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HIDE TREATMENT

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This invention is concerned with processes for the recovery of hair and proteinaceous materials from hides and skins and particularly with such processes wherein the hides and skins are treated with stomach linings.

Attempts have been made heretofore to recover wool and hair from hides and hide scraps by the use of pepsin but it has been found all the pepsin compositions hitherto used have been unsatisfactory. Pepsin compositions which have been known in the past have failed to attack and solubilize all of the hide constituents with the result that the recovery of wool and hair has been incomplete and the material so recovered has been contaminated with hide residues. It has been found particularly that the epidermal layer of skin is practically unattacked by a pepsin digestion.

We have now discovered that the hide constituents are digested or disintegrated so that they become soluble and the hair can be separated therefrom by treating hair-bearing hides with stomach lining, or fundus, which contains peptic and lypolytic enzymes. The stomach linings which are effective in this process are those from hogs, sheep, cattle or other animals in which peptic enzymes are elaborated in the stomach.

It is an advantage of our process that the protein degradation products which are recovered in the liquid solution are good starting materials for the manufacture of glue and other useful products.

It is an important advantage of our process also that hides and skins which have been treated in this manner yield wool or hair which is quite free of fatty material and requires less drastic scouring than the usual product.

It is a further advantage of our process that hide scrap and skin scrap, which are in fairly small pieces and are difficult to handle, may be treated in this way to produce wool or hair in good yield as well as valuable proteinaceous liquors. It is also an advantage of our process that the conditions under which the stomach linings act are also effective in preventing the growth of undesirable organisms and thus prevent putrefaction of the mass being treated.

There are several active constituents present in stomach linings, including peptic enzymes and lipase. It may be that the lipase exerts its action upon the lipoidal constituents of the hide or skin material and permits the peptic enzymes to infiltrate and attack the proteinaceous constituents. It may also be that the combined action of the active principles of the stomach lining helps to break up a protein-lipoid complex and thus acts to disintegrate the hide and free the hair. Whatever the mechanism of this reaction, treating with the stomach linings makes possible the disintegration of the hide material and the recovery of the hair in an undamaged state and of proteinaceous materials which are useful in glue manufacture and the like.

In carrying out our process the hides and skins are treated in the presence of water with linings of stomachs from animals such as hog, sheep or cattle at a pH of from about 1.0 to about 2.5. This treatment may advantageously be carried out at a temperature of from about 100° F. to about 115° F. If the hide material has been subjected to the treatment with the stomach linings so that part of the hide goes into solution but the hide has not been completely digested and disintegrated thereby, it may be neutralized and heated to a higher temperature to destroy the enzymes and to break down and disintegrate the remaining gelatinous hide material.

The liquid portion of the digest which is prepared according to our invention may be a solution in the strict sense of the term or it may contain finely divided particles of hide material in suspension, but for convenience it is referred to in this specification and in the appended claims as a solution. At the end of the treatment the solution is separated from the hair, carrying with it all of the hide constituents and leaving the hair free of hide or skin material, the liquid containing the proteinaceous substances which may then be worked up for other purposes.

The following examples will demonstrate more specifically certain methods of carrying out our process.

Example I

300 lbs. of sheep hide scrap are washed and placed in a vat with enough water to cover them. There are then added 27 lbs. of muriatic acid (24% hydrochloric acid) and 9 lbs. of fresh hog stomach. The mass is heated at from 100° F. to 110° F. for about 48 hours. The mixture has a pH of about 1.25 when the acid has been added and increases to pH 1.9 by the end of 48 hours. At the end of the digestion period, the mixture is neutralized by adding sodium carbonate and is then heated to boiling. The heating step destroys any residual enzymes and also brings into solution any remaining pieces of partially disintegrated hide.

The liquid containing the protein breakdown products and the fatty material is drained off

and the wool remaining in the vat is conveniently washed by stirring with successive portions of hot water. In order to give the wool a final scour to remove adhering fat and the like, about one pound of soap is added to the vat which contains the wool and enough water to cover it. The soapy mixture is heated to boiling and, after a short period, the soapy emulsion containing fatty or greasy impurities is drained off and the wool is then well rinsed with hot water.

Example II

300 lbs. of sheepskin trimmings which have been treated with sulfide to remove the greater part of the wool are placed in a vat and covered with water. There are then added 15 lbs. of muriatic acid (24% hydrochloric acid) which brings the mixture to pH 1.7 and the acidified mass is allowed to stand for 24 hours with occasional stirring. At the end of this time it is drained, removing the sulfur and lime compounds.

The hide pieces are then covered with water, and hydrochloric acid is added to bring the mixture to a pH of 1.5. There are then added 9 lbs. of hog stomach linings and the temperature of the mass is raised to 102° F. and maintained at that point for 36 hours. At the end of this digestion period the mixture is adjusted to pH 8.0 and is heated to boiling. After a short period of boiling, the solution is drained off and the wool is rinsed with hot water. It is then scoured by heating with water containing about 3 lbs. of sodium carbonate and 3 lbs. of soap chips, after which the wool is separated from the liquid and dried.

The temperature of digestion of the hide material should be somewhat elevated but should not exceed, of course, the temperature at which the enzymes are inactivated by heat. The digestion is preferably carried on at a temperature of from about 100° F. to 115° F. At a lower temperature the digestion proceeds somewhat more slowly and requires a longer time to cause disintegration of the hide material, while at higher temperatures, not exceeding the destructive temperature, the digestion proceeds more rapidly. The destructive temperatures will be found to be of the order of 130° F.

When working with hides or skins which have been treated with sulfides and limes, we have found it advisable to pre-treat the hides or skins to remove the added compounds present thereon. This is suitably done by soaking or treating the material with acidified water, the mixture having a pH of 6.00 or below and advantageously a pH of from about 1.0 to about 3.0, to leach out the undesirable substances. The soaking operation is preferably carried out at a temperature of from about 100° F. to about 115° F. The hides are then drained free of the leaching solution and afterward are treated with the stomach material as heretofore described.

The hide or skin of any type of animal can be treated by our process. Thus we can recover bristles from pigskin, wool from sheepskin, hair from cattle hide and, simultaneously from any of these, valuable proteinaceous solutions.

In carrying out our invention we can use the whole animal stomach, or we can separate the lining from the remainder of the stomach and use just the lining. In either mode of practice the hide is subjected to the action of the enzymes contained in the lining portion. In most instances we find no necessity for separating the linings from the remainder of the stomach material. The stomach or stomach linings used in the process may be fresh stock or may be material which has been frozen for purposes of preservation during storage or transportation, or may be material which has been dried or treated in any other way as long as the desired physiological characteristics have not been destroyed.

The hides when treated at from 100° F. to 115° F. are suitably held for 36 hours or more. However, the time of holding will be shortened when the temperature employed is higher; and it will be lengthened when the temperature is lower. The time will also vary somewhat with the size of the hide pieces which are being treated, smaller scrap being more quickly digested.

It has been found in the past that wool recovered from sheep hide or scrap is quite greasy and requires very thorough scouring. It is an advantage of our process that the wool recovered is contaminated with much less fat and the scouring operation is greatly simplified.

The above specific description is given for purposes of illustration only and it is to be understood that many modifications and variations may be made therein without departing from the spirit and scope of this invention.

We claim:

1. A process for treating hide to recover hair therefrom which comprises subjecting said hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5 until hide is brought into solution, and recovering hair from said solution.

2. A process for treating hide to recover hair therefrom which comprises subjecting said hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, for at least 36 hours, neutralizing the resulting mixture, heating said mixture to boiling and removing hair from the resulting liquid.

3. A process for treating sheep scrap to recover wool therefrom which comprises subjecting said scrap to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, until at least a part of the scrap has gone into solution, neutralizing the resulting mixture, heating to destroy the enzyme and bring all of the scrap into solution, and recovering the wool from said solution.

4. A process for treating hide to recover hair therefrom which comprises subjecting said hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, at a temperature of from about 100° F. to about 115° F., until the hide is disintegrated, and recovering the hair from the resulting solution.

5. A process for treating hide to recover hair therefrom which comprises subjecting said hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, at a temperature of from about 100° F. to about 115° F., until at least part of the hide has gone into solution, neutralizing the resulting mixture, heating to destroy the enzyme and bring the remaining hide material into solution, and recovering the hair.

6. A process for treating hide containing sulfide to recover hair therefrom which comprises treating said hide with water at a pH of less than about 6.0 to leach out the sulfide, separating the hide from said leaching water, subjecting the treated hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, until the hide is brought into solution, and recovering hair from said solution.

7. A process for treating hide containing sulfide to recover hair therefrom which comprises treating said hide with water at a pH of less than about 6.0 to leach out the sulfide, separating the hide from said leaching water, subjecting the treated hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated, in the presence of water at a pH of from about 1.0 to about 2.5, until at least part of the hide is brought into solution, neutralizing the resulting mixture, heating said mixture to destroy the enzyme and bring the remaining hide material into solution, and recovering hair from the said solution.

8. A process for recovering wool from sheep hide scraps which comprises subjecting said scrap to the action of hog stomach lining in the presence of water at a pH of from about 1.25 to about 1.9, at a temperature of from about 100° F. to about 110° F., for about two days, adding sodium carbonate to neutralize the resulting mixture, heating said mixture to boiling, and separating the wool from the resulting solution.

9. A process for recovering wool from sheep hide containing sulfide and lime which comprises treating said hide with acidified water, the resulting mixture having a pH of from about 1.0 to about 3.0, to leach out the sulfides and lime, separating the hide from the leaching solution, subjecting said hide to the action of hog stomach lining in the presence of water at about pH 1.5, at a temperature of from about 100° F. to about 110° F., for about 36 hours, neutralizing the resulting mixture, heating said mixture to boiling, and separating the wool from the resulting solution.

10. A process for treating hide to recover hair therefrom which comprises subjecting said hide to the action of the lining of an animal stomach in which peptic enzymes are normally elaborated in the presence of water at a pH of from about 1.0 to 2.5 until at least a part of the hide has gone into solution, neutralizing the resulting mixture, heating said mixture to dissolve any undissolved hide not already brought into solution by the action of said stomach lining, and removing hair from said solution.

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