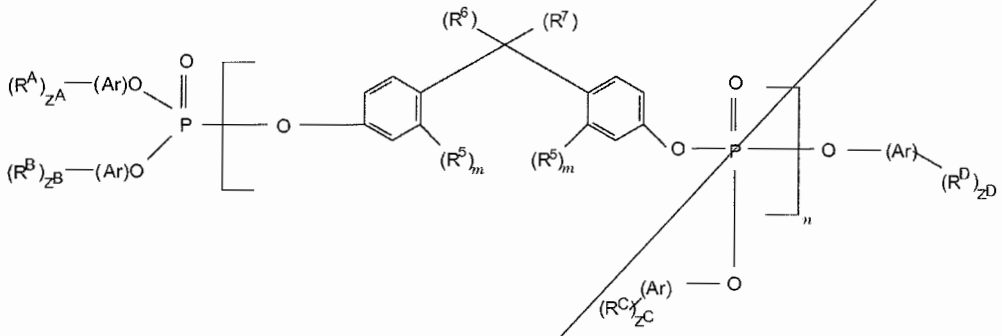
CLAIMS:

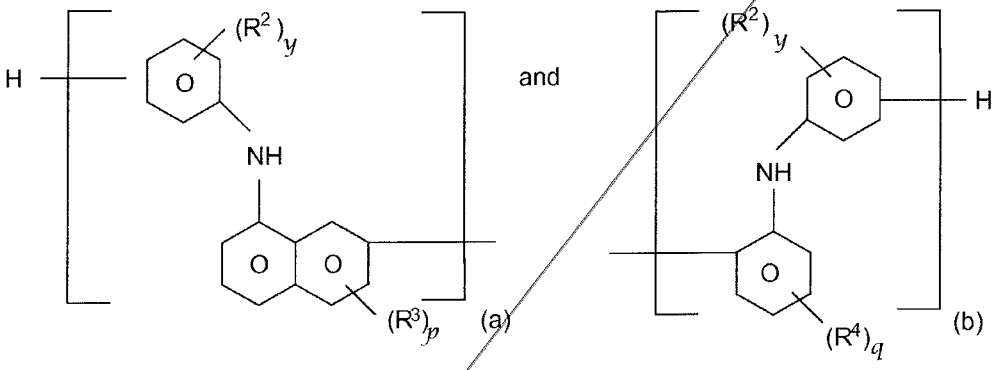
1. A method for improving the resistance to deposit formation of High Performance Category turbine oil comprising a synthetic ester base oil, one or more of a polymeric aminic antioxidant and IDP antiwear additive of the formula:



wherein R^5 is a C_1 to C_5 alkyl group and m is an integer ranging from zero to 4, n is an integer ranging from 1 to 7, R^6 is hydrogen or a C_1 to C_5 alkyl group, R^7 is hydrogen or a C_1 to C_5 alkyl group, each Ar is independently a phenyl or naphthyl group, R^A, R^B, R^C and R^D are the same or different selected from the group consisting of hydrogen, C_1 to C_{18} alkyl groups, and when any of R^A to R^D are other than hydrogen the corresponding Z^A, Z^B, Z^C and Z^D are the same or different and range from 1 to up to the available valence of each Ar group, the IDP being present in an amount in the range of 0.01 to 10 wt% based on active ingredient and contributing from 500 to 6000 ppm phosphorus, wherein the resistance to deposit formation as measured by the Vapor Phase Coker Test at 700° F of the turbine oil is at least 30 mg lower than the deposit formation of turbine oils containing the same ester base stock and polymeric aminic antioxidant. but containing tricresyl phosphate in place of the IDP.

2. The method of claim 1 wherein the one or more polymeric aminic antioxidant is the polymerized reaction product of one or more diphenyl amines, one or more phenyl naphthyl amines or both one or more diphenyl amines with one or more phenyl naphthyl amines.

3. The method of claim 1 wherein the one or more polymeric aminic antioxidants is the reaction product of:



wherein (a) and (b) each range from zero to 10 provided (a) + (b) is at least 2, R^2 is styrene or a C_1 to C_{30} alkyl, R^3 is styrene or a C_1 to C_{30} alkyl, R^4 is styrene or a C_1 to C_{10} alkyl, p, q and y individually range from zero to up to the valence of the aryl group to which the respective R groups are attached.

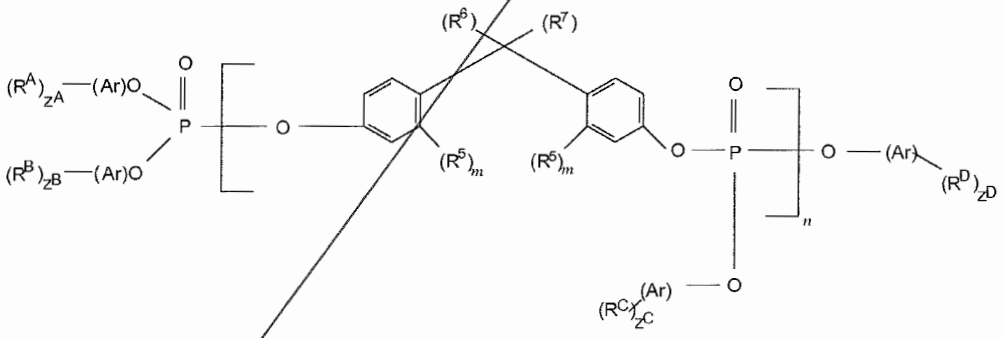
4. The method of claim 1 wherein in the IDP antiwear additive n ranges from zero to 2, R^A, R^B, R^C and R^D are the same or different and are selected from hydrogen and C_1 to C_5 alkyl groups, and Z^A, Z^B, Z^C and Z^D are the same or different and range from 1 to 2.

5. The method of claim 1 wherein the IDP is used in an amount in the range 0.1 to 5 wt% based on active ingredient contributing 1000 to 4000 ppm phosphorus.

~~6. The method of claim 1, 2, 3, 4 or 5 wherein the polymeric aminic~~ antioxidant is employed in an amount in the range 0.5 to 10 wt% based on active ingredient.

7. The method of claim 1, 2, 3, 4 or 5 wherein the synthetic ester consists of monopentaerythritol/dipentaerythritol esters of i-C_5, n-C_5, C_7 and C_9 acids, a mixture of monopentaerythritol/dipentaerythritol esters of n-C_5, n-C_7, C_8 and C_{10}.

8. A method for improving the resistance to deposit formation of Standard Performance Category (SPC) turbine oils comprising a synthetic ester base oil, one or more monomeric aminic antioxidants and IDP antiwear additive of the formula:

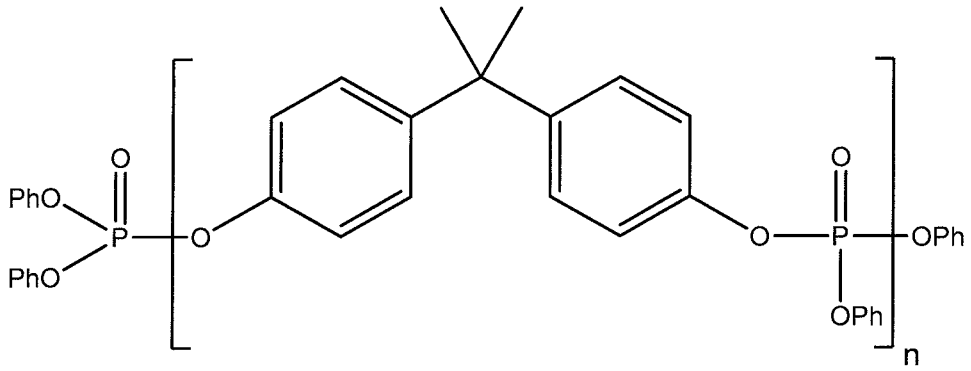


wherein R^5 is a C_1 to C_5 alkyl group and m is an integer ranging from zero to 4, n is an integer ranging from 1 to 7, R^6 is hydrogen or a C_1 to C_5 alkyl group, R^7 is hydrogen or a C_1 to C_5 alkyl group, each Ar is independently a phenyl or naphthyl group, R^A, R^B, R^C and R^D are the same or different selected from the group consisting of hydrogen, C_1 to C_{18} alkyl groups, and when any of R^A to R^D are other than hydrogen the corresponding Z^A, Z^B, Z^C and Z^D are the same or different and range from 1 to up to the available valence of each Ar group, the IDP being ~~present in an amount in the range of 0.01 to 10 wt% based on active ingredient~~

~~and contributing from 500 to 6000 ppm phosphorus, wherein the resistance to~~ deposit formation as measured by the Vapor Phase Coker Test at 700° F of the turbine oil is at least 40 mg lower than the deposit formation of turbine oils containing the same ester base stock and monomeric aminic antioxidant. but ~~containing trieresyl phosphate in place of the IDP~~

CLAIMS:

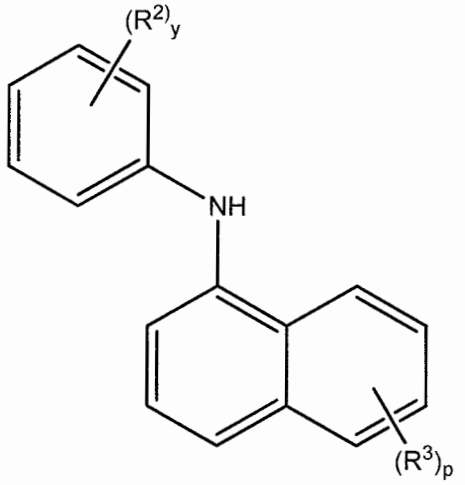
1. A method for improving the resistance to deposit formation of High Performance Category turbine oil comprising a synthetic polyol ester base oil, one or more of a polymeric aryl aminic antioxidant and IDP antiwear additive of the formula:



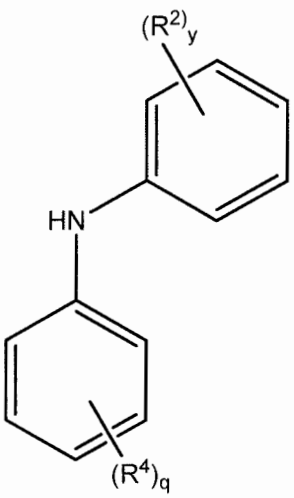
wherein n=1 to 7, Ph is phenyl, the IDP being present in an amount in the range of 2.09 to 3.28 wt% based on active ingredient, wherein the resistance to deposit formation as measured by the Vapor Phase Coker Test at 700° F of the turbine oil is at least 30 mg lower than the deposit formation of turbine oils containing the same ester base stock and polymeric aryl aminic antioxidant, but containing tricresyl phosphate in place of the IDP, and wherein the one or more polymeric aryl aminic antioxidant are present in an amount in the range 7 to 10 wt% as delivered.

2. The method of claim 1 wherein the one or more polymeric aryl aminic antioxidant is the polymerized reaction product of one or more diphenyl amines, one or more phenyl naphthyl amines or both one or more diphenyl amines with one or more phenyl naphthyl amines.

3. The method of claim 1 wherein the one or more polymeric aryl aminic antioxidants is the reaction product of:



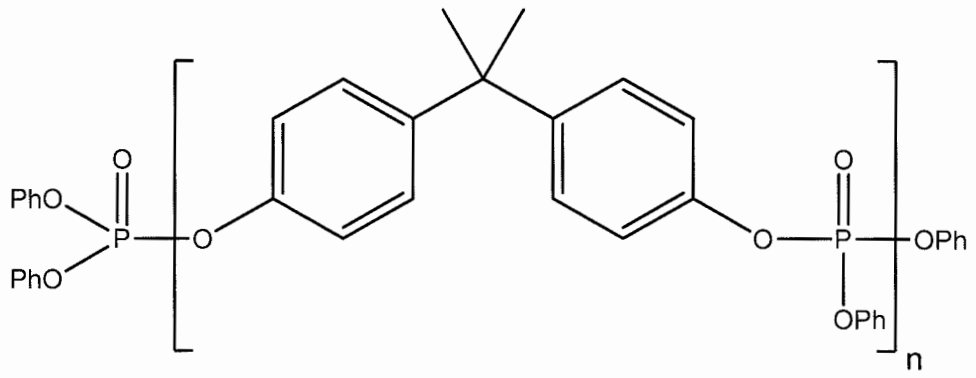
and



wherein R^2 is styrene or a C_1 to C_{30} alkyl, R^3 is styrene or a C_1 to C_{30} alkyl, R^4 is styrene or a C_1 to C_{30} alkyl, p, q and y individually range from zero to up to the valence of the aryl group to which the respective R groups are attached.

4. The method of claim 1, 2, or 3, wherein the synthetic polyol ester consists of monopentaerythritol/dipentaerythritol esters of i-C_5 acid, n-C_5 acid, C_7 acid and C_9 acid, or a mixture of monopentaerythritol/dipentaerythritol esters of n-C_5 acid, n-C_7 acid, C_8 acid and C_{10} acid.

5. A method for improving the resistance to deposit formation of Standard Performance Category (SPC) turbine oils comprising a synthetic polyol ester base oil, one or more monomeric aminic antioxidants and IDP antiwear additive of the formula:



wherein n=1 to 7, Ph is phenyl, the IDP being present in an amount in the range of 2.09 to 3.28 wt% based on active ingredient, wherein the resistance to deposit formation as measured by the Vapor Phase Coker Test at 700° F of the turbine oil is at least 40 mg lower than the deposit formation of turbine oils containing the same ester base stock and monomeric aminic antioxidant, but containing tricresyl phosphate in place of the IDP, and wherein the one or more monomeric aminic antioxidant are present in an amount in the range 2 to 5 wt% based on active ingredient.