



# Process to Accomplish Autothermal or Steam Reforming Via a Reciprocating Compression Device

## Opportunity

Research is not currently active on the patented technology "Process to Accomplish Autothermal or Steam Reforming Via a Reciprocating Compression Device." However, the technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory (NETL).

## Overview

Disclosed in this patent is an invention that provides a method and related apparatus required to produce a synthesis gas from a variety of hydrocarbons. The apparatus consists of a semibatch, nonconstant volume reactor that generates the synthesis gas. The key feature is that the apparatus feeds mixtures of air, steam, and hydrocarbons into a cylinder to raise temperature without causing heat transfer from an external source.

The process related to this invention involves introducing steam and/or air with a hydrocarbon mixture into a reactor; compressing the mixture, thus raising the temperature of the mixture; generating a spark ignition (optional step in lieu of rapid, high compression) of the mixture to create the synthesis gas product; expanding the product to partially recover energy spent in compression; and finally exhausting the gas product. During the gas expansion step, the temperature of the synthesis gas products will decrease marginally as the volume of the cylinder increases. The decreased temperature from its peak is considered to be an advantage because many applications using synthesis gas requires the lower temperature, and this heat would otherwise be wasted.

This invention's quick-start capability shares an advantage with internal combustion engines and can start and stop more readily than continuous-flow reactor technologies. Like internal combustion engines, this invention is also sulfur tolerant, which is a distinct advantage because many catalyst-based systems are poisoned by sulfur. As a result, this invention's sulfur-conversion capabilities outperform other commercialized methods.

## Patent Details

U.S. Patent No. 6,793,910; filed: October 2, 2002; titled "Process to accomplish autothermal or steam reforming via a reciprocating compression device."

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## Significance

- Synthesis gas is produced from a variety of hydrocarbons
- The process can be started and stopped within seconds
- Heat transfer is not required from external sources
- Poisons, such as sulfur, do not adversely affect the process or equipment
- Organic sulfur compounds are decomposed to hydrogen sulfide and easily removed

## Applications

- Synthesis gas production

## Contact

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April 2012