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PROVISIONAL SPECIFICATION.

PREPARATION OF ADHERENT RUBBER ELECTRODEPOSITS OVER ALUMINIUM FROM NATURAL RUBBER LATEX

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAJ MARG, NEW DELHI-1, INDIAN, 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 Dr. Sankaran Guruswamy, Scientist, Central Electrochemical Research Institute, Karaikudi-3 (Tamil Nadu) and Shri Venkateraman Yegnaraman, Senior Laboratory Assistant, Central Electrochemical Research Institute, Karaikudi-3 (Tamil Nadu), both Indian Citizens.

This invention relates to the preparation of adherent rubber electrodeposits over aluminium from natural rubber latex.

The method of electrodepositing rubber from natural rubber latex on metal and/or electrically conducting surfaces is known for some time and has been used for the manufacture of articles based on deposits that can be peeled off. The use of the method, however, to obtain an adherent deposit over metals has been handicapped by the non-adherent nature of the metal-electrodeposited rubber bond.

The object of the invention is to obtain an adherent deposit of rubber on aluminium by passing an electric current under specified voltages, through commercially available rubber latex modified by adding ammonia and other additives and by a suitable heat treatment of the aluminium electro-coated with rubber.

To these ends, the invention broadly consists in i) passing a D. C. electric current between an aluminium anode dipped in the rubber latex bath, kept in a porous pot and a stainless steel metal container cathode containing water : the porous pot is kept inside the metal container. Additives like ammonia, mercaptobenzothiazole, titanium dioxide, cobalt naphthenate and sulphur are added to the bath as per specific requirements and ii) heating the electrodeposited aluminium at 180° to 200° for about two hours.

The following typical examples are given to illustrate the invention :

EXAMPLE I

A reddish brown smooth glossy adherent coating (size 2 cms. x 4 cms) of electrodeposited rubber on aluminium plate is made by passing direct current at 150 volts for a period of three minutes, through an aqueous bath containing 6 parts of rubber, 0.2 to 0.5 parts of mercaptobenzothiazole, 0.2 to 0.3 parts of cobalt naphthenate and 1.0 part of finely divided sulphur suitably dispersed and sufficient amount of concentrated ammonia to adjust the pH to 11.0 to 11.5 and by heating the electrodeposit at 200°C in a vertical position for about two hours.

EXAMPLE II

A dull brown adherent smooth coating (size 2 cms. x 4 cms.) of electrodeposited rubber on aluminium plate is obtained by adding 1 part of finely divided titanium dioxide to the bath described in Example I, the current conditions and heat treatment are the same as in Example I.

EXAMPLE III

A light brown smooth adherent coating (size 2 cms. x 4 cms.) of electrodeposited rubber on aluminium plate is obtained by passing a direct current at 150 volts for a period of three minutes through an aqueous bath containing 6 parts of rubber, 0.4 parts of mercaptobenzothiazole, 0.25 parts of cobalt naphthenate 1.5 parts of titanium dioxide and sufficient amount of concentrated ammonia to adjust the pH to 11 to 11.5 and heating the deposit at 180°C for about 100 minutes.

The following are the main advantages of the invention :

1. It has the advantage of producing organic coating on aluminium with the minimum damage to the underlying metal.
2. It is capable of being adopted to the needs of continuous coating of aluminium articles in industry and commerce.

R. BHASKAR PAI

Patents Officer.

Council of Scientific and Industrial Research.

Dated this 28th day of August 1971.

Price : TWO RUPEES

COMPLETE SPECIFICATION.

PREPARATION OF ADHERENT RUBBER ELECTRODEPOSITS OVER ALUMINIUM FROM NATURAL RUBBER LATEX

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAJ MARG, 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 Dr. Sankaran Guruswamy, Scientist, and Venkataraman Yegnaraman, Senior Laboratory Assistant, both of the Central Electrochemical Research Institute, Karaikudi-3 (Tamil Nadu), both Indian Citizens.

This invention relates to the preparation of adherent rubber electrodeposits over aluminium from natural rubber latex.

Natural rubber latex (collected from the rubber tree) suitably diluted gives electrodeposits over metals when direct current is passed through it. The electrodeposits, however, are peelable, in other words, not adherent. The object of this invention is to prepare adherent rubber electro coatings over aluminium from natural rubber latex with the help of direct current.

We have found that this can be done by incorporating suitable additives in natural rubber latex, and by taking the electro deposited rubber for specified time and temperature so to obtain rubber coatings of industrial value.

According to the present invention, there is provided a process for the preparation of adherent rubber latex, by direct current characterised in that mechanically polished aluminium articles, are kept as anodes in a porous pot containing commercially available centrifuged rubber latex in the concentration of 6 to 10% with additives and the porous pot is kept in a stainless steel container containing water, wherein direct current in the voltage range 120 to 150 volts is passed between the aluminium article as the anode and the stainless steel container as the cathode to obtain an electro-coating of rubber on the anode, and wherein the electro-deposited rubber is baked at temperatures in the range of 150 to 200°C for 1 to 3 hours to develop adhesion. Other properties which are of value in organic coatings of industrial importance are also developed as will be evident from the following description.

Additives like mercaptobenzothiazole (0.2 to 0.5%), cobalt naphthanate (0.2 to 0.3%) and sulphur (1 to 2%) are added to the commercially available centrifuged rubber latex diluted with water to a concentration of 6 to 10% and maintained at a pH of 11 to 11.5 by the addition of ammonia, and wherein the electrodeposit is heated at 200°C for about two hours to obtain a reddish brown, smooth glossy adherent coating.

Titanium dioxide is added to the commercially available centrifuged rubber latex diluted with water to a concentration of 6 to 10%, and containing additives like mercaptobenzothiazole (0.3 to 0.4%), cobalt naphthanate (0.2 to 0.3%), and wherein the electrodeposited rubber is heated at 180°C for about 100 minutes to obtain brown/light brown adherent electrocoating of rubber over aluminium.

Thus, the steps of the process are: (a) preparing the depositing bath, (b) mechanically polishing the aluminium article, (c) keeping the article as the anode in a porous pot containing the depositing bath, (d) keeping the porous pot in a stainless steel container containing water, (e) passing DC at preferred voltages through the aluminium article kept as the anode, and the metal container as the cathode for a period of 2 to 3 minutes, (f) washing the electrocoated sample

with water, (g) baking the rubber electrocoated samples in an air oven for a specified time (1 to 3 hours) at temperature 200 to 150°C. In our invention the bath is prepared as follows: commercially available centrifuged rubber latex (60%) is diluted 6 to 10 times and additives like mercaptobenzothiazole (0.2 to 0.5%) titanium dioxide (8 to 15%) cobalt naphthanate (0.2 to 0.3%) and sulphur (1 to 2%) are added to the bath as per specific requirements. The pH of the bath is maintained in the range 10.5 to 12 by the addition of ammonia. We have found that reddish brown, smooth, glossy deposits can be obtained by adding additives like sulphur (1 to 2%), cobalt naphthanate (0.2 to 0.3%) mercapto benzothiazole (0.2 to 0.5%) and baking the deposit at 200°C for about two hours. Dull brown/light brown deposits can be prepared by adding titanium dioxide in suitable concentrations (8 to 15% preferred range 10 to 12%) to the rubber latex bath.

Typical cases of electrocoatings are illustrated in examples I to III below.

EXAMPLE I

A reddish brown smooth glossy adherent coating (size 2 cms. x 4 cms) of electrodeposited rubber on aluminium plate is made by passing direct current at 150 volts for a period of three minutes through an aqueous bath containing 6 parts of rubber, 0.2 to 0.5 parts of mercaptobenzothiazole, 0.2 to 0.3 parts of cobalt naphthanate and 1.0 part of finely divided sulphur suitably dispersed and sufficient amount of concentrated ammonia to adjust the pH to 11.0 to 11.5 and by heating the electrodeposit at 200°C in a vertical position for about two hours.

EXAMPLE II

A dull brown adherent smooth coating (size 2 cms x 4 cms) of electrodeposited rubber on aluminium plate is obtained by adding 1 part of finely divided titanium dioxide to the bath described in Example I. The current conditions and heat treatment are the same as in Example I.

EXAMPLE III

A light brown smooth adherent coating (size 2 cms x 4 cms) of electrodeposited rubber on aluminium plate is obtained by passing a direct current at 150 Volts for a period of three minutes through an aqueous bath containing 6 parts of rubber, 0.4 parts of mercaptobenzothiazole, 0.25 parts of cobalt naphthanate, 1.5 parts of titanium dioxide and sufficient amount of concentrated ammonia to adjust the pH to 11 to 11.5 and heating the deposit at 180°C for about 100 minutes.

The following are the main advantages of the invention:

1. It has the advantage of producing organic coat

ing on aluminium with the minimum damage to the underlying metal ;

2. It is capable of being adopted to the needs of continuous coating of aluminium articles in industry and commerce.

We claim :

1. A process for the preparation of adherent rubber electrodeposits over aluminium from natural rubber latex, by direct current characterised in that mechanically polished aluminium articles are kept as anodes in a porous pot containing commercially available centrifuged rubber latex in the concentration of 6 to 10% with additives and the porous pot is kept in a stainless steel container containing water, wherein direct current in the voltage range 120 to 150 volts is passed between the aluminium article as the anode and the stainless steel container as the cathode to obtain an electrocoating of rubber on the anode, and wherein the electrodeposited rubber is baked at temperatures in the range of 150 to 200°C for 1 to 3 hours to develop adhesion.

2. A process as claimed in Claim 1 wherein additives like mercaptobenzothiazole (0.2 to 0.5%), cobalt naphthanate (0.2 to 0.3%) and sulphur (1 to 2%) are added to the commercially available centrifuged rubber latex diluted with water to a concentration of 6 to 10% and maintained at a pH of 11 to 11.5 by the addition of ammonia, and wherein the electrodeposit is heated at 200°C for about two hours to obtain a reddish brown, smooth glossy adherent coating.

3. A process as claimed in Claim 1 wherein titanium dioxide is added to the commercially available centrifuged rubber latex diluted with water to a concentration of 6 to 10%, and containing additives like mercaptobenzothiazole (0.3 to 0.4%), cobalt naphthanate (0.2 to 0.3%); and wherein the electrodeposited rubber is heated at 180°C for about 100 minutes to obtain brown/light brown adherent electrocoating of rubber over aluminium.

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Dated this 12th day of June 1972.