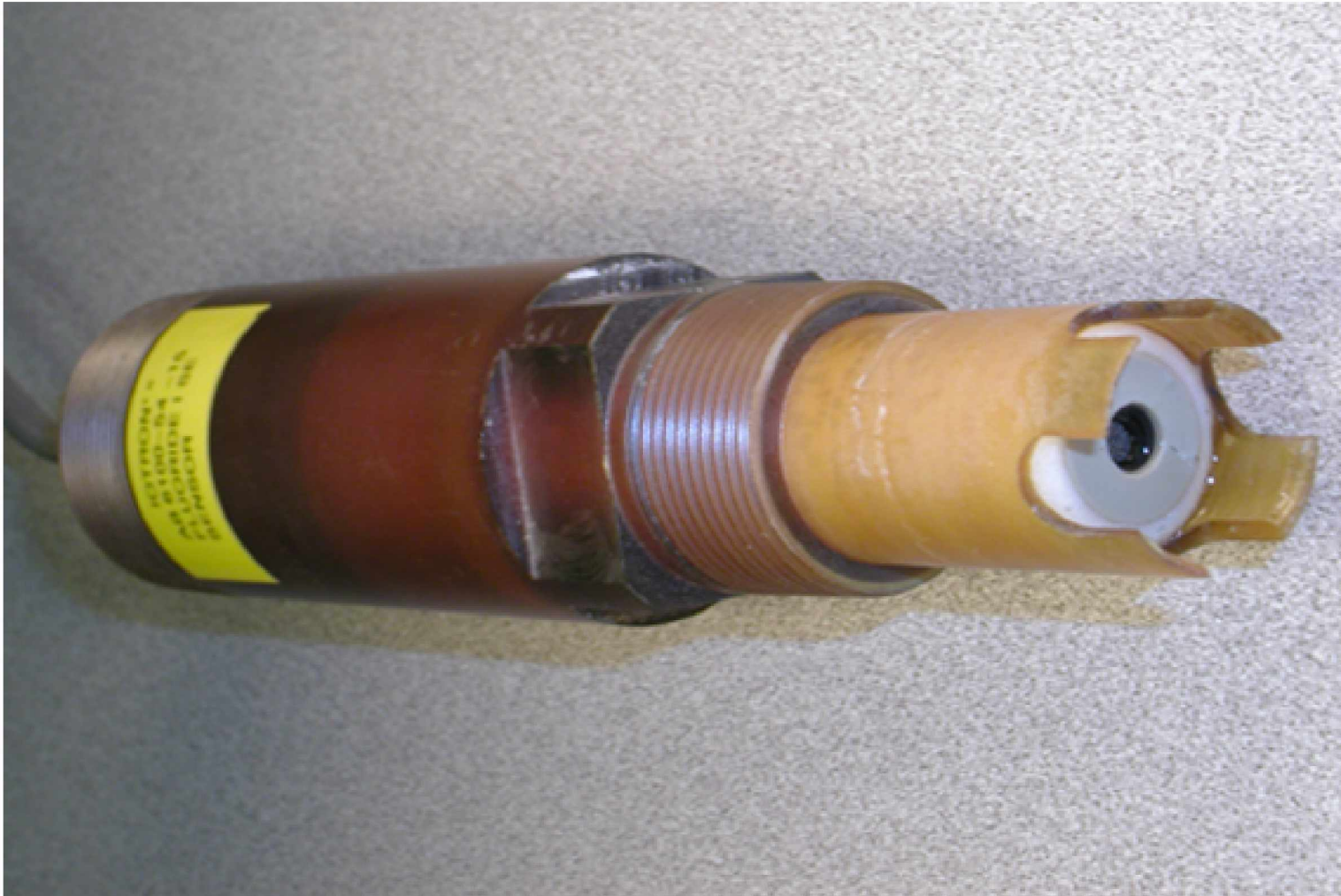
ASTI has operated in strong acid solutions where the pH values were often well below zero and in strong base solutions where the values were above fourteen. These conditions are accompanied by the presence of high concentrations of dissolved sulfides, ammonia and other hazardous off-gases such as sulfur and nitric oxides.



ASTI is able to operate in such strenuous process measurements due in part to our use of a wide diversity of thermoplastics, selected for each application, based upon their chemical, thermal and mechanical characteristics.

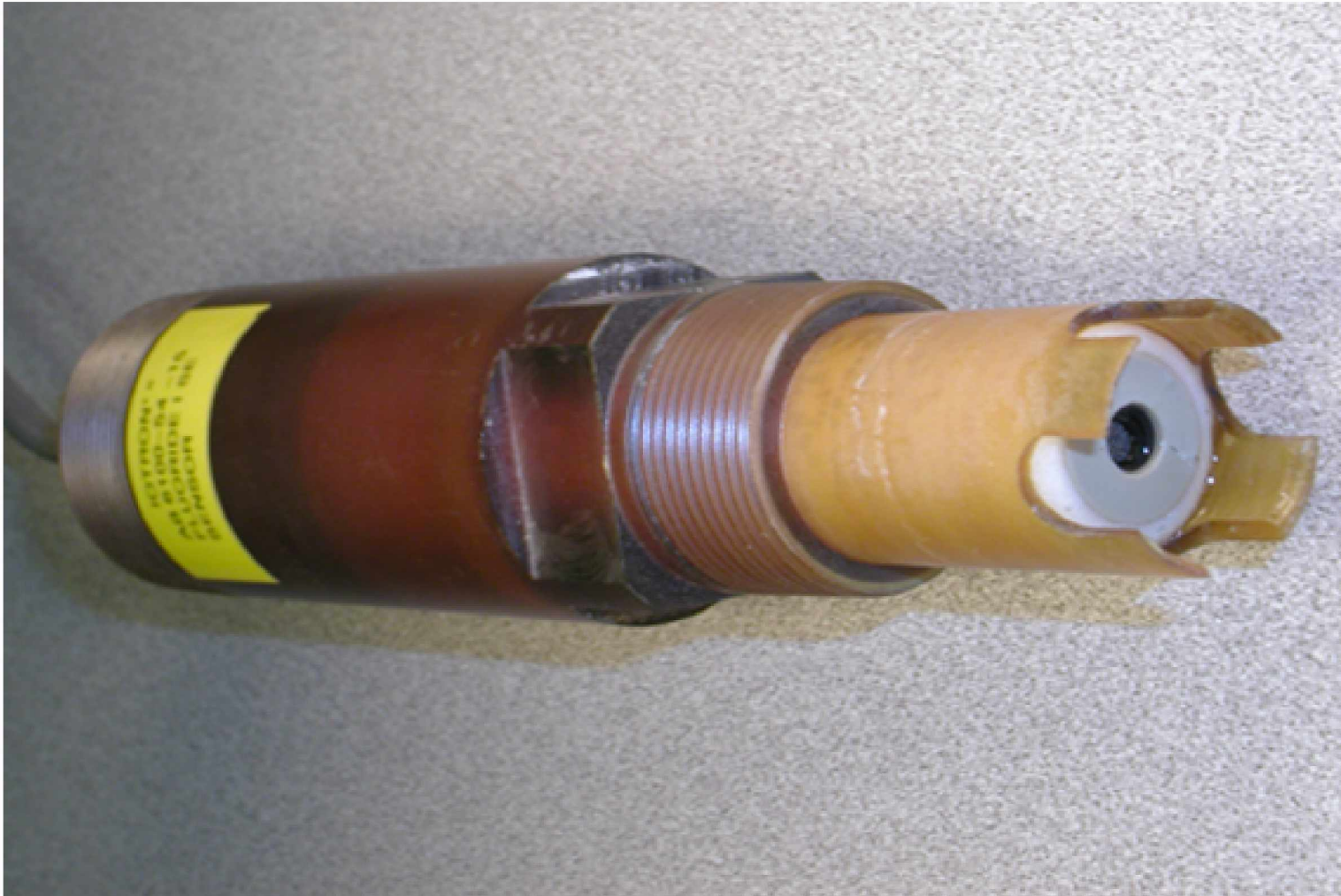


In Acid/Etching applications and the waste treatment of such solutions: ASTI has extensive experience performing fluoride activity and pH measurement in the presence of high fluoride concentrations and low pH conditions, often accompanied by elevated temperatures.

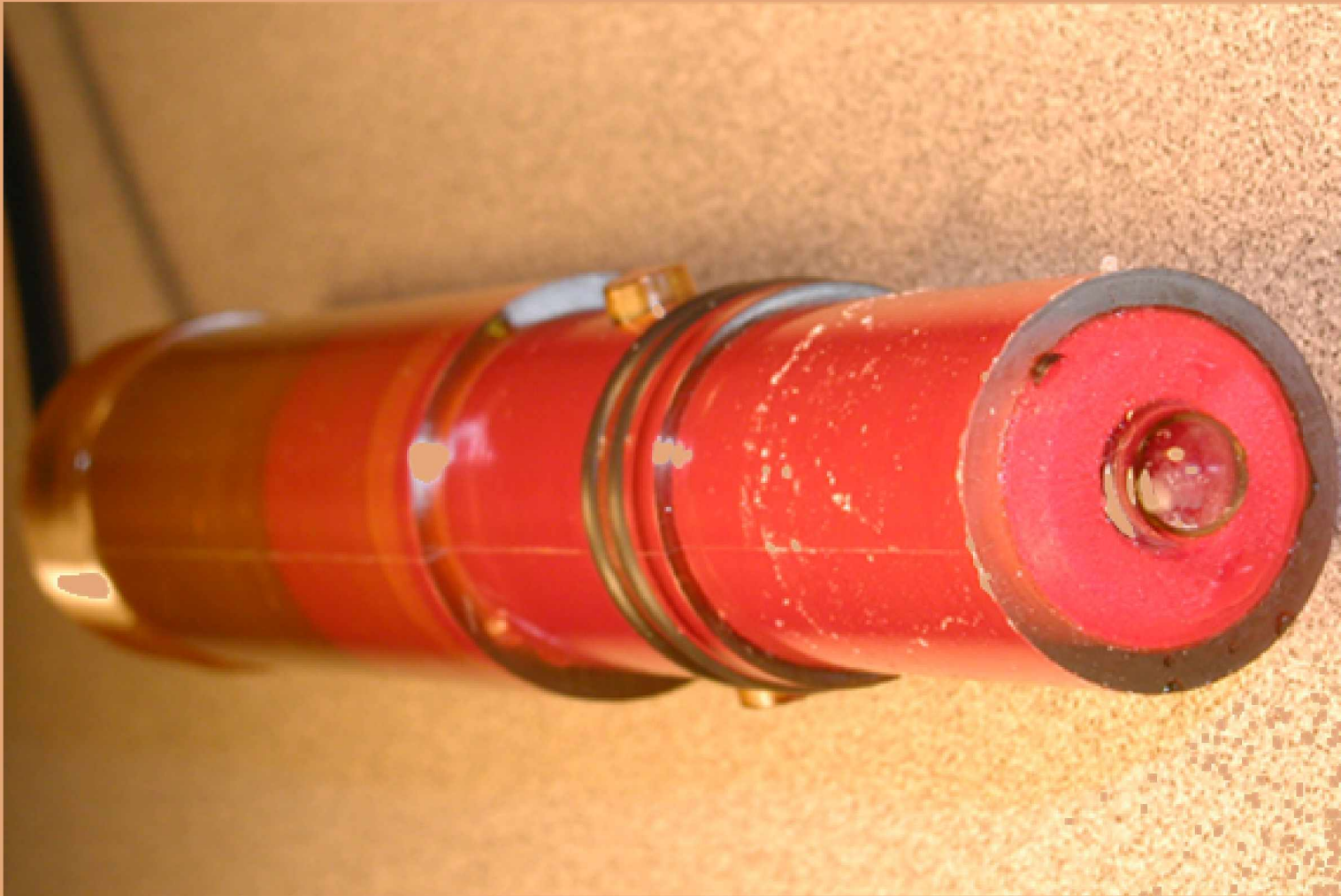


These products were engineered to meet specific customer needs and optimized to function under the rigors of hydrofluoric and acid addition etching systems.

These sensors are also used to monitor fluoride and pH levels in the fluoride wastewater treatment systems of these etching solutions. We offer the only fluoride ion selective sensor on the market that can withstand exposure to strong acid-etching media for prolonged periods and provide a stable control quality signal.

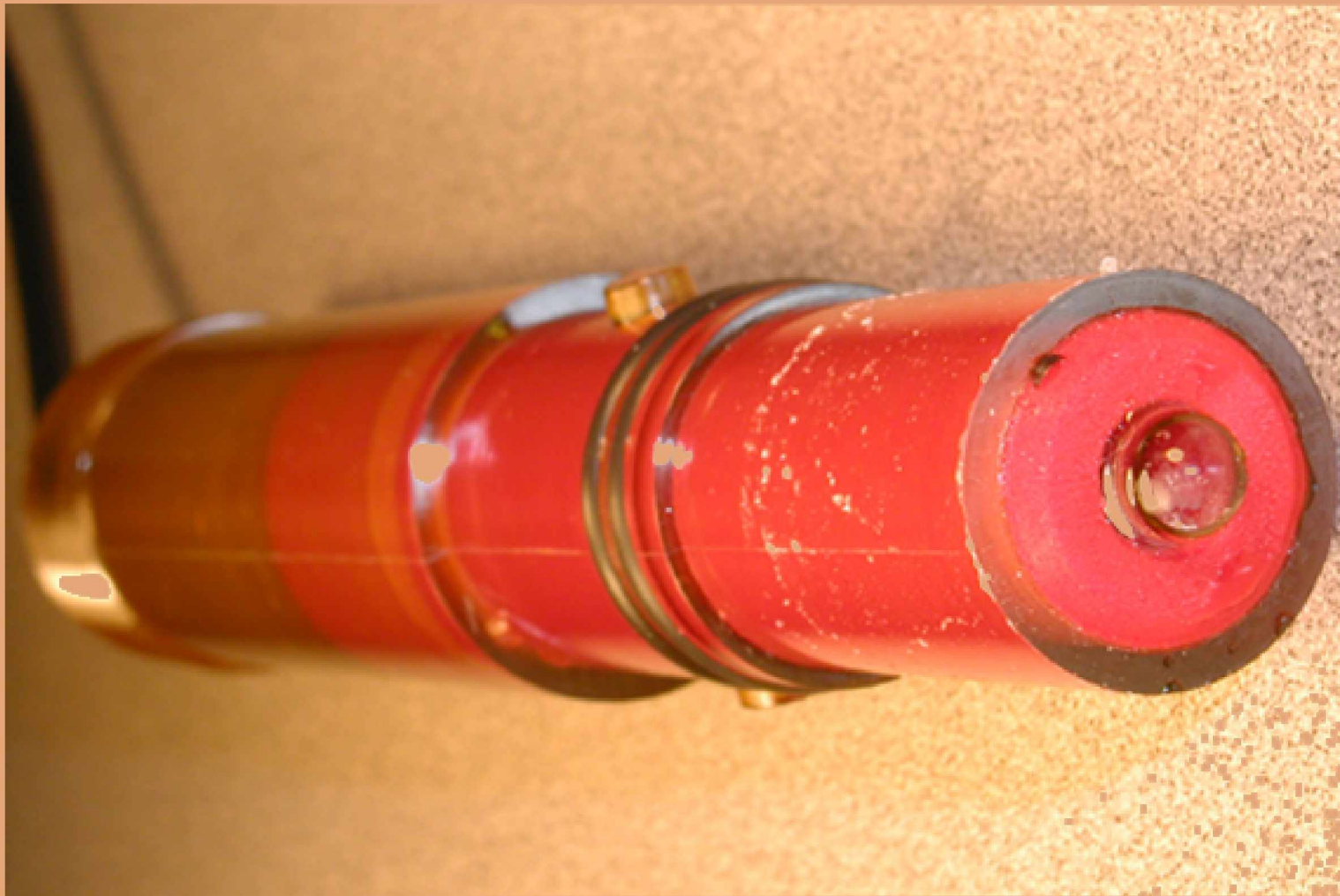


pH control in HF treatment systems: ASTI offers the most accurate pH sensors for high HF media on the market with our proprietary hydrofluoric resistant pH glass formulation and ultra-thick wall construction. Antimony and ISFET based pH sensors are often used to substitute for glass-based sensors due to their lack of resistance to HF.

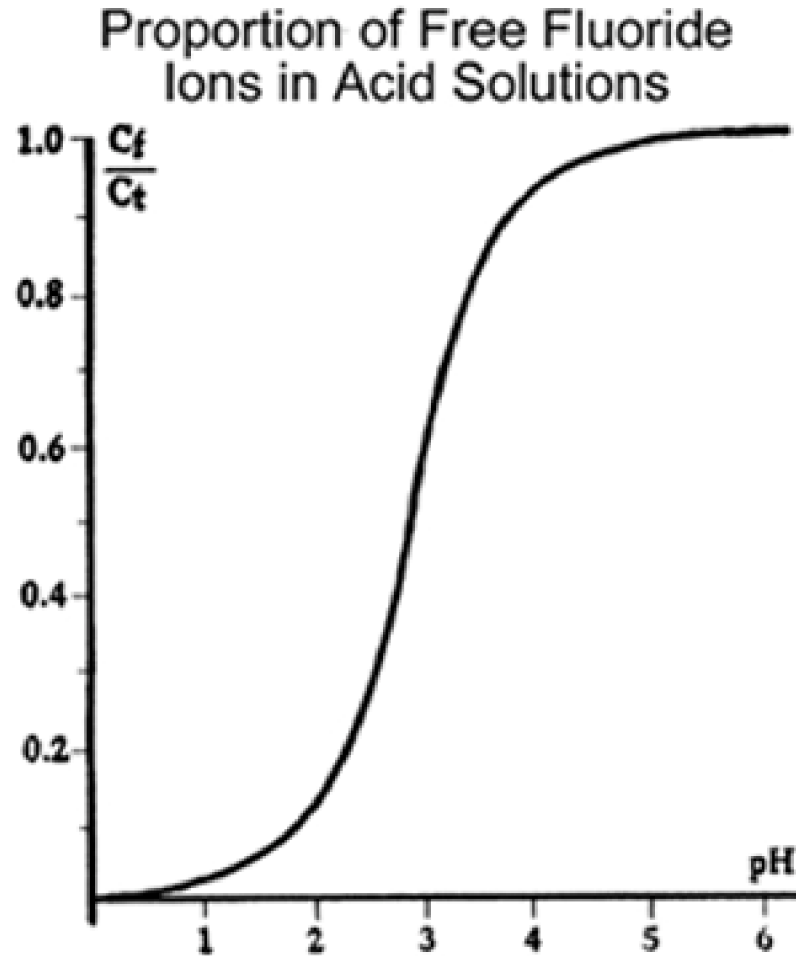


These non-glass sensors cannot match the accuracy and consistency that ASTI's high HF resistant glass based pH sensors provide.

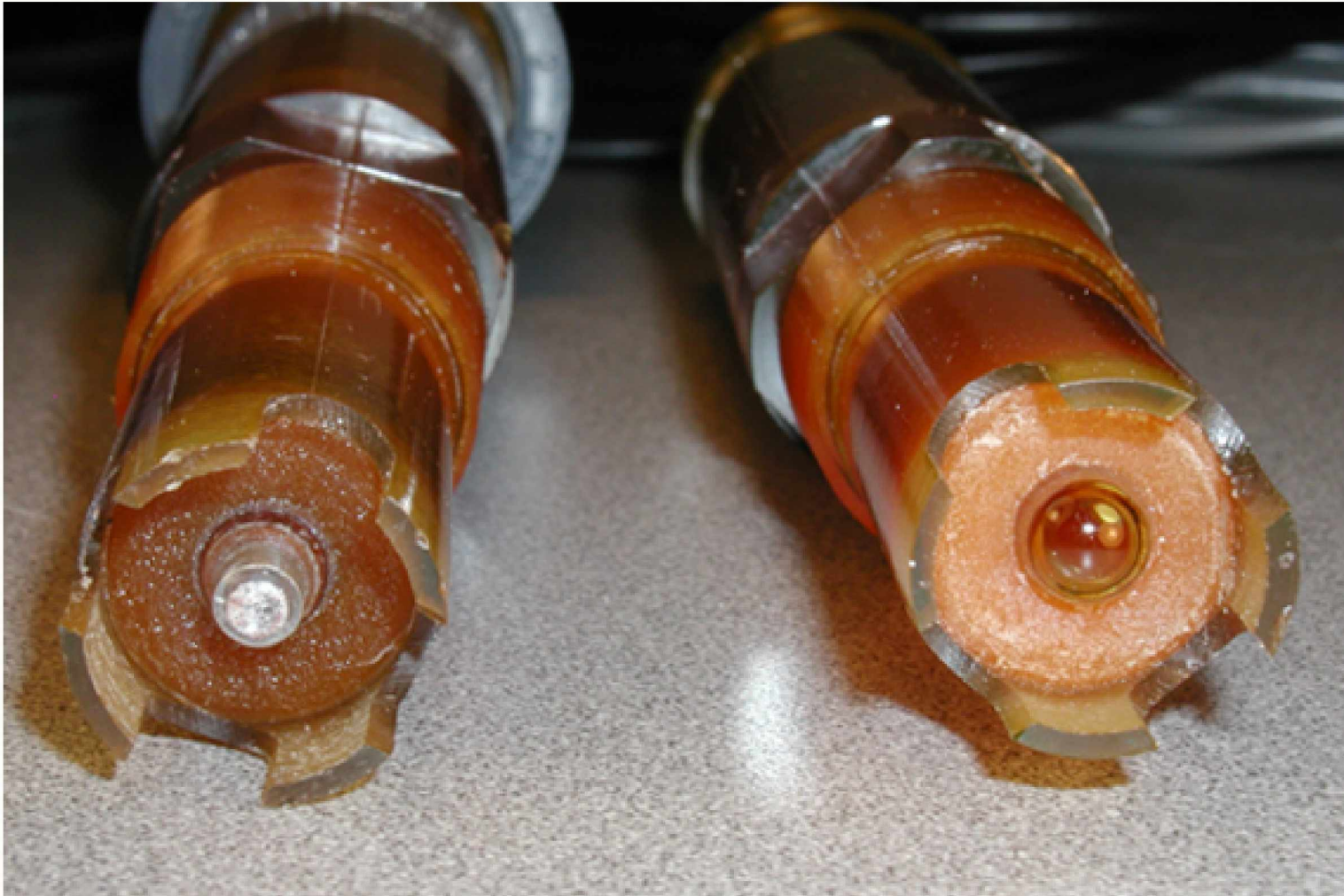
This accuracy is often crucial due to the complex nature of free fluoride and its dependence upon pH. This interdependence makes pH measurement a critical factor to determine the total fluoride present at any given pH.



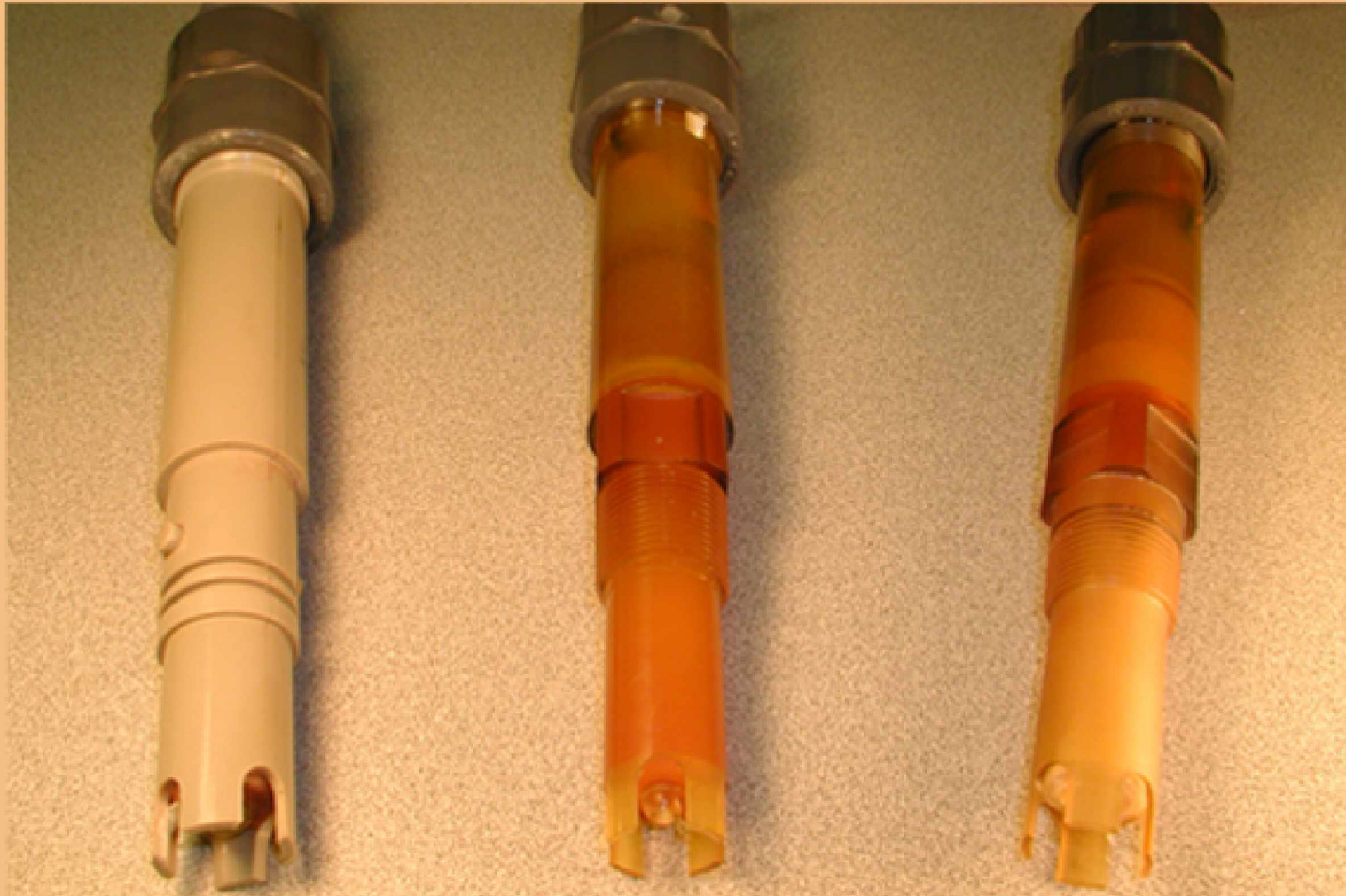
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In Aqueous Mining Applications:
ASTI outperforms every competitor in the difficult pH/ORP measurements presented
by the mining industry while charging only commensurate prices.



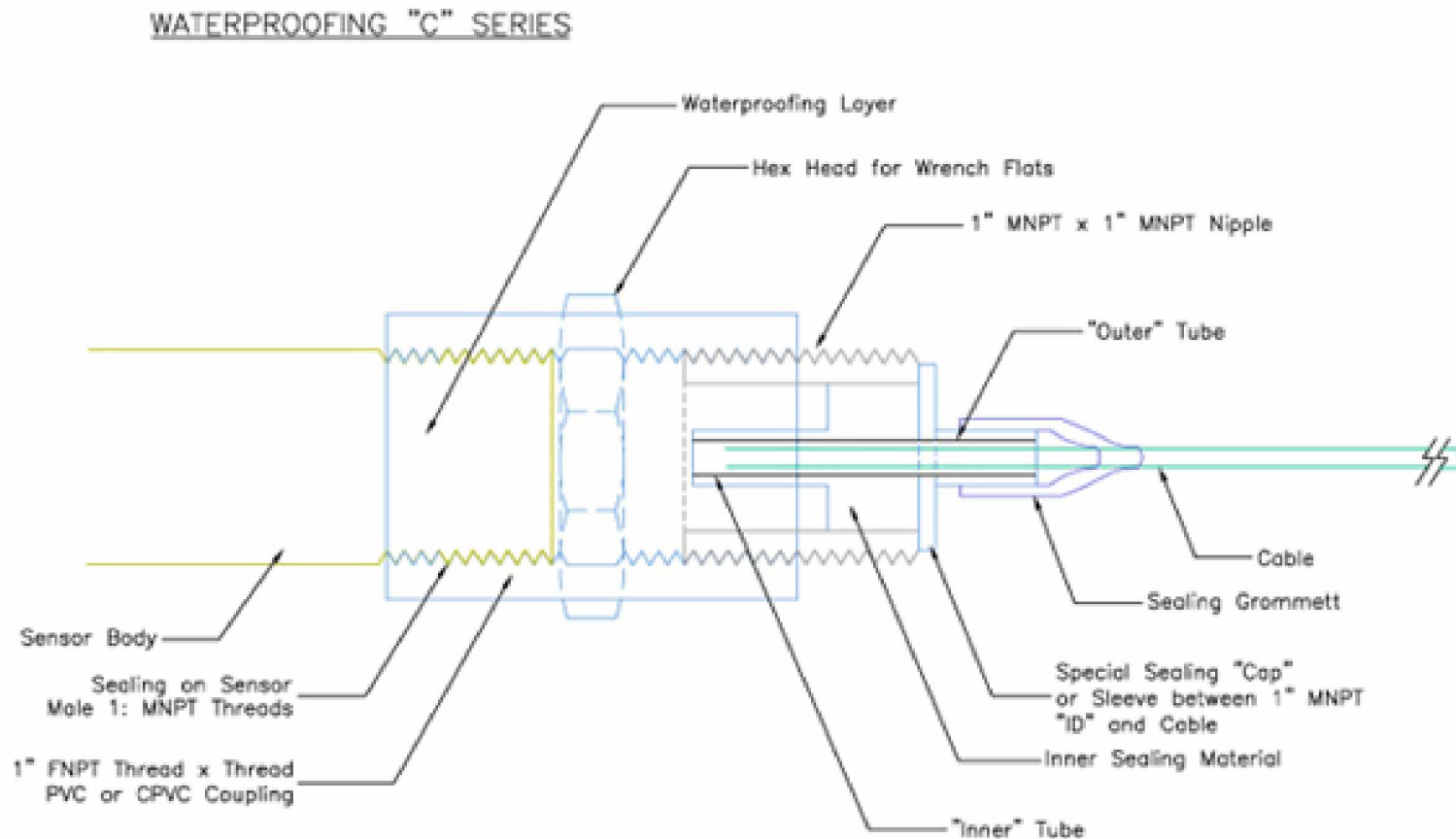
Because of the extended lifetime of our customer engineered mining oriented sensors, we offer a cost of ownership that is far below the rest of the industry.



Because of the extended lifetime of our customer engineered mining oriented sensors, we offer a cost of ownership that is far below the rest of the industry. We have designed completely submersible assemblies with extra thick wall pH elements that have proved nearly indestructible during ordinary process use.

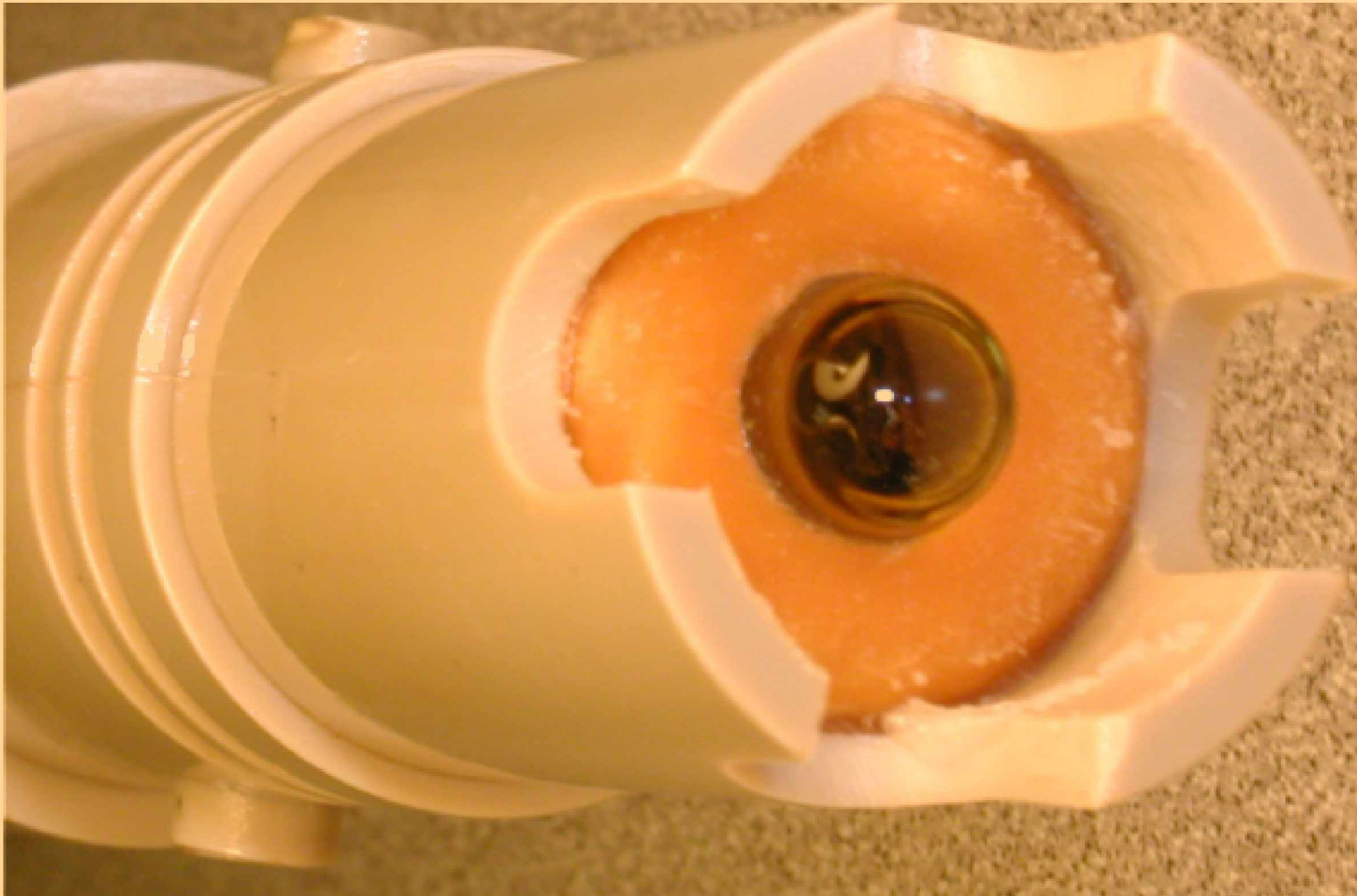


Our high grade thermoplastics and solid state conductive polymer reference system offer great resilience to common mining process conditions, these conditions include agitated heavy slurries, dissolved ammonia gases, low pH conditions and elevated temperatures, often at or above 100 degrees Celsius.



Due to our rugged design tailored for the mining industry, our sensors can readily withstand aggressive chemical and mechanical cleaning.

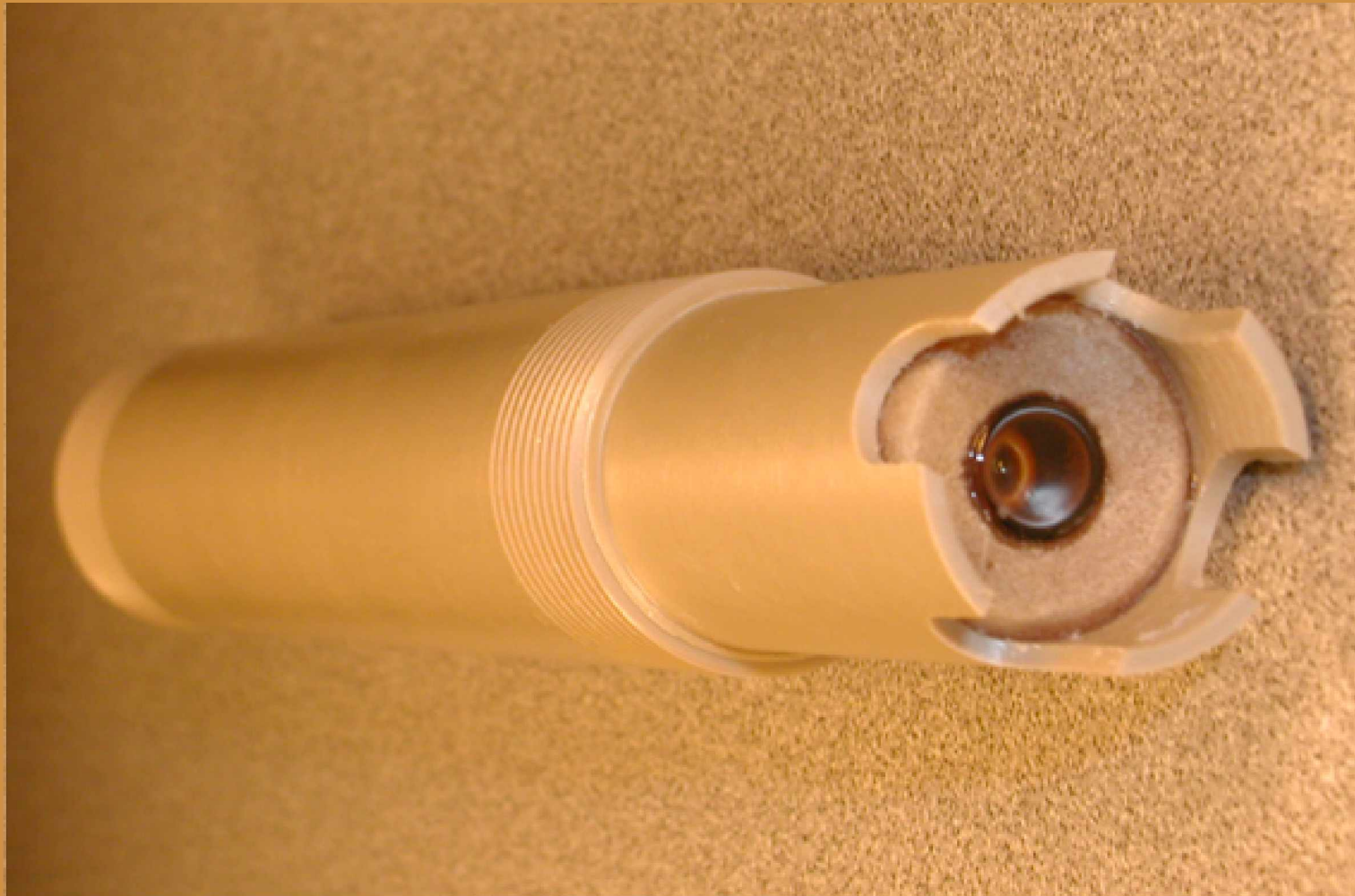
We have proven solutions in acid leaching and solvent extraction operations for copper, nickel, zinc, titanium and many other types of mines.



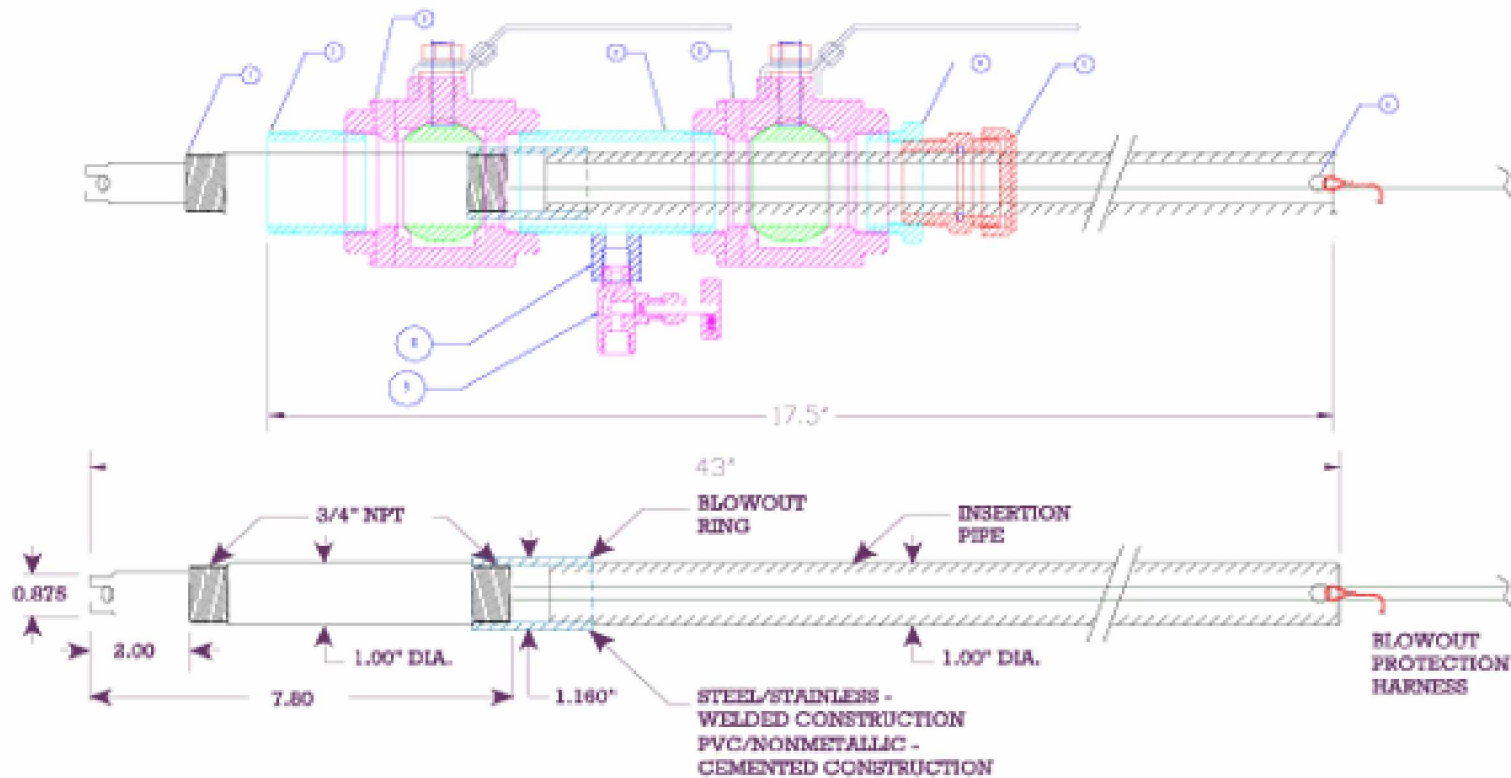
Our performance in solvent extraction systems is unparalleled due to our custom designed sensors built to operate in heavy, hot and agitated slurry mixtures in the presence of pure hydrocarbons.



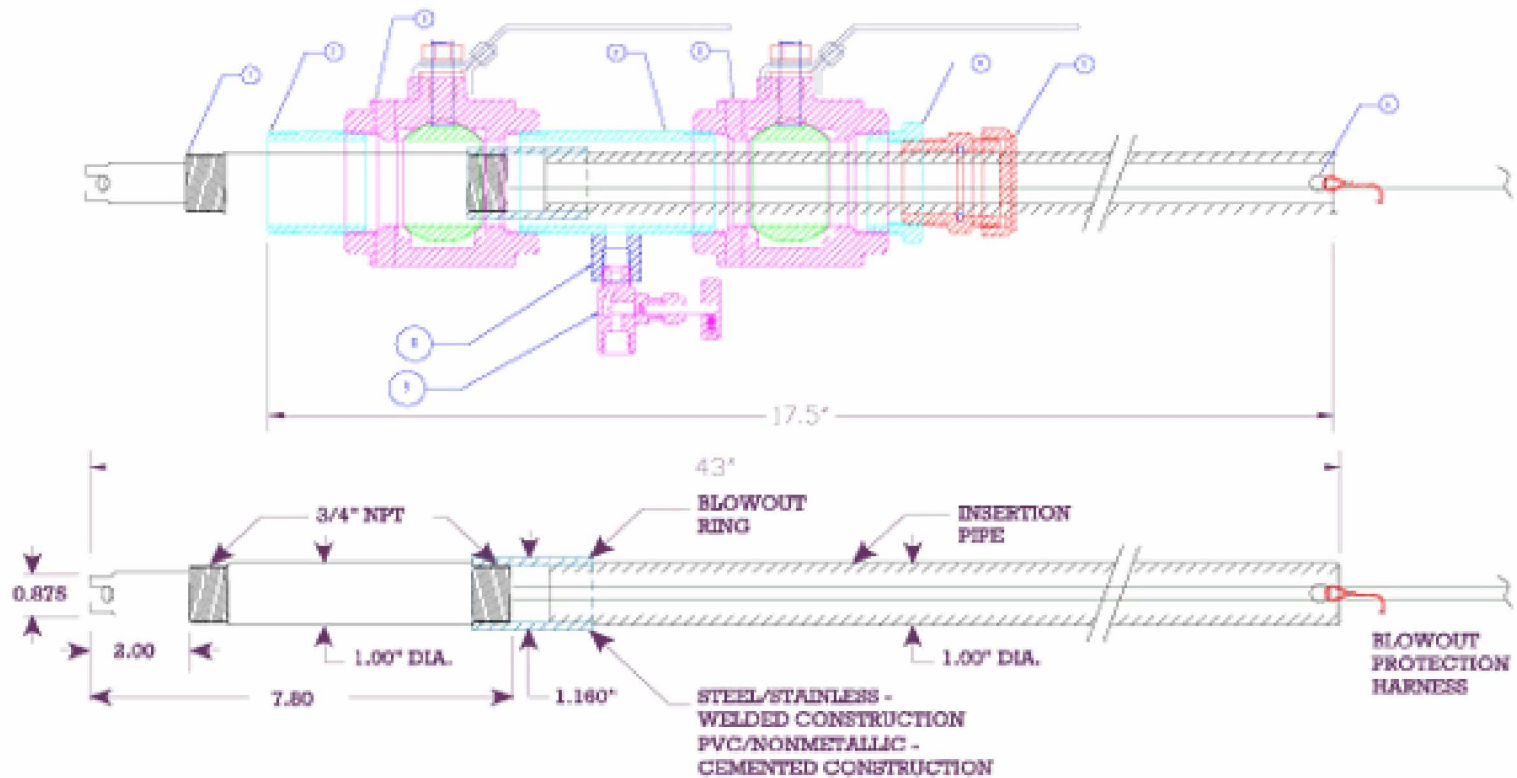
In the Pulp & Paper Industry: ASTI has proven solutions to problematic pH/ORP measurements in bleach lines and digesters. Our slurry and dissolved gas resistant solid-state reference systems require minimal cleaning and recalibration, compared to the commonly used porous technologies of our competitors.



ASTI's unique double ball valve retraction assemblies optimize the task of servicing and replacing sensors. In addition, they provide improved safety by minimizing risk to the operator via complete isolation from process gases using our purge port and vent valve feature.



This valve retracting system can use most commercially available immersion sensors, thereby reducing the operation cost for valve retractable installations, while maximizing the choices available to the customer.



ASTI's experience in analytical chemistry and our unique industrial grade ion selective sensors allow us to provide a viable and simple replacement to costly and maintenance intensive sampling analyzers.



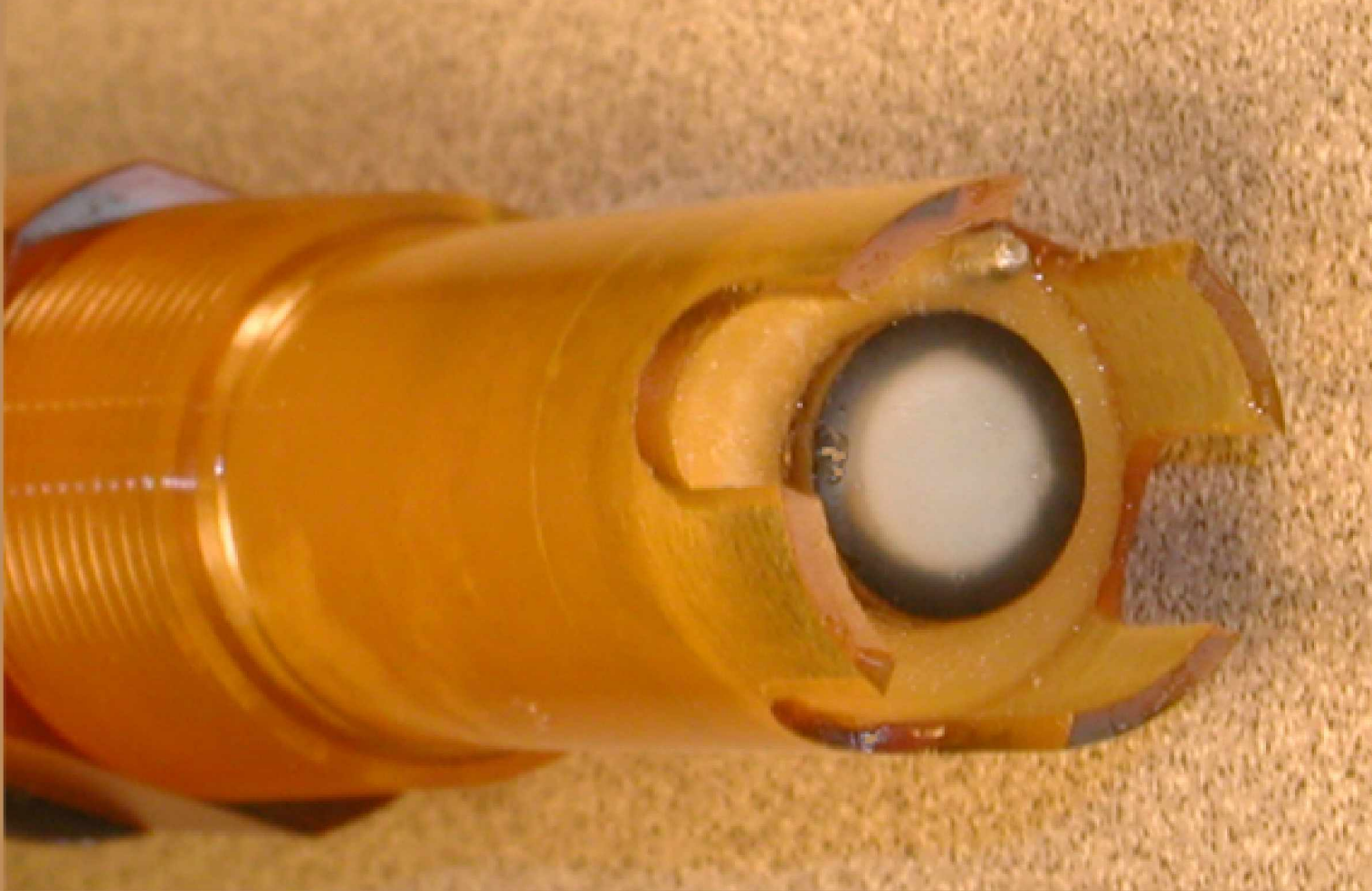
Our online ion analysis systems operate, calibrate and output in convenient ppm units.

There are no chemicals to add or complex hardware to service.

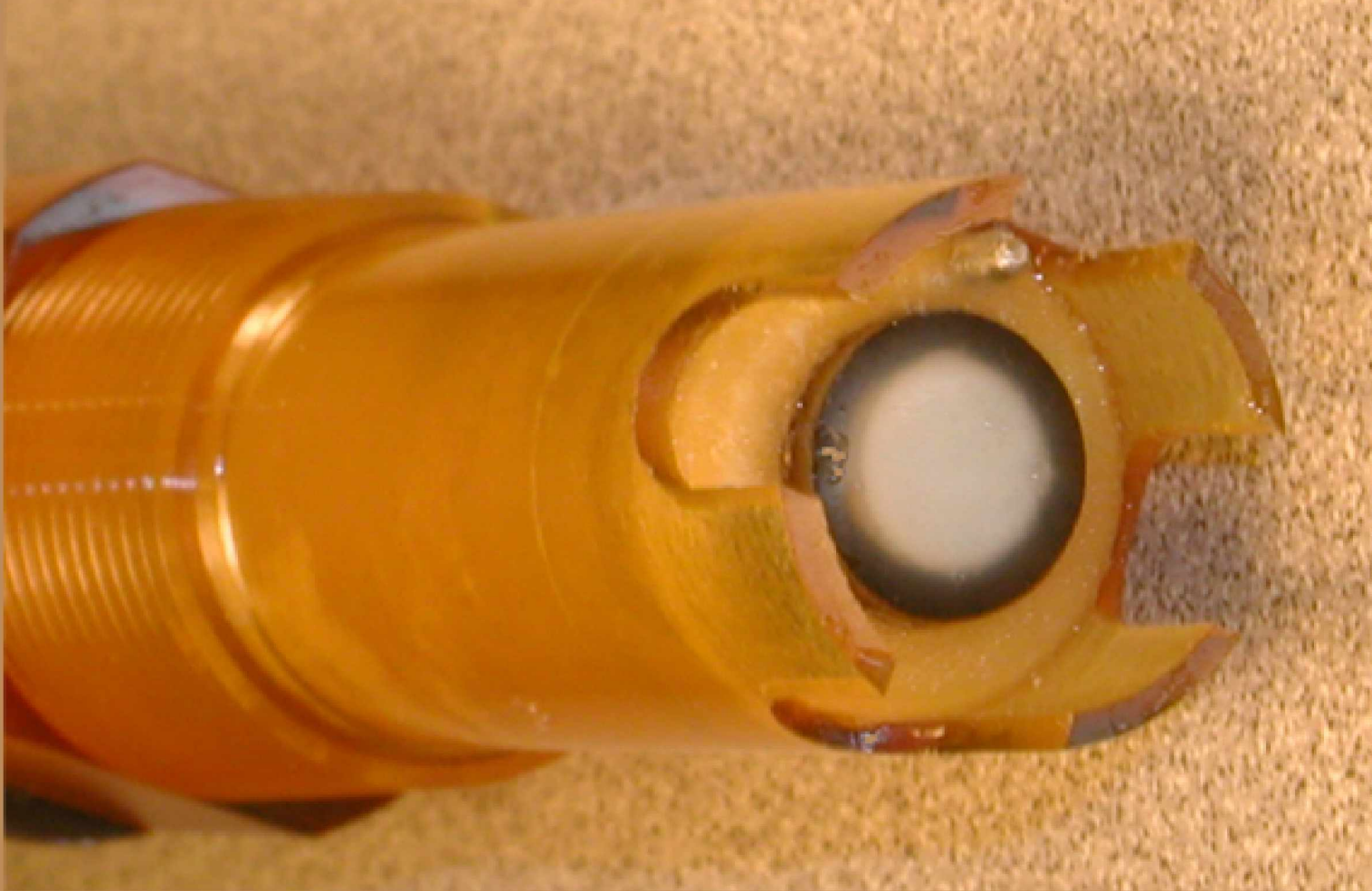
Once a slipstream and has been optimized for ion selective use, your system will operate just like a simple inline pH loop.



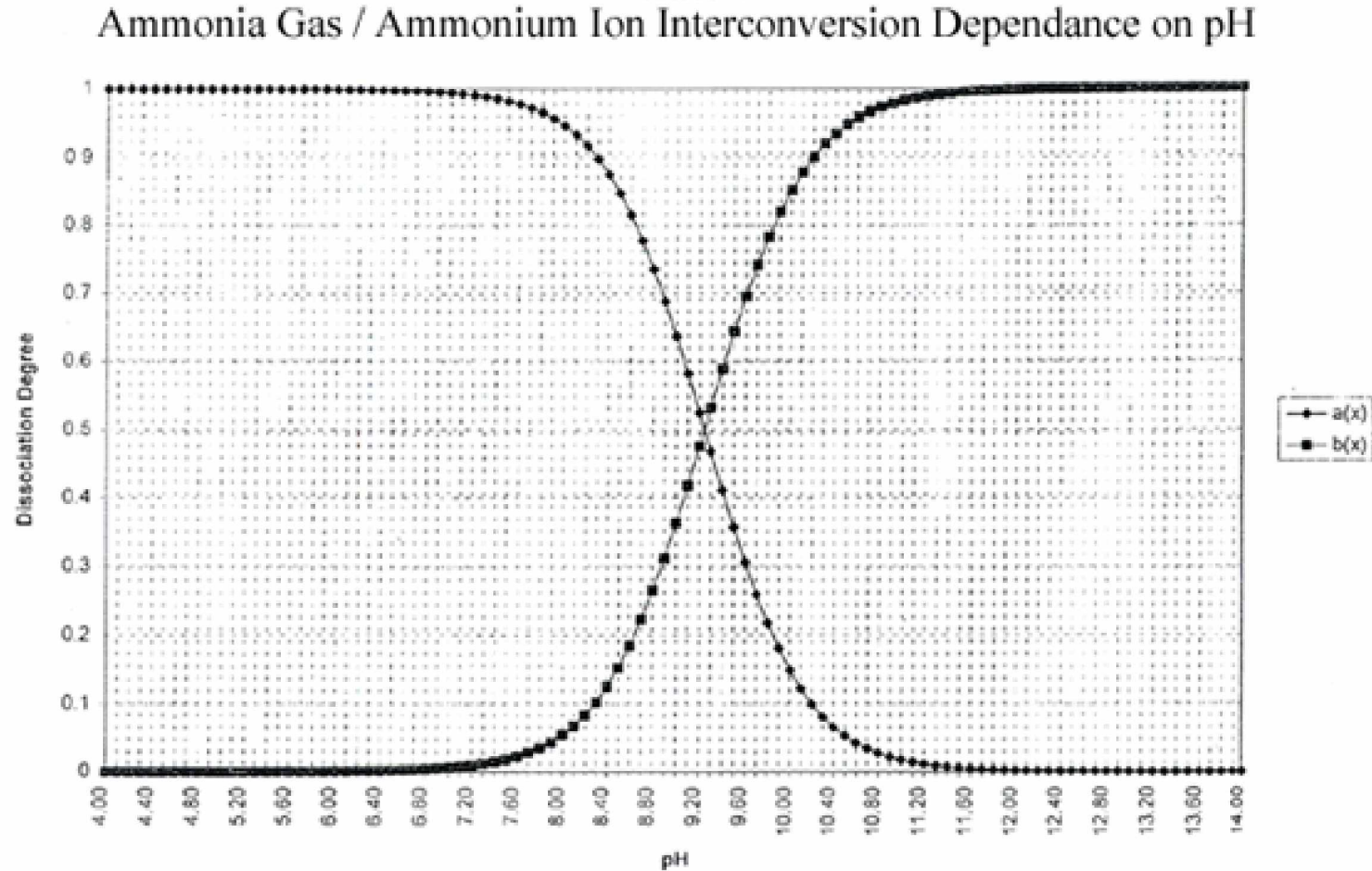
ASTI offers the most complete line of ion selective measurements in the industry. We offer proven solutions to measure anions such as fluoride, chloride, sulfide and cyanide as well as cations like ammonium, sodium and calcium.



Many other ions are available with the technical capabilities and limitations posted on our website. You will need to contact ASTI with process details to determine if your particular measurement is suitable for our ion analysis system.

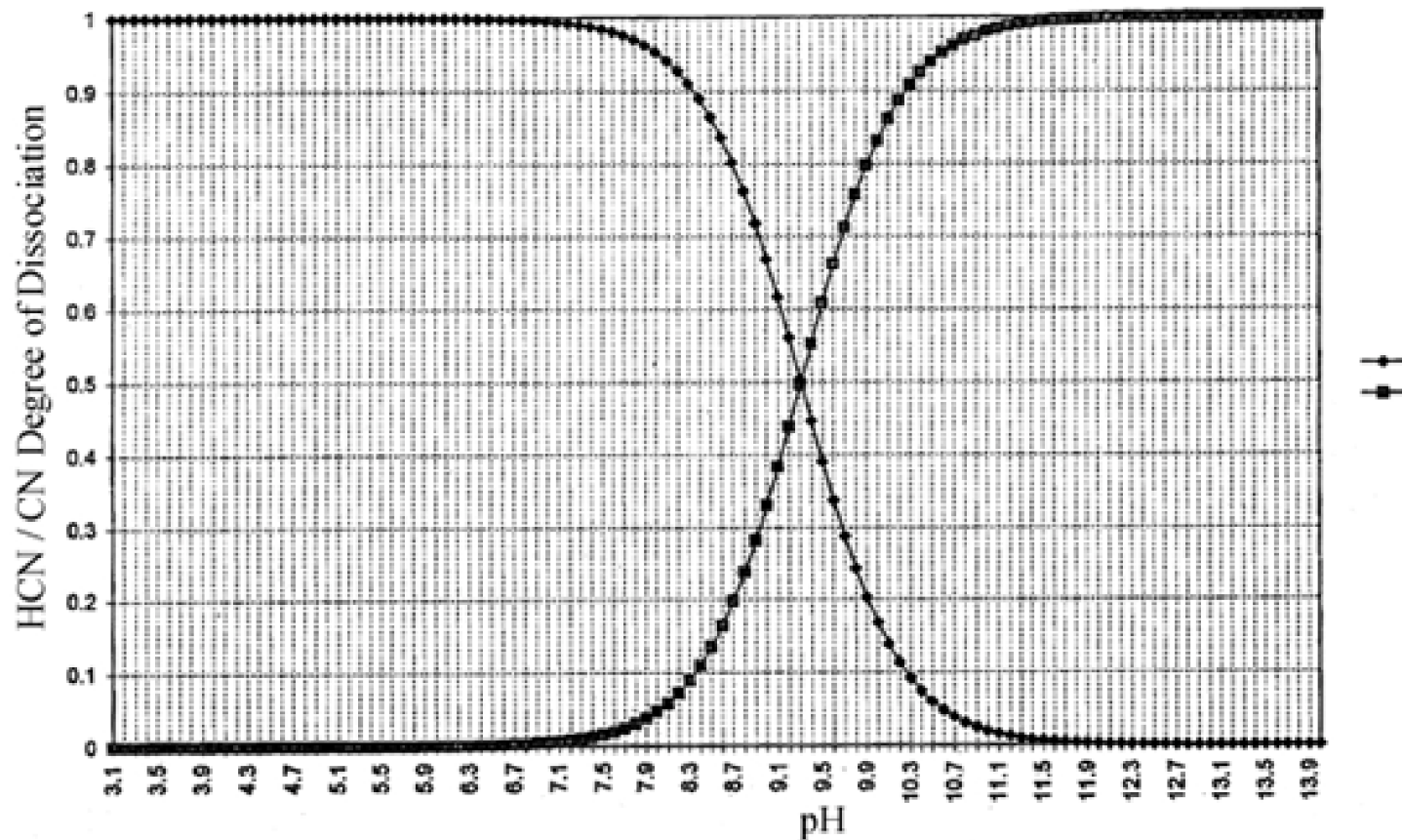


ASTI offers systems that can be used to monitor total ammonia. These systems required both an inline pH and ion selective sensor. Algorithms are provided to enable determination of the total species from these two measurements in any PLC.

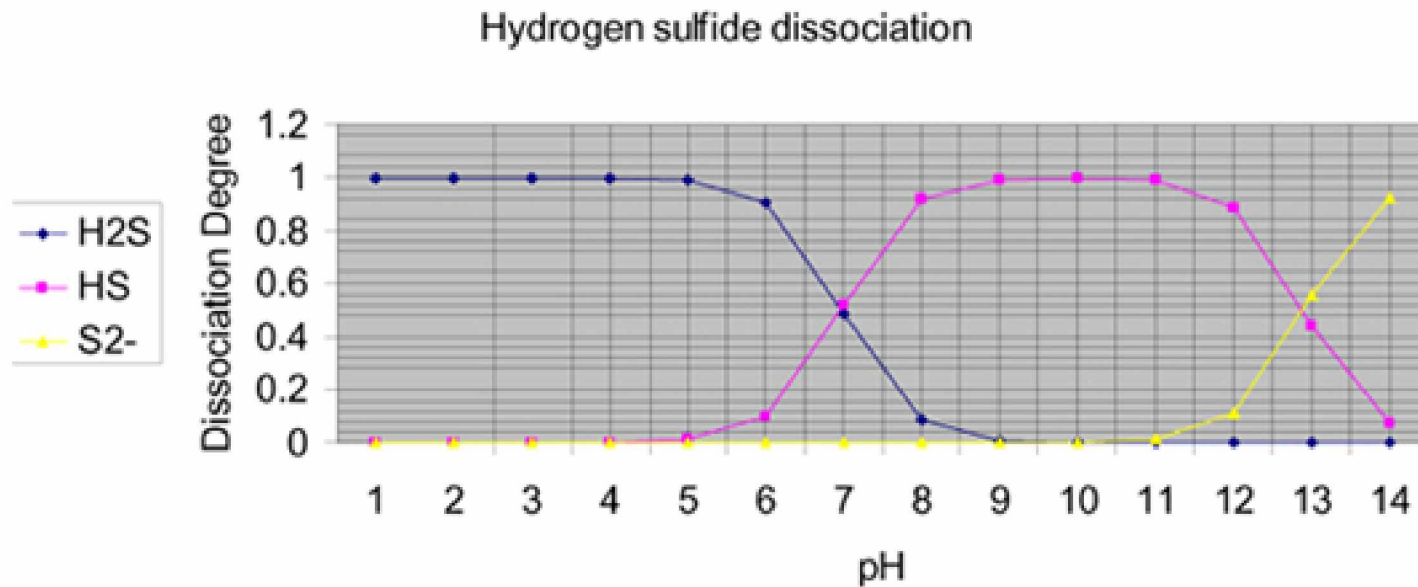


ASTI offers systems that can be used to monitor total cyanide. These systems required both an inline pH and ion selective sensor. Algorithms are provided to enable determination of the total species from these two measurements in any PLC.

HCN/CN Dissociation Dependence on pH



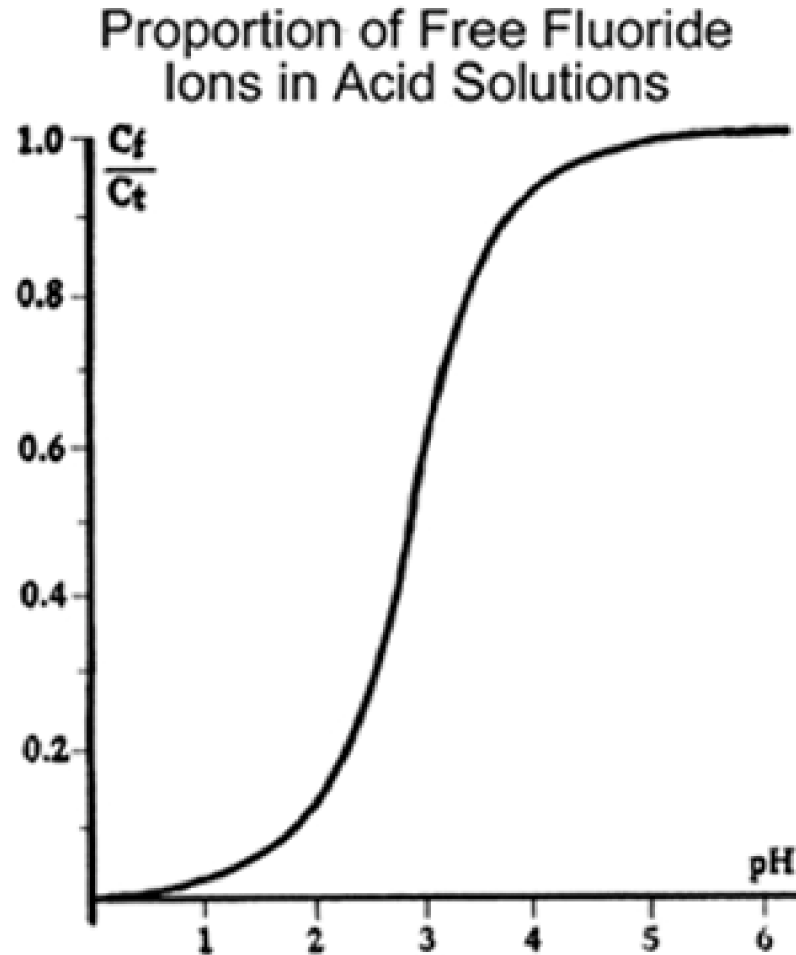
ASTI offers systems that can be used to monitor total sulfide. These systems required both an inline pH and ion selective sensor. Algorithms are provided to enable determination of the total species from these two measurements in any PLC.



ASTI offers systems that can be used to monitor total HF.

These systems required both an inline pH and ion selective sensor.

Algorithms are provided to enable determination of the total species from these two measurements in any PLC.



In the Water and Wastewater Field:
Our low cost of ownership enables ASTI to provide cost effective solutions to common
pH measurements.

Our sensors can retrofit most existing transmitters and installation styles.



We provide our customers high quality replacement sensors without requiring costly upgrades to their control or instrumentation systems. Our break resistant flat glass minimizes process build-up and the rugged solid-state reference permits aggressive mechanical and acid cleaning.



ASTI offers low cost PVC and CPVC versions of our rugged industrial pH and ORP sensors for less intensive applications. These competitively priced sensors are manufactured with the same high quality solid-state components and backed by the ASTI standard performance guarantee.



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Superior pH, ORP & Ion Selective Sensors for
Difficult Process Measurement Applications