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PROCESS FOR PRODUCING STABLE BLEACHING POWDER

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2 Claims. (Cl. 23—250)

This invention relates to a process for the production of bleaching powder with greatly improved stability during storage.

In the manufacture of bleaching powder, it is known to be important that a product should be obtained in which the content of available chlorine is as high as possible at the outset, and does not decrease during storage in warm air, for example in the tropics.

Owing to its relatively high moisture content, the bleaching powder produced in the ordinary way is well known to be inferior in respect to its behavior during storage, and frequent attempts have therefore been made to discover ways and means of dehydrating the bleaching powder, or of rendering the moisture content harmless in some other way.

Experiments conducted by applicant with regard to the effect of diminishing proportions of contained moisture upon the storing qualities of bleaching powder have revealed the fact, that with a moisture content of about 1 percent and less, bleaching powder is particularly resistant to the action of elevated temperatures.

From the works of various writers on the formation of bleaching powder, it is also known that, in the course of reaction of chlorine on calcium hydroxide, the molecule of water combined with the CaO is displaced by chlorine (and also by any carbon dioxide present), and that both this water—the "theoretical" amount, which can be calculated from the chlorine content—and also the "free" water introduced, as moisture, in the calcium hydroxide can be combined in the manner of water of crystallization with the resulting chlorine compounds of calcium. Since this loosely combined water has a certain vapour tension, it can be extracted from the chlorine compounds by the action of a vacuum or of a current of inert gas.

A number of so-called drying processes for bleaching powder have been based on this fact, with the object of extracting a large portion of the moisture content (about 10–14 percent) from bleaching powder manufactured in the ordinary manner, by drying it, at increasing temperatures, in a current of air free from carbon dioxide and also, if necessary, in vacuo. It is known, however, that in drying such bleaching powder by means of this process, considerable losses of available chlorine are always bound to occur at the start, this liberated chlorine escaping with the water to be eliminated. The result of these losses is that the increase in the content of available chlorine in the final product is not as large as it should be calculated on the basis of the extraction of water alone. In this operation a further rather considerable amount of the available chlorine is converted into chloride or chlorate. In addition, these drying processes are attended with the drawback that suitable measures must be taken for the separation and recovery of the highly diluted escaping chlorine, and finally that, in the initial stage, the drying can only be performed at a moderate rate.

It has also been proposed that the small amounts of water still left in the bleaching powder after a drying process of this kind should be combined by means of quick lime and thus rendered innocuous. Quite apart, however, from the losses of available chlorine owing to the previous partial drying, and the further reduction in the available chlorine content by introduction of quick lime, even this process does not make the bleaching powder sufficiently stable during storage.

It has now been observed that the losses of available chlorine, attending the drying of bleaching powder by the known processes are largely dependent on the moisture content of the initial product, and it has been ascertained that notable losses of available chlorine occur when—but only when—the moisture content of the bleaching powder to be treated is higher than corresponds to the "theoretical" amount. In the case of a bleaching powder containing 36–37 percent of available chlorine, this amount is about 9.5 percent of water, when dry calcium hydroxide has been used. On the other hand, it has been found that a bleaching powder with a lower content of moisture can be freed from the latter, without any appreciable loss of chlorine, by the known processes either in a current of air free from carbon dioxide, or in vacuo, at progressively rising temperatures, and that this dehydration can be carried to below the 1 percent limit of moisture—ascertained as decisive for the stability of the bleaching powder—without any noteworthy losses of available chlorine. In such case, a product is obtained which, with a maximum content of available chlorine, is storage-proof to a greater degree than hitherto attainable.

The known processes for the production of bleaching powder ordinarily furnish a product, the moisture content of which exceeds, to a not inconsiderable extent, the 9.5 percent ascertained as the limit for drying without appreciable decomposition, so that the requisite initial drying to that limit is always attended with losses of available chlorine.

It has now been ascertained that also these losses can be prevented by adding to the bleaching powder produced by the ordinary processes, prior to drying, an amount of unslaked lime which is sufficient to combine with at least the "free" water, that is such water as is present in excess of the "theoretical" moisture content which is the moisture displaced by chlorine in the manufacture of bleaching powder when moisture-free slaked lime is treated with chlorine. As a practical rule, it has been found that the amount of unslaked lime to be added should be 0.5–1 part for each part of water present in the bleaching powder. The addition of unslaked lime may, however, be carried so far that the finished product contains not less than 35 percent of available chlorine after drying. The bleaching powder treated with quick lime in this manner is left to stand for a few days—with moderate heating, if desired—during which period the slaking of the quick lime takes place, and is then subjected to any of the known drying processes.

Example

A bleaching powder containing 36.5 percent of available chlorine and 11.5 percent of moisture is intimately mixed with 6 percent of unslaked lime and left to stand for about three or four days. Owing to the addition of the unslaked lime, the percentage content in available chlorine of the product is reduced to 34.4 percent. The product is subsequently dried in a vacuum of about 30 mms. while heating slowly from normal temperatures up to about 100° C. until a bleaching powder containing 36.5 percent of available chlorine and 1 percent of moisture is obtained.

In order to test the storing qualities of the products obtained by the present process they were successively subjected to the following conditions ("quick storage test").

Stage 1

(*a*) Slowly heated from 30 to 50° C. within two hours

(*b*) Temperature of 50° C., maintained during six hours

(*c*) Slowly cooled in the open air during 16 hours.

Stage 2

(*a*) Slowly heated from 50 to 70° C. within two hours

(*b*) Temperature of 70° C. maintained during six hours

(*c*) Slowly cooled in the open air during 16 hours.

Stage 3

(*a*) Slowly heated from 70 to 80° C. within two hours

(*b*) Temperature of 80° C. maintained during six hours

(*c*) Slowly cooled in the open air during 16 hours.

Stage 4

(*a*) Exposed to a temperature of 80° C. for 8 hours.

After this treatment the products showed a decrease of their percentage of available chlorine not exceeding about 3 units (that is from 39 percent of available chlorine to 36 percent etc.).

I claim:

1. A process of converting undried bleaching powder into a condition in which it is stable during storage which comprises the steps of mixing the undried bleaching powder containing at least about 36 percent of available chlorine with an amount of unslaked lime which is at least sufficient to combine with the "free" water content of said bleaching powder, exposing the mixture to temperature conditions leading to the slaking of said added unslaked lime, and finally drying the product.

2. A process of converting undried bleaching powder into a condition in which it is stable during storage which comprises the steps of first mixing the undried bleaching powder containing at least about 36 percent of available chlorine with between about 0.5 to 1 part of unslaked lime for each part of water present in said bleaching powder, then leaving the product to stand for a prolonged time until the lime added is converted into the slaked condition and finally drying the product.

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