CHEMMOTOLOGY AND TRIBOLOGY

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Interest in the problems of the quality of fuels, oils, greases, and special liquids and the technology of their testing and use has greatly increased during the last decade, not only in our country, but in nearly all countries with a highly developed technology, in the USA, Great Britain, France, the Federal German Republic, Japan, the Democratic German Republic, Czechoslovakia, and others.

This was due to the fact that the role and importance of the fuel and lubricating materials has been fundamentally altered as a result of the scientific and technical revolution which has taken place.

Among the numerous and diverse aspects of the use of petroleum products in engineering, the problems of the utilization of fuels and lubricants in internal combustion engines have assumed particularly great significance.

The problems of the development and selection of fuels and lubricating oils for motors and engines are today no longer problems of local importance as they were several years ago, but problems of paramount importance, extremely complex and difficult to solve since they combine the interests of the petroleum industry, the machine building industry, and many departments which make use of engineering techniques.

Tens of millions of tons of fuel and lubricating oils are required for the operation of millions of prime movers and other machines, so that any measure which at first appears to result in only a very slight saving in their consumption, gives an enormous saving in government expenditure when considered on a country-wide basis.

It can be said without exaggeration that the trend of development of the petroleum and machine building industry and the rate of scientific and technical progress in the country today depend greatly on the correct solution of the problems of the qualitative improvement of fuels and lubricants and the improvement of the methods for testing and using them.

Typical for the scientific-technical revolution is the birth of new sciences and new scientific disciplines on the basis of the existing ones. This process takes place mainly in the spheres of science and engineering where there is an extreme need for more profound specialization and an accelerated development of certain scientific specialties and thus, this process has naturally also affected the field of engine fuels and lubricants.

In the editorials of 1959 in the journal "Khimiya i Tekhnologiya Topliv i Masel" [1, 2], attention was given to the fact that we must recognize the fact of the birth of a new scientific-technical discipline at the conjunction of different sciences; the use of fuels and lubricants in motors and machines.

In the editorials of 1964 in the journal "Khimiya i Tekhnologiya Topliv i Masel" [3], it was proposed to name the science of the use of fuels and lubricants chemmotology, i.e., to use the term chemmotology instead of the term "use" in its collective meaning, which no longer reflects the essence and complexity of the whole complex of problems relating to the quality and utilization of fuels and lubricants in engineering and even minimizes the importance of the problems in this field.

The term "chemmotology" is formed (with slight abbreviation) from the three words chemia (Greek) + motor (Latin) + logos (Greek) = chemmotologos.

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The articles [3, 4] once more substantiated the need for organizing the training of chemmotology engineers in the petroleum institutes and the establishment of chemmotology laboratories at the departmental research institutes, the large engine building and petroleum refining plants, and also the main consumers of fuels and lubricants, the transport industry and agriculture. It was also pointed out that the importance and significance of the chemmotology problems for the national economy and the defence of the country are so great that the research in this field should be supervised by the academy of sciences of the USSR.

The question as to what chemmotology is, can be answered briefly: this is the science of the properties, quality and rational utilization of fuels, lubricants, and special liquids in engineering.

The term chemmotology can also be used in a more narrow sense, if it is applied to a single type of production, such as, for example, the chemmotology of fuels, lubricants, greases, etc.

Chemmotology investigates the physicochemical and performance characteristics of fuels, lubricating oils, greases, and special liquids; the processes taking place in these products during the operation of internal combustion engines, machines and mechanisms and also during storage, transfer, and transport; establishes the laws which correlate the product quality with the operating indices of engines and machines and works on the problems of increasing the reliability, service life, and economy of operation of engines, machines, and mechanisms in connection with the quality improvement of fuel and lubricant materials and their rational use.

In other words, the task of chemmotology includes the solution of the problems on fuels, lubricants, and liquids which concern equally the interests of the producers and consumers of these products.

Among these problems are the following:

1. Establishment of the optimum requirements with respect to the quality of fuels, lubricating oils, greases, and special liquids, to ensure reliable, long, and economical operation of existing and new engines and machines.
2. Development of standards for high-grade fuels, lubricants, and other liquid products.
3. Determination of the efficient use of fuels and lubricants in machines.
4. Reduction in the consumption of fuels, lubricating materials, and other liquid products.
5. Standardization of the assortment of fuel and lubricant materials in actual use.

These problems of chemmotology are characterized by the fact that they are not of a temporary, episodic nature, but that they are constant and inseparably linked with technical progress.

These problems also have another characteristic feature.

Their solution requires highly qualified specialists who are well versed in the chemistry of fuels and lubricating oils, engines, and the processes taking place in them and who also study the performance conditions and have a knowledge of economics.

This is quite natural since chemmotology developed on the borderline of different branches of science and engineering such as: petroleum technology, organic chemistry, colloid chemistry, physical chemistry, inorganic chemistry, heat engineering, machine engineering, and economics [1, 2, 3].

Much has been done in recent years in the field of chemmotology. The training of engineers in chemmotology has begun in the institutes of higher learning (some workers of the Ministry of Higher and Medium Special Education of the USSR still fear the term chemmotology and apply it to engineers specializing in the use of fuels, lubricating oils, greases, and special liquids instead of using the brief and comprehensive term of chemmotology engineer).

A good beginning has also been made by the State Interdepartmental Commission on Testing of Fuels, Lubricating Oils, and Special Liquids, which has created a commission for working out scientific methods for the quality control of the products.

The research work on the chemmotology of fuels, lubricating oils, greases, and special liquids is carried out on a broader front. The following recommendations were made by the seminar conference held at Yaroslavl on September 2nd-5th 1969 on the problem of improvement of the quality of liquid fuels and lubricants as a precondition for the achievement of reliable operation and long service life of tractor engines: