

# UNITED STATES PATENT OFFICE.

FRIEDRICH LUDWIG SCHMIDT, OF CHARLOTTENEURG, GERMANY, ASSIGNOR TO THE ROESSLER & HASSLACHER CHEMICAL COMPANY, A CORPORATION OF NEW YORK.

MIXTURES OF BORATES CONTAINING ACTIVE OXYGEN.

1,155,101.

Specification of Letters Patent. Patented Sept. 28, 1915.

No Drawing.

Application filed January 25, 1910. Serial No. 540,044.

*To all whom it may concern:*

Be it known that I, FRIEDRICH LUDWIG SCHMIDT, a subject of the German Empire, residing at Charlottenburg, Germany, have invented new and useful Mixtures of Borates Containing Active Oxygen, of which the following is a specification.

Sodium perborate possesses the property of giving off its oxygen rather rapidly in water at a temperature as low as 50° C. This is a disadvantage in the application of sodium perborate as a bleaching agent, inasmuch as the washing and bleaching process can only properly begin at a higher temperature, so that a large proportion of the oxygen will be driven off and its effect lost before the efficient temperature is attained. In view of this fact, the discovery that magnesium perborate evolves its oxygen at a higher temperature represented an advance. It is known that mixtures of sodium perborate and a magnesium salt in equivalent proportions can be employed for bleaching, instead of pure magnesium perborate. In this case the magnesium perborate is formed from the sodium perborate and the magnesium salt by double decomposition. The proportions which are used in the latter process are such that the whole of the sodium perborate is decomposed by the magnesium salt. To this extent the latter process only differs from that with magnesium perborate in the fact that the magnesium perborate is produced by the said double decomposition just before the bleaching occurs. While the employment of magnesium perborate for bleaching purposes represents an advance as regards the bleaching effect, owing to the greater stability of the magnesium perborate under boiling, yet on the other hand its high price militates against its wide employment.

We have found that it is possible to obtain the effect of greater resistance to boiling with the cheap sodium perborate and with the other alkali perborates containing active oxygen, by adding certain substances to the same. To these substances belong also the salts of magnesium and their base magnesia itself.

The present invention, so far as it extends to the addition of magnesium, differs from the above mentioned process according to which sodium perborate is completely de-

composed by equivalent proportions of magnesium salt.

We have found that it is not necessary to add to the alkali perborate so much magnesium compound that the whole bleaching process is carried out with magnesium perborate, that is to say that all the sodium perborate is decomposed by the magnesium salt. On the contrary, we have found that it is possible to attain the said effect of greater resistance to boiling with only very small proportions of an addition of a magnesium compound. For example, the addition of a fraction of a molecular proportion suffices to attain a very distinct effect, as will appear from the following:—A one per cent. solution of sodium perborate heated to 70–80° C. was found after a few minutes to have lost half its active oxygen and after twenty-five minutes only 10 per cent. of the oxygen remained. When 1/6th. of a molecular proportion of magnesium sulfate is added to one molecular proportion of sodium perborate, dissolved to a one per cent. solution, about 98 per cent. of the active oxygen remains after twenty-five minutes heating to 70–80° C. When under the same conditions 1/12th. of a molecular proportion of magnesium sulfate is added, the effect of this addition is that after twenty-five minutes heating to the same temperature, about 95 per cent. of the oxygen remains. The addition of 1/60th. of a molecular proportion of magnesium sulfate under exactly the same conditions has the effect that about 70 per cent. of the oxygen remains after the same period. It follows from these examples that in order to attain a higher resistance to boiling it is not necessary to convert the alkali perborate completely into magnesium perborate, but on the contrary a very small molecular proportion of magnesium salt suffices. This action of less than equivalent proportions of magnesium salt was not to be foreseen, for in the new process the greater portion of the sodium perborate remains unaltered in solution, and the natural assumption would therefore be that this unaltered sodium perborate would split off the oxygen just as readily as do ordinary solutions of sodium perborate.

The new process utilizing only small quantities of magnesium salt possesses another

important technical advantage over the known process using either ready prepared magnesium perborate or freshly formed magnesium perborate. Both magnesium perborate and the magnesium borate into which the former becomes converted after the bleaching action are insoluble. There is therefore in the bleaching liquor a considerable quantity of such magnesium precipitate, which, owing to the large quantity present, has a detrimental effect and is difficult to remove from the bleached goods. By using smaller quantities of magnesium salt, far less of this troublesome precipitate has to be dealt with, and the less the quantity of magnesium salt used the smaller is the quantity of the precipitate.

It has further been found that it is not only magnesium alone that possesses the described action, but that compounds of the alkaline earth metals calcium, strontium, barium give the same action. This is illustrated by the following examples carried out under the same conditions as with the sodium perborate, the heating being carried out at the same temperature of 70-80° C. and the remaining oxygen being measured after twenty-five minutes. The addition of 1/6th of a molecular proportion of chlorid of calcium is found to make the solution stable up to about 87 per cent., while 1/50th of a molecular proportion of chlorid of calcium is found to give a stability of about 50 per cent. 1/15th of a molecular proportion of strontium chlorid gives about 90 per cent. stability, 1/12th of a molecular proportion of barium chlorid about 80 per cent. stability. The fixing effect of the said substances applies not only to sodium perborate, but also to the other borates containing

active oxygen, which can be obtained by crystallization or by mixing or melting. The effect obtained also applies to mixtures of the same with other substances not having a contrary action. The said fixing substances may be added to the active borates and handled or put on the market as a mixture, or the procedure may be such that they are added just before use or during use. It is not even necessary that the salts or bases having an action in the described sense shall be of the ordinary kind; for example the per-salts and peroxids of the same will serve the purpose.

I wish to be understood that the term "perborate" is also to embrace other borates containing active oxygen, as for instance perborax and such borates, containing active oxygen, as manufactured by the process covered by U. S. Patent No. 1,006,798 issued to me.

What I claim is:

1. The herein described new mixtures of borates comprising a perborate and a soluble inorganic magnesium compound in a less than equivalent proportion, which give a superior bleaching effect.

2. The herein described new mixtures of borates, comprising a perborate and a soluble inorganic compound of an alkaline earth metal in a less than equivalent proportion which give a superior bleaching effect.

In witness whereof I have hereunto signed my name this sixth day of January, 1910, in the presence of two subscribing witnesses.

DR. FRIEDRICH LUDWIG SCHMIDT.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."