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USE OF IGNITION ACCELERATORS IN  
DIESEL FUELS

SUMMARY:

In the work described, the effect of various additives, suggested in the literature on the subject, on the ignitability of Diesel fuels was tested. Tests showed that some only of these substances are effective, namely, alkyl-nitrates, alkyl-nitrites, peroxides, alkyl-halogen-nitrates, nitroso compounds, and polysulphides. Nitrosamines, such as nitrosodimethylaniline-para, oximes such as cyclo-hexanon-oxime, ketones such as benzoylacetone, and unsaturated hydro-carbons such as dipentene and terpene, were ineffective. The degree of increase in ignitability is affected by the chemical compositions of the fuels.

Attempts to raise the ignition accelerating effect of nitrates and nitrites by adding butyl bromide, benzyl bromide, or copper stearate, or bromide and stearate together, did not result in any improvement in ignitability over and above the effect of the nitrites and nitrates.

Most additives do not lose their effectiveness even during storage of the fuels. Separation, such as would reduce the stability of the fuels in storage, only occurred with amyl nitrite and tetraline peroxide, which reacted with individual fuels to form precipitates; therefore these materials when added in small quantities, did not effect any appreciable ignition acceleration.

The corrosion properties of the fuels are considerably worsened by the additives in many cases, so that it appears important to compare the corrosivity of doped fuels as regards the engine materials before they are used.

The presence of ignition accelerators has a specially marked effect on the tendency of the fuels to coking. With the exception of tetraline peroxide, 0.5% by weight of additive causes an increase in the Conradson values above the limit permitted by specification. The increase in the tendency of the fuels to coking to a great extent limits the use of ignition accelerators, as the fuels whose ignitability is to be improved have themselves generally a high coking tendency which the ignition accelerators increase further.

The failure of some of the ignition accelerators suggested in the literature is attributed to the fact that in their development it was falsely assumed that the ignition point is the factor which decides the effectiveness. Therefore, only those additives are useful which have a tendency to decompose under engine conditions and begin the combustion process by acting as ignition starters.