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PRODUCING TRANSPARENT PROTECTIVE FILMS ON ZINC OR CADMIUM

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6 Claims. (Cl. 146—6.21)

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The present invention relates to improved compositions and a process of treatment for zinc and cadmium and similar materials electronegative to iron, whereby the bright luster of the same is preserved.

One of the problems that confronts manufacturers of zinc coated products, particularly galvanized steel sheets, is the rapidity with which the zinc surface loses its bright luster and becomes coated with an oxidation product sometimes called "white bloom." The manufacturer desires to deliver his product to the consumer with a bright metallic surface. However, in normal distribution practices the zinc coated products are usually stored in the manufacturer's or jobber's warehouse for a considerable period. In the damp atmosphere of the warehouse the coating soon begins to oxidize. Even coated sheets that are stacked in contact become covered with the dull "bloom" in a short time.

It has been a practice to coat mill galvanized sheets at the factory with oil to overcome the tendency to oxidize. However, this treatment is not completely satisfactory, and furthermore it must be removed before painting can be attempted. Attempts have been made to use chromic acid and mineral acid dips to inhibit corrosion. However, in most cases, the dips have been too expensive or difficult to apply, or produce a visible colored coating which detracts from the metallic appearance.

We have devised compositions and a process employing a chemical dip which will overcome the defects mentioned above. Our invention preserves the original bright metallic luster of the metallic products and provides a basis for paint if it is desired to add such a coating to the object.

These compositions are available as concentrates for dilution with water to produce a dip or bath capable of forming a transparent, corrosion resistant, protective film on coatings or castings of zinc and cadmium.

We have discovered that improved results are obtained by employing a dilute aqueous solution containing chromium trioxide (CrO_3) and hydrochloric acid (36 to 38%) wherein there is about a 1:1 ratio of an equal number of grams of chromium trioxide to an equal number of milliliters of hydrochloric acid. Other critical conditions surrounding the method of treatment are a solution having a pH between about 1.75 and 2.05, an immersion period of 5 to 120 seconds, with best results at about 60 seconds, a bath temperature between about 70 and 212° F. with the

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optimum at about 180° F., followed by a final rinse in hot or cold water at a temperature of about 70 to 140° F.

Example I

CrO_3	1 gm./l
HCl	1 ml./l

The metal surfaces treated under the foregoing conditions retain their luster with substantially complete freedom from zinc rust, and, moreover, withstand a salt spray test throughout a commercially feasible time cycle.

Preferably, neutral salts such as zinc sulphate, ammonium sulphate or sodium sulphate are added to the formula of Example I in critical amounts to produce a concentration of the sulphate radical (SO_4) of about 75 to 150 mg./l.

Example II

CrO_3	1 gm./l
HCl	1 ml./l
$ZnSO_4 \cdot 7H_2O$	0.2 to 0.4 gm./l

The pH is maintained within the range indicated for Example I and the other critical treating conditions described are observed.

While a preferred method of treating is to immerse the coated metal products or castings in solutions of the character described, the solutions may be used as treating agents by spraying the same upon the objects.

The important results obtained are the maintenance of the luster and freedom from oxidation and without producing discoloration of the articles.

In referring to zinc and cadmium in the appended claims we intend to include coatings and castings of these materials as well as alloys containing an appreciable amount of the same.

This application is a continuation-in-part of our copending application, Serial No. 754,062, filed June 11, 1947, now abandoned.

We claim:

1. An aqueous solution for use in the treatment of metals selected from the group consisting of zinc and cadmium to preserve the luster thereof and reduce oxidation consisting essentially of a 1:1 ratio of an equal number of grams of chromium trioxide to an equal number of milliliters of hydrochloric acid (36 to 38%).

2. An aqueous concentrated solution for use in the treatment of metals selected from the group consisting of zinc and cadmium to preserve the luster thereof and reduce oxidation consisting essentially of a 1:1 ratio of an equal number of

grams of chromium trioxide to an equal number of milliliters of hydrochloric acid (36 to 38%).

3. An aqueous solution for use in the treatment of metals selected from the group consisting of zinc and cadmium to preserve the luster thereof and reduce oxidation consisting essentially of 1 gram per liter of chromium trioxide and 1 milliliter per liter of hydrochloric acid (36 to 38%).

4. An aqueous solution according to claim 3 containing a neutral salt of sulphuric acid in an amount to produce a concentration of the sulphate radical of 75 to 150 mg./l which will not discolor the zinc or cadmium surface.

5. The process of treating metals selected from the group consisting of zinc and cadmium to preserve the luster thereof and reduce oxidation which comprises treating the metal with an aqueous solution consisting essentially of 1 gram per liter of chromium trioxide and one milliliter per liter of hydrochloric acid (36 to 38%), said solution having a temperature between 70° and 212° F. and the treatment of the metal being conducted for 50 to 120 seconds.

6. The process according to claim 5 wherein the solution contains a neutral salt of sulphuric acid in amount to produce a concentration of the sulphate radical of 75 to 150 mg./l which will not discolor the zinc or cadmium surface.

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