

BIODIESEL FUEL FOR AGRICULTURAL MACHINERY

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Summary. Materials installation for manufacture of biodiesel fuel conditions is developed.

Key words: biodiesel fuel, oils, rape oil, hydrodynamical.

INTRODUCTION

The Advanced European countries (Germany, Austria, France etc.) successfully organize manufacture of biodiesel fuel from hydrodynamically produced active mix of rape oils with diesel fuel of a petroleum origin. In Europe there are annually developed over 600 thousand tons of biodiesel fuel (BDF) with use of rape oils. Areas under rape crops in the world are considerably increased, in particular in Germany where they reach 12 % of arable lands. In Ukraine, in connection with the arisen petroleum problems, the tendency to increase areas under crops of various rape varieties has been planned, especially on the polluted soils of the Chernobyl zone.

The cost of BDF based on a mix of rape oils, as a rule, is lower than a market price of petroleum diesel fuel. But even at equal prices the expediency BDF use is dictated by the increased prices for petroleum, requirements of ecology. Positive results on manufacture of BDF are received abroad [1].

For the last 10 years demand on BDF has increased up to 2 million tons. Half of this volume is consumed in Germany where BDF is not taxed with analogue and costs 0,1 euros , by half cheaper than diesel fuel of a petroleum origin. It is predicted, that by the end of 2005 the need of the EU in BDF will make 5 million tons, and till 2010-12 million tons, which will increase demand on rape oil by 20-25 % [1].

Due to the world fuel crisis in Ukraine there were objectively necessary conditions for development of manufacture BDF on the basis of vegetable oils, first of all, at mini-factories with volume of manufacture biodiesel fuel 50-100 thousand a year.

There are such precedents: for example, a Polish company Manzoil which is engaged in trade with food oils and BDF, at present conducts a construction of a mini-factory with capacity of 150 thousand tons per one year in the northwestern part of the country. The termination of the construction is planned by the end 2005 r.. Company Manzoil is also the intermediary in the market of technical vegetable oils.

In Lithuania the law on manufacture BDF has been accepted and the factory “Stumbras” is finishing reconstruction of a BDF manufacture.

In. Hayde in the area of Papua, New Guinea, a mini-factory manufacturing BDF is in operation.

In the USA, 1,5 billion dollars is spent on manufacture and sale of BDF, and the tax discount on 1l. of biodiesel fuel annually makes 0,25 dollars.

RESEARCH METHOD

Considering the above-mentioned issues, taking into account an opportunity and prospects of manufacture and use in Ukraine of BDF for diesel engines of agricultural machinery, we develop small-sized installation for reception of a hydrodynamically produced active mix [2] of rape oils with biodiesel fuel of petroleum origin. The installation is intended for reception of BDF in conditions of agroindustrial manufacture. The circuit of installation is submitted in Fig. 1.

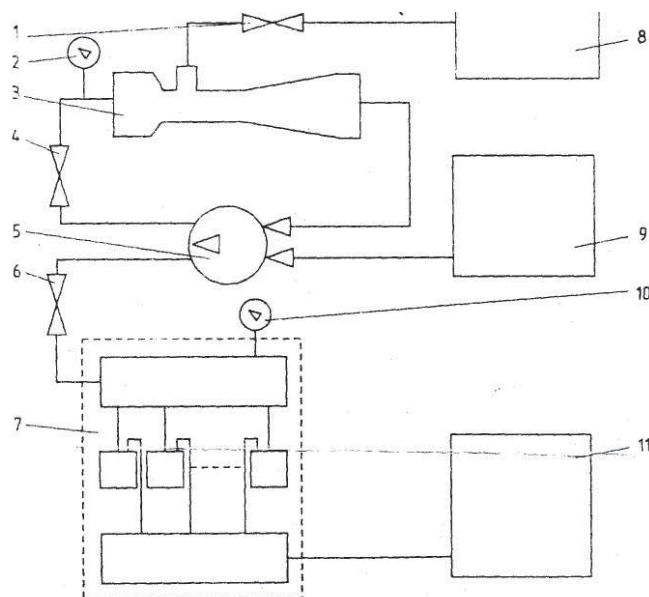


Fig. 1. The circuit of inclusion of installation: 1,4,6 – gates; 2,10 – manometers; 3 – the jet pump; 5 – pump; 7 – amulgator; 8 – tank for an additive; 9-tank for light mineral oil; 11 – atank for finished goods

Completeness of installation – hydrostation, amulgator, the jet pump – batcher, the control and measuring and connecting equipment, a control panel. As hydrostation installation YSG – 01PS and the jet pump -batcher of electronic type is used. Amulgator represents the monoblock consisting of the parallel hydrodynamical, two distributive collectors, and the measuring equipment (cranes, manometers, thermometers etc. – Fig. 2.)

The technology of BDF production is based on batching and dispersion of rape oils with diesel fuel of a petroleum origin. The proportion of rape oils in BDF reaches 20-25 % (depending on methane number).

Technological process of BDF reception consists of the following stages:

- Preparation of raw material (rape oil),
- Batching and dispersion of rape oils in a stream of diesel fuel of petroleum origin;
- The entrance analysis and definition of quality of production (intermediate analyses);
- The final analysis and certification of the finished BDF.

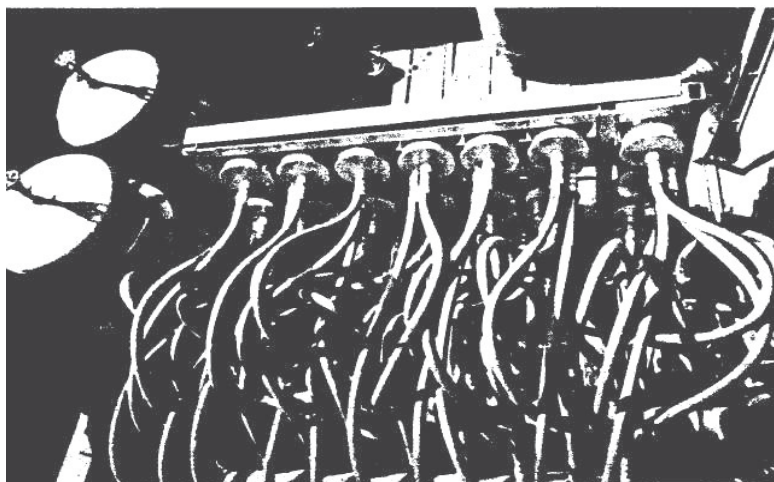


Fig. 2. General view of installation for the reception of biodiesel fuel

RESULTS OF RESEARCH 130

Biodiesel fuel on the basis of rape oils has passed tests. On results of tests encouraging results are received. The data of the specialized firms of Germany, Poland, USA, and also the Ukrainian Agrarian Academy of Sciences, Research Transport Institute (Kiev) etc. are simultaneously generalized. Extensive researches on BDF with rape oil have also been carried out in Austria, France, Italy, Spain and Great Britain [1]. The generalized data on the properties of rape oil and traditional diesel fuel are presented in Table 1.

Table 1. Properties of rape oil and traditional diesel fuel

Fuel	Density at temperature 200C, kg / m ³	Viscosity at temperature 200C, MM ² /WIDTH	Metane number	The sinking point	Point of the cold filter closing	Termo ability MDZ/KG
Traditional diesel fuel	834	4-6	50	80	-11,0	46,4
Rape oil	922	7,4	44	317	+15,0	39,5
Mix Tessol	898	3,2	39	-	-5,5	39,4
Rape and methyl ether	882	6-8	48	> 100	-8,0	40,0
Soya oil	931	7,8	46	347	+18	43,7

From Table 1 it is visible that biodiesel fuel on the basis of rape oil can be suitable for use in engines of all sorts without their constructive change. German biodiesel fuel of the firm Tessol

Stuttgart is made by dispersion from 20% of spirit, 25% gas and 55% of coldly pressed filtered rape oil. Such fuel mix was widely used in diesel engines by technical universities of Stuttgart, the Kaiser – Slayterna and Hohenhayma. By results of researches it is established, that emissions of the fulfilled gases under condition of transition to a rape -methyl ether are reduced by 50% in case of the maximal loading of a diesel engine. Emissions of firm particles decrease by 20%. Taking into account, that in Ukraine there is 80 spirits, the general capacity 670 million l. of spirit per one year, and needs of the internal food market make 200 million l. Of spirit, it is rational to direct surplus of spirit to manufacture of fuel mixes for automobiles and other types of transport. Consumers have already been using liquid fuel based on VKD from Odessa and Drogobych oil manufactures.

CONCLUSIONS

Relying on foreign experience of manufacture and use of rape -diesel fuel, the review of the literature and own results of researches in this area, it is obviously possible to formulate the following:

- In the world, wide experience of rape oils use for manufacture of biodiesel fuel has been collected.
- Foreign technologies of the advanced countries (Germany, Austria, France etc.) have made use of ecologically safe biodiesel fuel.
- In Ukraine there are all opportunities for an organization of biodiesel fuel manufacture on the basis of rape oils. The appreciable effect can be received without radical re-equipment of diesel engines of a batch production, having mastered technology of biodiesel fuel production, consisting of hydrodynamically activated mix of a petroleum origin with rape oil [2]. It is especially important for Ukraine having huge opportunities of rape growing (for example, on the polluted grounds of the Chernobyl zone) and characterized by considerable deficiency of mineral oil. Use of biodiesel fuel will allow to reduce needs for petroleum by 1-2 million tons (depending on the volume of BDF manufacture).

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