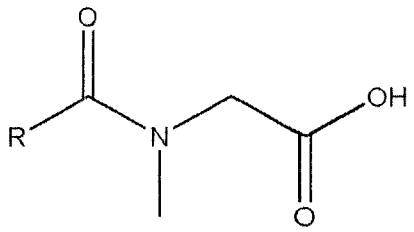
WHAT IS CLAIMED IS:

1. An ~~lubricating engine~~ oil composition comprising ~~a major amount of~~ agreater than 50wt% of base oil selected from the group consisting of a Group II, Group III, Group IV and Group V base oil and mixture thereof, wherein the Group II and Group III base oils have at least 90% saturates, and ~~a minor amount of~~ an additive package, wherein the additive package comprises:

(A) a friction modifier component selected from:

(a) one or more ~~a~~ reaction products of a compound of the formula IV:



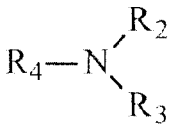
(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having ~~about~~ 8 to ~~about~~ 22 carbon atoms, with:

(i) one or more alcohols to form an ester reaction product;

(ii) one or more amine alcohols to form an ester or amide reaction product;

(iii) one or more amines of the formula V:

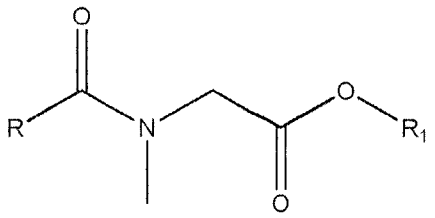


(V)

wherein R_2, R_3, and R_4 are independently selected from hydrogen, C_1-C_{18} hydrocarbyl groups, and hydrocarbons containing C_3-C_{12} hydrocarbyl groups and one or more heteroatoms to form an amide reaction product; or

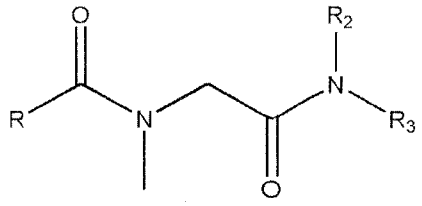
(iv) an alkali metal hydroxide, an alkaline earth metal hydroxide, an alkali metal oxide, an alkaline earth metal hydroxide, ammonia, an amine or mixtures thereof, wherein the reaction product is in the form of a salt; and

(b) one or more compounds of the Formulae ~~II~~-III:



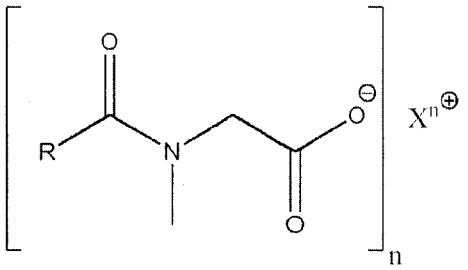
(I)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl having 8 to 22 carbon atoms and R_1 is hydrogen, a hydrocarbyl having from 1 to 8 carbon atoms, or a C_1-C_8 hydrocarbyl group containing one or more heteroatoms;



(II)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl having ~~about~~ 8 to ~~about~~ 22 carbon atoms and R_2 and R_3 are independently selected from hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms;



(III)

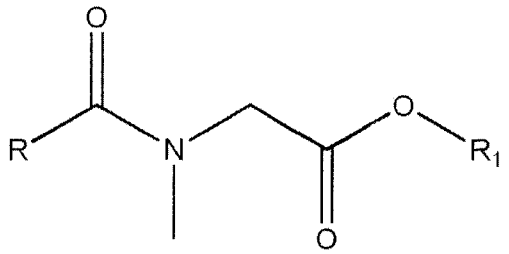
wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl having ~~about~~ 8 to ~~about~~ 22 carbon atoms; and X is an alkali metal, alkaline earth metal or ammonium cation and n is the valence of cation X; and

(B) at least one detergent; and

wherein the engine oil composition is adapted for use as an engine oil, and wherein the engine oil composition has a phosphorus content of 50-1000 ppm and the engine oil composition contains 0.1-2.0 wt% of the friction modifier component (A), based on a total weight of the engine oil composition.

2. The ~~lubricating~~ engine oil composition of claim 1, wherein the additive package comprises at least one ester reaction product of an alcohol with a compound of the formula IV.

3. The ~~lubricating~~ engine oil composition of claim 2, wherein the ~~one or more reaction products of an alcohol with a compound of the formula IV~~additive package comprises one or more compounds of the formula I:



(I)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl having ~~about~~ 8 to ~~about~~ 22 carbon atoms and R_1 is hydrogen, a hydrocarbyl having from ~~about~~ 1 to ~~about~~ 8 carbon atoms, or a C_1-C_8 hydrocarbyl group containing one or more heteroatoms.

4. The ~~lubricating~~ engine oil composition of claim 1, wherein the additive package comprises one or more compounds of the formula II.

5. The ~~lubricating~~ engine oil composition of claim 1, wherein the additive package comprises at least one salt of the formula III.

6. The ~~lubricating~~ engine oil composition of claim 1, wherein the additive package comprises at least two different compounds independently selected from the ester reaction products of an alcohol with one or more compounds of the formula IV and compounds of the formulae II-III.

7. The ~~lubricating~~ engine oil composition of any one of claims 3 and 6, wherein R_1 is hydrocarbyl group having from ~~about~~ 1 to ~~about~~ 8 carbon atoms.

8. The ~~lubricating~~ engine oil composition of any one of claims 3 and 6, wherein R_1 is a hydrocarbyl group containing a C_1-C_8 hydrocarbyl group containing one or more heteroatoms.

9. The ~~lubricating~~ engine oil composition of any one of claims 4 and 6, wherein R_2 and R_3 are independently selected from hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms.

10. The ~~lubricating~~ engine oil composition of any one of claims 4 and 6, wherein R_2 and R_3 are independently selected from hydrogen and C_4-C_8 hydrocarbyl groups.

11. The ~~lubricating~~ engine oil composition of any one of claims 5 and 6, wherein the one or more compounds of the formula III are salts of one or more cations selected from sodium, lithium, potassium, calcium, magnesium, and an amine.

12. The ~~lubricating~~ engine oil composition of claim 1, wherein the friction modifier comprises one or more ~~a~~ amide or ester reaction products of a compound of the formula IV and one or more amine alcohols.

~~13. The lubricating oil of claim 1, wherein the friction modifier comprises one or more a reaction products of a compound of the formula IV and one or more amino alcohols.~~

~~14~~13. The ~~lubricating~~ engine oil composition of claim 1, wherein the friction modifier comprises one or more ~~a~~ amide reaction products of a compound of the formula IV and one or more amines of the formula V.

~~15~~14. The ~~lubricating~~ engine oil composition of claim 1, wherein the friction modifier comprises one or more ~~a~~ reaction products of a compound of the formula IV and an alkali metal hydroxide, an alkaline earth metal hydroxide, an alkali metal oxide, an alkaline earth metal hydroxide, ammonia, an amine or mixtures thereof, wherein the reaction product is in the form of a salt.

~~16~~15. The ~~lubricating~~ engine oil composition of any one of claims 1-~~15~~14, wherein R has from ~~about~~ 10 to ~~about~~ 20 carbon atoms.

~~17~~16. The ~~lubricating~~ engine oil composition of any one of claims 1-~~15~~14, wherein R has from ~~about~~ 12 to ~~about~~ 18 carbon atoms.

~~18~~17. The ~~lubricating~~ engine oil composition of any one of claims 1-~~17~~16, wherein the additive package further comprises at least one additive selected from the group consisting of antioxidants, antifoam agents, molybdenum-containing compounds, titanium-containing compounds, phosphorus-containing compounds, viscosity index improvers, pour point depressants, and diluent oils.

~~19~~18. The ~~lubricating~~ engine oil composition of any one of claims 1-~~18~~ 17~~or the engine oil of claim 19~~, wherein the at least one detergent comprises two or more detergents.

~~20~~19. The ~~lubricating~~ engine oil composition of claim ~~19~~18, wherein a first detergent has a total base number of 40 to 450 and a second detergent has a total base number of up to 80.

~~21~~20. The ~~lubricating~~ engine oil composition of any one of claims 1-~~20~~19, wherein the at least one detergent comprises a sulfonate, a phenate, or a salicylate.

~~22~~21. The ~~lubricating~~ engine oil composition of any one of claims 1-~~20~~19, wherein the at least one detergent comprises at least one compound selected from calcium sulfonate, magnesium sulfonate, sodium sulfonate, calcium phenate, sodium phenate, calcium salicylate, and sodium salicylate.

~~23~~22. The ~~lubricating~~ engine oil composition of any one of claims 1-~~20~~19, wherein the at least one detergent comprises a metal salt wherein the metal is selected from the group consisting of alkaline and alkaline earth metals.

~~24~~23. The ~~lubricating~~ engine oil composition of any one of claims 1-~~23~~22, wherein a total base number of the at least one detergent is up to ~~about~~ 450.

~~25~~24. The ~~lubricating~~ engine oil composition of any one of claims 1-~~23~~22, wherein a total base number of the at least one detergent is from ~~about~~ 80 to ~~about~~ 350.

~~26~~25. The ~~lubricating~~ engine oil composition of any one of claims 1-~~25~~24, wherein the at least one detergent comprises from ~~about~~ 0.1 wt.% to ~~about~~ 10 wt.% of a total weight of the lubricating oil.

~~27. The lubricating oil of any one of claims 1-26, wherein the lubricating oil composition is an engine oil.~~

~~28~~26. A method for ~~improving~~ reducing thin film and boundary layer friction in an engine comprising the step of lubricating the engine with the engine oil composition as claimed in claim ~~27~~1.

~~29~~27. The method as claimed in claim ~~28~~26, wherein the ~~improved~~ reduced thin film and boundary layer friction is determined relative to a same composition in the absence of the one or more friction modifier components.

~~30~~28. A method for ~~improving~~ reducing boundary layer friction in an engine, comprising the step of lubricating the engine with the engine oil composition as claimed in claim ~~27~~1.

~~31~~29. The method as claimed in claim ~~30~~28, wherein the ~~improved~~ reduced boundary layer friction is determined relative to a same composition in the absence of the one or more friction modifier components.

~~32~~30. A method for ~~improving~~ reducing thin film friction in an engine, comprising the step of lubricating

the engine with the engine oil composition as claimed in claim ~~27~~1.

~~33~~31. The method as claimed in claim ~~32~~30, wherein the ~~improved~~ reduced thin film friction is determined relative to a same composition in the absence of the one or more friction modifier components.