LUBRICANT COMPOSITIONS FOR IMPROVED HIGH PRESSURE FREE-RADICAL POLYMERIZATIONS

REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 62/079345, filed November 13, 2014, and incorporated herein by reference.

BACKGROUND OF THE INVENTION

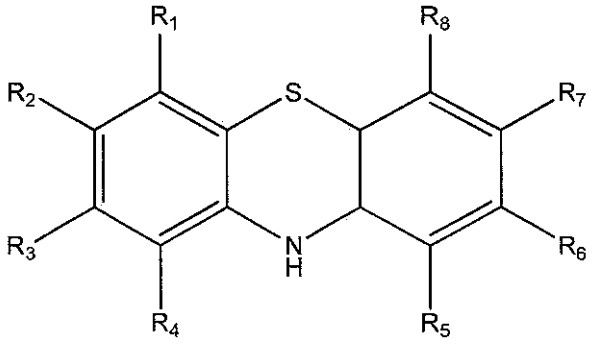
The undesired self-polymerization of a reactive polar comonomer, in high pressure free radical polymerizations, have been studied and countered using polymerization inhibitors and other methods. See, for example, U.S. Patent 4,721,761, U.S. Patent 7,413,615 and International Publication WO2014/106067. However, there is a need for new lubricant compositions that can be used to reduced the self-polymerization of polar comonomers, and prevent the premature failure of devices (for example, rotational and/or reciprocating devices) in contact with the comonomer. This need has been met by the following invention.

SUMMARY

The present disclosure provides a composition comprising at least the following:

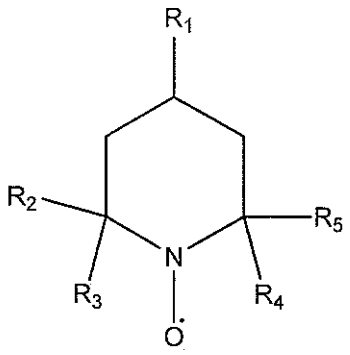
A) an oil, and

B) at least one compound selected from the following compounds i) through iv):

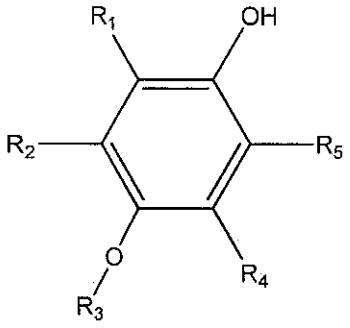
i) 

(Compound 1),

wherein, for Compound 1, R1 R2, R3, R4, R5, R6, R7 and R8 are each independently selected from H, an alkyl, or an alkoxy;

ii)  (Compound 2),

wherein, for Compound 2, R1 is selected from OH or OR, wherein R is alkyl; and R2, R3, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy;

iii)  (Compound 3)

wherein, for Compound 3, R1, R2, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy; and R3 is selected from H or an alkyl; or

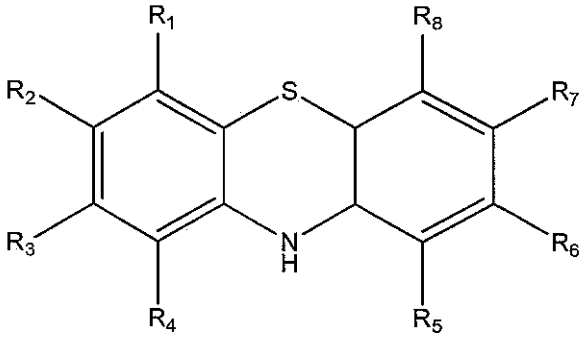
iv) a combination of two or more of Compounds 1 through 3; and

wherein the composition comprises less than, or equal to, 1.0 weight percent (based on the weight of the composition) of a non-aromatic polar compound, excluding alcohols, and other than Compound 2 above, and wherein the non-aromatic compound has Dipole Moment greater than, or equal to, 1.00 Debye.

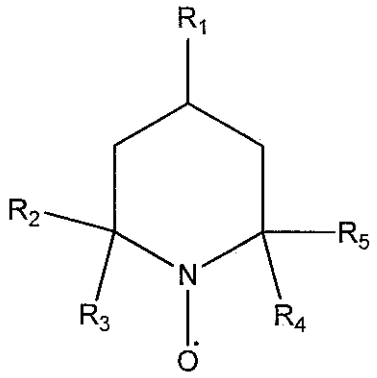
In one aspect, there is provided a composition comprising at least the following:

A) an oil, and

B) at least one compound selected from the following compounds i), ii) or iv):

i)  (Compound 1),

wherein, for Compound 1, R1, R2, R3, R4, R5, R6, R7 and R8 are each independently selected from H, an alkyl, or an alkoxy;



ii) (Compound 2),

wherein, for Compound 2, R1 is selected from OH or O-R, wherein R is alkyl; and R2, R3, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy;

or

iv) a combination of Compounds 1 and 2;

wherein the composition comprises 0.1 to 1.0 weight percent (based on the weight of the composition) of a non-aromatic polar compound, excluding alcohols, and other than Compound 2 above, and wherein the non-aromatic compound has a Dipole Moment greater than, or equal to, 1.00 Debye; and

wherein the at least one compound of component B) is present in an amount from 5 to 200 ppm, based on the weight of the oil.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts a general flow diagram showing a reactor system for a high pressure copolymerization process, and comprising an autoclave, tubular reactor, or a combination of both reactors.

DETAILED DESCRIPTION

As discussed above, the invention provides a composition comprising at least the following:

A) an oil, and

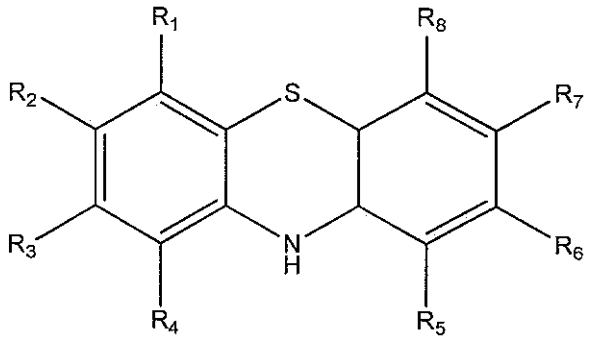
B) at least one compound selected from the following compounds i) through iv):

CLAIMS

1. A composition comprising at least the following:

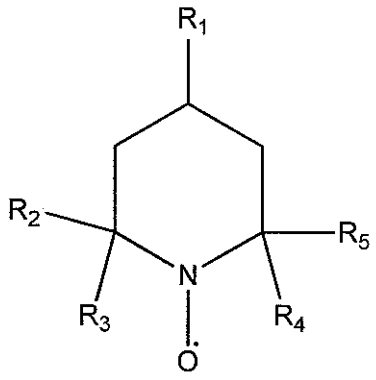
A) an oil, and

B) at least one compound selected from the following compounds i), ii) or iv):



i) (Compound 1),

wherein, for Compound 1, R1, R2, R3, R4, R5, R6, R7 and R8 are each independently selected from H, an alkyl, or an alkoxy;



ii) (Compound 2),

wherein, for Compound 2, R1 is selected from OH or O-R, wherein R is alkyl; and R2, R3, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy;

or

iv) a combination of Compounds 1 and 2;

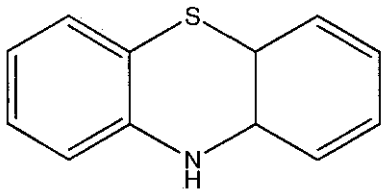
wherein the composition comprises 0.1 to 1.0 weight percent (based

on the weight of the composition) of a non-aromatic polar compound, excluding alcohols, and other than Compound 2 above; wherein the non-aromatic compound has a Dipole Moment greater than, or equal to, 1.00 Debye; and

wherein the at least one compound of component B) is present in an amount from 5 to 200 ppm, based on the weight of the oil.

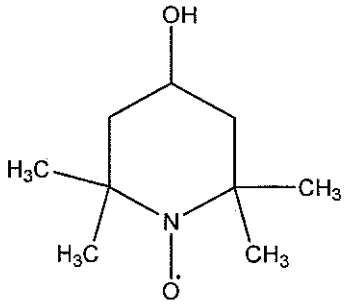
2. The composition of claim 1, wherein the oil and the at least one compound of component B) comprise greater than, or equal to, 99.0 weight percent of the composition, based on the weight of the composition.

3. The composition of any one of the previous claims, wherein the at least one compound of component B) is selected from the following compounds b) through d):



Phenothiazine (PTZ)

b),



4-hydroxy Tempo

c), or d) a combination thereof.