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ELECTROCLEANER FOR BRASS

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The present invention relates to an electrocleaner for brass, and more particularly to a composition which will enable brass comprising from ten to fifty weight percent of zinc to be electrocleaned without tarnishing or staining.

Experience in the plating industry has shown that the plating of brass, particularly brass comprising from ten to fifty weight percent of zinc, is rendered difficult because of the difficulties connected with cleaning the brass prior to plating. Techniques involving direct current and reverse current cleaning methods have been utilized followed by acid pickling, but notwithstanding the use of a wide variety of compositions in the direct current and reverse current cleaning baths, tarnishing and staining of the brass has been a serious problem.

During the direct current cleaning stage, the scrubbing action of the electrocleaning forms the basis of the cleaning action, while during the reverse current cleaning stage any metallic impurities which have plated out onto the brass are removed. Acid pickling subsequent to the electrocleaning stages is necessary to remove material, such as metallic oxides, which is not removed during the electrocleaning stages.

The problems heretofore referred to comprise the formation of tarnish subsequent to the electrocleaning upon the surface of the brass. The exact chemical nature of such tarnish is not fully understood, but it is believed to be complex oxides formed during the electrocleaning stages. Since the acid pickling stage in connection with brass cleaning is limited in respect to the concentration of acid which may be utilized, in most cases it has proved impossible to remove all of the tarnish which forms on the brass subsequent to the electrocleaning stage.

A wide variety of chemical compositions have been suggested as being useful for addition to the electrocleaning stages, but to date no electrocleaner composition for the cleaning of brass has proved to be entirely satisfactory. While resort has been had to high current density in the direct current electrocleaning stage in order to obtain a greater degree of gassing and/or the use of strongly alkaline electrocleaning solutions, no prior electrocleaner known to me will yield a high luster etch-free brass without substantial buffing.

The present invention has as an object the provision of an electrocleaner for brass which will prevent tarnishing, etching and staining of the brass during its electrocleaning.

The present invention has as another object the provision of a method for yielding a brass particularly suited for electroplating.

Other objects will appear hereinafter.

These and other objects are accomplished by the electrocleaner of the present invention which comprises a mixture of about five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, with the remainder being soda ash (sodium carbonate) and/or sodium pyrophosphate or

related phosphoric acid salts. Preferably, minor amounts such as one to two weight percent of a wetting agent and up to about two weight percent of sodium gluconate should be present in the composition. The aforesaid composition should be added to water in a concentration ratio of between about one to twelve ounces of such composition per gallon of water to form an electrocleaning bath.

In the preferred compositions of the present invention, the glucose should be present in the composition to the extent of about ten weight percent, the sodium meta silicate should be present in the composition to the extent of about five weight percent, and the one hundred percent sodium hydroxide should be present to the extent of about twenty-two weight percent. It is, of course, to be understood that the compositions of the present invention may be derived from caustic soda other than one hundred percent sodium hydroxide, provided that the ratio of this component is equilibrated to the aforesaid value based on one hundred percent sodium hydroxide. The optimum electrocleaning bath of the present invention comprises from two to six ounces of the aforesaid mixture per gallon of water.

I have found that the synergistic action between the glucose and sodium meta silicate in the electrocleaning composition of my invention is substantially unique in respect to the glucose. Thus, experiments with other sugars, such as sucrose, revealed no synergistic relationship, and no efficacy for electrocleaning upon the part of the sucrose compositions.

I have found that not only do the compositions of my invention when utilized as an electrocleaning bath serve to remove impurities which have plated out onto the brass when the bath is used in reverse current cleaning, but moreover a light protective film of unknown composition is deposited upon the brass after such reverse current cleaning which serves to prevent staining during the transfer of the brass from the bath to a rinsing water stage. Thus, my invention solves a long felt need in the electroplating of brass, since experience has shown that brass which has been electrocleaned by direct current cleaning is particularly susceptible to staining during transfer to the rinse water stage.

I have found that the removal of the glucose and/or sodium meta silicate from the electrocleaning baths of my invention will result in the formation of a dark tarnish on the brass (as above-noted, brass as used herein is meant to include alloys of zinc and copper consisting of from ten to fifty weight percent of zinc), which dark tarnish is not removed in the subsequent acid pickle. While I have not been able to absolutely identify the chemical composition of the aforesaid dark tarnish, I believe it to be oxides, perhaps complex oxides, formed during electrocleaning. All attempts to remove such tarnish chemically resulted in the reduction of the luster of the brass.

I have definitely established a true synergistic effect between the glucose and the sodium meta silicate in the electrocleaning compositions of my invention. Thus, I have determined that when the glucose is present without the sodium meta silicate or when the sodium meta silicate is present without the glucose, the electrocleaning bath is but slightly better in reducing tarnishing than a bath without either the glucose or the sodium meta silicate. I have further found that increasing the amount of glucose in the absence of sodium meta silicate will tend to increase the degree of tarnishing, particularly when the glucose concentration reaches a high level. Increasing the concentration of the sodium meta silicate in the absence of glucose will reduce the degree of tarnishing slightly, but will cause etching at high current densities. The combination of both the glucose and the

sodium meta silicate in the aforesaid concentrations substantially eliminates both tarnishing and etching, and as aforesaid provides a coating which prevents staining on transference to a rinsing water stage.

As illustrative of one embodiment of the present invention may be mentioned the following example:

One thousand gallons of an electrocleaning bath in accordance with the present invention was made up from water and four thousand ounces of the following dry mix composition: ten weight percent of glucose; five weight percent of sodium hydroxide; fifty-nine weight percent of sodium carbonate; two weight percent of sodium gluconate; and two weight percent of alkyl aryl sulfonate surface active agent.

Electrocleaning of a wide variety of brasses with the aforementioned bath, such electrocleaning occurring first in a direct current stage and then in a reverse current stage and followed by acid pickling cleaning with hydrochloric acid produced surfaces entirely free from both etching and tarnish and which received metallic plated coatings with a high degree of facility. The total electrocleaning time should be between twenty seconds to two minutes, with the current density being regulated to between ten to fifty amperes per square foot.

The composition referred to above was modified in that solid sodium pyrophosphate was substituted in place of the sodium carbonate. Equally good results were obtained with this composition, clearly establishing the non-critical nature of the sodium carbonate. However, the sodium carbonate has an advantage over sodium pyrophosphate in that it is a better desiccant and materially aids in the elimination of blending problems when the dry mix is being prepared, which problems may arise from the fixation of atmospheric water vapor by the one hundred percent sodium hydroxide.

While sodium meta silicate is to be preferred, sodium orthosilicate, sodium disilicate, potassium meta silicate, potassium orthosilicate, or potassium disilicate may be substituted therefor. Moreover, in place of sodium carbonate, potassium carbonate may be substituted, and in place of sodium pyrophosphate, other phosphates such as potassium pyrophosphate, and the sodium or potassium metaphosphates or orthophosphates may be substituted. Where a substitution is made for the sodium meta silicate, sodium carbonate or sodium pyrophosphate the weight percent ratio heretofore set forth should be adjusted to provide for the stoichiometric equivalent of the substituted material.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. An electrocleaner consisting essentially of a mixture of about five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, and the major weight percentage of the remainder comprising one or more salts selected from the group consisting of sodium carbonate and sodium pyrophosphate.

2. An electrocleaner bath consisting essentially of the electrocleaner defined in accordance with claim 1 and water, in which said electrocleaner is present in a concentration ratio of between about one to twelve ounces per gallon of water.

3. In an electrocleaner for brass a mixture consisting essentially of about five to fifteen parts by weight of glucose, two to ten parts by weight of sodium meta silicate, and an amount of caustic soda equivalent to fifteen to twenty-five parts by weight of one hundred percent sodium hydroxide.

4. An electrocleaner for brass consisting essentially of about ten weight percent glucose, five weight percent of sodium meta silicate, twenty-two weight percent of one hundred percent sodium hydroxide, and the remainder comprising a salt selected from the group consisting of sodium carbonate and sodium pyrophosphate.

5. An electrocleaner bath for brass consisting essentially of the electrocleaner defined in claim 4 and water, in which said electrocleaner is present in a concentration ratio to the water of about two to six ounces of said electrocleaner per gallon of water.

6. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to direct current in a bath consisting essentially of water, from five to fifteen parts by weight of glucose, from two to ten parts by weight of sodium meta silicate, and an amount of caustic soda equivalent to from fifteen to twenty-five parts by weight of one hundred percent sodium hydroxide.

7. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to reverse current in a bath consisting essentially of water, from five to fifteen parts by weight of glucose, from two to ten parts by weight of sodium meta silicate, and an amount of caustic soda equivalent to from fifteen to twenty-five parts by weight of one hundred percent sodium hydroxide.

8. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to direct current in a bath consisting essentially of water, from five to fifteen parts by weight of glucose, from two to ten parts by weight of sodium meta silicate, and an amount of caustic soda equivalent to from fifteen to twenty-five parts by weight of one hundred percent sodium hydroxide, and then exposing said brass to reverse current in a bath comprising water, from five to fifteen parts by weight of glucose, from two to ten parts by weight of sodium meta silicate, and an amount of caustic soda equivalent to from fifteen to twenty-five parts by weight of one hundred percent sodium hydroxide.

9. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to direct current in a bath consisting essentially of water, from five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, and the major weight percentage of the remainder comprising one or more salts selected from the group consisting of sodium carbonate and sodium pyrophosphate, with the concentration ratio between the water and the remaining aforesaid components being a concentration ratio of between about one to twelve ounces of the remaining aforesaid components per gallon of water.

10. In a method in accordance with claim 9, the use of a bath in which the concentration ratio between the water and the remaining components of the bath is a concentration ratio of about two to six ounces of such remaining components per gallon of water.

11. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to reverse current in a bath consisting essentially of water, from five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, and the major weight percentage of the remainder comprising one or more salts selected from the group consisting of sodium carbonate and sodium pyrophosphate, with the concentration ratio between the water and the remaining aforesaid components being a concentration ratio of between about one to twelve ounces of the remaining aforesaid components per gallon of water.

12. In a method in accordance with claim 11, the use of a bath in which the concentration ratio between the

water and the remaining components of the bath is a concentration ratio of about two to six ounces of such remaining components per gallon of water.

13. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to direct current in a bath consisting essentially of water and a dissolved electrocleaner, said dissolved electrocleaner comprising from about five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, and the major weight percentage of the remainder comprising one or more salts selected from the group consisting of sodium carbonate and sodium pyrophosphate, with the concentration of said electrocleaner to water being in the ratio of about one to twelve ounces of electrocleaner per gallon of water, and then exposing said brass to reverse current in a bath comprising water, and a dissolved electrocleaner, said dissolved electrocleaner comprising about five to fifteen weight percent of glucose, two to ten weight percent of sodium meta silicate, fifteen to twenty-five weight percent of one hundred percent sodium hydroxide, and the major weight percentage of the remainder comprising one or more salts selected from the group consisting of sodium carbonate and sodium pyrophosphate, with the concentration ratio between said electrocleaner and water being about one to twelve ounces of electrocleaner per gallon of water.

14. The method in accordance with claim 13 in which the electrocleaner is present in both the direct current bath and the reverse current bath in a concentration ratio of between about two to six ounces of electrocleaner per gallon of water.

15. An electrocleaner consisting essentially of a mixture of glucose, a compound selected from the class consisting of sodium meta silicate, sodium orthosilicate, sodium disilicate, potassium meta silicate, potassium orthosilicate, and potassium disilicate, sodium hydroxide, and a major weight percentage of a salt selected from the group consisting of sodium carbonate, potassium carbonate, sodium pyrophosphate, potassium pyrophosphate, sodium metaphosphate, potassium metaphosphate, sodium orthophosphate, and potassium orthophosphate.

16. In a method for electrocleaning brass, the improvement which comprises cleaning said brass by exposing it to direct current in a bath consisting essentially of water and the composition set forth in claim 15.

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