FABRIC ANALYSIS.

(Continued from September issue.)

Total Size, or Sizing Matters.

The amount of size, weighting, stiffening, or finish of cloth is determined by repeatedly boiling the sample with water, with or without the addition of substances to facilitate the solution of the starch, until a complete separation is effected. An error of some importance is sometimes made by considering *all* the matters removed by boiling water to have been added in course of manufacture. It has, however, been found that cotton loses about 2 per cent of its weight on repeated boiling with water. It follows that if this method of size abstraction be adopted, and no correction be made, that an absolutely pure cloth or yarn would be shown to contain 2 per cent of added size.

When the amount of size contained in a sample is relatively small, it is necessary to evaporate the washings to dryness and to weigh the residue, the purified cloth being only weighed (in the absolutely dry state) when the added size exceeds, say, 50 per cent. This procedure reduces the error due to the difficulty of obtaining exact results when weighing such a hygroscopic substance as absolutely dry cotton. In support of the statement that such a difficulty does exist, it may be noted that when a small quantity of absolutely dry cotton is exposed to the air, it may readily take up as much as 3 per cent of moisture in as many minutes.

The amount of fibre mechanically removed from cotton cloth during the scouring is usually very small, even raised flannelettes seldom losing more than $\frac{1}{10}$ th per cent in the process. If any doubt exists as to the complete removal of mineral matter by washing, it is well to ascertain the ash of the washed cloth, and, if necessary, to correct the result accordingly. In calculating the amounts of mineral substances present in cloth, it is necessary to subtract 1 per cent from the result found, to make due allowance for the natural ash of the cotton, the 1 per cent being calculated upon the weight of fibre present.

It is doubtful whether there are any substances extensively used in warp sizing that are not removed by boiling with water alone, but it is well to remember when soap is used in removing zinc or magnesium salts that an insoluble mass is obtained, which may, however, be easily treated by adding small quantities of hydrochloric acid. Large quantities of paraffin wax, cellulose deposits, albumen, and perhaps some other materials will require special treatment. Some methods of dyeing introduce considerable quantities of mineral matter into the cloth, rendering extraction a difficult matter, or necessitating a comparative blank test on pure cotton. This shows what allowance must be made for the action of the reagent or chemical selected to effect removal.

Analysis of Size, Sizing Compositions, Finishes, etc.

The usual analysis of the composition of size comprises determinations of starch (flour), grease (tallow or paraffin), China clay or other minerals, zinc chloride, magnesium chloride, and moisture. Grey cloth may occasionally contain in addition one or more of the following substances: Glucose, dextrin, irish moss, glycerine, calcium sulphate, glauber's salts, epsom salts, oleine oil, common salt, soap, chloride of calcium.

The peculiar finish which distinguishes the production of some firms is not always capable of imitation when based on purely analytical grounds, owing to some peculiarity in the mechanical treatment (hot calendering, open steaming, beetling, raising, etc.) so that it is impossible in many cases for the analyst to imitate a finish from the results of his analysis alone.

As an instance may be given the well-known appearance of an "Epsom finish," the characteristic hardness of which may be almost entirely removed by what is sometimes known as "breaking down"; in this case the crystals entangled amongst the fibres are merely crushed, but this entirely alters the handle or feel of the cloth—analysis would not show any difference.

Stained, Tendered, or Otherwise Damaged Goods.

We have no hesitation in admitting that it is sometimes impossible to state the exact cause of damage to textiles, particularly when information has to be based upon the results of analysis of a single sample. All traces of the cause of the damage are sometimes absent, while, again, the indications may be so obscure that the cost of examination would be beyond all reason.

Mildew.

Chloride of zinc has been extensively used for the prevention of mildew, chiefly perhaps for goods that are to be shipped to warm climates. It has often been said that all sized goods sent to warm climates should contain this substance, and it is undoubtedly true so long as the additional use of chloride of magnesium, or packing in a moist state, is a necessity. Chloride of zinc has, in fact, gained so important a place as an antiseptic that there seems to be a danger of forgetting that so long as goods are packed in a sufficiently, dry state, mildew is an impossibility. Several cases have been known where unsized or bleached cloth or pure yarn has been returned from abroad in a mildewed condition, and wherever it has been possible to ascertain the amount of moisture when packed, it has been abundantly evident that the mildew has been due to an excess of such moisture; further, it has been shown that isolated packages from the same consignments have remained sound, owing to normal or deficient moisture. This is, perhaps, one of the best reasons for resisting any increase of the existing standard of moisture.

When goods are packed in bale form, it frequently happens that the mildew is more distinct towards the sides or edges than at the centre, and this has often been taken as evidence of "external damage" from water. If we consider the greater amount of pressure present at the outer parts of the bale, along with the well-known preference which mildew has for growing in enclosed air spaces, we shall see that it is easy to attach too much importance to the distribution of mildew throughout the bale. The enclosed air spaces are found at the ends or edges of pieces, at the headings of knots in bundles of yarn, alongside string used in making-up separate parcels, and these places provide the best conditions for mildew growth. Such spaces, moreover, are the very places where the mildew grows most luxuriantly when this defect has attacked the whole package to some extent.

It is almost impossible, from an examination of a damaged sample, to distinguish between rain water that has penetrated through the packing to the goods in transit, and water already contained when packed; but sea water can generally be identified with certainty. If the goods contain antiseptics, however, it may in some cases be impossible to say whether sea water is present.

The amount of chloride of zinc required to prevent mildew is stated to be 8 per cent of dry chloride, calculated upon the weight of organic matter added in sizing. This amount is accepted as a standard, and cloths are only assumed to be mildew-resisting when they contain this or a greater amount of chloride. The above does not apply when magnesium chloride is present.

In deciding upon the cause of damage, it is not enough to attribute stains to mildew merely because they have the appearance common to this growth, but it is necessary to identify the mildew by observation of the fructification and filaments seen under the microscope. Stains caused by iron or grease frequently simulate mildew to a remarkable degree. The common acidity of mildew stains has frequently been overlooked, and we have known cause and effect to be transposed through failure to grasp this.

When goods are returned mildewed from abroad, it is always advisable to have an unopened bale or case returned, so that some idea can be gathered of the amount of moisture present in the goods at the time of packing.

The use of excessive quantities of paste for fastening tickets may also be mentioned as an occasional source of the excessive moisture and consequently a cause of the mildew growth.

Tendered Cloth or Yarn.

Difficulty frequently arises in deciding whether a sample of cloth or yarn is tender, the buyer and the seller holding entirely different views upon the particular case in point. They can seldom agree upon the definition of the word, and it is not surprising, since it admits of a comparative meaning, that both may have some grounds for their position. A broad trade meaning to the term is "below the strength common to the goods in question," but others will maintain that the meaning is "of such weakness that the buyer is entitled to reject the goods or to claim an allowance." Whatever meaning may be attached to tenderness, the only reliable ground upon which an opinion can be based or a conclusion arrived at as regards any particular instance, must be the strength test; this may be arrived at by ascertaining the breaking strain of the woven cloth, or where a comparison of tearing strain is more to the point, the separate threads of

the cloth should be tested. This latter means of testing is frequently more valuable than the cloth test, because the results are directly comparable with the hand tests or rule-of-thumb tests practised by buyers.

In testing cloth or yarn supposed to have been tendered by chemical action on the fibres, it is advisable to note the elasticity or extension of the sample, these figures frequently showing large differences between sound and tender yarn or cloth. It is of course necessary to compare the strength of the suspected sample with that of a sample admittedly sound, since it would be impossible in the present state of the industry to have standards for all kinds of cloth and yarn, sized, bleached and dyed goods. This is a branch of testing requiring much further investigation, particularly so in view of the greatly-increased importance attached in recent years to the value of the test.

Cloth is frequently tendered in the singeing process previous to bleaching or dyeing. A determination of the amount of chloride of magnesium present in the grey cloth will at once show whether this substance has contributed to or caused the damage. We have known at least one case where the manufacturer was quite unaware that chloride of magnesium was present in his size-mixing until it was pointed out that one of his sizing compositions contained this substance without his knowledge. It must be mentioned that the ash of pure cotton naturally contains calcium and magnesium chlorides to a small extent. The quantities natural to cotton have been carefully ascertained, and the quantities found by analysis have, of course, to be reduced by the amounts natural to the cotton in order to find the amounts of added salts.

The tendering of bleached goods is frequently attributable to the imperfect removal of acid liquors, and it is taken for granted, so long as any mineral acid can be found in the cloth, that this is the cause of damage. It is frequently impossible to state the amount of acid found, since it is too small to be estimated by any means with which we are acquainted. By the special methods, however, it is not difficult to ascertain with certainty the presence of mere traces of acid. It frequently happens that goods have been tendered during some particular process, and that owing to a subsequent alkaline treatment or thorough washing, no acid remains; examination of the tender sample can then, of course, furnish no clue to the cause of damage. If the amount of acid left in bleached goods is small, no tenderness may be apparent for some time, but on protracted exposure to conditions of warmth and dryness the tendering may become very pronounced. Cloth has very frequently been found to be tendered when exported to warm climates, while the reference sample kept in this country has remained apparently or actually sound.

Testing Cotton Bleached for Gun-cotton.

Cotton waste and linters are bleached thoroughly previously to nitration for the production of gun-cotton; it is of great importance that the thoroughness of the bleaching must be of a high order, making it necessary to submit the bleached cotton to careful examination before it can be allowed to pass on to be nitrated.

The amount of moisture present in the cotton is one feature requiring determination. This is ascertained by placing a sample of about 20 grms. of the bleached cotton in a large weighing bottle and drying it at 105 deg. C., for three hours, or until no further loss in weight is sustained. The loss in weight is calculated to percentage of moisture.

For the determination of the ash 2 or 3 grms. of the sample are treated in a silica dish until well charred. The flame is then removed and the dish allowed to cool, when three or four drops of pure nitric acid are added and the contents cautiously heated for a few minutes, and then strongly, until all carbon has been consumed. The dish is then cooled in a desiccator, weighed and the ash calculated.

Fats are estimated by placing about 5 grms. of the dry sample rolled in the form of a cartridge, using fat-free filter-paper, in a Knorr extractor and treating with ether for about two hours. The increase in the weight of the flask equals the amount of oil and grease. The flask containing the extracted matter should be dried at 105 deg. C., to remove the last traces of ether. Care should be observed that no cotton fibres are carried over mechanically, otherwise the results obtained would be erroneous.

The presence of acid is determined at the bleaching stage by testing the wash-water after the operation of souring. Two test-tubes are used, one containing a portion of the wash-water and the other distilled water. One drop of methyl orange is added to each test-tube and comparison made. When the wash-liquor matches the standard it is concluded that all acid has been removed, and that washing is complete.

At the bleaching stage tests must also be made for the detection of free chlorine. For this test a portion of the wash-water is placed in a test-tube, a few drops of acetic acid added, followed by a small amount of a solution of potassium iodide and starch. The production of a blue color indicates the presence of chlorine.

As cellulose is insoluble in alkalies, whereas hydro-cellulose and oxycellulose are soluble, these characteristics afford a means of determining the presence or absence of the two forms of modified cellulose. A solution of caustic potash, 10 per cent, accurately checked against standard acid, is employed for the purpose. About 2 grms. of the cotton previously dried are placed in a beaker of about 250 c.c. capacity, and covered with 100 c.c. of the 10 per cent solution of caustic potash; the beaker is covered over with a watch-glass, and the contents heated at 100 deg. C. for three hours, during which time the cotton must be kept completely submerged in the solution. Any loss of liquor by evaporation during the period of heating must be compensated for by the addition of distilled water. After heating the required length of time, the contents of the beaker are poured into a litre of water in a larger vessel, any residue being washed from the small beaker to the larger. The alkali is then neutralized by an excess of acetic acid; any undissolved cotton is then filtered into a weighed Gooch crucible and washed successively with hot water, alcohol and ether, and dried at 105 deg. C. to a constant weight.

The Term "Shoddy" in the Textile Trade.

The subject of finding a new name for "shoddy"—a task of no extreme difficulty in itself—was revived the other day. What is shoddy? The manufacturer has no doubt and has his answers pat. Shoddy means to him the longer fibre recovered from the disintegration of woolen cloth; in other words, his shoddy is good, serviceable stuff.

To the person in the street shoddy does not mean the same thing. The shoddy against which the consumer rails is not good stuff at all, but rubbish; false goods which attract the purchaser only to ensnare him; trash of any kind, irrespective of its origin, composition, or manufacture; articles of a fair outward aspect that are not worth the money paid for them.

No vendor of textiles to the general public would label his goods as shoddy, being too well aware of the double meaning. He is more likely to call his fabrics by a noncommittal name—tweeds, pilots, meltons, or cheviots, for instance. The woolen manufacturer's shoddy is not sold as shoddy, and does not get called by that name unless the purchaser feels that he has been deluded in buying it. There has to be some one name to denote a bad bargain, and the choice has descended upon shoddy, a term that will hold the field until it has been exterminated by another of a more opprobrious sound.

It is impossible for the present to sterilize that word and purge it of the objectionable associations, and hence arises the question of abolishing the ambiguous term from all trade use. Perhaps if the name were left long enough disused it would perish and lose its association with woolens and with rags. Necessarily the name must be a long time in dying, but it is one that the trade can quite well do without, and is not too fond of using.

The more polite name for the article is the generic one of *waste,* and although there are traders unabashedly calling themselves shoddy manufacturers, they are rag pullers, not makers of cloth. Is it conceivable that their retention of an inelegant and ineuphonious name does something to perpetuate the confusion between good shoddy and fraudulent goods? If so they can have no compensating advantage for clinging to it. and they could rationally be asked to find some inoffensive substitute for it.