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.
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 (H₂) and carbon monoxide (CO).

\[
\text{CH}_4 + \text{H}_2\text{O} \rightleftharpoons 3\text{H}_2 + \text{CO}
\]

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

\[
\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2
\]

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 (H₂O) 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 (CO₂).

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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