



EFFECTS OF MAGNETIC AND ELECTRIC FIELDS ON FUEL MOLECULES

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Annotation: In this article, the influence of external magnetic and electric fields on fuel molecules, their role in changing the molecular structure, and their contribution to optimizing the combustion process are scientifically analyzed. The possibilities of improving the physicochemical properties of fuel and increasing engine efficiency are highlighted through the fields.

Keywords: magnetic field, electric field, fuel molecules, molecular structure, combustion process, engine efficiency.

The combustion of gasoline is a chain chemical reaction of the mutual oxidation of oxygen atoms in the air with individual free atoms that make up hydrocarbons, characterizing its ability to release heat. The speed of the chain combustion reaction and the completeness of the combustion of liquid hydrocarbons are determined, first of all, by the kinetics of their decomposition into individual molecules, and then into individual atoms. The process of decomposition of molecules into individual atoms consists of separate stages, consuming the energy of the combustion process. Therefore, the combustion temperature and rate of liquid hydrocarbons are lower than in gases, i.e., there is no need to break down the initial stage in gases into individual molecules [1-3]. The initial stage of liquid hydrocarbon decomposition consists of heating the system or applying various physical fields designed to separate atoms from the hydrocarbon chain and increase their energy. One of the promising physical methods for solving this problem is the electromagnetic field. Based on this, we are studying the influence of the electromagnetic field on liquid hydrocarbons to prepare them for combustion, reduce the combustion temperature, and, as a result, obtain the full heat of combustion [4,5].

It is known that when magnetic and electromagnetic fields are applied to oil, they undergo deparaffinization, and the influence of other technological processes changes. The mechanism of such influence is related to the magnetic properties of the components of oil and liquid hydrocarbons, as well as the magnetic field, the interaction of individual atoms of the substance.

Analysis of the structure of hydrocarbon molecules and the influence of molecular mass on the specific magnetic susceptibility χ_p showed that the lightest fractions of alkanes with a molecular mass of $(72...300) \times 10^{-3}$ kg/mol are the most diamagnetic ($\chi_p = 0.895 \cdot 10^{-9} - 0.83 \cdot 10^{-9}$ kg⁻¹). Cycloalkanes with a molecular mass of $(72...135) \times 10^{-3}$ kg/mol are characterized by the parameter $\chi_p = (0.82...0.84) \times 10^{-9}$ kg⁻¹, while benzene and petroleum aromatic hydrocarbons, as well as polynuclear aromatics, have a much smaller range of magnetic susceptibility $(0.7...0.76) \cdot 10^{-9}$ kg⁻¹ [31]. Thus, the largest diamagnets are light fractions composed of paraffin-oil hydrocarbons, which are raw materials for the production of gasoline and diesel fuel. With the transition to kerosene and oil fractions, the content of paraffin-petroleum hydrocarbons in them significantly decreases and aromatics increase, which increases the magnetic susceptibility of the corresponding fractions. The magnetic susceptibility of oil residues is significantly higher than that of light fractions. This is due to an increase in the proportion of paramagnetic components in the corresponding fractions.

Surface tension, formed as a result of the interaction of molecules (atoms), is the main

thermodynamic characteristic of the liquid surface and is an important physical quantity of liquid media.

For complete combustion, liquid hydrocarbons are sprayed into the combustion chamber. This process is the preparation of droplets for separation into individual molecules and subsequent breakdown into individual atoms. The surface tension of liquids significantly influences this process.

In addition to the orbital angular momentum of an electron, it can also have its own mechanical moment, called spin.

, (1)

The projection of the spin onto the direction of the magnetic field takes two values:

, (2)

The electron's intrinsic angular momentum - intrinsic magnetic moment - is related by the following expression:

, (3)

The gyromagnetic ratio of the electron's intrinsic moment is:

, (4)

The following table presents data on the spin configuration of the electrons of the 3d shells of free iron atoms.

In chromium and manganese, the non-compensation of spins has a maximum value, therefore, maximum resultant values of spin magnetic moments are observed in these elements. However, the orientation of such spins is disrupted when a solid phase state is formed.

The atomic nucleus has spin and a magnetic moment associated with it. The spin of the nucleus is also quantitatively equal to the spin of the electron. Since the mass of the nucleus is approximately 10^3 times greater than the mass of the electron, the magnetic moment of the nucleus is a thousand times less than the magnetic moment of the electron.

Therefore, it can be assumed that the magnetic moments of the nuclei practically do not affect the magnetic properties of the body:

First, based on the spatial quantization rule, we find the resultant orbital angular momentum:

, (5)

L - number, takes all minimum and maximum values of the orbital quantum numbers of individual electrons.

Then, the resultant spin moment of the atom is found:

, (6)

S - number takes the values of the minimum and maximum values of the algebraic sum of the spin quantum numbers of individual electrons, differing by 1.

As a result, the total angular momentum of the atom is typed:

, (7)

j takes the following values:

if:

if:

Total angular momentum of an atom in the direction of the magnetic field

$$P_{LH} = m_j \hbar$$

can have multiple projection.

The total angular momentum of an atom corresponds to the following magnetic moment:

, (8)

and its projection onto the direction of the field is equal to:

, (9)

here

, (10)

We place an isotropic body *with volume V* in a uniform field with strength and induction . Under the action of the field, the body acquires a magnetic moment M and becomes magnetized.

Conclusion. In engines running on gaseous fuels, the activator is installed on the fuel line before the mixer. In Naijada, the fuel is activated in the air hose before entering the cylinder.

In diesel engines, the activator is installed on the fuel line before the high-pressure pump. In the engine, the fuel is activated before entering the cylinder.

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