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COMPOSITION

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This invention relates to cleaning and to the pickling of metals and is particularly directed to compositions and processes wherein there is employed a water soluble compound having the sulfamic acid radical NH_2SO_3^- and forming an acidic aqueous solution.

The cleaning and pickling of metals is ordinarily effected in commercial practice by the use of solutions of acids such as sulfuric or hydrochloric. Such cleaning solutions are very corrosive and to reduce the rapidity of their attack upon metals it has been the practice to add inhibitors such as derivatives of cinchona bark alkaloids, pyridine base compounds, and thioureas. Solutions of inhibited acids may sometimes effect an undesirably great corrosive action and they are in any event difficult to handle requiring special skill and a knowledge of the hazards involved.

The use of acids has been particularly unsuited for practice by the general public. Such acids have been mixed with various inhibitors, abrasives, and diluents to make pastes which with some degree of success could be used by the general public without undue hazards, but even so the compositions produced are none too satisfactory for general use.

Now I have found that a water soluble compound having the sulfamic acid radical NH_2SO_3^- and being acid to litmus in aqueous solution may advantageously be used as a cleaning and pickling material. Using solutions of sulfamic acid or sulfamates which yield acidic solutions, inhibited if desired, one may readily clean and pickle ferrous articles, for instance, without the attendant difficulties heretofore encountered. Sulfamic acid and sulfamates which are acidic can also be advantageously used in the form of pastes or in other such forms facilitating application for the cleaning of various metal surfaces.

Sulfamic acid and sulfamates which yield acidic solutions may advantageously be used, as will be apparent, in removing metal oxides such as rust from any surface upon which they are found. For instance the cleaning compositions of my invention may be employed for removing rust stains from porcelain bathroom fixtures, for removing rust stains from coal and, in short, for removing such stains from any surface upon which they are found.

Sulfamic acid and sulfamates which yield acidic solutions are ideally adapted both to the cleaning and pickling of metals on a commercial scale and to use by the general public for small and varied applications.

Sulfamic acid and sulfamates which yield acidic solutions may readily be transported in the dry form in containers which are not resistant to the action of strong acids. Being in the dry form sulfamic acid and sulfamates which are acidic have the advantage over liquid acids such as sulfuric and hydrochloric that if a receptacle containing sulfamic acid or a sulfamate is broken or its contents spilled, the acidic material can be gathered up before any substantial damage results. With fluid acids such as hydrochloric or sulfuric, spilling the acid or breaking a receptacle containing it has immediate and disastrous consequences which are with difficulty alleviated.

The physical and chemical characteristics of sulfamic acid and sulfamates which yield acidic solutions makes it entirely feasible to apply compositions containing them by hand without the painful and sometimes dangerous corrosive action exercised on the skin by acids as heretofore used.

The specific advantages and attributes of the novel cleaning compositions of my invention will be more fully set out hereinafter.

For the pickling and cleaning of metals such as copper, brass, iron, or steel in commercial installations it will usually be found desirable to employ solutions of sulfamic acid. These solutions may be inhibited if desired by the use of inhibitors known to the art such as cinchona bark alkaloid derivatives, pyridine derivatives, or thioureas.

The concentration of such a pickling solution may be varied depending upon the specific nature of the work to be cleaned and upon the rate of cleaning desired. The specific amount to use in a particular instance may most readily be determined by a few simple trials. Ordinarily a solution containing somewhere around ten per cent of sulfamic acid would be satisfactory though, as observed, the concentration might need raising or lowering depending upon specific circumstances.

Numerous cleaning compositions particularly adapted for use by the general public may readily be prepared using sulfamic acid or sulfamates. Sulfamic acid itself in finely divided crystalline form may be used dry, alone or mixed with abrasives, as a cleaning powder, a surface for instance being rubbed with a damp cloth or brush upon which a little sulfamic acid has been sprinkled. It will be observed that the sulfamic acid crystals further aid the cleaning by reason of an abrasive action of their own which they exercise until they are dissolved.

Sulfamic acid or its acidic salts may be sold in solutions or for ease of application may preferably be sold as pastes. Such cleaning compositions may include various bodying agents, inhibitors, wetting agents, abrasives, and other such detergent additions as are known to the trade.

My invention may be better understood by reference to the following illustrative examples.

Example 1

A cleaning and pickling bath was made up using five per cent by weight of sulfamic acid. The solution was used at a temperature of 180° F. for the treatment of hot rolled sheet steel. The mill scale was satisfactorily removed from the steel by the action of this pickling bath.

Example 2

A cleaning and pickling bath was made up using ten per cent by weight of sulfamic acid with 0.025% by weight of sulfurized quinoidine as an inhibitor. This solution was employed at 180° F. for the pickling of iron and steel articles with good results.

Example 3

A paste cleaning composition was made up as follows:

	Parts by weight
Bentonite clay	20
Water	30
Octyl alcohol sulfate	2
Sulfamic acid	10

The mixture made a stiff paste which was easily applied with a damp cloth to metal surfaces. Tarnished copper, rusted chromium plate, and badly tarnished nickel plate were polished using the paste of this example and in all cases the tarnished corrosion products were rapidly and effectively removed without apparent etching of the metal surfaces.

Example 4

A stiff paste adapted to be readily applied to metal surfaces with a damp cloth was made up as follows:

	Parts by weight
Bentonite clay	20
Water	30
Octyl alcohol sulfate	2
Ammonium sulfamate	10

The cleaning composition of this example was very effectively used on metal surfaces with excellent results.

Example 5

Another cleaning composition in paste form was made up as follows:

	Parts by weight
Glycerine	25
Bentonite clay	20
Octyl alcohol sulfate	2.5
Ammonium sulfamate	2.5

The paste of this example was used as a polish and cleaner on copper and on tin plate and was found to be very effective.

While I have shown certain specific compositions and processes, it will be understood that any water soluble compound having the sulfamic acid radical NH_2SO_3^- and being acid to litmus in aqueous solution may be used according to my invention in numerous relations wherein cleaning and pickling compositions of the art have found application and may be used for the cleaning and pickling of various ferrous and non-ferrous metal surfaces. As has been indicated, ammonium sulfamate and sulfamic acid are the preferred materials for use according to my invention.

It will be apparent that sulfamic acid or sulfamates may be used as such or in admixture with various compositions known to the art for addition to cleaning, pickling, and detergent compounds.

I claim:

1. In a process for cleaning and pickling metals and removing rust, the step comprising subjecting an object to be cleaned to the action of a water soluble compound having the sulfamic acid radical NH_2SO_3^- and being acid to litmus in aqueous solution.

2. In a process for cleaning and pickling metals and removing rust, the step comprising subjecting a surface to the action of sulfamic acid.

3. In a process for cleaning and pickling metals and removing rust, the step comprising subjecting a surface to the action of ammonium sulfamate.

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