

## **Study of the Processes of Obtaining Synthetic Liquid Fuels and Their Advantages Over Traditional Types of Fuel**

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**Abstract.** *This article highlights the relevance of synthetic liquid fuel production today. With the increase in the types and movement of land, air, and water transport in the world, fuel consumption is also increasing day by day. To meet the demand for fuel, a number of energy-efficient, environmentally friendly synthetic liquid fuel productions is being launched. In this regard, obtaining synthetic fuel using local raw materials is the most urgent task for chemists, technologists, and engineers who are currently studying synthetic fuel issues. In Uzbekistan GTL technology based on being taken synthetic from our fuels one diesel fuel traditional diesel to fuel relatively one how much advantage in return world to the standards answer is giving. This and the domestic market Our Republic's fuel demand is met oil and gas in the field the most big achievement is GTL diesel working release beginning Uzbekistan fuel independence strengthens and internal the market high good quality products with provides.*

**Keywords:** *GTL(Gas to liquid), Synthetic liquid fuel, jet fuel, diesel, naphtha, sulfur.*

**Introduction.** Current on the day oil in the world of products price raised lying down one in the market, fuel and to anoint how much the materials useful problem because of fuel for synthetic. All materials benefit same appropriate for the purpose is considered. Above many times being emphasized synthetic fuel "Synthetic" the term "fuel" descriptive if we are, someone product oil or oil from products prepared if so, it synthetic product is called. If a product is made from something unrelated to oil, it is called a natural product. However, when it comes to fuel, this rule is reversed. That is, if the fuel is made from oil, it is natural, on the contrary, fuels made from something other than oil are called artificial, that is, synthetic. So, when we say "synthetic fuel", we mean a fuel that can completely replace fuels obtained from oil, but is not itself made from oil. For example, if gasoline is obtained not from oil, but from coal or gas, then that gasoline is a synthetic fuel [1-3].

Synthetic diesel is a neutral substance, it does not contain various toxic substances, resins, aromatics, and therefore it does not poison humans. This is a very important aspect. The most prestigious chemical and technological research institutes in the world are currently working hard to develop the most effective technological methods for obtaining environmentally friendly synthetic fuel. The questions of which reactions will produce the highest quality and cleanest synthetic fuel, and the possibility of bringing such technology to an industrial scale, are the most urgent tasks for chemical technologists and engineers who are currently working on synthetic fuel issues [4].

With the depletion of oil reserves, the aggravation of environmental problems, as well as the constant increase in the cost of traditional energy resources, interest in alternative fuels has increased

significantly worldwide in recent years, and solving such issues serves as one of the solutions to energy and environmental problems in our Republic [5].

The GTL plant in Uzbekistan, with a total cost of more than \$ 3.61 billion, is one of the most innovative production enterprises in the region, expanding the capacity of deep processing of natural gas, reducing the import of hydrocarbons, meeting the country's need for modern, high-quality and environmentally friendly fuel, as well as providing the market with strategic products produced from its own raw materials. Our opinion is confirmed by the fact that such a large complex has been built in only 4 countries in the world so far - Qatar (2), Nigeria, the Republic of South Africa and Malaysia. In a word, this plant is the largest enterprise in the oil, gas and chemical industry in our country and, in general, in our region. The complex processes 3.6 billion cubic meters of natural gas per year and produces 1.5 million tons of finished liquid products worth more than \$ 1 million. In particular, 307 thousand tons of jet fuel, 724 thousand tons of diesel fuel, 437 thousand tons of naphtha, and 53 thousand tons of liquefied gas will be produced. These products will cover \$500 million in imports annually, ensure \$200 million in exports , and generate 2 trillion soums in tax revenues for the budget [6].

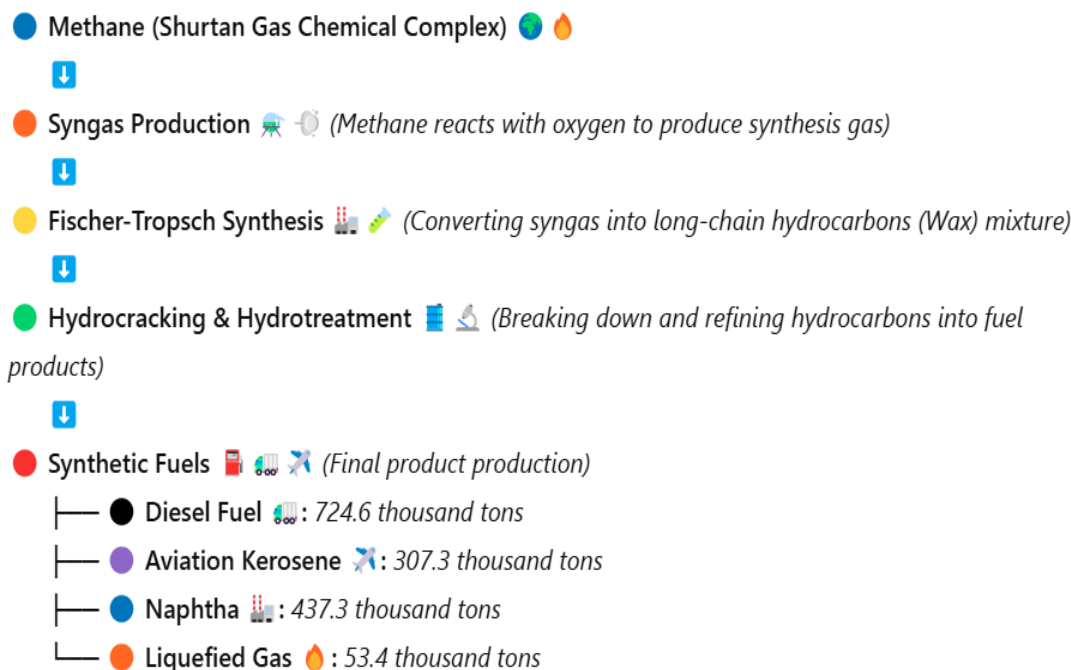
The basis of GTL technology is a Fischer-Tropsch reactor, where the main product is paraffin's from synthesis gas, and by adjusting the necessary parameters, synthetic liquid fuels are extracted [7].

The possibilities of solving the problem of using associated petroleum gas using GTL technologies. The most important difference between hydrocarbon products of Fischer-Tropsch synthesis and petroleum products is that they do not contain sulfur, nitrogen, and in some cases aromatic compounds, which determines their environmental significance. Synthetic oil is a mixture of normal and isotropic C5-C19 hydrocarbons used as a raw material for the processing of paraffins and motor fuels, for the chemical and petrochemical industries, or as a commercial product [8].

A rapidly increasing its prices and uncertainties concerning petroleum availability threaten the sustainable development of the world economy. Both the environmental concern and availability of fuels greatly affect fuel trends for transportation vehicles. The present work aims to compile a holistic scenario of different resources, production technologies, and properties of alternative fuels for transportation vehicles. Detailed descriptions of production technologies and fuel properties would help to refine and further enhance the technologies [9].

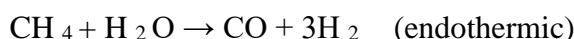
Synthetic fuels are a diverse group of compounds that can be used as replacements for traditional fuels, such as gasoline and diesel. This paper provides a comprehensive review of synthetic fuels, with a focus on their classification and production processes. The article begins with an in-depth introduction, followed by virtually classifying the major synthetic fuels that are currently produced on an industrial scale [10].

**Methods.** The GTL technology is based on the three- stage Sasol Slurry Phase Distillate Process™. In the first stage, natural gas is combined with oxygen to produce synthesis gas. The synthesis gas is then converted to a paraffinic synthetic crude oil by the Fischer-Tropsch conversion process. In the final stage, this synthetic crude oil is cracked to produce a finished product [11].

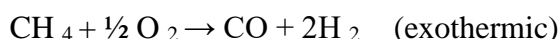


**Figure 1. Sasol Slurry Phase Distillate Process**

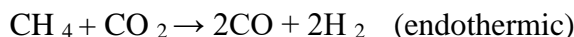
### Steam reforming of methane.



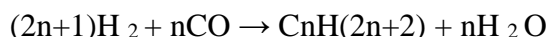
### Partial oxidation of methane. \*



### Dry reforming of methane.



### Synthesis



**Fig 2. Synthetic liquid fuel diesel fuel traditional to diesel comparison official.**

GTL fuel has shown excellent thermal stability, clean and efficient combustion. High cetane number (>70) The property makes the engine easier to start, reduces engine noise and improves engine efficiency. Aromatic hydrocarbons are almost zero (<0.5 %). Almost odorless and colorless. Meets all requirements of the European standard EN 15940 [12].

In addition, toxic gases emitted from vehicles not only cause drastic climate change, but also have a significant impact on human health. Carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), hydrocarbons (HC), benzene (C<sub>6</sub>H<sub>6</sub>) and other harmful and toxic gas particles have a negative impact on the health of humans and living beings [13].

## Synthetic fuel advantages

- ✓ Ecological Cleanliness: Traditional oil to their products relatively lower harmful waste produces .
- ✓ Quality Stability: Internal combustion engines for high good quality fuel as possible use .
- ✓ From resources effective Application: Oil was dependence reduce and alternative from sources use opportunity gives.

**Conclusion.** The increasing demand for synthetic fuels, on the one hand, makes people choose environmentally friendly energy, and on the other hand, it causes the reserves of traditional fuels to decrease day by day, which leads to increased costs due to the increase in their price. I believe that synthetic liquid fuels will be the fuel of the future.

Based on my research, I would like to offer the following suggestions:

- 1) Uzbekistan natural gas from reserves effective use GTL installations for this purpose power increase
- 2) Environmental impact reduce for alternative fuel sources more attention focus and waste-free working release technologies current be
- 3) Scientific and technical research reinforcement through synthetic fuel working release processes further effective do
- 4) World trends analysis do for advanced countries experience study and from them come outside Uzbekistan for suitable strategy working exit

At this point, we consider it appropriate to conclude our article with the slogan of the Uzbekistan GTL company: "WE CREATE PURE ENERGY".

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