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INHIBITOR

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12 Claims. (Cl. 148—8)

This invention relates to the production of pickling or cleaning baths which display protective action on the metal of crude ferrous metal surfaces, whereby the oxide and scale are selectively dissolved without substantial loss of free metal. Furthermore these baths have the property of forming a surface foam.

According to our invention we add to the acid pickling or cleaning bath, which may consist of an aqueous solution of sulphuric acid or hydrochloric acid, or other non-oxidizing acid, a long chain alkyl quaternary ammonium compound.

By the term long chain alkyl quaternary ammonium compound we mean a compound containing a quaternary ammonium grouping, and a long chain alkyl radical, that is, an alkyl radical of not less than six carbon atoms.

Compounds of this type are obtained from the higher alcohols and are exemplified by cetyl-pyridinium bromide, cetyl-trimethyl-ammonium hydroxide, octadecyl-pyridinium halogenides, the free bases or other salts thereof.

The invention is illustrated but not limited by the following example in which the parts are by weight.

Example 1

A pickling bath is prepared by mixing 1.75 parts of octadecyl-pyridinium bromide with 100,000 parts of a 7% solution of sulphuric acid in water and heating to a temperature of about 90° C. If sheet iron, with an oxidized or scaly surface, is immersed in this bath the impurity is readily removed leaving a clean metallic surface. During this process of pickling a foam is formed on the surface. When previously de-scaled and cleaned, sheet iron is immersed for five minutes in a similar bath, the metallic loss which results amounts to 0.31% by weight, whereas similar treatment in a free acid bath not containing the octadecyl-pyridinium bromide results in a loss of 2.53% by weight.

Example 2

2 parts of cetyltrimethylammonium bromide are dissolved in 100,000 parts of 7% sulphuric acid at 60° C. In comparative experiments descaled sheet iron was immersed for 5 minutes in such a bath and the metallic loss which resulted was 0.195% whilst similar treatment of the same sheet iron without the use of an inhibitor brought about a metallic loss of 1.16%.

Example 3

A pickling bath is prepared by mixing 1.75% parts of octadecyltrimethylammonium bromide with 100,000 parts of a 7% solution of sulphuric acid in water and heating to a temperature of about 90° C. If sheet iron, with an oxidized or scaly surface is immersed in this bath the impurity is readily removed leaving a clean metallic surface. During this process of pickling a foam is formed on the surface. When previously descaled and cleaned sheet iron is immersed for five minutes in a similar bath, the metallic loss which results amounts to 0.122% by weight, whereas similar treatment in a free acid bath not containing the octadecyltrimethylammonium bromide results in a loss of 1.16% by weight.

Example 4

1 part dodecyl pyridinium bromide is dissolved in 8000 parts of 4.8% hydrochloric acid at 20–24° C. When as above descaled sheet iron was immersed for 15 hours in such a bath the metallic loss resulting was 0.0665% whilst similar treatment of the same iron without the use of an inhibitor brought about a metallic loss of 2.14%.

Testing the efficiency of such compounds by the loss of weight method we found that cetyl-pyridinium bromide possesses an inhibiting efficiency ranging from 99.5% for a concentration of 0.5% to 92.8% efficiency for a concentration of 0.001%. For this same range of concentrations the efficiency ratings of cetyl-trimethyl ammonium bromide were 93.3% and 89.2% respectively.

In both instances the baths were covered by a tenacious foam.

We claim:

1. A cleaning and pickling bath for metals comprising a dilute, non-oxidizing acid and a small amount of an organic quaternary-octadecyl ammonium compound.

2. A cleaning and pickling bath for metals comprising a dilute, non-oxidizing acid, and a small amount of an organic quaternary-cetyl ammonium compound.

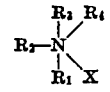
3. A cleaning and pickling bath for metal comprising a dilute, non-oxidizing acid, and a small amount of a cetyl-pyridinium compound.

4. In a process of cleaning and pickling metal articles the step of treating said articles with a bath comprising a dilute, non-oxidizing acid and a small amount of an organic quaternary-octadecyl ammonium compound.

5. In a process of cleaning and pickling metal articles the step of treating said articles with a bath comprising a dilute, non-oxidizing acid and a a small amount of an organic quaternary-cetyl ammonium compound.

6. In a process of cleaning and pickling metal articles the step of treating said articles with a bath comprising a dilute, non-oxidizing acid and a small amount of a cetyl-pyridinium compound.

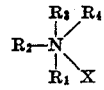
7. A cleaning and picking bath for metals comprising a dilute, non-oxidizing acid and a small amount of a compound of the formula:



wherein R_1 is a long chain alkyl radical of not less than 6 carbon atoms, X is a hydroxyl or acid group, and wherein R_2, R_3 and R_4 are alkyl radicals or the valences at R_2, R_3 and R_4 are satisfied by including N in a pyridine ring.

8. A cleaning and pickling bath for metals comprising a dilute, non-oxidizing acid and a small amount of a compound selected from the group consisting of organic quaternary-octadecyl ammonium compounds and quaternary-cetyl ammonium compounds.

9. In a process of cleaning and pickling metal articles the step of treating said articles with a bath comprising a dilute, non-oxidizing acid and a small amount of:



wherein R_1 is a long chain alkyl radical of not less than 6 carbon atoms, X is a hydroxyl or acid group, and wherein R_2, R_3 and R_4 are alkyl radicals or the valences of R_2, R_3 and R_4 are satisfied by including N in a pyridine ring.

10. In a process of cleaning and pickling metal articles the step of treating said articles with a bath comprising a dilute, non-oxidizing acid and a small amount of a compound selected from the group consisting of organic quaternary-octadecyl ammonium compounds and quaternary-cetyl ammonium compounds.

11. The cleaning and pickling bath of claim 7 in which R_1 of the formula is a long chain alkyl radical of from 12 to 18 inclusive carbon atoms.

12. The process of claim 9 in which R_1 of the formula is a long chain alkyl radical of from 12 to 18 inclusive carbon atoms.

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