Methaforming Feed Requirements

Typical Methaforming feed is a combination of two streams:

1. Straight-run gasoline (virgin naphtha), obtained from the atmospheric distillation of crude oil, or gas condensate. One can use similar hydrocarbon feeds of other origins if they comply with the requirements listed in the table below. The share of this feed stream is 70-85% by weight, depending on the target product specifications, local feed and product prices.
2. Methanol, ethanol, another oxygenate, light olefins or a mixture of these. The share of this feed stream is 15 to 30% by weight.

The feed requirements are presented here in a condensed form, for the most frequently encountered feeds (condensate, virgin naphtha).

Additional requirements may be important for feeds of other origins, e.g. it may be necessary to check for the levels of nitrous, chlor-organic compounds, heavy metals, etc.

In any case, a decision on the suitability of a certain feed for Methaforming process should be taken in consulation with our experts.

General requirements to the hydrocarbon feed.

Indicator	Unit	Recommended Value	Critical permissible value	Consequences of exceeding recommended values
Sulfur content	mg/kg, ppm wt.	not more than 100	not more than 500 (1 000)	100-500 – more frequent regenerations; 500-1000 – additional desulfurization.
Fractional composition:				
Evaporated at 70°C (158°F)	% vol.	not more than 15	--	Lower yields of the gasoline product
Final boiling point (FBP)	°C (°F)	not more than 180°C (356°F)	not more than 200°C (392°F)	Higher FBP of the gasoline product; more frequent regenerations
Saturated vapor pressure	kPa psi	not more than 80 14.5	--	Lower yields of the gasoline product
Solvent-washed gum content	mg /100 cm^3	not more than 5	--	Elevated gum content in the product; more frequent regenerations
Lead content	mg/L	none	--	Presence of lead in the product
Benzene content	% wt.	2.0	--	Elevated benzene content in the gasoline product
Research octane number (RON)		not less than 56	--	Lower octane values of the final product
Appearance		Visually free from undissolved water, sediment, and suspended matter		

Methaforming has been successfully used to process the following hydrocarbon feeds:

- straight-run gasolines (virgin naphthas),
- gas condensates,
- pyrolysis gasoline,
- raffinates from aromatics removal units,
- light FCC naphthas (with 20-25% wt. of olefins),
- benzene-rich naphthas (up to 10% vol. of benzene in the feed),
- narrow fractions of C6-C7 hydrocarbons (boiling range 60-85°C),
- light naphthas and solvents (up to 30%vol. of C5 components), including those of synthetic origin (e.g. the products of Fischer-Tropsch process, known as GTL naphtha).

This list is not exhaustive. If a feed meets the requirements of the table above, then it can be a candidate for Methaforming regardless of its origin.

A decision regarding non-conventional hydrocarbon feeds may require detailed information on their composition, including various impurities and catalytic poisons. The yields and qualities of the products of Methaforming depend on the qualities of the feeds and if non-conventional feeds are used, the results may differ significantly from the results of processing typical virgin naphthas.

Methanol is a typical oxygenate for the Methafoming process. However, the process can be modified to accept ethanol, mixtures of alcohols and simple ethers (including dimethyl ether), and alcohol-water mixtures as the co-feed. The process can accept methanol and ethanol solutions with up to 50% vol. of water. We can also assess the possibility of using industrial byproducts with high methanol or ethanol content as co-feeds to Methaforming process.

Methanol may be replaced or combined with light olefins e.g. ethylene, propylene, butylene. Ethylene contained in FCC dry gas is a very low cost replacement for purchased methanol. The FCC dry gas would need to be cleaned up as is typically done before it enters the fuel gas system. If this gas mix is used as a feed for M-20 or a similar unit, the ethylene and the small amount of propylene will be reactively extracted in the unit while the other hydrocarbon components of the gas (e.g. hydrogen, methane, ethane) would pass through the unit unreacted.

The Methaforming process is tolerant to wide variations in the hydrocarbon and oxygenate feeds. Knowing the composition of the available feeds, their prices, and the prices of the potential products, we will be happy to assist you in selecting optimal combinations of the feeds and the process conditions to meet your specific requirements.

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