

## Feedstock Purity Calibration Solutions

All the right stuff to ensure accurate monitoring of ethylene and propylene purity in product or polymer grade feedstocks



### **Air Liquide Feedstock Purity Solutions include:**

- 1 – 5 ppm Moisture Standard in Nitrogen
- 1 – 5 ppm Ammonia Standard in Nitrogen
- 0.1 – 1 ppm Hydrogen Sulfide Standard in Nitrogen
- 0.1 – 1 ppm Hydrogen Sulfide/Carbonyl Sulfide/Methyl Mercaptan Standard in Nitrogen
- Custom Feedstock Blend Combinations
- Zero Nitrogen (certified conformance to Federal Register specs 40CFR 72.2)
- ALPHAGAZ™ 1 pure instrument support gases
- Scott™ high-performance gas delivery equipment

### **Benefits and Features**

- 12-month shelf life provides long-term stability
- $\pm 5\%$  accuracy ensures precise analyzer calibration for error-free purity analysis
- Low impurity levels protect analyzer sensitivity and ensure long-term, contamination-free instrument performance
- $\pm 10\%$  blend tolerance for standards ensures content certainty of product ordered
- 10 to 20 working day lead times reduce the need for on-site specialty gas inventory
- 140 CF contents of aluminum cylinders provide cost-effective gas quantity
- Zero nitrogen and pure instrument support gases available for single-source accountability
- High-performance gas handling equipment available for trouble-free gas delivery

## Impurity analysis of olefin monomers

Ethylene and propylene are two important feedstocks used as building blocks for many types of resins and plastics, such as polyethylene and polypropylene. These materials are the backbone for numerous industrial and consumer products; billions of pounds are produced every year.

Ethylene and propylene are produced by combining steam with ethane or propane feedstocks in a furnace at about 1500° under relatively low pressure. The “cracked” gas is cooled and compressed, and then the ethylene is separated from ethane by cryogenic distillation. The finished monomer product is dried over a desiccant and then distributed to petrochemical facilities through a complex network of pipelines and underground storage facilities.

Polyethylene and polypropylene are produced at petrochemical facilities using sophisticated processes and exotic catalysts whose selectivity and sensitivity increase all the time. Polymerization catalysts are themselves very expensive and are easily “poisoned” by undesirable impurities in the monomer feedstocks. Frequent catalyst replacement coupled with associated plant shutdowns result in economic losses for the producer.

## Monitoring trace impurities critical

Extremely stringent purity specifications and trace impurity analysis of polymer grade ethylene and propylene, even to low ppb levels, have therefore achieved critical importance. Even though these monomers may have been produced to tight purity standards, they can pick up traces of water and other impurities during storage and transportation. As a result, polymer grade ethylene and propylene are sampled and analyzed numerous times along the supply chain, particularly where valuation and custody transfer occurs.

Some of the critical impurities listed in the table below have the power to adversely affect polymerization catalysts. For this reason, it is critical that monomer producers accurately detect and measure one or more of the specified impurities at very low levels.

Impurity	Range	Typical Limit
<b>Moisture</b>	0.1 – 1 ppm	0.50 ppm
<b>Ammonia</b>	0.05 – 1 ppm	0.10 ppm
<b>Arsine/Phosphine</b>	0.01 – 0.1 ppm	0.02 ppm
<b>Chlorinates:</b> phosgene, chlorine	0.01 – 0.1 ppm	0.05 ppm
<b>Halogen Acids:</b> hydrogen chloride, hydrogen fluoride	0.1 – 1 ppm	0.20 ppm
<b>Hydrogen Cyanide</b>	0.05 – 1 ppm	0.10 ppm
<b>Nitrogen Dioxide</b>	0.01 – 0.5 ppm	0.05 ppm
<b>Sulfurs:</b> hydrogen sulfide, carbonyl sulfide, methyl mercaptan, sulfur dioxide	0.01 – 0.1 ppm	0.02 ppm

## High-accuracy calibration standards for monitoring feedstock purity

Product/ Concentration*	Bal	Cyl Size	Contents		Scott™ Regulators	Part No.
			CF	m3		
<b>H<sub>2</sub>O Standard</b> 1 – 5 ppm	N <sub>2</sub>	30AL	140	4	211H Two-stage (Heated)	Q1-211H-580
<b>NH<sub>3</sub> Standard</b> 1 – 5 ppm	N <sub>2</sub>	30AL	140	4	215 SS Two-Stage 213 SS Single-Stage	Q1-215B-705 Q1-213B-705
<b>H<sub>2</sub>S Standard</b> 0.1 – 1 ppm	N <sub>2</sub>	30AL	140	4	215 SS Two-Stage 213 SS Single-Stage	Q1-215B-330 Q1-213B-330
<b>Tri-Blend Standard</b> 0.1 – 1 ppm (H <sub>2</sub> S, COS, CH <sub>3</sub> SH)	N <sub>2</sub>	30AL	140	4	215 SS Two-Stage 213 SS Single-Stage	Q1-215B-330 Q1-213B-330
<b>Certified Zero Nitrogen</b> 99.9995% Min. Purity CO < 0.5 ppm CO <sub>2</sub> < 1 ppm H <sub>2</sub> O < 2 ppm NO <sub>x</sub> < 0.1 ppm O <sub>2</sub> < 0.5 ppm SO <sub>x</sub> < 0.1 ppm THC < 0.1 ppm		30AL	140	4	318 Brass Two-Stage 14C Nickel-Plated	Q1-318B-580 Q1-14C-580

\* For information regarding other feedstock blend combinations, please contact your Air Liquide representative or call 800.217.2688.

## Complete your feedstock purity solution by using ALPHAGAZ™ 1 pure gases

Our pure gases provide cost-effective, reliable performance for all petrochemical process control applications. They feature guaranteed low impurity levels that exceed purity recommendations of most laboratory instrument manufacturers, making them the obvious choice for optimal instrument performance and sensitivity.

ALPHAGAZ Product	Purity	H <sub>2</sub> O	O <sub>2</sub>	THC	Scott™ Regulators
<b>Air</b>	NA	< 3 ppm	20 – 22%	< 0.1 ppm	318 Brass Two-Stage Q1-318B-590
<b>Argon</b>	99.999%	< 3 ppm	< 2 ppm	< 0.5 ppm	318 Brass Two-Stage Q1-318B-580
<b>Helium</b>	99.999%	< 3 ppm	< 2 ppm	< 0.5 ppm	318 Brass Two-Stage Q1-318B-580
<b>Hydrogen</b>	99.999%	< 3 ppm	< 2 ppm	< 0.5 ppm	318 Brass Two-Stage Q1-318B-350
<b>Nitrogen</b>	99.999%	< 3 ppm	< 2 ppm	< 0.5 ppm	318 Brass Two-Stage Q1-318B-580
<b>Oxygen</b>	99.999%	< 3 ppm	NA	< 0.5 ppm	318 Brass Two-Stage Q1-318B-540

Ensure contamination-free delivery of feedstock calibration standards and pure gases by using Scott™ high-performance pressure regulators



### Scott Ultra-High-Purity Regulators Models 213 and 215 for Corrosive Service

These stainless steel regulators provide outstanding performance when used with feedstock calibration standards. The single-stage design is recommended for use where inlet pressure does not vary greatly such as with liquefied gases, or where periodic readjustment of delivery pressure setting does not present a problem. Two-stage design provides constant delivery pressure with no need for periodic readjustment.

#### Benefits and Features

- Stainless steel diaphragm minimizes diffusion of air into regulator and eliminates off-gassing
- Convoluted stainless steel diaphragm (single-stage design) provides excellent delivery pressure accuracy
- Filter traps foreign matter, extends service life and reduces maintenance
- Threaded bonnet allows for easy panel mounting
- Threaded holes in rear of single-stage regulator for front panel mounting
- Stainless steel diaphragm-sealed outlet valve provides on/off flow control and helps maintain gas purity



### Scott Ultra-High-Purity Regulator Model 318 for Noncorrosive Service

This brass regulator provides excellent performance when used with ALPHAGAZ pure gases and zero nitrogen. Brass construction protects gas purity and ensures long regulator service life. Two-stage design provides constant delivery pressure with no need for periodic readjustment.

#### Benefits and Features

- Stainless steel diaphragm minimizes diffusion of air into regulator and eliminates off-gassing
- Brass diaphragm-sealed outlet valve provides on/off flow control to help maintain gas purity
- Filter traps foreign matter, extends service life and reduces maintenance
- Threaded bonnet allows for easy panel mounting



### Scott High-Purity Nickel-Plated Regulator Model 14 for Noncorrosive Service

Our Model 14 Series regulator is recommended for zero nitrogen applications. Compact, two-stage design provides constant delivery pressure with no need for periodic readjustment. Nickel-plated brass construction protects gas purity and ensures long regulator life.

#### Benefits and Features

- Stainless steel diaphragm on the second stage minimizes diffusion of air into regulator to eliminate off-gassing
- Sintered filter protects the internal parts and extends the life of regulator
- Low internal dead volume minimizes purge time
- Economical with a proven service life of many years