Syngas from Gaseous Feedstocks

Synthesis gas from natural gas, ROG via SMR or Partial Oxidation (POx)

Air Products Syngas Solutions™
Partial Oxidation Technology formerly GE Energy's gasification technology

Air Products has two technologies to convert gaseous feedstocks, including "refinery off-gas" (ROG) to synthesis gas or hydrogen. The choice of the technology, SMR or POx, depends largely on the desired output composition.

Steam Methane Reforming (SMR): Air Products' high-efficiency SMR plants produce syngas and/or hydrogen in volumes ranging from 1,000 to 100 million standard cubic feet per day. As the world's leading hydrogen supplier, we have the technologies and experience to improve process efficiency, optimize gas usage, and improve safety. Whether you buy gaseous hydrogen under an on-site agreement or purchase the hydrogen plant, you will join customers in over 40 countries who count on Air Products (airproducts.com/h2solutions).

Partial Oxidation (POx): POx technologies offer an alternative better suited to GTL applications or some chemical processes.

Chemical customers around the world are using Air Products' gasification or POx technology to convert natural gas or refinery off-gas (ROG) to ammonia, acetic acetyls, oxo-chemicals, polycarbonate and other useful chemicals and products. Our combination of technical expertise, commercial experience, process and product innovation helps customers realize increased profitability.

Capitalizing on experience

SMR

Air Products is the world's largest supplier of merchant hydrogen. SMRs are preferred for refining hydrogen.

Gaseous hydrocarbon partial oxidation

Air Products has one of the largest installed bases of (GE-licensed) natural gas partial oxidation facilities globally. As our existing customers look to expand their operations, they turn to Air Products for additional technology to support their growth.

Partial oxidation provides the following benefits:

- High plant reliability – 99% on-stream time, based on proven commercial plant operations
- Energy efficiency – waste heat recovery for net production of high-pressure steam
- Attractive economics – low capital cost
- Feedstock flexibility – processes refinery off-gas, unsaturated hydrocarbons, and by-product gases.
- Process flexibility – ability to produce syngas with H_2:CO ratio adjustment as low as 1:1
- High methane conversion – greater than 99.5%
- Low water consumption – lower compared to SMR
- Turndown capabilities – plant can turn down 50-60% of capacity without impacting process performance
- Environmental friendliness – can consume more CO_2 than it produces

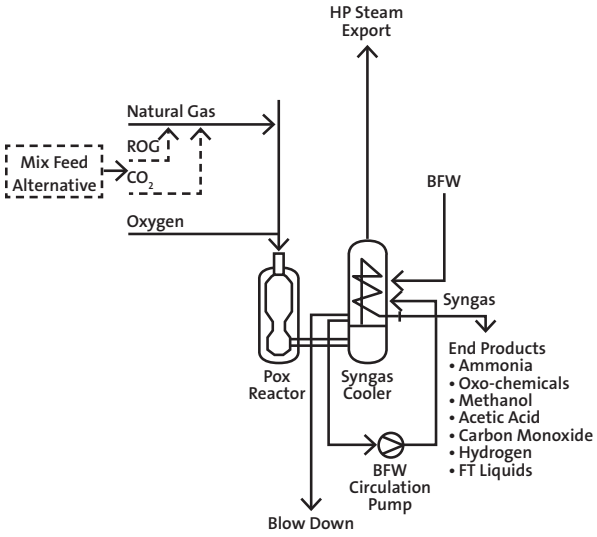
Things to know about SMR

Steam methane reforming is the most common and economical way to make hydrogen. There are two primary reactions: the reforming reaction and the water gas shift reaction. In the reforming reaction, natural gas is mixed with steam, heated to over 1,500 degrees Fahrenheit, and reacted with nickel catalyst to produce hydrogen (H_2) and carbon monoxide (CO).

$$CH_4 + H_2O \rightleftharpoons 3H_2 + CO$$

To produce additional hydrogen, CO from the reforming reaction interacts with steam in the water gas shift reactor.

$$CO + H_2O \rightleftharpoons CO_2 + H_2$$



Feedstock

Natural gas is the most common feedstock in steam reformers; naphtha and refinery off-gas may also be used.

Main components

Furnace

The furnace is where the process of liberating hydrogen from natural gas and steam begins. The gas-and-steam mixture travels down into reformer tubes that hang in vertical rows surrounded by gas burners that heat the mixture. The reformer tubes are full of nickel catalyst, which triggers a reaction, causing the methane in natural gas to react with water vapor to form hydrogen, carbon monoxide, and carbon dioxide.

Water-gas shift reactor

Additional hydrogen is created in the water gas shift reactor. The water gas shift reactor is filled with an iron chrome-based catalyst that causes steam (H_2O) to break into oxygen and hydrogen. The hydrogen moves through the plant, while the oxygen joins carbon monoxide from the furnace (reforming reaction) and becomes carbon dioxide (CO_2).

What we offer

- Syngas as a service by SMR or POx.
- Studies customized to your individual objectives, such as productivity, reliability, operability improvements, capacity expansion, feedstock flexibility, emission reduction, etc. to identify the best solution.
- Implementation services such as design, installation, construction, operator training, and start-up support.
- Analytical services such as tube, streams and plant subsystem analysis; plant component analysis.
- Cost-effective hydrogen plant emission reduction solutions.
- New SMR hydrogen plant purchasing support.

For more information, please contact us at:

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