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PETROLEUM OIL COMPOSITIONS

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1

This invention relates to novel petroleum oil compositions containing stabilizers and more particularly to mineral oil compositions that contain an inhibitor effective to retard halogenation thereof.

It is well known that petroleum oils can be chlorinated. However, there are some situations in which it is desired to employ a petroleum oil where it will be in contact with gaseous chlorine and still not react too extensively therewith. This problem arises for instance in connection with the operation of gas compressors and vacuum pumps used to handle gases containing chlorine. In such gas compressors and vacuum pumps petroleum lubricating oils are employed not only to lubricate and to cool the pump mechanism but also to provide a liquid seal which assists in maintaining the pressure or vacuum. When such compressors and vacuum pumps are employed to handle gases containing chlorine, the petroleum lubricating oils used to facilitate the operation of said compressors and pumps tend to become chlorinated. The chlorination of said petroleum lubricating oils is disadvantageous, since when said oils are chlorinated their viscosities increase greatly, and decomposition products are formed; hence their effectiveness as mediums for lubricating, cooling and maintaining liquid seals in gas compressors and vacuum pumps becomes greatly diminished.

It is accordingly an object of this invention to provide suitable liquid mediums capable of lubricating, cooling and maintaining liquid seals in gas compressors and vacuum pumps, the effectiveness of which will not substantially diminish if said gas compressors and vacuum pumps are used to handle gases containing chlorine. A further object is to provide improved mineral oil compositions, the viscosities of which do not rapidly and greatly increase when said mineral oil compositions come in contact with gaseous chlorine and which are otherwise stable in the presence of chlorine under the conditions of use. A still further object is to provide a stabilized mineral oil composition containing an inhibitor effective to retard chlorination thereof. Another object is to provide a mineral oil composition containing an inhibitor capable of reducing the susceptibility of said mineral oil to chlorination, which oil composition can be reclaimed after use by treating it with clay without any substantial loss of its ability to resist chlorination. Other objects will appear hereinafter.

These objects are accomplished in accordance with the following invention by providing a mineral oil composition comprising a major amount of a petroleum lubricating oil and a minor amount of benzaldehyde phenylhydrazone sufficient to retard halogenation of said petroleum lubricating oil. This invention is applicable to both paraffinic and naphthene-type lubricating oils. It is particularly applicable to lubricating oils having a viscosity ranging from 150 to 450 Saybolt Universal seconds at 100° F. Ordinarily the addition of from 0.25 to 0.5 per cent by weight of benzaldehyde phenylhydrazone to such an oil will suffice to substantially reduce the susceptibility of the oil to chlorination.

2

It has been found that a petroleum lubricating oil which has been highly refined in the presence of anhydrous aluminum chloride and which has a high viscosity index of the order of 100 and a viscosity of about 170 Saybolt Universal seconds at 100° F. is a very effective lubricant for a vacuum pump. However, if said pump is used to handle gases containing chlorine this lubricating oil deteriorates greatly and its viscosity increases greatly. A mineral oil composition containing 0.5 per cent by weight of benzaldehyde phenylhydrazone added to a petroleum lubricating oil having the properties just mentioned is not readily attacked by chlorine. When this oil composition containing benzaldehyde phenylhydrazone is used to lubricate and facilitate the operation of a vacuum pump that is handling gases containing chlorine, it does not readily deteriorate and its viscosity increases slowly in small increments.

It has also been found that the addition of benzaldehyde phenylhydrazone to a mineral oil lubricant materially improves its color stability.

Furthermore, it has been found that petroleum lubricating oils containing benzaldehyde phenylhydrazone as a chlorination inhibitor can be reclaimed by heating them with fuller's earth and that the reclaimed oils are still resistant to chlorination. This is important because it is a routine operation to reclaim vacuum pump oils by passing them through a fuller's earth filter at 210° to 220° F. Persistence of the inhibiting effect after said clay treatment is obviously very desirable when the oils are to be used after reclaiming in places where they will come in contact with chlorine.

In determining whether a given oil composition containing a known amount of a chlorination inhibitor can be heated with clay as is done in an oil reclaiming operation without substantial loss of its ability to resist chlorination, the following experimental procedure is employed.

Ten per cent by weight of powdered fuller's earth is added to an oil composition containing a chlorination inhibitor at temperatures between 210° and 220° F. to drive off any water, and the oil is stirred vigorously for ten minutes. The mixture is then immediately filtered twice with the help of an asbestos type of filter aid. The oil composition thus treated may then be tested by the procedure set forth in the following paragraph to see if it is sufficiently stabilized against chlorination.

In determining whether a given oil composition containing a known amount of a chlorination inhibitor is sufficiently stabilized against chlorination, the following experimental procedure is employed. A plurality of 80 c. c. samples of the oil composition containing an inhibitor are placed in 100 c. c. graduated cylinders, and 8 c. c. of distilled water is added to each cylinder. Each of the samples is shaken vigorously, and 12 inches each of No. 20 American gauge copper and iron wires coiled together are immediately introduced into each cylinder, being suspended in the emulsion from the top of each cylinder. Free gaseous chlorine is then bubbled through each sample at the rate of 1400 c. c. per hour. At hourly intervals chlorination of one of the samples is discontinued, and the copper and iron wires are removed therefrom. After chlorination has been discontinued on a given sample it is allowed to sit until the oil reaches room temperature. The oil is decanted from the water and then blown with free nitrogen until all free chlorine has been eliminated. It is usually necessary to blow with nitrogen for about two hours before the oil no longer emits an odor of chlorine. Each sample is then analyzed to find the amount of chlorine taken up by the oil, and its viscosity is determined by A. S. T. M. method D 88–44. In this way one can determine the amount of chlorine absorption and the viscosity change at hourly intervals, and these data can be plotted in curves if desired.

When a petroleum lubricating oil that has been refined in the presence of anhydrous aluminum chloride, which has a viscosity index of about 100 and a viscosity of about 170 Saybolt Universal seconds at 100° F., and which contains no inhibitors is chlorinated and tested in accordance with the procedure set forth in the preceding paragraph, it is found that after five hours of chlorination it has absorbed 11.3 per cent of chlorine and its viscosity in Saybolt Universal seconds at 100° F. has increased 135 per cent. When to the same oil there is added 0.5 per cent by weight of benzaldehyde phenylhydrazone, it is found that after five hours of chlorination it has absorbed only 5.3 per cent of chlorine and its viscosity in Saybolt Universal seconds at 100° F. has increased only 28 per cent. Furthermore, when the same oil containing 0.5 per cent by weight of benzaldehyde phenylhydrazone has been heated with fuller's earth as described hereinabove, it is found that after five hours of chlorination it has absorbed only 5 per cent of chlorine and its viscosity in Saybolt Universal seconds at 100° F. has increased only 30 per cent. It can therefore be seen that benzaldehyde phenylhydrazone materially retards chlorination of this lubricating oil.

Resort may be had to such variations and equivalents of this invention as come within the spirit of the invention and the scope of the appended claims.

What we claim is:

1. A mineral oil composition comprising a major amount of a petroleum lubricating oil and a minor amount of benzaldehyde phenylhydrazone sufficient to retard halogenation of said petroleum lubricating oil.

2. A mineral oil composition comprising a major amount of a petroleum lubricating oil having a viscosity lying in the range from about 150 to 450 Saybolt Universal seconds at 100° F. and from 0.25 to 0.5 per cent by weight of benzaldehyde phenylhydrazone to retard chlorination of said petroleum lubricating oil.

3. A mineral oil composition suitable for facilitating the operation of a vacuum pump that is handling gases containing chlorine comprising about 99.5 per cent of a highly paraffinic petroleum lubricating oil having a viscosity of about 170 Saybolt Universal seconds at 100° F., and about 0.5 per cent of benzaldehyde phenylhydrazone to retard chlorination of said petroleum lubricating oil.

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