Agilent

Trusted Answers

GC workflows for hydrogen vehicles and natural gas blending

# Hydrogen Fuel Testing Solutions

Application Compendium


# Discover optimized testing solutions to ensure the high-purity standards necessary for efficient, safe hydrogen fuel

Hydrogen fuel is essential for clean energy, but impurities can impact fuel cell performance, safety, and environmental benefits. Therefore, testing for purity is crucial.

Agilent offers advanced solutions for hydrogen fuel testing, including gas chromatography (GC) systems equipped with detectors such as mass spectrometers (MSD), chemiluminescence detectors (SCD, NCD), and other specialized detectors.

Experience the confidence that Agilent GC solutions provide, delivering exceptional robustness and precision for your hydrogen purity testing. Our curated portfolio meets the requirements of established regulations and methods—like ISO 14687-2019, SAE J2719 2015, and GB/T 37244-2018—as well as future testing needs.

Agilent solutions ensure reliable impurity analysis, supporting the adoption of hydrogen as a clean energy source.

# Know when to test for impurities in hydrogen

Purity testing is essential at every stage of the supply chain for hydrogen fuel and natural gas blending—starting with production, continuing during storage and transportation, and finally before distribution.

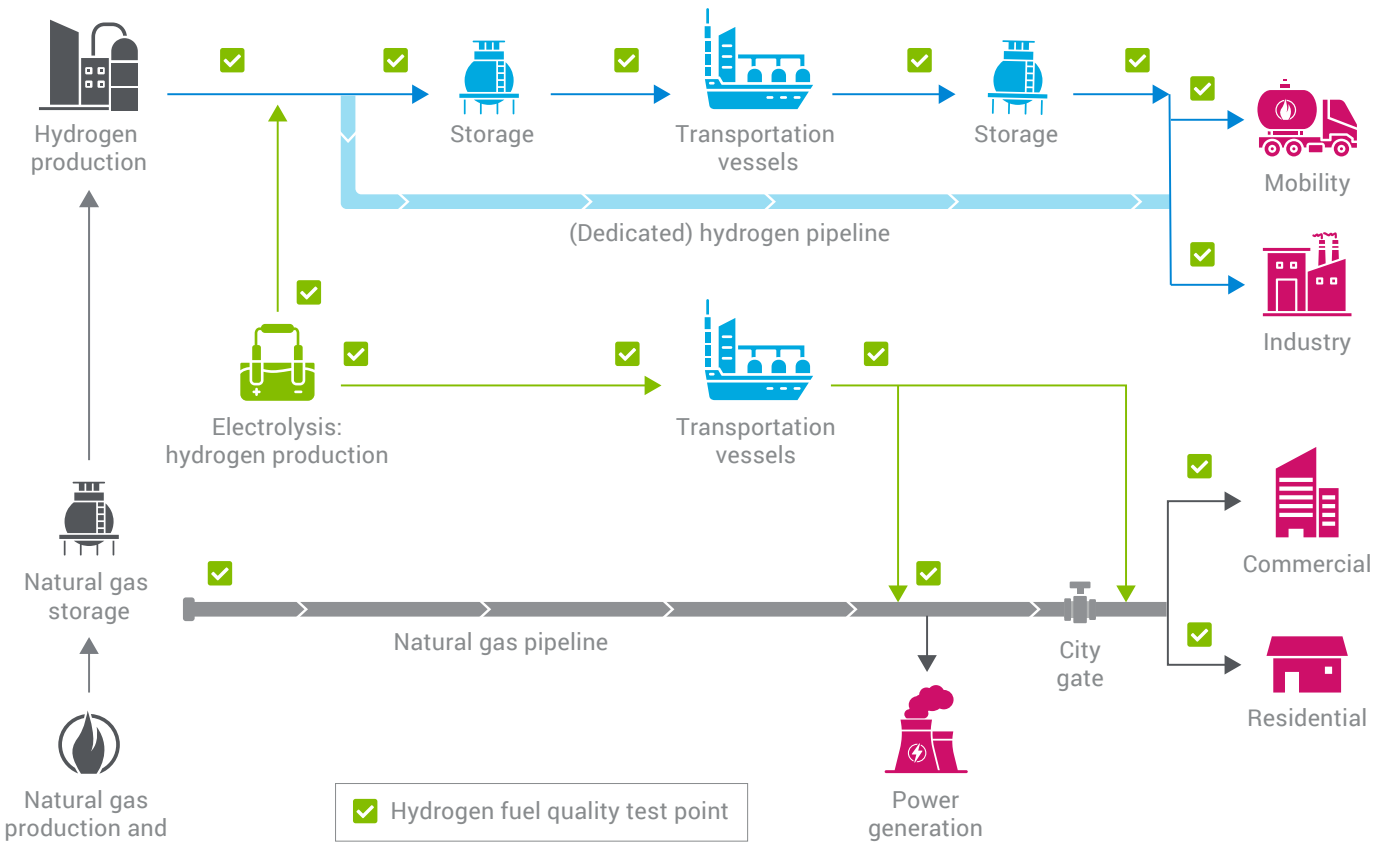



**Figure 1.** The hydrogen fuel and natural gas blending supply chain.


# Meet the high demands for high-purity hydrogen and hydrogen/natural gas blending analyses

Addressing the challenges of impurity testing in hydrogen fuel involves more than just preventing contamination. It demands a thorough understanding of the chemical processes at play, meticulous attention to detail during sampling and analysis, and the use of advanced technologies to maintain the highest standards of fuel purity.

Blending hydrogen into natural gas is an innovative approach to reducing carbon emissions by using cleaner energy within existing pipelines. However, both hydrogen and natural gas can contain impurities—such as moisture, sulfur, or other chemicals—that can damage pipes and equipment. These impurities can also hinder the proper functioning of appliances.

One of the major challenges is that most current gas systems were not designed to handle hydrogen, which behaves differently from natural gas. This necessitates advanced testing solutions to monitor and control the quality of the blended gas.

Agilent has developed solutions for the analysis of the most common hydrogen impurities. Learn more in our featured application notes.

# Featured application notes

To access our application notes, click the titles

### Ammonia Analysis in High-Purity Hydrogen for Fuel Cell Vehicles

An Agilent 8890 GC, equipped with an Agilent J&W Select Low Ammonia column and an Agilent 8255 NCD, delivers a simple and robust way to analyze trace ammonia in hydrogen with excellent sensitivity, repeatability, and linearity.

### Analysis of Sulfides, Formaldehyde, and Organic Halides in High-Purity Hydrogen for Fuel Cell Vehicles

A flexible, dual-detector GC/SCD/MSD system delivers exceptional performance for three distinct compound types, fully satisfying quality control criteria specified in ISO 14687-2019, SAE J2719 2015, and GB/T 37244-2018 methods.

### Analysis of Sulfur Compounds in High-Purity Hydrogen

An Agilent 8890 GC with an Agilent 8355 SCD offers excellent linearity and repeatability for trace sulfur analysis, with LODs around 10 ppb. Excellent peak shape and resolution are achieved using an Agilent J&W DB-Sulfur SCD column.

### Hydrogen Impurity Analysis Using the Agilent 990 Micro GC

A portable Agilent 990 Micro GC with a low-dead-volume micro thermal conductivity detector (µ-TCD) provides a sensitive analysis for 2 to 10,000 ppm level H2 impurities in less than 150 seconds, enabling quick decisions regarding fuel purity.

### Argon and Oxygen Analysis Using the Agilent 990 Micro GC

A Micro GC equipped with a MEMS technology-based chip injector, ultrafast narrow bore columns with Molesieve 5Å stationary phase, a sensitive µ-TCD, and near zero-dead-volume connections achieves baseline separation of argon and oxygen.

### Fast Analysis of Natural Gas Using the Agilent 990 Micro GC Natural Gas Analyzer (NGA)

A Micro GC-based NGA uses a factory-optimized method and four unique channels for specific natural gas analyses. This fast, portable, energy-efficient solution ensures excellent retention time and area repeatability for high-confidence results.

## Additional resources

### Ensure Composition, Purity, and Calorific Value: Agilent Natural Gas Analyzers

Before it can be sold, natural gas must meet specifications for calorific value and purity. Accordingly, collection, processing, transmitting, and distribution require an array of analytical capabilities.

### Monitor and Optimize Processes and Establish Market Value: Agilent Refinery Gas Analyzers

Precisely analyzing refinery gases is challenging because the source and composition of each gas varies considerably. To succeed, analyzers must quickly separate complex mixtures—including a broad range of samples found in refinery and petrochemical streams.

# Select instruments

Agilent instruments for pure hydrogen, natural gas, and hydrogen/natural gas blend testing


Thermal desorption (TD)

990 Micro GC natural gas analyzer

8355 SCD

Refinery gas analyzers

8890 GC

8255 NCD

5977C GC/MSD


# Services to support purchase, setup, and operation

Whether you require technical support, financing to purchase equipment, or assistance with staff training, Agilent provides a comprehensive range of trusted solutions.

### Instrument buy-back

Agilent offers trade-in and buyback opportunities on lab assets, allowing you to turn underutilized assets into income. We handle the removal of used instruments at no cost, unlocking the value and simultaneously supporting your sustainability targets.

**More information**

### Instrument verification services

CrossLab Verification Services ensure your analytical instruments have documented verification to meet your quality system needs and optimal instrument performance, while remaining a cost-effective verification process.

**Verification services**

### Lab operations management

Make data-driven decisions on lab operations with CrossLab Connect. By leveraging insights from CrossLab Connect, you can enhance lab performance, improve operational efficiency, lower costs, manage risks, and promote sustainability.

**CrossLab Connect**

## Financial solutions

Agilent financial solutions help businesses manage their capital budgets effectively. We provide flexible payment plans to meet business and analytical needs, allowing adjustments based on the budgetary cycles.

More information

## Agilent Certified Pre-Owned Instruments

Certified Pre-Owned Instruments offer high-quality, reliable, and affordable instrumentation for labs. These instruments undergo comprehensive refurbishment, testing, and come with factory updates, consumable parts, startup kits, cosmetic refreshment, and a one-year warranty, ensuring Agilent quality and performance at an attractive price.

More information

## Analytical method development and application consulting

Improve the economics of your testing with the optimum methods and protocols to meet your needs with Agilent method consulting services.

Method consulting services

## Analyst training and support

Improve lab operations and minimize downtime with courses covering troubleshooting, maintenance, and sample preparation with developmental and educational training.

Education services

## Software solutions

Commitment to open data is at the heart of delivering solutions for your analytical challenges and business needs.

Agilent OpenLab software allows for secure, centralized management of your instrument's data and reports, ensuring an integrated workflow between all products.

Agilent SLIMS workflow management provides a solution for streamlining and organizing lab operations. With a wide range of features, SLIMS can betailored to meet your specific needs.

OpenLab suite data management

SLIMS

## Product service and maintenance

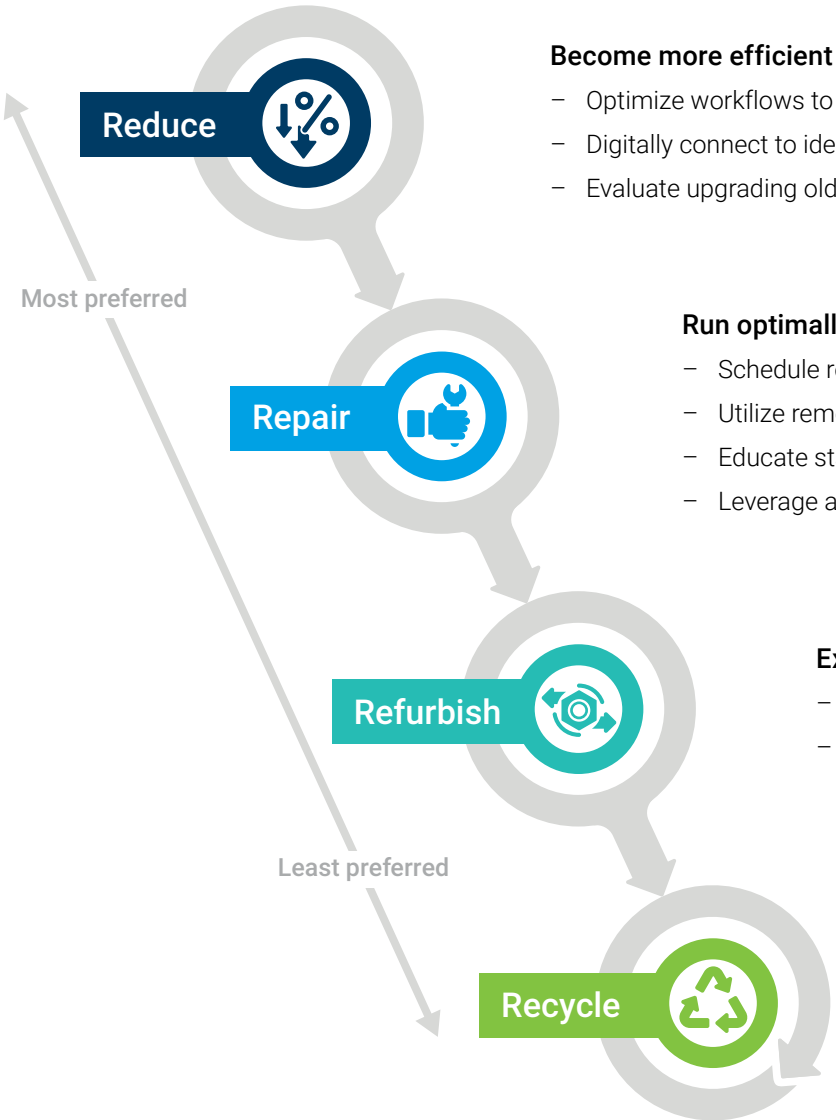
Service plans cover preventive maintenance, which is proven to lower repair costs and save days of downtime each year. Options for remote diagnostics can help identify and troubleshoot issues before they become critical. Support and maintenance for both Agilent and non-Agilent equipment is available.

Instrument services

# Reduce, Reuse, and Extend

Sustainable lab strategies to support the future of clean hydrogen energy

Achieving sustainability in hydrogen fuel testing goes beyond the fuel itself—it starts in the lab. Agilent empowers laboratories to adopt environmentally responsible practices that align with the broader goals of hydrogen as a clean energy source. Through resource-efficient workflows, extended instrument lifecycles, and waste-reduction programs, our solutions help labs maintain analytical excellence while contributing to the sustainability of hydrogen fuel for fuel cell vehicles and hydrogen/natural gas blending applications.




**Become more efficient to reduce waste**

- Optimize workflows to reduce resource consumption
- Digitally connect to identify improvement opportunities
- Evaluate upgrading old, inefficient instruments

**Run optimally and increase longevity**

- Schedule routine preventive maintenance
- Utilize remote repair services
- Educate staff to strengthen operators' knowledge
- Leverage access to free user forums

**Extend instrument life and value**

- Trade in underutilized and older instruments
- Consider Certified Pre-Owned Instruments

**Keep materials in circulation**

- Ensure recyclable materials are redirected from the waste stream
- Look for the How2Recycle logo for proper recycling instructions

Interested in making your workflows more sustainable? **Click here.**

# Contact us

Learn more:
**www.agilent.com/energychem/hydrogen-fuel-testing**

U.S. and Canada
**1-800-227-9770**
**agilent_inquiries@agilent.com**

Europe
**info_agilent@agilent.com**

Asia Pacific
**inquiry_lsca@agilent.com**

DE-009358


Published in the USA, September 25, 2025
5994-8643EN

Agilent
Trusted Answers