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CLAY TREATMENT

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6 Claims

ABSTRACT OF THE DISCLOSURE

A clay treatment method for improving whiteness by adding an oxidizing agent to a slurry of the clay and thereafter bleaching with a reducing bleaching agent.

This invention relates to clay treatment and particularly to a method of reclaiming those kaolins which have heretofore been considered of such poor color that no treatment would render them fit for use in those industrial applications requiring a reasonable degree of whiteness, e.g., paper coating and filling, paint and rubber fillers and ceramics.

It is well known in the kaolin industry that there are numerous large deposits of kaolin that have heretofore gone unclaimed due to their poor response to normal bleaching techniques for kaolin. The normal reducing type bleaching agents used in the kaolin industry have very little if any effect on the pigment whiteness or brightness of these clays.

In general, this large group of kaolins has an original color (unbleached) of such poor quality that not enough increase can be obtained by any bleaching step heretofore practiced in the kaolin field to warrant its being mined, or more important, to meet any customer specifications. There are also a few instances where the original color (unbleached) is good but the kaolin fails to respond to any of the conventional bleaching steps, normally used to bring a normal kaolin up to standard specifications.

We have discovered a process which makes it possible to bring these poorly colored clays up to the specifications for color which are generally used in the kaolin trade. We have found that, if these clays are given a unique pretreatment prior to the normal bleaching step, a quality clay capable of meeting customer specifications for color can be had. We discovered, surprisingly, that by treatment of these clays with an oxidizing agent we are able to so alter the clay that the subsequent addition of the normal reducing bleaching agents will be effective to produce a clay whose whiteness meets normal customer specifications in the trade.

We have also found that working the clay prior to pretreatment and bleaching would effectively raise the whiteness and brightness upon bleaching.

Our process consists in the addition of an oxidizing agent, such as a per compound or a chlorate or hypochlorite, to a clay to be treated. Holding the clay until oxidation reactions have effectively ceased and then bleaching by any of the standard kaolin bleaching techniques e.g., with $\text{Na}_2\text{S}_2\text{O}_4$, ZnS_2O_4 , etc.

We have found that any of the per compounds such as peroxides, perborates, perchlorates, the chlorates and the hypochlorites are very effective in our process. For example, we have used hydrogen peroxide, sodium peroxide, sodium perborate, sodium perchlorate, sodium chlorate, sodium hypochlorite and other members of this group with unique success. We have discovered that the precise amount of oxidizing agent, the pH, the time and temperature will vary from clay to clay and should be determined on a small fraction of a given clay prior to be-

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ginning an extended mill run. However, we have found no case where the technique here described was not effective to improve the whiteness and brightness of the kaolin treated. We have worked in both acid and alkaline slurries of kaolin with equal success and at temperatures up to 100°C . and at times from 30 minutes to 72 hours and have obtained improvement in every case. However, the maximum improvement will be obtained if a check is first made to determine the optimum condition as outlined above.

This invention can perhaps best be illustrated by referring to the following examples.

EXAMPLE I

A kaolin fraction of 80% less than 2 microns E.S.D. (equivalent spherical diameter) with an unbleached brightness of 70.2 was slurried and bleached with $\text{Na}_2\text{S}_2\text{O}_4$ by usual bleaching techniques. The resulting brightness was 72.0, completely unsatisfactory for normal customer requirements.

A like fraction was slurried to 20% slurry and treated with 0.5 gram of hydrogen peroxide per 100 grams slurry. The brightness was immediately raised to 83.4. The slurry was filtered, washed and bleached with $\text{Na}_2\text{S}_2\text{O}_4$ in the same manner as conventional bleaching and the resulting final brightness was 85.0.

EXAMPLE II

A kaolin fraction of 80% less than 2 microns E.S.D. with an unbleached brightness of 74.2 and a bleached brightness, by conventional reducing bleaching techniques, of 74.2 was slurried and treated as in Example I to produce an unbleached brightness following oxidation pretreatment of 86.0 and after final bleach with $\text{Na}_2\text{S}_2\text{O}_4$ a final brightness of 86.6.

EXAMPLE III

A kaolin fraction of 80% less than 2 microns E.S.D. and an unbleached brightness of 81.5 was bleached in the conventional manner with $\text{Na}_2\text{S}_2\text{O}_4$ to produce a final brightness of 83.0. Another slurry of the same clay was pretreated according to our process with sodium hypochlorite to produce an unbleached brightness of 83.0. The pretreated clay was then bleached with $\text{Na}_2\text{S}_2\text{O}_4$ to produce a final brightness of 85.5.

EXAMPLE IV

The same clay from Example III was treated with sodium chlorate to produce an unbleached brightness of 82.5 and thereafter bleached with $\text{Na}_2\text{S}_2\text{O}_4$ to a final brightness of 85.0.

The effectiveness of our method in improving a normally acceptable kaolin is illustrated in the following example.

EXAMPLE V

A clay of 80% less than 2 microns with an unbleached brightness of 82.6 and a bleached brightness (using $\text{Na}_2\text{S}_2\text{O}_4$ in conventional manner) of 85.4 (normally acceptable in the trade), was treated by our process using hydrogen peroxide to an unbleached brightness of 85.5 and thereafter bleached with conventional practices using $\text{Na}_2\text{S}_2\text{O}_4$ to a final brightness of 88.6.

We have, in the foregoing specification, given certain preferred practices and techniques of our invention; however, it will be understood that this invention may be otherwise embodied within the scope of the following claims.

We claim:

1. The method of treating white and discolored white kaolin to improve its brightness and color comprising the steps of forming a slurry of a fraction of said kaolin having 80% below 2 microns E.S.D., adding to said clay an

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oxidizing agent, permitting said oxidizing agent to react with said clay and thereafter bleaching said kaolin with a reducing bleaching agent.

2. The method of treating kaolin as claimed in claim 1 wherein the oxidizing agent is selected from the group consisting of per compounds, chlorates and hypochlorites.

3. The method of treating kaolin as claimed in claim 1 wherein the oxidizing agent is hydrogen peroxide.

4. The method of treating kaolin as claimed in claim 1 wherein the oxidizing agent is sodium hypochlorite.

5. The method of treating kaolin as claimed in claim 1 wherein the oxidizing agent is sodium chlorate.

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6. The method of treating kaolin as claimed in claim 1 wherein the oxidizing agent is sodium perchlorate.

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