

UNITED STATES PATENT OFFICE

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ANTIFREEZE NONCORROSIVE SOLUTION

No Drawing.

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This invention relates to a new composition of matter having both non-corrosive and anti-freezing properties and which is particularly adapted for use in the cooling systems of water-cooled internal combustion engines.

It is well known that in the operation of automotive vehicles, particularly in the winter months, it is necessary, when using those employing water-cooling systems, to use as a cooling medium a liquid which will not freeze under the conditions of operation. Various so-called anti-freezing liquids have been proposed for this purpose, such, for example, as ethyl alcohol, glycerol, ethylene glycol, and aqueous solutions of inorganic salts. The polyhydroxy alcohols which are used to some extent have proven rather expensive when leaks occur in the cooling systems; the employment of inorganic salts in the radiator solutions are prone to effect undue corrosion of the various parts thereof, and while ethyl alcohol has proven to be inexpensive, nevertheless when used alone, it effects considerable corrosion of the metal parts of the radiators in contact with it.

An object of the present invention is to provide a composition of matter which not only has a low freezing point but likewise inhibits corrosion. A further object of this invention is to provide such a composition of matter, particularly for use in internal combustion engines, and in which the corrosive action of the anti-freeze liquid and the water is inhibited. Other objects will hereinafter appear.

We have found that a solution containing the water soluble lower aliphatic alcohols and principally ethanol, methanol, and propanol, in which there has been dissolved an alkali tartrate, such, for example, as an alkali or alkaline earth tartrate, or mixed alkali tartrates, as sodium potassium tartrate, antimony potassium tartrate, often called tartar emetic, etc., may be used in the cooling systems of internal combustion engines without fear of the corrosion of the oxidizable metals, such as brass, aluminum, steel, or other metals found in such apparatus by the water or acidic impurities present and with the as-

surance that, even though the temperature of the solution becomes excessive, there will result substantially no corrosion of the metal surfaces.

When preparing alcohol solutions containing the alkali or alkaline earth tartrates, they may be formed by a mere solution of these compounds in the alcohol or, as they are generally somewhat more soluble in water than in alcohol, it may be found preferable to dissolve them first in water which is subsequently added to the alcohol, giving thereto the desired concentration of the corrosion inhibitor. In this manner the tartrates can be readily incorporated in a solution containing a high concentration of methanol. The addition of such an alcohol salt solution to the automobile radiator will protect the metallic parts thereof from corrosion as well as imparting thereto the freezing point lowering of the radiator solution in proportion to the amount of the alcohol used.

The corrosion in the radiators of automotive vehicles or stationary internal combustion engines will, of course, be governed by many factors, such, for instance, as the impurities in the water present, the purity of the alcohols, etc. Generally speaking, however, a concentration within the radiator of from 0.1% to 0.5% of the tartrate will give a solution having substantially no corrosive action on the oxidizable metals with which said solution may contact.

While various aliphatic alcohols may be used in conjunction with the tartrate, we prefer methanol as it has several advantages over the other lower aliphatic alcohols. A smaller amount of methanol is required to effect the same freezing point lowering of a solution than is required to effect the same freezing point lowering by the addition of the higher molecular weight alcohols and consequently it is less expensive to use even when their cost per gallon is the same. Furthermore, an aqueous solution protected against freezing to 20° F. will have a boiling point of 199° F. if methanol is used and 194° F. if ethanol,—at 10° F. the relative boiling points are 193° F. for the

methanol protected solution and 187° F. for the ethanol protected solution. Obviously a smaller amount of methanol will be lost by evaporation under similar operating conditions.

An anti-freezing, non-corrosive composition for addition to the water-cooling system of internal combustion engines, in accord with our invention, should contain sufficient amount of the tartrate to give adequate protection from corrosion. This should be true even though the freezing point of the radiator solution is lowered only to a temperature of, say, 15° F. This result is realized when the methanol solution contains in the neighborhood of, say, 1 to 3% of the alkaline earth tartrate, alkali tartrate, or mixed alkali tartrate, and further a concentration even as low as .1% of these tartrates or the antimony alkali tartrates alone or mixed with other corrosion inhibitors is sufficient to give worthwhile corrosion inhibiting effect both in the radiator when diluted with water and in the container prior to dilution. The amount of methanol or other aliphatic alcohol required to give the desired lowering of the freezing point will be determined, of course, by the amount thereof added to the aqueous solution. The amount of methanol required to be added to obtain protection to a certain temperature below 32° F. is approximately 1% by weight of methanol for each degree Fahrenheit lowering desired.

Various changes may be made in the proportions and in the types of alcohols and tartrates employed without departing from this invention or sacrificing any of the advantages that may be derived therefrom.

We claim:

1. A process for inhibiting the corrosion of the oxidizable metals with which the anti-freeze radiator composition of automobiles is in contact, which comprises contacting the anti-freeze composition containing a water soluble aliphatic alcohol with the oxidizable metals in the presence of a small amount of a compound selected from the group consisting of the alkaline earth tartrates, the alkali tartrates, the mixed alkali tartrates, and the antimony alkali tartrates.

2. A process for inhibiting the corrosion of the oxidizable metals with which the anti-freeze radiator composition of automobiles is in contact, which comprises contacting the anti-freeze composition containing a water soluble aliphatic alcohol with the oxidizable metals in the presence of .1 to .5% of a compound selected from the group consisting of the alkaline earth tartrates, the alkali tartrates, the mixed alkali tartrates, and the antimony alkali tartrates.

3. A process for inhibiting the corrosion of oxidizable metals with which the liquid anti-freeze radiator compositions of automobiles is in contact, which comprises contact-

ing the anti-freeze composition containing an aqueous methanol solution and from 0.1 to 0.5% of an antimony alkali tartrate with the metals.

4. An automobile anti-freeze which is substantially non-corrosive towards the oxidizable metals of the automobile with which it contacts, which comprises an aqueous methanol solution containing 0.1% to 0.5% of an antimony potassium tartrate.

5. An automobile anti-freeze which is substantially non-corrosive towards the oxidizable metals of the automobile with which it contacts, which comprises a water soluble aliphatic alcohol and a small amount of a compound selected from the group consisting of the alkaline earth tartrates, the alkali tartrates, the mixed alkali tartrates, and the antimony alkali tartrates.

6. An automobile anti-freeze which is substantially non-corrosive towards the oxidizable metals of the automobile with which it contacts, which comprises a water soluble aliphatic alcohol and from 0.1 to 0.5% of a compound selected from the group consisting of the alkaline earth tartrates, the alkali tartrates, the mixed alkali tartrates, and the antimony alkali tartrates.

In testimony whereof we affix our signatures.

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