

ALIEN PROPERTY CUSTODIAN

PROCESS FOR TREATING TOMATO PLANT STALKS FOR THE PURPOSE OF OBTAINING TEXTILE FIBRES AND/OR PAPER PULPS

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It has been discovered according to this invention that the fibres making up the cortical part of tomato plants, when they have been extracted in such a way as to keep their length, strength and flexibility, can be used advantageously either alone or together with other fibres of an animal, vegetable or artificial origin, to form yarns and textiles, or they can be employed for various purposes even when they are loose, or in tufts like other textile fibres known. It has further been found that the cellulosic material obtainable from the middle part of tomato plant stalks, is a cheap ingredient which can be used satisfactorily after the cortical part has been removed, for making paper and cardboard pulps and the like.

The process in conformity with this invention consists of gathering the tomato plant stalks, removing the leaves as well as other superfluous parts and leaf-mould, after which comes heat treatment of the aforesaid stalks in water, mechanical removal of the cortical part from the middle part, treating the said cortical part in an alkaline bath, then washing with water, drying and carding of the product obtained; after having been removed from the cortical part in this way, the middle part is washed with water, treated preferably with a bleaching agent and then washed with water again. The cellulosic material thus obtained can also be treated according to the known process for preparing sulphite cellulose.

This cellulosic material can be used unreservedly for preparing paper pulp in addition with the materials usually employed for this purpose. For the purpose of improving and accelerating the process, heat treatment in water of the stalks should preferably take place in an autoclave. The temperature and consequently the pressure to be kept in the autoclave can vary within a broad range, according to the quality of the raw material, but above all according to the age of the plant and the degree of its lignification; at any rate the temperature and pressure in the autoclave can vary to a fairly large extent for the same kind of stalks; the time required for complete and satisfactory treatment will consequently vary inversely.

It can be said generally that the pressure to be kept in the autoclave can vary from about 0.2 to 4 kg./s. cm., thereby varying the temperature from 104° C.-151° C. whereas the time required can vary parallelly from about 6 hours to about 5 minutes. It is to be understood that such ranges are not absolute and should be in-

terpreted with a certain amount of broadness, since there may be other kinds of raw material which can undergo treatment quite well in conditions exceeding the said ranges. It has been found however that the above specific conditions are the best.

A particularly suitable example of conditions is represented by a temperature of about 127° C. corresponding to a pressure of about 1.5 kg./s. cm. with treatment lasting about an hour.

The autoclave can be heated in any way, with direct or indirect steam for instance, electric heating or any other system.

When the stalks come from the autoclave after the aforesaid treatment, they are then mechanically treated to detach the cortical part to be used, from which the middle part of the stalk is removed. This treatment can be given either mechanically with brushes or by hand with same, but it is obvious that any hand or mechanical brushing or ravelling device can be used for this purpose.

After the cortical part has been obtained and separated from the middle part as mentioned hereinbefore, useless or noxious substances must be removed from it, such as hemicellulose, chlorophyll, and others for instance. The aforesaid cortical part in conformity with the invention, is treated with or without heat in an alkaline solution for this purpose. The said solution should preferably be a solution of sodium or potassium hydrate in water, in which the caustic alkali percentage can vary from about 5% to 40%. The temperature of the bath can vary in relation with the temperature of the surroundings to the extent of about 130° C., and in case of a higher temperature the treatment must evidently take place in an autoclave.

The time during which the treatment has to last can also vary in very broad ranges, i. e., from about 5 minutes to 36 hours. The aforesaid conditions are of course in relation with each other, and they further depend on the quality of the cortical material treated, on its degree of lignification and the quantity of it contained in the foreign material to be got rid of.

More plainly speaking, the said treatment can be carried out with a caustic alkali solution, sodium hydrate for instance in proportions varying from about 20 to 40% during a variable period of time from about 36 hours to six hours respectively when the treatment takes place without heat. But when the treatment takes place with heat, the caustic alkali percentage in the solution can vary from about 5% to 20%

and the pressure from about 0.8 to 1.5 kg./s. cm.; the treatment time can vary in relation from about 4 hours to about 5 minutes.

One example of particularly suitable conditions for cold treatment is represented by a concentration of caustic alkali, sodium hydrate for instance, of 20% and a period of time of about 8 hours. An example of heat treatment conditions on the other hand is represented by a 10% caustic alkali concentration, by a temperature of about 120° corresponding to an autoclave pressure of about 1 kg./s. cm. and by lasting time of about 30 minutes.

The material treated in this way is then washed with running water until all the alkalis used for depuration are completely removed, as well as the residues of products of lixiviation of the hemicellulose, chlorophyll, chlorophyllin, etc.

The washed fibrous product is then subjected to an ordinary process of natural or artificial drying after which it is carded according to methods known to the textile industry.

The cellulosic material making up the middle part of the stalk and not used for producing textile fibres, may be treated in a bleaching solution, which treatment can last from about an hour to 18 hours for instance in chlorine water at 1% which can be obtained either by bubbling chlorine gas direct into the water, or with the use of alkaline or alkaline earth hypochlorites in such proportions as to produce just about the same chlorine solution as that mentioned above.

Bleaching can take place with other agents if required; it can be part bleaching only, or it can be left out altogether when a completely bleached paper pulp is not necessary, like for instance, in the manufacture of cardboard.

The cellulosic material can be used unreservedly as in ingredient for manufacturing paper pulps after it has been washed or after the bleaching if any, followed by a second washing preferably in running water. As mentioned hereinbefore the product can be further purified if necessary by having it undergo one of the ordinary processes for preparing cellulose, such as that for preparing sulphite cellulose.

Some examples of the process according to the invention will be given for the purpose of illustrating it, but not to confine its range in any way.

Example 1

100 kg. of dry tomato plant stalks are carefully cleaned to remove earth after which the leaves are removed.

The said stalks dipped in water are placed in an autoclave which is heated and put under pres-

sure with direct steam, or with outside heating or some other means until an inside pressure in the autoclave of about 5 kg./s. cm. corresponding to the temperature of about 127°C., is reached.

5 The stalks are left in the autoclave like this for about an hour. They are extracted after this period and their cortical part is removed by hand or mechanical brushes, which contains the raw fibre and the middle part is removed.

10 The raw fibrous material obtained in this way is dipped in a 10% caustic soda solution and the solution containing the aforesaid material is put in an autoclave where it is left for about 30 minutes at the pressure of about 1 kg./s.cm. corresponding to a temperature of about 120° C.

After the aforesaid heat treatment, the fibre is washed with running water until all the alkali and lixiviation products are completely removed from it.

20 The fibre is finally dried and carded in the way known.

The middle parts of the stalks thus separated from the cortical parts are then immersed in a 1% chlorine solution as specified hereinbefore where they are kept in contact with this solution as long as may be necessary to obtain the bleaching required, namely, for about 6 hours. When bleaching has taken place the mass of the sheaths is taken from the bleaching bath and washed with plenty of water.

30 At this stage the sheath mass is ready to be used direct in ordinary workmanship for preparing paper.

As mentioned before, the sheath mass can undergo one of the usual processes for preparing sulphite cellulose before being used.

Example 2

40 100 kg. of dry tomato plant stalks are cleaned and treated in water in an autoclave as called for above in Example 1.

45 The cortical part is removed from the stalks thus treated by brushing them after which the fibrous material obtained is immersed in a 20% caustic soda solution at room temperature, i. e., about 15° C., where it is left for about 8 hours.

The fibre obtained is then washed in water, dried and carded as per Example 1.

50 After being washed in water, the middle parts separated from the cortical parts are used direct as an ingredient in the preparation of pulp to manufacture paper or cardboard. This material can be bleached if necessary, or treated in any way before it is used.

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