

IMPROVEMENTS IN OR RELATING TO THE PROTECTION OF METALLIC SURFACES AGAINST  
 ATMOSPHERIC CORROSION.

PROVISIONAL SPECIFICATION

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, OLD MILL ROAD, NEW DELHI-1, INDIA, AN  
 INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

The following specification describes the nature of this invention.

THIS IS AN INVENTION BY KUMMATTITHIDAL SANTHANAM RAJAGOPALAN, AND GANAPATHY  
 RAMASESHAN, BOTH OF THE CENTRAL ELECTROCHEMICAL RESEARCH INSTITUTE, KARAIKUDI, MADRAS, INDIA, BOTH  
 INDIAN CITIZENS.

This invention relates to improvements in or relating to the protection of metallic surfaces against atmospheric corrosion during storage and transportation. The metal parts are usually housed, packaged, boxed and enveloped under such conditions that water vapour and air are either already present or enter later through packaging material. The invention has particular reference to preventing the corrosion of steel or ferrous metal during storage, handling and transportation.

The object of the present invention is to provide a method of preventing the corrosion of metallic surfaces which will be cheap, which will employ readily available materials and which will be particularly useful for protection against atmospheric condition usually met with in this country.

We have found that meta-dinitrobenzene or beta-naphthol can be used for the protection of packaged metal parts from humid atmospheric conditions and from humid atmospheres containing salt pollution.

The process for protecting metal surfaces against corrosion consists according to the present invention in exposing them to an atmosphere which contains m-dinitrobenzene or beta-naphthol in the form of vapour. The corrosion inhibitor (namely, m-dinitrobenzene or beta-naphthol) can be introduced inside the system in several ways e.g., as coating on packaging material or powder.

Objects to be protected against corrosion may be closed entirely or practically entirely. The closed space may be a drum, a warehouse, a room or formed by covering, wrapping the metal object with suitable packing material. The packing material may be paper, card-board, paper reinforced with plastic materials or waxy substances. A preferred embodiment of the process comprises coating of the volatile inhibitor on the packing material or as an impregnant on packing materials.

The amount of inhibitor required will vary depending upon the severity of conditions under which it is to be employed, the particular inhibitor utilized and the manner in which it is used. For general purposes, ordinary paper wrappings such as commonly employed in packaging metal articles will provide satisfactory inhibition against corrosion by moisture condensation within the package if the wrapping is coated with 1 gm. to 5 gms. of inhibitor/sq. ft. of packing material. It has been found that optimum protection is obtained from the vapour phase inhibitors if the distance between the inhibitor coated paper and the metal surface is not more than 6".

The effectiveness of the vapour phase inhibitors covered by this invention is shown by the following data.

Protection given to Steel.

Method of Test.

600 cc. bottles containing constant humidity solutions to a depth of 3" are taken and cylindrical pieces of filter paper impregnated with inhibitor to the extent of 1gm/sq. ft. are introduced inside these bottles such that they are situated a

few inches above the level of the humidity solutions. Mild steel test specimens are then suspended inside the bottles by Nichrome wire hooks fixed to the rubber closures such that they do not touch the paper and are equidistant from the paper in all directions. The bottles are closed and left inside an air thermostat for a period of one month at the end of which the steel specimens are taken out and their condition examined. In one set of experiments the steel specimens are also inoculated with dry sodium-chloride particles before introduction into the bottles. Under these conditions in the absence of inhibition, the steel specimens are completely covered with rust. Results obtained with the chemicals, the use of which is covered by this specification, are given in Table I.

TABLE I

Sl. No.	Chemical	Condition of specimens at the end of test			
		When inoculated with salt at		When not inoculated with salt at	
		90% RH	100% RH	90% RH	100% RH
1.	m-Dinitrobenzene	Rusting confined to where salt nuclei are present.	Rusting confined to where salt nuclei are present	Unaffected	Unaffected except for slight rusting at suspension hole.
2.	B-naphthol	Slight rusting at places where salt nuclei are present.	Slightly more rusting at places where salt nuclei are present.	Unaffected.	-do-

The invented process is particularly useful for anti-corrosion packaging of metal stores and protection during handling, storage and transportation under atmospheric conditions prevailing inside packages in the coastal areas of the country.

The coating or impregnation of filter paper or packing material according to our invention by cheaply available chemical is likely to result in the production of large quantities of such papers and packing material for the protection of packaged metal parts under humid atmospheric conditions. The invention is, therefore, of considerable utility to all those who deal in large stocks of metallic stores.

R. BHASKAR PAI,

Patent Officer,

Council of Scientific & Industrial Research.

Dated this 9th day of July 1959.

Price : TWO RUPEES.

## COMPLETE SPECIFICATION

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, OLD MILL ROAD, NEW DELHI 1, INDIA, AN  
INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860)

*The following specification particularly describes and ascertains the nature of this invention and the manner  
in which it is to be performed*

THIS IS AN INVENTION BY KUMMATTITHIDAL SANTHANAM BAJAGOPALAN AND GANAPATHY  
RAMASESHAN, BOTH OF THE CENTRAL ELECTRO CHEMICAL RESEARCH INSTITUTE, KARAIKUDI, MADRAS, INDIA, BOTH  
INDIAN CITIZENS

This invention relates to improvements in or relating to the protection of metallic surfaces against atmospheric corrosion during storage and transportation. The metal parts are usually housed, packaged, boxed and enveloped under such conditions that water vapour and air are either already present or enter later through packaging material. The invention has particular reference to preventing the corrosion of steel or ferrous metal during storage, handling and transportation.

The object of the present invention is to provide a method of preventing the corrosion of metallic surfaces which will be cheap, which will employ readily available materials and which will be particularly useful for protection against atmospheric conditions usually met with in this country.

We have found that meta dinitrobenzene and beta naphthol can be used for the protection of packaged metal parts from humid atmospheric conditions and from humid atmospheres containing salt pollution.

The process for protecting metal surfaces against corrosion consists according to the present invention in exposing them to an atmosphere which contains m-dinitrobenzene or beta naphthol in the form of vapour. The corrosion inhibitor (namely, m-dinitrobenzene or beta-naphthol) can be introduced inside the system in several ways, e.g., as coating on packaging material or as powder. The preferred method of application of the inhibitor on packing material is to spray a solution of the inhibitor in a volatile solvent containing the required amount of inhibitor and an adhesive material.

Objects to be protected against corrosion may be closed entirely or practically entirely. The enclosed space may be a drum, a warehouse, a room or formed by covering, wrapping the metal object with suitable packing material. The packing material may be paper, card board, paper reinforced with plastic materials or waxy substances. A preferred embodiment of the process comprises coating of the volatile inhibitor on the packing material or as an impregnant on packing materials.

The amount of inhibitor required will vary depending upon the severity of conditions under which it is to be employed, the particular inhibitor utilized and the manner in which it is used. For general purposes, ordinary paper wrapping such as commonly employed in packaging metal articles will provide satisfactory inhibition against corrosion by moisture condensation within the package if the wrapping is coated with 1 gm. to 5 gms. of inhibitor/sq. ft. of packing material. It has been found that optimum protection is obtained from the vapour phase inhibitors if the distance between the inhibitor coated paper and the metal surface is not more than 6".

The effectiveness of the vapour phase inhibitors covered by this invention is shown by the following data.

### *Protection given to Steel*

#### Method of Test

600 cc bottles containing constant humidity solutions to a depth of  $\frac{3}{4}$ " are taken and cylindrical pieces of filter paper impregnated with inhibitor to the extent of 1 gm/sq. ft. are introduced inside these bottles such that they are situated a few inches above the level of the humidity solutions. Mild steel test specimens are then suspended inside the bottles by nichrome wire hooks fixed to the rubber closures such that they do not touch the paper and are equidistant from the

paper in all directions. The bottles are closed and left inside an air thermostat for a period of one month at the end of which the steel specimens are taken out and their condition examined. In one set of experiments the steel specimens are also inoculated with dry sodium chloride particles before introduction into the bottles. Under these conditions in the absence of inhibition, the steel specimens are completely covered with rust. Results obtained with the chemicals, the use of which is covered by this specification, are given in Table I.

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The invented process is particularly useful for anti-corrosion packaging of metal stores and protection during handling, storage and transportation under atmospheric conditions prevailing inside packages in the coastal areas of the country.

The coating or impregnation on filter paper or packing material according to our invention by cheaply available chemicals is likely to result in the production of large quantities of such papers and packing material for the protection of packaged metal parts under humid atmospheric conditions. The invention is, therefore, of considerable utility to all those who deal in large stocks of metallic stores.

We claim:

1 A process for the protection of metallic surfaces against atmospheric corrosion which consists in exposing them to an atmosphere which contains m-dinitrobenzene or beta naphthol in the form of vapour.

2 A process as claimed in Claim 1 wherein m-dinitrobenzene or beta naphthol is introduced as coating or impregnant on packaging material or as powder.

3 A process as claimed in Claim 1 wherein a solution of m-dinitrobenzene or beta naphthol in a volatile solvent containing an adhesive material is sprayed on packing material.

4 A process as claimed in any of the preceding claims wherein the metallic surfaces to be protected are kept in an enclosed space such as a drum, a warehouse, a room, or formed by covering or wrapping the metal object with

packing material such as paper, cardboard, paper reinforced with plastic materials or waxy substances.

5. A process as claimed in any of the preceding claims wherein the packing material, e.g., paper wrappings for packaging metal articles is coated with 1 gm to 5 gms of m-dinitrobenzene or beta-naphthol per square foot of packing material.

6. A process as claimed in any of the preceding claims wherein the distance between the inhibitor coated paper and metal surface is not more than 6 inches to obtain optimum protection.

7. Metal surfaces, particularly of steel or ferrous metal, whenever protected against atmospheric corrosion according to a process substantially as hereinbefore described.

R. BHASKAR PAI,

Patents Officer,

*Council of Scientific and Industrial Research.*

*Dated this 18th day of March 1960.*