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CORROSION INHIBITOR FOR METALS

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This invention relates to methods for inhibiting corrosion of metals by the corrosive action of water vapor.

In manufacturing and commercial practices, metal objects are often wrapped or packaged for storing and shipping purposes and many attempts have been made to protect the metal objects from the corrosive action of water vapor by carefully wrapping or packaging the metal objects in moisture-proof wrappers or packages in order to prevent moisture from contacting the metal objects. In this respect elaborate schemes of wrapping and packaging have been tried and utilized such as sealing the metal objects in as many as three or four layers of moisture-resistant wrappings. However, such schemes have not been wholly successful for despite the best efforts corrosion by the corrosive action of water vapor still takes place. Moisture does seek its way into the interior of the wrapping or package and, also, such schemes do not take into account the water vapor trapped in the wrapping or package when it is sealed.

The principal object of this invention is to provide new and improved methods of inhibiting corrosion of metal objects by the corrosive action of water vapor wherein absolute sealing of the metal objects in moistureproof wrappings or packages is not required and wherein moisture trapped in the wrapping or package when it is sealed has no corrosive effect on the metal objects.

More specifically, an object of this invention is to associate with the metal objects to be protected a volatile compound that emits a vapor which deposits a corrosion-inhibiting film on the metal objects for preventing water vapor, which may be present, from corroding the metal objects.

A further object of this invention is to treat a fibrous material, such as paper, textile, etc., with a volatile compound that emits a vapor which deposits a corrosion inhibiting film on the metal objects to be protected and associating the fibrous material with the metal objects for preventing water vapor from corroding the metal objects. Such fibrous material may be interspersed with the metal objects in a conventional wrapping or package or it may be utilized as a part of the wrapping or package.

Another object of this invention is to utilize amines and amino-alcohols as the volatile compound for emitting the vapor which deposits a corrosion inhibiting film on the metal objects to be protected.

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In accordance with this invention a fibrous material, such as paper, textile, wood, etc., is treated with a volatile compound having vapor pressures such that under temperature conditions of use it will emit vapor having corrosion inhibiting characteristics. Amines and amino-alcohols having the desired vapor pressure characteristics have been, in accordance with this invention, determined to be particularly suitable as the volatile compound for emitting vapor having corrosion inhibiting characteristics.

In treating the fibrous material, it is preferably wetted by an alcohol solution containing the amines or amino-alcohols and after drying, upon evaporation of the alcohol solvent, the fibrous material is thoroughly and uniformly provided or impregnated with the resultant amines or amino-alcohols. The fibrous material provided or impregnated with the amines or amino-alcohols emits and continues to emit vapor having corrosion inhibiting characteristics as long as the fibrous material remains coated or impregnated.

The amount of impregnation of the fibrous material, and hence the lasting qualities of the volatile compound, a course, depends upon the percentage of amines or amino-alcohols in the original alcohol solution and the degree of wetting of the fibrous material which in turn depends upon the absorptive capacity of the fibrous material and the quantity of alcohol solution applied.

From an economic viewpoint it is generally desirable to utilize the least amount of volatile compound which will provide adequate protection against corrosion for the desired length of time and, of course, the amount of volatile compound, coating or impregnating the fibrous material, may be varied to suit the various applications.

For example, paper, such as conventional wrapping paper made from wood pulp stock, has been completely wetted with an alcohol solution containing substantially ten per cent monoethanolamine, then dried and sufficient quantities of vapor have been emitted therefrom to protect a metal object loosely wrapped therein for a period of weeks with no substantial signs of corrosion of the metal object even though the wrapping was subjected to one hundred per cent relative humidity at 120° F. temperature over that period of time.

Other alcohol solutions of amines and amino-alcohols having substantially the same percentages have been similarly tried and tested with substantially the same results. Among the amines and amino-alcohols so tried and successfully

tested are ethyl diethanolamine, butyl monoethanolamine, ethyl monoethanolamine, butyl diethanolamine and di-n-butylamino ethanol.

The fibrous material provided or impregnated with the volatile compound may be utilized for corrosion inhibiting purposes in various ways.

The metal objects to be protected may be wrapped or packaged in the fibrous material coated or impregnated with the volatile compound so that the vapors emanating therefrom may deposit a corrosion inhibiting film on the metal objects. In such case it is desirable to provide the outside of the wrapping or package with a covering which is impervious to the vapors of the volatile compound so that the vapors will be directed toward the metal objects to be protected and not wasted by emission to the surrounding atmosphere. This outer impervious covering may be a separate covering later applied, or a compound wrapping may be utilized having two laminations, one containing the volatile compound and the other being impervious to the vapors. In the latter case, the laminated covering, when stored preparatory to use, may be stacked or rolled so that wasting of the vapors during the storing period may be kept to a minimum by reason of the alternate impervious layers.

Instead of the laminated construction just described a single layer of fibrous material may be utilized with the same general results if one side of the layer is coated or impregnated with the volatile compound while the other side is provided or impregnated with a material impervious to the vapors.

Obviously, the invention is applicable to wrappings or packages in sheet form, envelope form or carton form.

The metal objects to be protected may also be wrapped or packaged in the usual manner with the volatile compound distributed conveniently within the parcel or package so that the vapors emitted therefrom will deposit a corrosion inhibiting film on the metal objects. The volatile compound may be distributed within the parcel or package in solid state in cloth bags or other porous containers or it may be sprinkled between layers of wadding or in some cases sprinkled directly into the package.

For ease of handling, uniform distribution, and proximity of the volatile compound to the surface of the metal objects, it may be desirable to distribute in the package fibrous material, preferably in strip or sheet form, coated or impregnated with the volatile compound. In this way considerable versatility of application in packaging is made possible.

If it be desired to protect metal inner surfaces of normally closed devices, such as for example in engine blocks, gear casings, measuring instruments, clocks, radio chassis and the like, the volatile compound may be distributed therein for emitting vapors to provide a corrosion inhibiting film on said metal inner surfaces.

Since the volatile compounds emit a vapor which deposits a corrosion inhibiting film on the metal objects or parts, the presence of water

vapor within the wrapping or package has no appreciable corrosive action on the metal objects or parts. It is therefore not necessary to seal the metal objects or parts from moisture as has been done in the past. It is only necessary to prevent entry into the package or parcel of considerable quantities of water and water vapor. In accordance with this invention corrosion prevention depends on inhibition of the corrosive action of the water vapor which gains access to the package or parcel rather than on complete exclusion of water vapor therefrom. By this invention, therefore, corrosion prevention and packaging and wrapping are greatly simplified and cheapened.

Although the invention has been described with certain illustrative embodiments, it will be apparent that changes and modifications may be readily made without departing from the spirit and scope of this invention and, therefore, this invention is to be limited only by the scope of the appended claims and prior art.

I claim as my invention:

1. A product for inhibiting corrosion of metal objects comprising, a material provided with a composition consisting essentially of a volatile compound comprising a lower alkylol amine and having a vapor pressure to emit at temperatures of use a metal corrosion inhibiting vapor.

2. A product for inhibiting corrosion of metal objects comprising, a fibrous absorbent material impregnated with a composition consisting essentially of a volatile compound comprising a lower alkylol amine and having a vapor pressure to emit at temperatures of use a metal corrosion inhibiting vapor.

3. A packaging for inhibiting corrosion of metal objects comprising, a laminated sheet of material for packaging the metal objects, one of the laminations provided with a composition consisting essentially of a lower alkylol amine having a vapor pressure to emit at temperatures of use a metal corrosion inhibiting vapor, the other lamination being a layer which is impervious to vapors.

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