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LUBRICANT COMPOSITION

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1 Claim. (Cl. 252—52)

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The present invention relates to lubricants of improved quality. More particularly, the invention concerns improved lubricant compositions for use in certain types of service wherein operating conditions are such as to tend to cause rusting of equipment.

There are certain types of operation requiring lubrication of metal surfaces in which the service equipment is prone to rust due to the presence of water. In such operations, it is desirable, and often mandatory, that the lubricant serve not only as a lubricating agent but also as a rust-preventive agent. In order for the lubricant to fulfill the latter function in satisfactory manner it must be capable preferentially of wetting the metal surfaces under prevailing operating conditions so that a protective coating of lubricant will form and prevent effective contact between the metal and water.

An outstanding example of a case where the lubricant should function as an anti-rust agent as well as a lubricant occurs in the operation of steam turbines. Due to the elevated temperatures employed in turbine operations and to the presence of water formed through condensation of the steam, steel surfaces within the turbine or gear case are prone to rust. In cases where the lubricating oil has insufficient protective quality the metal surfaces may become so badly rusted as to scale off, causing scoring of bearings, sticking of governor mechanisms, plugging of oil lines, etc., often resulting in severe economic loss. A trend in turbine developments within recent years toward higher operating temperatures and pressures has placed increasingly greater requirements on the turbine oils, with the result that oils which were satisfactory some years ago are now unsuitable in many cases, if not generally. Oils refined in accordance with usual present-day practice generally lack preferential wetting characteristics necessary to impart the desired rust-preventive qualities.

The present invention is directed to and provides lubricant compositions which have the desired rust-preventive characteristics. In accordance with the invention the aforesaid rust-preventive quality is obtained in the highest degree by incorporating in the lubricant composition a substance comprising a relatively small amount of an oil-soluble, water-insoluble substituted 1,2-dihydroxy-benzene, preferably derivatives of pyrocatechol (1,2-benzenediol) having an alkyl group attached to the benzene ring in the para position. I have discovered that substances

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of this type when added to lubricating oil in relatively small proportion impart to the resulting composition the ability to prevent rusting of metallic surfaces, presumably due to preferential wetting of the surfaces by the lubricant composition.

As examples of effective rust-preventing agents of the type above set forth may be mentioned the following: 4-tertiary butyl-1,2 benzenediol; 4-tertiary octyl-1,2 benzenediol; 4-lauryl-1,2-benzenediol; and 4-cyclohexyl-1,2 benzenediol. In these examples it is to be noted that the number of carbon atoms in the attached hydrocarbon groups vary from four to twelve and that in all cases the size of the hydrocarbon chains are such as to impart to the compounds the desired solubility characteristics. These compounds may be used in any effective proportion, but it is generally satisfactory to employ relatively small amounts, for example, not over 2 per cent and preferably 0.1–0.5 per cent. The stearyl derivative of pyrocatechol, which contains eighteen carbon atoms in the attached stearyl group, although having the desired solubility characteristics, is not as effective as the above named agents and therefore must be used in a greater proportion in order to afford the desired protective action. The lower effectiveness of the stearyl derivative presumably may be due to too large a number of carbon atoms in the attached hydrocarbon group; accordingly it is preferred to use derivatives having fewer carbon atoms in the attached group, for instance 4–12 carbon atoms.

The following examples are given by way of illustration of the invention but are not to be taken in limitation thereof since many modifications obviously are within the purview of the invention:

An acid-treated and clay-filtered turbine oil stock having the following specifications:

Gravity ° A. P. I.	22.5
Flash point ° F.	335
Fire point ° F.	380
Saybolt Universal vis. at 100° F.	155
N. P. A. color	1¾

was blended with various anti-rust agents as listed below. Each blend was tested according to A. S. T. M. Tentative method D665–42T for evaluating rust-preventing characteristics of turbine oil, described on pages 274–276 of the publication entitled, "A. S. T. M. Standards on Petroleum Products and Lubricants," issued October, 1942. In this test a highly polished steel

specimen is maintained in contact with oil containing 10 per cent water at a temperature of 140° F. under carefully controlled conditions for a period of 48 hours. In order that the oil pass the test the steel specimen after this period of time must be free from rust. The results of these tests were as follows:

	Evaluation	Per cent of specimen surface rusted
Turbine oil stock	Failed	80
Turbine oil stock +0.2% 4-tertiary butyl-1, 2 benzenediol.	Passed	0
Turbine oil stock +0.2% 4-tertiary octyl-1, 2 benzenediol.	do	0
Turbine oil stock +0.2% 4-lauryl-1, 2 benzenediol.	do	0
Turbine oil stock +0.1% 4-cyclohexyl-1, 2 benzenediol.	do	0

The above tabulation clearly shows that all of the addition agents effectively prevent rusting.

In the appended claim whenever reference is made to a substituted dihydroxy-benzene, it should be understood that this refers to a compound resulting from replacement of nuclear hydrogen in a dihydroxy-benzene by at least one hydrocarbon group.

What I claim and desire to protect by Letters Patent is:

A lubricant composition adapted for use under service conditions in the presence of water to prevent rusting due to contact between metal and water which consists essentially of lubricating oil

and 0.1%–2.0% of an oil soluble, water-insoluble 1,2 dihydroxybenzene having an alkyl group attached to the benzene ring selected from the group consisting of 4-tertiary butyl-1,2 benzenediol; 4-tertiary octyl-1,2 benzenediol; 4-lauryl-1,2 benzenediol and 4-cyclohexyl-1,2 benzenediol.

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