

required for Indigo, very large. The colour of the reduced solution was very interesting in the case of Flavanthrene, the effect being exactly the opposite of what occurred with Indigo. It seemed rather a disadvantage that Indanthrene yielded a blue vat, as the extent to which reduction had taken place could not be gauged as in the case of Indigo. He would like to point out that Violanthrene was not the first direct colouring matter that contained no nitrogen; the lecturer had evidently overlooked the natural dyestuffs—Safflower and Turmeric. He further asked whether it was absolutely impossible to strip goods which had been unevenly dyed with these colours, e.g., by means of permanganate. Could the colours be used in conjunction with Indigo, and was it possible to dye them together with sulphide colours? The lecturer had shown them samples of mercerised goods dyed Indanthrene. Had any comparative experiments been made as to the amount of colour taken up by ordinary cotton and mercerised cotton. Some years ago the Badische Anilin und Soda Fabrik took out a patent for the use of lead peroxide as a resist for Indigo, which at the same time bleached the ground. The idea, as expressed by the patent, seemed a very good one, but he did not know whether this had been successful, and he enquired whether it had been tried for Indanthrene. With the permission of the lecturer, he would like to mention that in a paper read by Prof. Green before this society, it was mentioned that in fixing certain sulphide colours on the fibre, advantage was taken of the reducing action of the cotton, no sodium sulphide or other fixing agent being employed.

The Lecturer, in replying to the Chairman, said that the cost of Indanthrene was justified by the results which could be obtained by using it. It was essentially a colour to be employed for high-class work. The expense, however, was to some extent exaggerated, as good sky blue shades on warps, such as would be used in the manufacture of flannelettes and shirtings could be obtained with 2 or 3 per cent. of colour.

With regard to mixtures of Indanthrene and Flavanthrene dyeing better on warps than hanks, he thought this was due to the warps going through the vat at a continuous rate, whilst it was somewhat difficult to manipulate yarn rapidly enough for the level dyeing of this combination.

In reply to Mr. Ermen, he had received no complaints of tendering due to the addition of potassium bichromate to the caustic liquor in the kier. He was of opinion that the quantity recommended (2 or 3 grs. per litre) was not sufficient to bring about this result. He could not explain the action of steam in improving the fastness to chlorine. It was quite possible that in dyeing the special dark blue a certain amount of mercerisation took place by the caustic soda treatment. Dr. Knecht had

already mentioned a point in support of the reducing action of the fibre restoring the colour of Indanthrene. He could not give any guarantee that Indanthrene used for headings would not mark off on pieces boiled under pressure in a kier. The action of the caustic soda seemed to be more physical than chemical, rendering the colour soft and more easily blurred by rubbing. He had known cases where no marking off had occurred, but it might happen at any time.

In answer to Dr. Knecht, he had not tried to find the amount of hydrogen necessary to reduce Indanthrene. As to the use of Indanthrene with Indigo, he thought this would, in the case of large quantities of Indanthrene, present difficulty owing to the large amount of hydrogen required to reduce it, but it was used successfully in calico printing when applied in small quantities to brighten Indigo. He agreed with Dr. Knecht that it was a disadvantage that Indanthrene gave a blue vat, but he thought a little experience rendered it easy to judge how far the dyeing had proceeded, by the change from greenish blue to reddish blue on oxidation. He had found it absolutely impossible to completely remove Indanthrene from the fibre, but this was due to its excellent quality of fastness. Even potassium permanganate will not entirely remove it. He had not heard of any successful application in combination with sulphide colours. The lecturer showed two pattern cards illustrating ordinary and mercerised cotton dyed with Indanthrene; he judged that 8 per cent. on mercerised cotton was equal to about 12 or 13 per cent. on unmercerised cotton. He did not know whether the lead peroxide resist under Indigo had been a commercial success, nor whether it had been tried for Indanthrene.

A vote of thanks was proposed by Mr. Marshall, and in seconding this, Dr. Knecht said it would be well if we had also a bright red belonging to this series of dyestuffs.

The Lecturer in reply said that he hoped that he or one of his colleagues would be able in the future to make a further communication to the Society on the subject of these colours.

LONDON SECTION.

MEETING held in the rooms of the Launderers' Association, Birkbeck Bank Chambers, Nov. 29th, 1905, Mr. M. C. Lamb, F.C.S., in the chair.

Notes on Garment Dyeing.

By F. E. ROBERTSON, F.C.S.

In this paper your attention will be drawn to the treatment of garments, particularly ladies' garments, before, during, and after dyeing, and also to some of the numerous difficulties met with and the methods adopted for overcoming them.

Garment dyeing is a branch of the dyeing trade that may be said to bristle with difficulties.

Examination of Materials.—A few years back dresses were made almost entirely of one material, such as cotton, silk, or wool, and the dyeing of them was a much simpler matter than is the case now when ladies' costumes may consist of any of the following, in varying quantities :—Artificial, Tussore, glace and other varieties of silk, paper, cotton, mercerised cotton, linen, cardboard, gum, canvas, wire, glass, paint, leather, and wool, not to mention the presence of horn, mother of pearl, or fancy metal buttons.

It is of the utmost importance that a thorough examination of the condition and composition of the garments be made, before they are put in hand, buttons, trimming, or lace being removed if necessary, cleaned or dyed separately, and replaced afterwards.

The suitability or otherwise of colours and patterns chosen by customers requires special attention, and if a stripping process appears likely to be necessary, in order to remove the colour from the articles before dyeing to pattern, the advisability of suggesting another colour should be considered, as stripping processes are somewhat expensive and do not always have the desired effect. They also frequently tend to impoverish the material.

One source of trouble to the garment dyer is that patterns are frequently received differing entirely in appearance and composition from the articles to be dyed, and the following amongst others have in my own experience been utilised for this purpose :—Wall-paper, leather, velvet, plush, carpet, shot silk, straw hat, thread of silk, heather tweed, black and white check material sent for a grey, and the blue sea of a picture post card of Naples Bay. The difficulties of matching to some of the above are obvious, especially in the case of shot materials and plush.

When possible dresses should be dyed colours that change least in artificial light, or that have an agreeable change, such as greenish-blue, red, and brown. Violets change to purples, and therefore should never be recommended. Blues redden considerably in most cases. To obtain certain shades that alter very little in appearance under artificial light, dye with colours such as acid violets, which redden in gaslight, combined with one of the clear greenish-blues, such as Patent Blue, which becomes greener.

Cleaning.—Stains of various kinds are often met with and require removing before garments are dyed. Blood stains should be removed by brushing with cold or slightly warm water. Grease stains are about the most common kind of stains met with, and their removal in the cleaning process is simplified by the use of a little alcohol or chloroform, bottles of which can be placed on or near the brushing table. Chloroform is a very powerful solvent, and is most useful when varnish and paint stains, and more

especially old paint stains, have to be dealt with. Iron and iron ink stains can be removed by a warm oxalic acid liquor, or if necessary a dilute hydrochloric acid treatment. Wax, tar, and pitch stains are best treated with benzene. Dye stains remaining after a warm soap and soda bath can sometimes be removed by treatment with permanganate of potash solution and sulphurous acid. The methods used for removing stains are influenced by the nature of the material and the ultimate shade aimed at. Thus wine, tea, and coffee stains are best removed from cotton goods by a weak bleaching powder solution, and from silk and wool by warm soap liquors with addition of ammonia. It may be mentioned here that white cotton waistcoats are frequently stitched with silk, and are then not suitable for a lime bleach. Marking-ink stains on cotton and linen can usually be removed by slightly warm solution of cyanide of potassium. All kinds of soaps are used according to the class of work for which they are required. The soap should be well made and free from excess of alkali and water. Garments are cleaned in cold or warm soap liquors with or without addition of soda or ammonia. Thorough rinsing in warm water follows, rinsing until the last used water, a cold water, is practically clear after a passage of the goods.

During the making of new clothes the material is often rubbed over on the inside with soap to assist the pressing, and this soap must be well worked out when cleaning, otherwise it may prevent the dye penetrating, especially close to the button-holes of gentlemen's clothes.

Stripping Processes.—The processes chiefly met with are :—

- (1.) Stripping in alkaline baths ;
- (2.) Stripping with oxidising agents ;
- (3.) Stripping with reducing agents.

The woollen material of dresses received by the garment dyer has in the majority of cases been previously dyed with acid colours. It is often necessary to remove the old colour as much as possible before re-dyeing, so that it shall not influence the shade of the new colour. A good soap liquor with the addition of a little soda will strip many acid colours sufficiently, amongst which the following may serve as examples :—Acid Magenta, Azo Eosin (Bayer), Indian Yellow (Bayer), Naphthol Yellow S (Bayer), Acid Green extra conc. (C.), Cyanole Blue (C.).

Where dark colours, especially blues and browns, require stripping, some idea of the previous process of dyeing is of great assistance, and this can sometimes be fairly accurately guessed at by the quality of the goods and where the soap and soda bath has no effect, the material has probably been dyed with mordant colours, such as Alizarin Blues and Greens and Anthracene Browns. These cannot be easily removed, and it therefore seems best to advise

re-dyeing, or dyeing black in the case of dark shades of blue and brown, unless there is an opportunity for testing them before deciding. The above remarks apply to all kinds of men's suitings, dress goods, and ladies' cloths. Sulphon cyanines are not much affected by a soap and soda liquor, but can be removed by a bichrome and sulphuric acid bath ($1\frac{1}{2}$ parts of bichromate of potash and 4 parts sulphuric acid by weight), or by a nitric acid bath.

If the stripping is done with a view to obtaining a lighter shade of blue, hydrosulphite of soda should be the stripping agent used.

I here take the liberty of quoting the following from Mr. F. W. Walker's most interesting lecture on "Bleaching and Stripping Agents and their application". (see this Journal, December 12th, 1904):—"Very recently certain stable hydrosulphite compounds have been placed on the market to replace the liquid hydrosulphite of soda, which is so easily decomposed in the atmosphere. These new discharging agents are sold under the names of Hyraldite (Cassella) and Hydrosulphite NF (M.L. & B.). The new stripping agent, Rongalite C (B.A.S.F.), has similar characteristics to the above-mentioned."

These stripping agents, although of great use to the garment dyers for destroying colours on fabrics, do not in the words of the dyehouse "cut up the fades of woollen garments." Titanium salts are also used to some extent for stripping purposes, but are not quite so useful for half wool jobs as Hydrosulphite. Again quoting from Mr. Walker's paper:—"For the bleaching of the natural yellow colour of wool, sulphur stoving, though scarcely satisfactory, is inexpensive and consequently largely employed. Its chief defects are the lack of permanence of the white obtained, the objectionable smell which the goods have after treatment, and the harsh feel due to the retention of sulphurous acid. The latter is also apt to cause patchiness in subsequent dyeing owing to its reducing action on colours."

Sulphur bleached goods are frequently troublesome to the garment dyer, and should, after cleaning, be further bleached in a hydrogen peroxide bath so as to destroy the yellow colour of the wool, which owing to the lack of permanence of the original white obtained by the sulphur bleach, has gradually reappeared, probably through the oxidation of the decolourised pigment.

The peroxide bath is made up as follows, in a wooden vessel:—

- 90 gallons warm water.
- 10 gallons Hydrogen Peroxide (10 vols.).
- $\frac{1}{2}$ gallon Ammonia (0008 sp. gr.).

Soak goods overnight. On removing the goods squeeze, rinse in water.

Flannels may be met with dyed either with acid or direct dyes, the latter being largely

employed chiefly for reds, owing principally to their fastness to washing. When such is the case a hydrosulphite bath is to be recommended if stripping is desired.

Cotton linings in garments may have been dyed by one of the following methods:—

Firstly.—Direct cotton dyes or direct cotton dyes topped with Basic colours.

Secondly.—Basic dyes.

Thirdly.—Direct dyes diazotised and developed.

The particular process varies according to the requirements as regards fastness to rubbing, light, washing, ironing, and acids (perspiration).

In the case of woollen dresses with cotton linings, in which the wool has been previously dyed with acid colours and the cotton lining with direct colours, it is of quite as much importance to remove the cotton colour before dyeing as it is to remove the wool colour, if it is proposed to dye in an acid bath with subsequent filling up of the cotton.

It is usually found that in an ordinary warm soap and soda liquor, the acid colour will be removed from the wool far more readily than the direct colour from the cotton. The dyer should then decide if a stripping bath is advisable, to remove the direct colour. This is a point that does not usually receive sufficient attention in garment dyeworks, and inattention to this is frequently the cause of the wool having a heavy appearance on the surface after dyeing a half wool garment in an acid bath. By dyeing in a salt bath this trouble is avoided and a stripping bath on account of the cotton colour becomes unnecessary.

Faded garments are generally dyed in an acid bath, with or without previous stripping to destroy the colour. If only slightly faded satisfactory results can be obtained after removing as much colour as possible in soap and soda liquors, by dyeing medium or dark shades.

Badly faded garments should only be taken for such colours as can be dyed on the yellowish ground resulting from stripping in a hot or boiling nitric acid or bichrome and sulphuric acid bath. A nitric acid bath of about one gallon nitric acid per ten gallons water will be found suitable. These stripping baths should only be used when the garments are in a fairly sound condition, the nitric bath especially being severe on the wool although it is the most powerful stripping agent for badly faded woollen goods. In dyeing faded garments, it is not advisable to boil much.

Selection of Dyeing Process.—The selection of the best process for dyeing a uniform shade on the collection of materials and fabrics that are used to build up a lady's costume requires, at the present day, the exercise of considerable judgment, and a few examples of this class of goods received by garment dyers will illustrate this point. Cotton-lined woollen costumes of a dark shade, sometimes have white silk collars

and cuffs, and are also trimmed with artificial silk, which frequently cannot be removed. Difficulties of this kind are best overcome in the case of non-faded garments by dyeing in a neutral bath with a combination of neutral dyeing acid colours and direct colours, which dye the cotton principally.

In the first place, it is easier to obtain level and deep shades on the cotton at or near the boil, and the matching of the wool and silk can be more safely done with neutral dyeing acid colours than with direct colours, owing to the ease with which the first-mentioned can be removed from the animal fibre if too deep a shade is produced. An example of the above method is the following recipe for a one bath bright medium blue on a mixed garment of wool, silk, and cotton:—Brilliant Azurine B (By.), Wool Blue N extra (By.), Formyl Violet 10B (C.), with addition of 15 per cent. Glauber's salt.

The one bath process described above is undoubtedly the best where artificial silk is present. It will be dyed a somewhat darker shade than the wool, and if not too loosely woven will, in most cases, remain in a sufficiently good condition.

Artificial silk trimming and lace are now used to a great extent in place of silk or cotton lace.

Woollen costumes for pale shades, trimmed with it, present an agreeable contrast if dyed in an acid bath, the artificial silk remaining undyed, but if the artificial silk is unsound or frayed it is best to dye it to match the wool in a direct bath as its condition will then not be so noticeable.

Tussore silk dresses are frequently a pale shade of fawn or green, and owing to the irregular nature of the fibre are apt to have an uneven appearance when dyed, especially in dull shades, particularly grey. It is therefore better to dye with a luminous colour, namely one reflecting a large amount of light, such as scarlet or yellowish-green. Silk on garments takes a full shade more readily and can be dyed to match the wool with greater facility in a direct bath than in an acid bath; in most cases proof of this is afforded by the practice of many dyers of adding basic dyestuffs to help the shade of the silk in an acid bath.

This is not to be recommended, as the basic colour, besides going partly on to the wool, is liable to rub.

The following well-known acid colours exhaust well in a neutral bath, and are useful for shading the wool of mixture garments:—Brilliant Croceine 3B (Bayer), Fast Red A (Bayer), Orange 11B (Bayer), Indian Yellow G (Bayer), Brilliant Milling Green B (C.), Wool Blue N extra (Bayer), Patent Blue A (M.L.B.), Formyl Violet 10B (C.), Fast Acid Violet A2R (M.L.B.), Phenylamine Black 4B (Bayer).

These can be combined with direct colours which dye the cotton principally, such as:—

Mikado Orange (Berlin), Diamine Fast Yellow A (C.), Chloramine Yellow GG (Bayer), Columbia Green (Berlin), Benzo Sky Blue (Bayer), Benzo Azurine G (Bayer), Brilliant Azurine B (Bayer), Diamine Black BH (C.), Direct Black VT (Bayer), Zambesi Brown G (Berlin), Diamine Catechine B (C.).

The two bath process, commonly used for half woollen goods, of dyeing the wool first and cotton afterwards, is satisfactory with non-faded work, especially when there is no pattern to be matched, but faded parts have a tendency to go heavy and dark in the direct bath. With most colours the shade of the wool is also affected, and this seriously adds to the difficulty of matching a pattern. The heaviness on the wool may sometimes be caused by the acid not being thoroughly rinsed out and in the salt bath it causes the colour to go on to the wool. The old process of filling up the cotton by sumach and iron, and dyeing up with basic or natural dyes is usually resorted to in the case of faded half wool garments. This does not affect the faded parts of the garments so much as after dyeing with direct colours, but there is danger of the basic colour going on to the wool.

Mordant with two to three per cent. tannic acid. Four parts of sumach extract (25 per cent.) are equivalent to one part tannic acid. The strength of the nitrate of iron bath varies according to requirements.

Bronziness caused by basic colours can usually be removed by lukewarm water followed by a rinse. It has been noticed that shades obtained with those direct colours recommended as being fast to light on cotton are faster than corresponding shades obtained by mordanting with tannic acid and tartar emetic, and dyeing with basic colours.

Examples:—A full shade of Brilliant Benzo Green B is faster than a 2 per cent. shade of Brilliant Green Crystals (Bayer). A full shade of Benzo Fast Violet R (By.) is faster than a full shade of Methyl Violet B (Bayer). The shade obtained with Methylene Blue BB (Bayer) is fairly fast to light and compares favourably in this respect with Benzo Sky Blue, but is not so fast as the darker shade obtained with Benzo Fast Blue BN (Bayer).

Woollen or silk garments with cotton lace trimming can be successfully dyed with acid colours leaving the trimming white, provided the goods are stitched with silk.

The following colours are useful for this purpose:—Scarlet R (M.L.B.), Orange G (M.L.B.), Naphthol Yellow S, Acid Green—all brands—(M.L.B.), Patent Blue V (M.L.B.), Acid Violet 4RS (M.L.B.), Acid Magenta.

Better results are sometimes obtained by doing this than by dyeing the cotton lace, because in the latter case, unless the lace matches the wool exactly, it is evident to the most casual observer that the garment has been dyed, and that is not usually the impression the

wearer wishes it to convey. Also new garments of a blue, green, grey, red, brown, or violet shade are never trimmed with lace of a similar colour, probably because it would not show enough. Silk dresses or blouses with cotton lace insertion or trimming look particularly well in pale shades of blue, green, violet, or grey if the lace is left white or tinted cream in a separate cold bath.

Selection of Dyes.—The following properties of the colours should be considered:—Their solubility, levelling power, fastness to light, perspiration (acids), rubbing, ironing, and washing. The dyer is greatly assisted in his selection by the excellent handbooks and pattern cards supplied by the manufacturers, but he should remember that the word "fast" does not always indicate fastness to light, although it is usually used for that purpose. Colouring matters should be dissolved in pure water for preference, but if this is not possible, water containing lime should be corrected with acetic acid or soda, according to the properties of the dyestuff. The precipitation of dyes in standing baths can be generally traced to the use of hard water, or to an excess of salt in the bath.

With reference to the levelling power, dyes that go on the fibre slowly give the best results.

Fastness to Light.—The red, yellow, and black dyes are, as a rule, faster than the green, blue, and violet dyes.

Only dyes possessing good fastness to light should be selected for garment dyeing, such as—

Reds:—Azo Fuchsine G (By.), Azo Acid Carmine B (M.L.B.), Azo Acid Magenta B (M.L.B.), Azo Acid Magenta G (M.L.B.), Chromotrope 2R (M.L.B.) (crimson), Cloth Red G (By.) (dyed Glauber's exhausted acetic), Brilliant Croceine 3B (By.).

Orange:—Croceine Orange G (By.). Croceine Orange G is faster than Orange 11B.

Yellows:—Fast Yellow extra (By.), Tartrazine (By.).

Greens:—Acid Green extra conc. (C.), Fast Green Bluish (By.), Fast Light Green (By.).

Blues:—Alizarine Sapphirole B (By.), Fast Acid Blue R (M.L.B.), Alizarin Triazole R (By.), Cyanole extra (C.), Sulphon Cyanines (By.), Alkali Blue.

Violets:—Fast Acid Violet A2R, R and B (M.L.B.), Patent Acid Violet 4R (B.A.S.F.).

Blacks:—Phenylamine Black 4B (By.), Victoria Black B (By.), Naphthol Black B (C.), Nerol Black (Ber.).

The direct reds, such as Benzo Purpurine and Delta Purpurines, are not by any means as fast to light on wool as the above-mentioned acid reds.

The following direct colours are fairly fast on wool:—Congo Orange R (By.), Chrysophinine, but the direct blues, browns, and greens are not very fast in comparison with similar shades obtained with the acid colours mentioned above.

Sulphon colours are of chief interest for blue shades.

Sulphon Cyanine G, GR extra, 3R, and 5R extra are all very good, and are much faster to light than Brilliant Sulphon Azurine R, and Sulphon Azurine D.

I have exposed patterns of all the above-mentioned colours to the action of a south light for two months in the summer, with the results I have mentioned.

Fastness to perspiration is of minor importance, and most of the colours used by garment dyers are sufficiently fast.

Fastness to rubbing can be obtained when treating half wool materials if the dyer confines himself to the acid, sulphon and direct dyes, and avoids the basic colours.

Fastness to ironing.—The shade of many dyes is altered by ironing, but not permanently, except in a few cases, some of the direct reds being affected.

Fastness to washing.—Half wool garments for outdoor wear should be dyed fast to washing. The direct colours can be recommended for this purpose in combination with suitable neutral dyeing acid colours or sulphon colours, such as:—Scarlet B extra (M.L.B.), Orange 11B and Indian Yellow G (By.) are fairly fast, Azo Acid Yellow (Ber.), Naphthalene Green V (M.L.B.), Brilliant Acid Green 6B (By.), Fast Green CR (By.), Patent Blue A (M.L.B.), Fast Acid Blue R, R conc. pat. (M.L.B.), Alkali Blue, Sulphon Cyanine G, GR extra, 3R and 5R extra (By.), Alkali Violet LR (By.), Fast Acid Violet A2R, B (M.L.B.).

The shades of the acid dyes dyed neutral are not quite so bright as when dyed acid.

How is the dyer to distinguish between acid colours and neutral dyeing acid colours? I believe that several of the neutral dyeing acid colours would be far more used in combination with direct colours if it was known by the actual dyer which of the colours he was using was suitable for this purpose, and this and other useful information could be printed on the labels attached, as in the majority of garment dye-works the dyers handle the actual tins. It is usual to keep standing liquors of the direct colours, principally for medium or dark shades. Standing liquors of those acid colours that do not exhaust are occasionally kept, but it is doubtful if this is wise owing to direct dye-stuffs boiling off the cotton linings of garments in the acid bath. The dyeing should not take place in the vat in which the standing liquor is kept; a better plan being to transfer about a quarter of the standing liquor to a clean vat or copper, bring to the boil, add the necessary dyestuff previously dissolved, and then add about two-thirds of the remaining standing liquor, and fill up with cold water. The standing bath will be continually freshened up by adopting this plan. This, of course, is not necessary in the case of standing liquors of acid or direct blacks. The conditions vary so much according to the quantity of work dealt with and the number of dyers employed, that one feels it advisable to draw attention to this as some

troubles that arise in a small works, with, say one dyer who has a free hand in the choice of process, would not be met with in a larger works, where each dyer is limited to a particular range of colours or materials, and has to use certain dyes for standard shades. To illustrate this, it sometimes happens that a lady's half wool bodice or jacket is dyed first, and that the skirt belonging to it is sent perhaps a month or so later, with instructions for it to be dyed to match pattern enclosed, which may possibly be a part of the bodice or jacket previously dyed. In a large dyehouse it stands a good chance of going through the same process, and therefore, providing it matches the pattern in daylight, it is certain to match the skirt under artificial light, but in a smaller works the jacket may possibly get dyed direct in one bath and the skirt, owing to its having been worn more frequently, and therefore, no doubt, being faded, may be dyed acid and filled in after and then in the case of colours that change much at night, there is likely to be trouble for the dyer. It is therefore best to use certain fixed colours and processes for as large a range of shades as possible.

To pursue this a stage further by following the history of a costume, the two parts of which have been dyed by different dyes to match the same shade, we may find some curious effects when fading commences. Take the case of two medium browns on wool, both dyed with acid colours and practically matching, the first dyed with—

- 2% Fast Green Bluish,
- 3.4% Orange 11B,
- 1% Azo Crimson S,
- 10% Glauber's salt,
- 5% Acetic acid,

and the second dyed with—

- 91% Brilliant Alizarin Cyanine 3G in powder,
 - 1.5 % Fast Light Yellow G,
 - 7% Orange 11B,
 - 21% Alizarin Sapphirole SE,
 - 20% Glauber's salt,
 - 2% Acetic acid,
- exhausted with 2% Sulphuric acid.

It is found that the brown dyed by the first recipe fades to a reddish-fawn, and by the second to a dull bluish green.

In the first case the colouring matters used are practically equally fast to light, but in the second case the blues and yellow are faster than the orange. This shows the importance of combining colours of similar fastness to light. It is not often that one hears of a dyed shade becoming brighter after some months exposure, but this actually occurs with a deep navy dyed on wool with—

- 3% Alizarin Cyanine 3G in powder,
 - 2% Fast Light Yellow G,
 - 1% Orange 11B,
 - 20% Glauber's salt,
 - 2% Acetic acid,
- exhausted with 2% Sulphuric acid.

This, of course, is due to the orange, and perhaps the yellow not being so fast as the blue.

New pieces of a few yards in length are sometimes sent with half wool costumes all to be dyed the same shade. An oxidising strip can be used with advantage to obtain a level bottom for some shades, especially if costumes are faded, but if not admissable and the garments are not much faded, the one bath process of dyeing will simplify the matching-up considerably.

A curious kind of garment that the dyer never forgets after he has once dyed one, consists of a white woollen frock, originally sulphur bleached, in which the arms have been renewed with the same sort of material, and perhaps an extra frill run round at the same time to increase the length. The body part will be somewhat yellower owing to the original colour of the wool being gradually restored by oxidation. If the garment is very dirty this may not be noticed until the dyer finds to his surprise that he has dyed two different colours, such as a pale blue and bluish-green with one dye, and if trimming has also been removed previously, a pronounced pattern will appear as well.

This class of work should never be taken for pale shades, as, even with the help of a peroxide bath before dyeing, it is almost impossible to get a good result.

Bronziness on wool, silk, or cotton in dyeing black by the one bath process is caused either by excess of dye or salt in the bath. To overcome this, blacks are rinsed once or twice and then squeezed through a hot soda bath, then again rinsed, and passed into a dilute acetic acid bath, lifted and extracted. The excess of dye is removed in the soda bath, which also helps to make the black fast to rubbing.

A bath made up with a little bleaching powder solution acts equally well, and possesses this advantage over the soda bath, that if carefully used it does not thin the shade of the cotton or give it a bluish tone.

Silks having a bronzed appearance after drying up can be cleared by passing through benzene.

Finishing.—The stiffness of costumes after dyeing varies very much according to the nature of the material, but usually a little stiffening is considered necessary and the following is suitable for wool or half wool garments:—A solution of a thin mixing starch is boiled for some time with a saturated solution of gelatine, roughly $\frac{1}{2}$ pail starch per pail of water, and one bowl gelatine solution. Strain half a pailful of this solution through a fine sieve into a shallow tub containing one pail of cold water. Handle garments in this clear liquor and squeeze out of it, shake out well, extract, and dry up.

When stiffening jobs dyed with direct reds sensitive to acid add a little ammonia to the stiffening bath.

The greatest drawback to having garments dyed has always been the shrinkage that occurs during the process, this being especially pronounced in the case of thin and loosely woven materials of which costumes and skirts are often

made, such as canvas, voile, alpaca, or nuns-veiling. The shrinkage that occurs during the dyeing and drying of a bodice or blouse does not cause so much inconvenience to the wearer as shrinkage of the skirt does, as, with the exercise of a little ingenuity the necessary enlargement can usually be effected. It is not so easy, however, to increase the length of a skirt.

Apart from hand or machine ironing the general method of finishing skirts is by stretching whilst slightly damp over a steam cone. This, however, does not to any great extent overcome the shrinking which is found to occur chiefly in the dyeing of loosely woven materials.

A recent invention in the form of a patent skirt stretching and drying machine is likely to prove invaluable to garment dyers, as, by its use, skirts can be taken straight from the extractor and can be stretched both in length and width, dried, and virtually finished in one operation.

The skirt is held upside down and the bottom of it is attached to a circle of movable pins, so arranged that they can be moved in any desired direction, and can be reduced or increased in number according to the circumference of the skirt. When this is partly done a wooden body is fixed in the waist and is connected with a lever, so that when ready the skirt can be stretched without difficulty to its original length. It dries quickly whilst stretched, and only requires ironing where attached to the frame. Skirts that have shrunk so much as to be unwearable can, by this means, be stretched back to their original shape and length.

In concluding these few remarks on some of the garment dyers' methods and difficulties, I wish to acknowledge the assistance I have obtained from some of the valuable pattern cards and books supplied by the various colour manufacturers.

DISCUSSION.

The Chairman asked whether standing baths of acid colours were much employed, and if such was the case, did not these deteriorate very rapidly.

Mr. Eastman said that he noticed Mr. Robertson specially emphasised the use of colours that were fast to light. In his (Mr. Eastman's) opinion, fastness to light was not of very great importance, because of the fact that when a garment was to be re-dyed it was not expected to wear much longer.

The Lecturer drew attention to the fact that curtains, cushion covers, &c., had often to be re-dyed by the garment dyer. Fastness to light was particularly important in these special cases.

Mr. F. W. Walker said that he noticed that Mr. Robertson recommended potassium cyanide for removing ordinary ink stains. Could he suggest a method for removing Aniline Black ink stains?

Mr. Robertson said that standing baths of the direct cotton colours were to be recommended. Acid blacks were the principal acid dyes most in favour. He could not suggest a method for removal of Aniline Black.

A vote of thanks to the lecturer concluded the proceedings.

MEETING held on Thursday, December 14th, 1905, Mr. M. C. LAMB in the chair.

Method for Production of Photographs on Silk.

By FRANK J. FARRELL, M.Sc.

In the unavoidable absence of Mr. Farrell, Dr. J. C. Cain read the paper.

In 1896 a series of experiments was made by Mr. Ernest Bentz and myself on the diazotisation of the wool fibre, the results of which were published in a short paper read before the Manchester Section of the Society of Chemical Industry, and printed in the Journal of that Society.

The object of these experiments was to determine whether the dyeing properties of the wool fibre depended in any degree on the assumed presence of an amido or imido group in the molecular complex of the fibre.

In order to accomplish this it was necessary to make dyeing experiments with wool in its unchanged condition, and wool from which the amido or imido group had been removed. The removal of the amido or imido group was effected by the well-known method of diazotising (whereby the wool was rendered deep yellow in colour) and boiling. It became necessary to prove in the course of these experiments that the immersion of the wool fibre in a solution of nitrous acid was actually converted into a diazo (or diazonium compound). This was readily proved by experiments showing that combinations with alkaline, aromatic hydroxy compounds could be effected, coloured bodies being produced, the colour varying with the hydroxy compound employed from yellow to red or brown. For example, combined with beta naphthol a bright red shade is produced; with resorcinol a golden orange.

During the conduct of these experiments it was found that the bright yellow colour of the diazotised wool fibre rapidly changes under the influence of sunlight, becoming very pale buff or deep cream in shade. When this change has occurred it is no longer capable of combining with alkaline hydroxy compounds.

The sensibility of the diazo compound to light suggested the possibility of applying the process photographically, and experiments showed that prints could be obtained. Owing, however, to the loose and fibrous surface of all wool fabrics, the prints produced were more or less blurred and indistinct, most of the fine detail being lost. The process was therefore only applicable in certain classes of subjects where the result depended more upon the broad general effect than upon the sharpness of the finer details.