Patented Oct. 7, 1930 1,777,446

UNITED STATES PATENT OFFICE

THOMAS WEBSTER PARKER, OF PLYMPTON, ENGLAND, ASSIGNOR TO THE DARTMOOR CHINA CLAY COMPANY, LIMITED, OF PLYMPTON, ENGLAND

BLEACHING OR DECOLORIZING OF CLAY OR OTHER MINERALS

No Drawing. Application filed February 25, 1928, Serial No. 257,108, and in Great Britain February 28, 1927.

This invention relates to the bleaching or decolorizing of clay or other minerals containing in their natural state iron compounds adapted to be partially removed by treatment with an acid.

It has been found that in bleaching or decolorizing clay and other minerals of the character in question by the use of acid alone or in conjunction with a reducing agent and subsequent washing, the reduction of the iron content of the material to a degree which will render the same suitable for a variety of industrial purposes is impossible; for instance, by treating a sample of china clay containing 0.13 per cent. of ferric oxide with acid and a reducing agent, filtering and washing with water, the bleached suspension containing 28.6 per cent. of clay and 0.65 per cent. of sulphurous acid, only 82 per cent. of the iron was separated from the clay and further washing with water did not reduce the iron content of the clay.

The present invention is based upon the observation that by the employment of solutions of soluble salts (polyvalent metals yielding colorless compounds with acidic radicles which are non-chromophoric and of which the acid radicles do not form insoluble iron compounds) in the washing of the clay subsequent to its having been treated with an acid alone or in association with a bleaching agent the removal of iron from the clay or other mineral can be facilitated.

For the purpose of the invention it is found that salts of polyvalent metals and ammonium salts are particularly effective.

As examples of salts of suitable metals the soluble salts of aluminium, calcium, barium and magnesium may be given.

Apparently the use of soluble aluminium salts, for instance aluminium sulphate is to be preferred.

According to the invention the salts in question may be present in the bleaching liquid either before or after it has been brought into association with the clay or other mineral as well as in the water used for washing the bleached clay or other mineral.

The presence of the salt in the bleaching liquid and in the water used for washing may be secured by introducing the salt as such into the liquid or the water, as the case may be, or by securing the formation of the desired salt in the liquid or water, for instance by the addition of an oxide, hydroxide or carbonate of a suitable metal or the metal itself if necessary together with acid to the water or the liquid.

As will be understood, salts of metals, the acid radicles of which form insoluble iron compounds, are not suitable for the purposes of the invention.

The effect of a given molecular proportion of a salt of metal required would appear to depend on the valency of the positive ion; the higher the valency of the ion the smaller the proportion of the salt or other compound required to ensure a particular degree of removal of iron from the clay.

As above indicated, generally speaking, the presence of aluminium salts in the liquid or washing water is to be preferred and sulphate of alumina, for instance alumina-ferric or potassium, sodium or ammonium alums may be conveniently employed.

The following particulars are given by way of example to illustrate suitable methods of carrying the invention into effect and the results achieved in particular cases.

Example I

China clay containing 0.133 per cent. of ferric oxide as coloring matter is bleached in the form of a suspension containing 28.6 per cent. of clay and 0.65 per cent. of sulphurous acid. The suspension is then filtered and the clay washed on the filter at first with a 0.9 per cent. solution of potassium alum and then with water to which no alum had been added, the weight of potassium alum solution used being 40 per cent. of the dry weight of the clay and the weight of the wash water subsequently used being 120 per cent. of the dry weight of the clay. In this way 99.5 per cent. of the iron present as coloring matter was separated from the particular clay treated.

Example II

China clay containing 0.163 per cent. of ferric oxide as coloring matter was bleached

in the form of a suspension containing 28.6 per cent. of clay, 0.17 per cent. of sulphurous acid and 0.13 per cent. of commercial 14 per cent. sulphate of alumina. The suspension was filtered and the clay washed with a 1.16 per cent. solution of sulphate of alumina followed by water to which no addition had been made. The weight of sulphate of alumina solution used was 40 per cent. of the dry weight of the clay and the weight of the wash water was, as in the preceding example, 120 per cent. of the dry weight of the clay. In this manner 96.6 per cent. of the iron present as coloring matter was separated from the clay.

After the extraction of the iron is completed the clay can be substantially neutralized by washing with water alone but if desired neutralization of any acid in the clay may be effected by the addition of alkali, for instance caustic soda, sodium carbonate or lime, to the wash water.

Generally speaking, the greater the quantity of iron in the clay the greater should be the quantity of aluminium or other salt used in washing.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The process of decolorizing clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid which comprises subjecting the said minerals to the action of an acid decolorizing agent, filtering the material so treated and washing the filter residue with an aqueous solution of a salt of a polyvalent metal which yields colorless compounds with non-chromophoric acid radicles.

2. The process of bleaching clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid which comprises subjecting the same to the action of a sulphurous acid, filtering the material so treated and washing the filter residue with an aqueous solution of a salt of a polyvalent metal which yields colorless compounds with non-chromophoric acid radicles.

3. The process of bleaching clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid, which comprises subjecting the said minerals to the action of an acid under reducing conditions, filtering the material and washing the filter residue with a solution of an aluminium salt.

4. The process of bleaching clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid, which comprises subjecting the said minerals to the action of an acid under reducing conditions, filtering the material and washing the filter residue with a solution of an aluminium alum.

5. The process of bleaching clays containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid which comprises treating the same with an acid reducing agent, filtering the material so treated, washing the filter residue with an approximately 1 per cent. aqueous solution of an aluminium salt equivalent to 40 per cent. by weight of the dry weight of the clay and subsequently with water equivalent to 120 per cent. by weight of the dry weight of the clay

6. The process of bleaching clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid, which comprises subjecting the said minerals to the action of an acid under reducing conditions, filtering the material and washing the filter residue with an aqueous solution of a salt of a polyvalent metal and an acid.

7. The process of bleaching clay and other minerals containing, in their natural state, iron compounds adapted to be partially removed by treatment with an acid, which comprises subjecting the said minerals to the action of an acid under reducing conditions filtering the material and washing the filter residue with an aluminium salt and an acid.

In testimony whereof I have signed my name to this specification.

THOMAS WEBSTER PARKER.