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BLEACHING WITH HYPOCHLORITES.

No Drawing. Application filed June 23, 1926, Serial No. 118,079, and in Germany July 27, 1925.

This invention relates to improvements in bleaching materials by means of aqueous solutions of hypochlorites. It is well known that the greater part of the metals, metallic oxides and metallic salts promote the decomposition of hypochlorites into oxygen and a chloride. Especially the metals iron, copper, nickel and manganese have often been examined and tried in view of their catalytic properties.

Therefore in all plants for bleaching raw paper-stock or cellulose or the like, or for bleaching fabrics or other textile goods, every contact with metal is intentionally avoided, or only those metals are employed whose catalytic influence upon the self-decomposition of hypochlorites has by experience been ascertained to be insignificant. Thus, for instance, in cellulose- and paper-mills the pulp engines serving for bleaching cellulose and paper-stock are purposely provided with equipments made of phosphor bronze in order to exclude, as far as possible, any catalytic effect.

Now I have found that, in spite of what is known, the bleaching process can be promoted and its efficiency increased to an extent, never noticed heretofore, with the aid of catalytic effects.

Nickel in the form of metal, metallic oxide or metallic salt has proved to be especially adapted for the purpose in question. However, in carrying out the process the result does not depend on a high-grade pureness of the nickel employed, but, for instance, nickel salt solutions may be employed which have been produced from alloys or directly from ores instead of the pure metal. To a certain degree also copper, cobalt and other metals or their compounds, alone or together with nickel are serviceable, provided that these metals are like nickel, capable of catalytically promoting the decomposition of hypochlorites, that is to say, to form different stages of oxidation warranting, by mutual action, an efficient transfer of the hypochlorite's oxygen.

The process assumes, from the industrial point of view, a surprisingly simple form. The bleaching bath, i. e. the bleaching solution including the material to be bleached, is allowed to come into contact with nickel, whereby dark-colored nickel oxide compounds are formed. This contact may be effected either by conveying the pulp over the nickel catalyst, for instance when bleaching cellulose, or the material to be bleached may be transported in the same manner as in the usual bleaching cylinders by propellers which in this case are made of nickel; or metal plates may be suspended into the pulp. Finally, nickel salts may be added to the bleaching solution, but in very small quantities, in any case not exceeding 0.5 per cent Ni calculated upon the weight of the material to be bleached.

It is also possible to effect the contact between the hypochlorite solution and the nickel catalyst in temporary absence of the material to be bleached, for instance by removing the bleaching solution from the bleaching apparatus by sucking or pressing and then exposing it alone to the nickel catalyst, whereupon the solution will be returned to the bleaching apparatus and the material to be bleached. This contact with the nickel catalyst may be rendered continuous.

The process permits of variations, for instance as to the bleaching velocity, by adjusting the temperature of the bleaching solution within the limits of from 0 to 60° C.

The activity of the nickel catalyst may be further favorably influenced by the addition of hydroxyl ions. The concentration of the hydroxyl ions is increased by the addition of alkaline substances, such as hydroxides or carbonates, preferably of the alkali metals, for instance by correspondingly increasing the alkalinity of the bleaching solution. Hydroxides or carbonates of the earth-alkali metals may also be used for the same purpose.

Of course, the black nickel oxide compounds produced in the present process provoke at first a certain discoloration of the material to be bleached, which discoloration, however, is easily removed with the remnants of the bleaching agent by washing, in some cases with the addition of diluted acids or acid salts, for instance of bisulphites. A 0.5 to 1 per cent acid may be sufficient. However, this discoloration will disappear by itself by allowing the bath to stand until the hypochlorite is completely consumed.

The present invention enables me, by utilizing a reaction which hitherto was considered to be of no use and even noxious, to

carry out the bleach with hypochlorites in a by far shorter period and with considerably better results than before. With my improved process only one half to one fourth of the time is required for bleaching than with the methods hitherto used. The novel process is as simple as can be imagined and requires no new devices or modifications of the method of operating, and therefore accomplishes an essential industrial progress in every respect.

I claim:—

The process of bleaching with hypochlorites, comprising the bringing of aqueous calcium hypochlorite solutions into contact with material containing nickel in presence of an alkaline compound of an alkali metal, and adjusting the temperature of the bleaching solution within the limits of from 0 to 60° C.

In testimony whereof I affix my signature.

HERMANN WENZL.