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to this invention is thus four times more efficient than one of the best presently known rust inhibitors, and its cost price is only twice that of sodium nitrite. It has also been checked that it is much more efficient than diethanolamine and morpholine, which on the other hand have the disadvantage of an unpleasant smell, whereas the product of the invention is odourless. Moreover, the product according to this invention is extremely stable in the solution form and another advantageous feature thereof is that it has antiseptic properties very useful when it is utilized for machining metals.

The rust-inhibiting action of the boric esters contemplated herein is higher than that of diethanolamine borate. This fact is probably due to the molecular structure of boric esters.

Witman W., Russel R., and Altieri, V. [Ind. Eng. Chem. 16, 445 (1924)] point out that the rate of corrosion of iron is independent of the pH in the pH range from 4 to 10, and that above pH=10 it decreases in proportion of the hydroxyl ion concentration. As the pH of solutions of boric esters of diethanolamine is about 8.4, the above-mentioned effect cannot be accounted for explaining the action exerted by the product of this invention.

A typical example of a procedure for preparing this product is given hereinafter:

#### EXAMPLE

105 parts by weight of diethanolamine and 62 parts by weight of boric acid, i.e. stoichiometric proportions of these two initial substances, are gradually heated together up to 230° C. About 38 parts by weight of water in the form of steam are released and entrain a small fraction of diethanolamine. The yield of boric esters of diethanolamine has practically the theoretical value in relation to the initial boric acid.

In practice, the rust preventing agent according to this invention is preferably used by preparing concentrated solutions of this product in adequate solvents selected among those mentioned hereinabove. Before actually utilizing the rust preventing agent, the concentrated solution is added to the medium which is to contact ferrous metals by using adequate proportions of said solution, so that the concentration of the boric esters of diethanolamine in said medium lies in the range of 0.8% to 5% by weight.

This invention is also concerned inter alia with the following applications:

(1) The anti-rust protection of water vessels, cooling towers, or water circuits, by incorporating said boric esters of diethanolamine in the liquid.

(2) The anti-rust protection of ferrous parts by impregnating same with an aqueous solution of boric esters of diethanolamine. To increase the wetting power of the solution, alcohols, soaps, or surface-tension products such as polyoxyethylenated octyl- or nonyl-phenols may be associated therewith.

(3) The grinding of metals by using an aqueous solution of boric esters of diethanolamine. The following advantages are thus obtained: no foam is produced, the grinding wheels remain constantly clean and the workpieces, after drying, have a pleasant, varnish-like surface appearance and are efficiently protected against rust. As the boric esters of diethanolamine are antiseptic, the solutions are not exposed to destruction by microorganisms during their use.

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(4) The machining of metals, by associating with the boric esters of diethanolamine substances like soaps, lubricating emulsions, polyglycols, extreme-pressure additives, or wetting agents.

(5) The protection of vehicle radiators or cooling circuits containing anti-freeze solutions against rust, by incorporating in the anti-freeze solution a few percent units of boric esters of diethanolamine. Since the boric esters of diethanolamine slightly attack copper alloys, mercaptobenzothiazol is added to said esters to inhibit this attack. A typical anti-freeze solution composition may be as follows:

	Parts by wt.
Glycol -----	950
Boric esters of diethanolamine -----	30
Mercaptobenzothiazol in the form of an alkali metal salt or amine salt -----	20

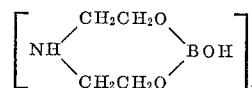
(6) Hydraulic fluids for braking systems, or fluids for so-called "incombustible" hydraulic circuits, which do not comprise petroleum products, are rendered rust-proof by adding to these fluids a few percent units of boric esters of diethanolamine.

(7) For protecting against rust freshly degreased parts it is only necessary to add a few percent units of boric esters of diethanolamine to the degreasing agent utilized.

The applications of boric esters of diethanolamine as rust inhibitors are extremely numerous. The examples given hereinabove are only illustrative and should not be construed as limiting the scope of the invention.

What I claim is:

1. A water-soluble rust preventing agent for aqueous media and polar media which are to be put in contact with ferrous metals, consisting essentially of a mixture of boric esters of diethanolamine having the formula



wherein  $n$  designates an integer of 1 to 6, said mixture being a highly hygroscopic vitreous and odourless mass having a good transparency, soluble in water, alcohols, glycols, polyglycols, ethers, ketones, and substantially insoluble in nonpolar solvents.

2. A method of protecting against rust ferrous metals kept in contact with a medium promoting the formation of rust, comprising impregnating said ferrous metal with a product containing from 0.8% to 5% by weight of a water-soluble rust preventing agent of claim 1.

3. A method of protecting against rust ferrous metals kept in contact with a medium promoting the formation of rust, comprising adding to said medium 0.8% to 5% by weight of a water-soluble rust preventing agent of claim 1.

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