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STABILIZATION OF PETROLEUM LUBRICANTS
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My invention relates to a stabilized petroleum lubricant and more particularly to a process for the production of stabilized petroleum lubricants containing as the active stabilizing agent nitrohaloalkanes having the structural formula:



R is selected from the group consisting of hydrogen, chloro, bromo and iodo; R¹ is selected from the group consisting of hydrogen, methyl, ethyl and propyl; and R² is selected from the group consisting of chloro, bromo and iodo.

It is well known that organisms from the groups consisting of Corynebacterium, Achromobacter, Pseudomonas, Nocardia and Mycobacterium metabolize petroleum hydrocarbons and fatty acids and thereby produce undesirable oxidation products.

The petroleum industry has long been interested in the stabilization of various petroleum products such as cutting oils, hydraulic fluids, etc., against breakdown by bacteria which metabolize the hydrocarbons with the concurrent formation of deleterious metabolites.

Many compounds have been used as stabilization agents in lubricants, but very few have been found to be commercially successful due to the fact that the compounds are unstable, or are not active against a wide variety of microorganisms.

Among the nitrohaloalkanes having the above structural formula are included 1-bromo-1-nitroethane, 1-bromo-1-nitropropane, 1-bromo-1-nitrobutane, 1,1-dibromo-1-nitropropane, 1-bromo-1-chloro-1-nitropropane, 1-bromo-1-iodo-1-nitroethane, 1-iodo-1-nitroethane, 1-chloro-1-nitroethane, 1-chloro-1-iodo-1-nitrobutane, 1,1-diiodo-1-nitroethane and bromonitromethane. I have found that in some instances I can obtain total inhibition of bacterial growth in petroleum lubricants at concentrations as low as 100 p.p.m. I prefer to include at least 1000 p.p.m. in most petroleum formations. However, I can employ amounts up to about 2% by weight of the active nitrohaloalkane when the latter is soluble to this extent in the particular petroleum hydrocarbon composition.

I have found that my active ingredients are effective bacteriostatic agents in petroleum containing lubricants such as cutting oils, penetrating oils, grinding lubricants, iron tinning lubricants, core oils, hydraulic fluids, etc.

The following examples set out lubricating compositions in which my active ingredients act as effective bacteriostatic agents. It is not intended that my invention be limited to the compositions, portions, or lubricants set out below, but rather I intend for all equivalents and variations obvious to those skilled in the art to be included within the scope of this specification and the attached claims.

Example I

To test the use of my active ingredients in cutting oils, a 25:1 water-cutting oil emulsion was prepared. The cutting oil concentrate used was a proprietary cutting oil containing no bacterial inhibitors sold by the Texas Company under the trade name Soluble Oil TL-3337. Ten 3000 ml. portions of the water-cutting oil emulsion were placed in large mouthed one gallon glass containers. Desired

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amounts of my nitrohaloalkanes were added to the cutting oil emulsion. No inhibitor was added to one 3000 ml. portion of the cutting oil emulsion which was used as a control. At the beginning of the experiment each unit was inoculated with 5 mls. of a heterogeneous bacterial culture which had grown for several years in a water-cutting oil emulsion. Aeration and mixing were obtained by bubbling compressed air through the emulsion. Water was added to each portion of the emulsion at periodic intervals in order to keep the volume of the units constant and to prevent concentration of the inhibitor by evaporation.

The following table sets out the results of the above tests and the number of days of total bacterial inhibition when the described concentration of the desired nitrohaloalkane was incorporated into the cutting oil emulsion.

Halonitroalkane	Concentration in 25:1 Water-Cutting Oil Emulsion	No. of Days Completely Effective
1-bromo-1-nitro-ethane.....	1,000 500 100	70 90 42
1-bromo-1-nitro-propane.....	1,000 500 100	42 42 21
1,1-dibromo-1-nitro-propane.....	1,000 500 100	28 14 7
Control.....		0

Example II

The following is a water emulsifiable cutting oil which is adequately protected by 1000 p.p.m. of my halonitroalkane inhibitors:

	Percent by weight
Light mineral oil.....	85
Oleic acid.....	10

Example III

The following is a stabilized steam cylinder oil which is adequately protected by 1000 p.p.m. of 1-bromo-1-nitroethane:

	Percent
S.A.E. lubricating oil.....	90
Oleic acid.....	10

Example IV

The following is a core oil which is adequately protected by 1000 p.p.m. of 1-bromo-1-nitropropane:

	Percent
Crude tall oil.....	25
Fuel oil.....	35
Tall oil ester (glycol or glycerol).....	40

Example V

The following is a cutting oil which is adequately protected by 1000 p.p.m. of 1-bromo-1-nitrobutane:

	Percent
Tallow.....	65
Paraffin wax.....	29
Beeswax.....	1.3
Oxalic acid.....	1.3
Potassium citrate.....	1.3
Urea.....	0.4

Now having described my invention what I claim is:

1. A liquid petroleum composition consisting essentially of a liquid petroleum hydrocarbon and a sufficient amount of a nitroalkane to stabilize said hydrocarbon against

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metabolizing bacteria, said nitroalkane having the structural formula:



wherein R is selected from the group consisting of hydrogen, bromo and iodo; R¹ is selected from the group consisting of hydrogen, methyl, ethyl and propyl; and R² is selected from the group consisting of bromo and iodo.

2. A liquid petroleum composition consisting essentially of a liquid petroleum hydrocarbon and a sufficient amount of 1-bromo-1-nitroethane to stabilize said hydrocarbon against metabolizing bacteria.

3. A liquid petroleum composition consisting essentially of a liquid petroleum hydrocarbon and a sufficient amount of 1-bromo-1-nitropropane to stabilize said hydrocarbon against metabolizing bacteria.

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4. A liquid petroleum composition consisting essentially of a liquid petroleum hydrocarbon and a sufficient amount of 1-bromo-1-nitrobutane to stabilize said hydrocarbon against metabolizing bacteria.

5. A liquid petroleum composition consisting essentially of a liquid petroleum hydrocarbon and a sufficient amount of 1-iodo-1-nitroethane to stabilize said hydrocarbon against metabolizing bacteria.

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