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METHOD OF PREPARING STABILIZED ORGANIC SULFUR-CONTAINING COMPOUNDS

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This invention relates to an improved method of inhibiting the evolution of hydrogen sulfide from organic sulfur-containing compounds from which hydrogen sulfide is normally evolved, and to organic sulfur-containing compounds stabilized against hydrogen sulfide evolution.

Many organic sulfur-containing compounds evolve hydrogen sulfide in the course of their normal use or in storage. Because of the obnoxious odor of hydrogen sulfide gas the evolution of hydrogen sulfide from such organic compounds is very objectionable. Examples of such organic compounds are sulfurized terpenes, sulfurized olefins and olefin polymers, sulfurized fatty oils of animal and vegetable origin, sulfurized sperm oil, sulfurized mineral oils and the like. Not only is the use of such organic compounds restricted because of the obnoxious odor given off by the evolved hydrogen sulfide, but the use of compounds containing various amounts of such organic sulfur compounds is often restricted because of this nuisance. For example, lubricants such as lubricating oils frequently contain sulfurized materials to impart thereto various desired properties such as extreme pressure properties, anti-corrosion properties and the like. However, such lubricants during service evolve hydrogen sulfide which is found highly objectionable by the users of such lubricants. It is therefore an object of the present invention to provide an improved method of inhibiting the evolution of hydrogen sulfide from organic sulfur containing compounds which normally evolve hydrogen sulfide during service or storage. Another object of the present invention is to provide a method whereby organic sulfur-containing compounds which evolve obnoxious hydrogren sulfide odors are rendered substantially inoffensive. Another object of the invention is to provide organic sulfur-containing compounds stabilized against hydrogen sulfide evolution. Other objects and advantages of the invention will become apparent from the following description thereof.

We have discovered that the evolution of hydrogen sulfide from organic sulfur-containing compounds can be substantially inhibited by adding to such sulfur-containing compounds a quinone in small but sufficient quantities to substantially inhibit the evolution of hydrogen sulfide; suitably in concentrations of from about 0.001% to about 4%, and preferably from about 0.01% to about 2%. The term "quinone" as used herein and in the appended claims includes mono- and polynuclear quinones such as benzoquinone, naphthoquinones, anthraquinones, phenanthraquinone, camphor-quinone and addition products and substituted derivatives thereof. The term "quinone" also includes isomers of such quinones. The quinones may contain substitution groups such as halogens, amino, alkyl, aryl, alkaryl, aralkyl, alkoxy, aroxyl, hydroxy and other substituent groups.

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The following specific compounds are representative of the classes named above:

Para-benzoquinone
Ortho-benzoquinone
2,6-dimethoxybenzoquinone
1,2-dimethyl-4,5-benzoquinone
Toluquinone
Xyloquinones
Quinone haloids
Monochloroquinone
Dichloroquinones
Methylanthraquinones
Acenaphthene-quinone
Phenanthraquinone
Aminoquinone
Diphenoquinone
Methoxynaphthoquinones
1,4-naphthoquinone
1,2-naphthoquinone
2,6-naphthoquinone
Camphor-quinone
Amphi-chrysene-quinone
Pyrene-quinone

While the foregoing compounds are all effective in inhibiting the evolution of hydrogen sulfide from organic sulfur-containing compounds, it is not to be implied that all are equivalents, since the specific activity of the various quinones varies to some extent. We prefer to employ the unsubstituted quinones.

The effectiveness of quinones in inhibiting the evolution of hydrogen sulfide from organic sulfur-containing compounds is illustrated by the data in the following table. To obtain these data the control which was a mineral lubricating oil additive composition containing a KOH neutralized reaction product of P_2S_5 and an isobutylene polymer, a sulfurized mineral oil and a sulfurized terpene, was placed in a container and maintained at a temperature of 200° F. while passing nitrogen through at a rate of one liter per hour. After one-half hour to remove preformed hydrogen sulfide, the exit tube was connected to a flask containing a lead acetate solution. The rate of hydrogen sulfide evolved was determined

by the amount of lead sulfide formed. The control and the control containing one percent (*a*) para-benzoquinone, (*b*) anthraquinone, and (*c*) 1,2-naphthoquinone were subjected to this test.

	Sample	Temperature, °F.	Mg. H_2S/100 gm. sample/Hr.
1	Control	200	18.0
2	Control+1% p-benzoquinone	200	None (3 hours)
3	Control+1% anthraquinone	200	8.3
4	Control+1% 1,2-naphthoquinone.	200	None (44 hours)

The above data show the effectiveness of quinones in inhibiting hydrogen sulfide evolution from organic sulfur-containing compounds.

While we have described our invention by reference to specific embodiments thereof, these have been by way of illustration, and the invention is not to be limited thereby but includes within its scope such modifications as come within the spirit of the appended claims.

We claim:

1. The method of inhibiting the evolution of hydrogen sulfide from a sulfurized oleaginous compound which evolves hydrogen sulfide, comprising adding to said compound from about 0.001% to about 4% of a quinone to substantially inhibit the evolution of hydrogen sulfide.

2. The method of inhibiting the evolution of hydrogen sulfide from a sulfurized oleaginous compound which evolves hydrogen sulfide, comprising adding to said compound from about 0.001% to about 4% of a benzoquinone to substantially inhibit the evolution of hydrogen sulfide.

3. The method described in claim 2 in which the benzoquinone is para-benzoquinone.

4. The method of inhibiting the evolution of hydrogen sulfide from a sulfurized oleaginous compound which evolves hydrogen sulfide, comprising adding to said compound from about 0.001% to about 4% of a polynuclear quinone to substantially inhibit the evolution of hydrogen sulfide.

5. The method of inhibiting the evolution of hydrogen sulfide from a sulfurized oleaginous compound which evolves hydrogen sulfide, comprising adding to said compound from about 0.001% to about 4% of a naphthoquinone to inhibit the evolution of hydrogen sulfide.

6. The method described in claim 5 in which the naphthoquinone is 1,2-naphthoquinone.

7. The method of inhibiting the evolution of hydrogen sulfide from a sulfurized oleaginous compound which evolves hydrogen sulfide, comprising adding to said compound from about 0.001% to about 4% of an anthroquinone to substantially inhibit the evolution of hydrogen sulfide.

8. The method of inhibiting the evolution of hydrogen sulfide from a lubricating oil composition containing a sulfurized oleaginous compound which normally evolves hydrogen sulfide in storage, comprising incorporating in said lubricating oil composition from about 0.001% to about 4% of a quinone to substantially inhibit the evolution of hydrogen sulfide.

9. The method as described in claim 8 in which the quinone is a benzoquinone.

10. The method as described in claim 8 in which the quinone is a naphthoquinone.

11. The method as described in claim 8 in which the quinone is an anthraquinone.

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