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FUEL COMPOSITION

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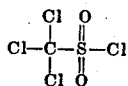
This invention relates to fuels for internal combustion engines of the Diesel or compression ignition type, and more particularly relates to the improvement of liquid hydrocarbon fuels by the addition thereto of a characterizing agent.

In Diesel engine operation, a liquid fuel is injected into a combustion chamber and ignited by compression. In order to obtain maximum efficiency of operation, the delay period between the instant of injection and the instant of ignition should be short. Improperly delayed ignition gives rise to the phenomenon known as "knocking" due to improper coordination of combustion and cylinder characteristics. By accelerating the ignition of Diesel fuel it is possible to lower the compression pressure at which spontaneous ignition will occur without combustion shock, thereby increasing the ease of starting and smoothness with which combustion takes place.

As is well known to those familiar with the art, various compounds have been credited with the capacity to improve the ignition quality of Diesel fuels. Small amounts of such compounds incorporated in the fuel act as ignition accelerators. By such means, the better grades of Diesel fuels are improved, and the lower grade fuels are improved so as to have greater value.

The present invention is predicated upon the discovery that the ignition delay period of liquid hydrocarbon fuel oils used in Diesel type engines is decreased substantially, and the lubricating qualities of the fuel on the engine parts are greatly improved, by the addition thereto of a minor proportion of trichloromethanesulfonylchloride. The present invention contemplates Diesel fuels having admixed therewith small amounts of trichloromethanesulfonylchloride, and particularly contemplated by the present invention is an improved method of accelerating the ignition of a non-viscous hydrocarbon fuel oil in compression ignition engines, said method being characterized by the step of admixing the aforesaid characterizing agent with the fuel prior to its ignition in the engine.

Those skilled in the art know trichloromethanesulfonylchloride by the chemical formula



and are familiar with various methods for the preparation of the same. Reference to the literature provides the following list of typical methods:

A. Action of moist chlorine on carbon disulfide. Berzelius, Marcet; Gilberts Annalen d. Phys. 48, 161. Kolbe; Am. 54, 152. Loew; Z. Chem. 82 (1869).

B. Perchloromethylmercaptan and nitric acid

(d.l.2) in contact for 2 to 3 weeks. Rathke; Ber. 3, 860. Rathke; Ann. 167, 202.

C. Reaction of trichloromethyl sulphinic acid and chlorine. Kolbe; Ann. 54, 154. Loew; Z. Chem. 82 (1869).

D. Oxidation of perchloromethylmercaptan in glacial acetic acid with concentrated nitric acid. Schechter and Haller; J. A. C. S. 63, 1764 (1941).

A preferred method of preparation of trichloromethanesulfonylchloride is that of Schechter and Haller given in reference "D." When isolated, the compound is a colorless solid having a melting point of 140° C. to 140.5° C. (corrected).

The effectiveness of trichloromethanesulfonylchloride in improving the ignition qualities of Diesel fuels is demonstrated by comparative cetane number results obtained with representative fuel blanks and fuel blends of the same containing the aforesaid characterizing agent.

The representative Diesel fuels are designated fuel A (a straight run number 2 fuel oil) and fuel B (a straight run Diesel fuel prepared from naphthenic base crudes). The physical characteristics of these fuel stocks are tabulated below in Table I. The cetane number, which is representative of the ignition quality, of the fuel blank and fuel blend was determined in each case by the proposed method of the A. S. T. M. (A. S. T. M. Proc. 38, I, 392, (1938)). The results of these determinations are given below in Table II.

Table I

	Fuel A	Fuel B
Gravity, °A. P. I.	39.8	31.6
Flash point (Pensky-Martens, °F.)	172	174
Aniline point, °F.	160.5	141.5
Diesel index	63.9	44.7
Cetane number	55	40
A. S. T. M. distillation:		
Initial, °F.	386	383
10%	435	458
90%	572	650
End point	614	728

Table II

Oil	Percent by wt. of trichloromethanesulfonylchloride	Cetane number	Increase in cetane number
A		55	
A	1.0	62.5	7.5
B		40	
B	1.0	44.8	4.8

By the term "Diesel type fuel" or "Diesel fuel" as used herein we have reference to any hydrocarbon or predominantly hydrocarbon material which is adapted for use as fuel in a Diesel engine and the ignition quality of which is susceptible

ble of improvement by the addition agent contemplated herein. It is to be understood, however, that in view of the aforesaid lubricant improving properties of the trichloromethanesulfonylchloride, the present invention is not limited to mineral oil fractions of the type ordinarily used as fuels, but is directed to mineral oil fractions broadly and includes those fractions normally used as lubricants where the sole purpose of the additive is to improve the lubricant characteristics.

The quantity of trichloromethanesulfonylchloride used in the mineral oil fraction may vary depending upon the oil fraction, the conditions of use, and results desired, but, in general, the compound may be added in an amount ranging from about 0.1% to about 10.0%.

We claim:

1. An improved Diesel fuel comprising a liquid hydrocarbon fuel oil and in admixture therewith a minor proportion of trichloromethanesulfonylchloride in an amount sufficient to improve the ignition quality of the fuel.

2. An improved Diesel fuel comprising a liquid hydrocarbon fuel oil and in admixture therewith a minor proportion, from about 0.1% to about 10.0%, of trichloromethanesulfonylchloride.

3. The method of accelerating the ignition quality of a liquid hydrocarbon fuel in an engine where the fuel is injected into compressed air in the engine cylinder and ignites spontaneously therein, which comprises admixing with the fuel, prior to its injection into the cylinder, a minor proportion of trichloromethanesulfonylchloride.

4. The method of accelerating the ignition quality of a liquid hydrocarbon fuel in an engine where the fuel is injected into compressed air in the engine cylinder and ignites spontaneously therein, which comprises admixing with the fuel, prior to its injection into the cylinder, a minor proportion, from about 0.1% to about 10.0%, of trichloromethanesulfonylchloride.

5. An oil composition comprising an oil selected from the group consisting of a Diesel fuel oil and a mineral lubricating oil, and in admixture therewith a minor proportion of trichloromethanesulfonylchloride.

6. An oil composition comprising an oil selected from the group consisting of a Diesel fuel oil and a mineral lubricating oil, and in admixture therewith a minor proportion, from about 0.1% to about 10.0%, of trichloromethanesulfonylchloride.

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