CLAIMS:

1. A method for reducing oxidation in internal combustion engines lubricated with a lubricating oil comprising a base oil and an additive amount of at least one additive selected from anti-oxidant, anti-wear, detergent or dispersant by the addition to the lubricating oil of an additive amount of one or more ionic ~~liquid(s)~~ liquids comprising,

(a) heating the ionic liquid alone to a temperature of from 30 to 120°C,

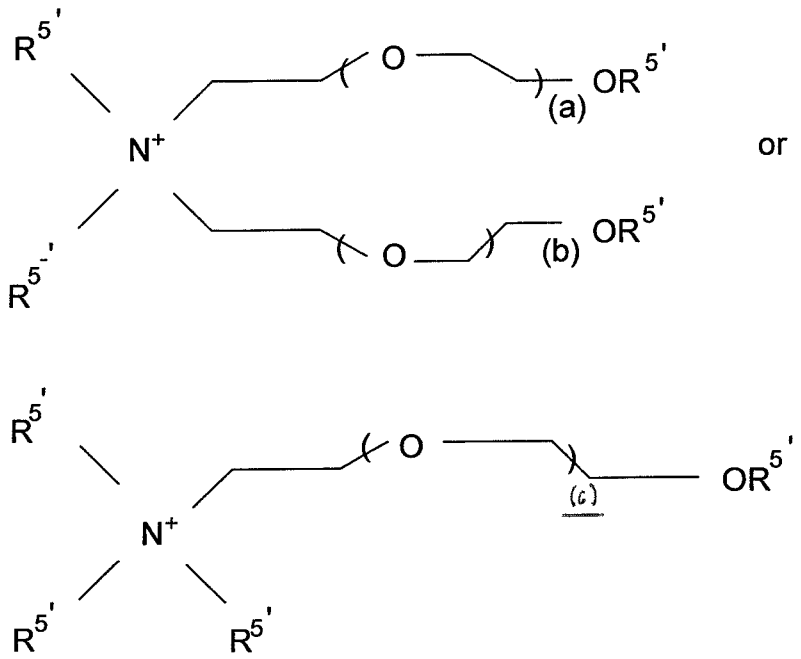
(b) adding to the heated ionic liquid a zinc or molybdenum dialkyl dithiophosphate or zinc or molybdenum dialkly dithiocarbamate,

(c) heating the mixture of (b) to a temperature between 50 to 120°C for a time sufficient for the ionic liquid and the zinc or molybdenum dialkly dithiophosphtate or dialkyl dithiocarbamate to interact, and

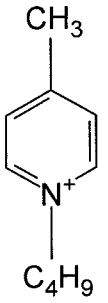
(d) adding resulting compound from (c) into base oil to make the lubricating oil.

2. The method of claim 1 wherein the additive amount of ionic liquid(s) is in the range of about 0.01 to 5.0 wt% based on the total weight of the lubricating oil.

3. The method of claim 2 wherein the ionic liquids are salts formed of cations and anions joined through an ionic bond.



wherein each of R^1 to R^{12} may be the same or different and are selected from the group consisting of hydrogen, -OH, C_1 to C_{16} alkyl group(s), C_2 to C_8 alkenyl group(s) wherein the alkyl or alkenyl group(s) may contain heteroatom substituent groups selected from –CN, $-SO_3H$, -OH; C_1 to C_8 fluorocarbon group(s), C_6 to C_{10} aryl group(s), C_7 to C_{12} arylkyl group(s), C_7 to C_{12} alkylaryl group(s), all of which group(s) may have an ether bond, C_1 to C_8 alkoxy group(s), and wherein $R^{5'}$s are the same or different and are selected from hydrogen, C_1 to C_{10} alkyl, C_1 to C_{10} hydroxyalkyl, C_6 to C_{10} aryl, C_7 to C_{12} aralkyl, C_7 to C_{12} alkaryl and (a), (b) and (c) are integers ranging from 1 to 30, preferably 1 to 10, and mixtures of such cations, and the anions are selected from the group consisting of BX_4^-, $Al_2X_7^-$, $Ga_2X_7^-$, PX_6^- wherein X is halogen, $R^{17}OSO_3^-$, $R^{17}SO_3^-$, SO_4^{-2}, PO_4^{-3}, NO_3^-, $(CN)_2N^-$, $R^{17}{}_2PO_4^-$, $R^{18}COO^-$, $R^{17}OCOO^-$, $R^{18}PO_2^-$, SCN^-, $HO(R^{18})COO^-$, $HS(R^{18})COO^-$, $R^{18}S^-$, $(C_nF_{(2n+1-x)}H_x)$ SO_3^-, $(C_nF_{(2n+1-x)}H_x)COO^-$, $F(HF)_n^-$, $((C_nF_{(2n+1-x)}H_x)Y'O_z)_3C^-$, $((C_nF_{(2n+1-x)}H_x)Y'O_z)_2N^-$ (wherein Y′ is a carbon atom or a sulfur atom; when more than a single Y′ is present they may be the same or different from one another, a plurality of $((C_nF_{(2n+1-x)}H_x)Y'O_z$ groups may be the same or different from one another), n is an integer, x is an integer of 0 to 13, z is an integer of 1 to 3 when Y′ is a carbon atom and 0 to 4 when Y′ is a sulfur atom,



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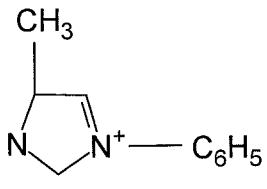

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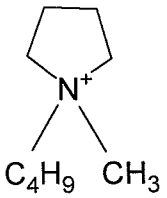

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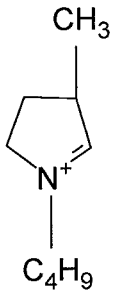

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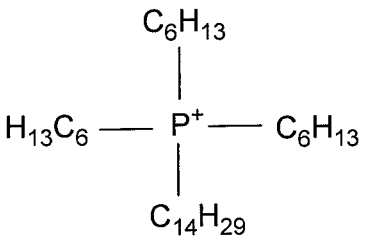

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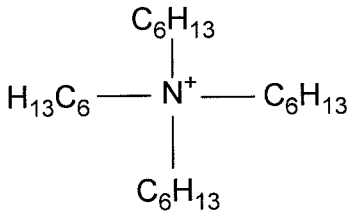
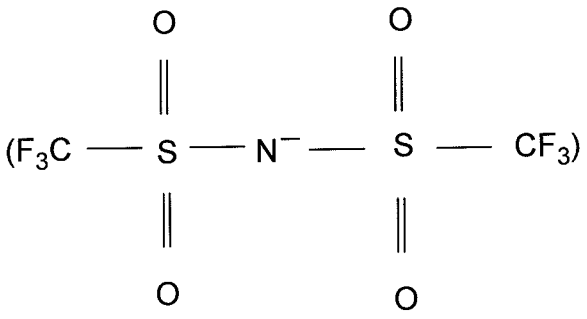


and the anions are selected from one or more of the group consisting of tetrafluoroborate, hexafluorophosphate, bis(trifluoromethyl sulfonyl imide,



di(C_3-C_{12} alkyl) dithiophosphate, di(C_3C_{12} alkyl) dithiocarbamate.

~~7. The method of claim 1, 2, 3, 4, 5 or 6 wherein the ionic liquid is premixed with zinc or molybdenum dialkyl dithiophoshate or zinc or molybdenum dialkyl dithiocarbamate.~~

~~8.~~7. The method of claim ~~7~~ 1 wherein the alkyl groups of the zinc or molybdenum dialkyl dithiophosphate or zinc or molybdenum dialkyl dithiocarbamate are the same or different and are selected from C_3 to C_{12} primary and secondary alkyl groups.

~~9.~~8. The method of claim ~~7~~ 1 wherein the ionic liquid(s) and the zinc or molybdenum dialkyl dithiophosphate or zinc or molybdenum dialkyl dithiocarbamate are combined in a ratio of 1:10 to 10:1.

~~10. The method of claim 7 wherein the ionic liquid(s) and the zinc or molybdenum dialkyl dithiocarbamate are premixed by:~~

~~(a) heating the ionic liquid(s) alone to a temperature of from 30 to 100°C;~~

~~(b) adding to the heated ionic liquid(s) the zinc or molybdenum dialkyl dithiophosphate (DDP) or zinc or molybdenum dialkyl dithiocarbamate (DTC).~~

~~(c) heating the mixture of (b) to a temperature between 50 to 120°C for a time sufficient for the ionic liquid(s) and the zinc or molybdenum DDP or DTC to interact.~~

~~11.~~9. The method of claim ~~7~~ 1 wherein the sole source of zinc or molybdenum ~~DDP~~ dialkyl dithiophosphate or ~~DTC~~ dialkly dithiocarbamate in the lubricating oil is from the premix.