difficulty in devising an equitable scheme was that in some cases the value of a process could only be determined after full-scale practical use for a considerable period. He had considerable experience of the working of a Patent Pool in Germany and it proved highly satisfactory.

Mr. J. Prior asked whether Mr. Potts thought that the Comptroller's jurisdiction should be limited to cases where the facts were clear or should cover cases where matters of opinion were concerned. He thought that danger would arise in the latter case. In his opinion a question much more important than that of subject matter was that of an extended search.

Mr. N. G. S. Cooper considered that the Comptroller, having a wide technical knowledge, should not have power to deal with subject matter; as preconceived opinions would often vitiate his judgment. He instanced the classic controversy as to whether calcium carbide was an organic or an inorganic chemical.

The Lecturer, in replying to the discussion, said that with regard to the question of definition he was pleased to find that Professor Green was in agreement with his general conclusion that the Comptroller should be given greater jurisdiction; but he could not agree that the patentee should be restricted so narrowly as Professor Green suggested. For example, a German inventor made the discovery that by condensing two ringed compounds with an intermediate carbonyl group between them, you get complex substances which then could be treated with a dehydrogenating catalyst in such a way that you could split the bridge. This was an entirely new reaction. In the present state of our law the inventor was most unfortunately limited to the particular catalysts which he had described. That was all wrong; a great deal of latitude should be allowed to the pioneer who blazes the trail. Such a patentee should be given the maximum protection which is due to the man who first shows the way.

The Court of Appeal should include an assessor. Instead of an appeal to the law officer, the report recommends that there should be an appeal to a Judge in Chambers—an admirable suggestion; but he thought the judge should be entitled to call upon an assessor for assistance. The experience in Germany shows that that process could be made to work. The foreign Courts often decide cases in a day or two days. In reply to Mr. Marlow, he thought that the inventor was entitled to generalise and should not be limited to the exact thing which he describes.

As regards secret user, he was inclined to agree with Mr. Marlow that if the patentee himself had used the patented process for profit, that might invalidate the patent.

He agreed with what Mr. Levy said about specialisation. It is, of course, common knowledge that many great inventions depend upon some point of apparently minor importance, but

really of crucial importance; but he had found that the German Examiners and the American Examiners, and still more, the British Examiners, because they are men of the world, are prepared to listen to representations as to what is known by people skilled in the industry. Therefore, if a real advance has been made, no matter how small it may appear at first sight, the patent examiners of the world are prepared to consider it in an impartial way.

As regards prior user, the law provides that reasonable trials may be made if it is really necessary to determine the success of an invention; but that position should be made more favourable to the inventor than it is to-day.

A cordial vote of thanks was given to Mr. Potts on the motion of Professor Green, seconded by Mr. E. T. Brewis.

MIDLANDS SECTION

Meeting held at the Leicester College of Technology on 11th March 1931, Mr. W. SHARDT in the chair.

The Removal of Stains from Hosiery Goods

H. L. LONG, B.Sc., A.I.C., A.M.I.Chem.E.

The scientific removal of stains depends on a knowledge of the properties of the material and of the chemical character of the stain.

Stain removing is no new art. A book entitled *"A Profitable Boke declaring Dyvers Approoved Remedies to take out Spottes and Staines in Silkes, Velvets, Linnen and Woollen clothes, taken out of Dutch and Englished by L. M. (Leonard Mascall),"* was published in 1583 (see Fig. 1*). At that time nearly all garments were coloured, and the process of stain removal was very difficult owing to the lack of fastness of the colours.

A profitable boke

declaring dyuers approoued re-
medies to take out fpottes and ftaines, in Silket,
Veluets, Linnen and Woollen
cluba.

With diuers colours how to die Vel-
vets and Silket, Linnen and Woollen, Fuftian
and Threads.

Alfo to dreffe Leather, and to co-
lour Felles. How to Gylde,Graue, Sowder,and Ver-
niffe. And to barnen and make fofte
Yron and Steele.

Very neceffarie for all men, fpecially for thofe
which harb or fhall haue any danges therein: with
a perfite table hereunto, to fynde all
thingsa readye, neuberetokre reuealde
in Englith heretofore.

TAKEN OVT OF DVTCHE
and englifhed by L. M.

Imprinted at London by Thomas
Purfoote, and William Pounfonbie,
1 5 8 3

Fig. 1

The stains usually met with can be classified into broad groups (Table I), a general method of attack being suitable for all stains in one group, although special methods are often desirable.

TABLE I

CLASSES OF STAINS

1—Tannin basis (tea, wine, etc.).
2—Albumen basis (blood stains, egg).
3—Chemical (a) Inks.
         (b) Iron mould, copying ink.
4—Oily, etc. (a) Drying oils, paints, lubricants.
         (b) Lacquers and varnishes.
5—Moulds and mildew.

The method adopted will depend on whether it is necessary to remove an individual local stain or a number of extensive stains. Methods which can be used for the former are not always applicable to the latter, owing to expense of reagent, action on machinery, labour involved, etc.

For small stains the apparatus necessary is simple, consisting of a few glass rods, small porcelain basins, brushes, and a spray for

TABLE II

CHEMICALS USED IN STAIN REMOVING

Solvents

Most generally useful—	Occasionally useful—
Benzine.	Chloroform.
Alcohol.	Benzene.
Acetone.	Amyl alcohol.
Ether.	Amyl acetate.
Westrosol (CHCl·CCl₂).	Ethyl acetate.
Westron (C₂H₂Cl₄).	Carbon tetrachloride.
Turpentine.	Aniline.
Oleic acid (emulsifier).	Pyridine.
	Glycerine.
	Phenol.
	Cresol.

Acids and Bleaches—

Acid or Bleach	Concentration of Solution	Temp.	Time
Oxalic acid ...	1 oz. in 1 pint water	100° F.	After permanganate 5 min. For iron stains, up to 15 min.
Acetic acid ...	1 oz. in ¼ pint water	Cold	Up to 5 min.
Hydrochloric acid	1 part of concentrated acid in 10 parts water.	Cold	Up to 5 min.
Hydrofluoric acid	1 part in 4 parts water	Cold	Instantaneous
Oxidising Bleaches Sodium hypochlorite. (With acetic acid)	0·15–0·2% available chlorine = 13–18 grains per pint. Made from 1 oz. bleaching powder, 1¼ oz. soda ash per gall., and allow to settle, using the clear liquid.	Cold	Up to 5 min.
Hydrogen peroxide (With ammonia)	1 to 10 vols. H₂O₂ ...	Cold	Overnight
Potassium permanganate.	1 oz. in 1–4 gall. water followed by oxalic acid, hydrogen peroxide or sulphurous acid.	Cold	Up to 15 min.
Sodium perborate	1 oz. in 4–6 pints (freshly prepared).	Warm	15 min. or longer.
Reducing Bleaches Sodium hydrosulphite. ...	1 oz. in 1–5 pints (freshly prepared).	Cold	Up to 5 min.

Occasionally dilute ammonia, citric acid, percarbonate, and sodium peroxide are used also. The latter offers no advantage over hydrogen peroxide.

solvent. A cord and hooks to suspend the material may be useful to prevent soiling of the bulk, and two concentric rings, such as are sometimes used in embroidery or darning, can be used for holding the stained portion. A blower is required to dry the spot quickly and thus note the effect of the reagent used.

The reagent to be used will depend on the character of the stain and the material. There is no satisfactory universal reagent since such a preparation would be unnecessarily drastic for many stains.

The chemicals can be classified as— (1) Solvents, (2) acids, (3) bleaching, oxidising, and reducing agents (see Table II). It is important that the concentration, time, and temperature stated should not be exceeded in order to avoid damage to the material. Extensive investigations have been carried out on this point by the British Launderers' Research Association. Table III gives the reagents permissible for use on various materials.

TABLE III

PERMISSIBLE BLEACHING AGENTS FOR VARIOUS MATERIALS

	White Material.	Dyed Material.
Cotton, linen, and viscose silk.	All.	Hydrogen peroxide. Sodium perborate. Oxalic acid. Citric acid.

	White or Dyed.
Silk and wool.	Hydrogen peroxide. Sodium perborate. Permanganate followed by hydrogen peroxide and acetic acid.

PERMISSIBLE SOLVENTS FOR USE WITH CELLULOSE ACETATE SILK

Dilute alkali.	Turpentine.
Benzine.	Glycerine.
Solvent naphtha.	Chlorohydrin.
Benzene.	Dichloroethyl ether.

The following *must not* be used—

Acetone.	Chloroform.
Alcohol.	Acetic acid.
Westron.	Carbon tetrachloride.
Westrosol.	

Removal of unknown stains should be attempted first by washing with water, then (after drying) by treatment with solvents, then with acids, and finally with bleaches. The latter are the most liable to damage the material, are often unnecessary, and may sometimes fix a stain more firmly.

Stains with a tannin or albumen basis can be removed frequently by washing alone, or by washing followed by a mild bleach. To avoid "setting" an albumen stain, the washing must be done with water below 100° F. A solution of salt often assists in removal of stains of this class.

The greater number of stains occurring in hosiery goods and other textiles, however, belong to the last three classes (Table I).

Chemical stains generally require bleaching, although if a metal is present in the stain it should first be treated with acid.

For iron stains, oxalic acid, sodium hydrosulphite, or hydrofluoric acid (1 in 4) is used. The latter is very effective and does not damage cotton to the same extent as oxalic acid, but great care is necessary, of course, to avoid injury to the user.

Copper should not be treated with bleaching agents, as it acts as a catalyst and the cloth may be tendered.*

The removal of oil or grease stains depends on emulsification by scouring with soap and alkali, or solution and removal by a solvent. In removal by the latter, white blotting paper should be placed under the material and the solvent placed round the stain first, not directly on it. The surface tension of oil or grease is greater than that of benzine. Hence if the spot is surrounded by the solvent, the mixture of grease and solvent is drawn inwards. Otherwise, spreading takes place by the grease being forced outwards and clean solvent is left at the centre. The area wetted can be minimised by dabbing the spot with cotton wool saturated with the solvent, or by thickening the solvent with, e.g. gum tragacanth.

Oleic acid is superior to soap and alkali as an emulsifier. Oleic acid is rubbed on to the stain and left for some time, and then the spot washed with dilute ammonia. An ammonium soap is formed and the stain is removed in rinsing out the soap. This method can be applied even when the staining is extensive.

For removal of mildew, hydrogen peroxide is often useful. The most effective process, however, is to leave permanganate solution in contact with the mildew for about fifteen minutes, and then to treat with a hot oxalic acid solution.

In dealing with coloured goods, it is generally necessary to effect a compromise and use a reagent which removes the majority of the stain without stripping too much colour. If such a reagent cannot be found owing to the lack of fastness of the dye, it may be possible to remove both stain and colour, and then to redye the spot, or fill it in with crayons specially made for the purpose. The final result, if not perfect, is less noticeable than the stain.

In general, if a reagent acts slowly on the stain it is advisable to rinse out and repeat with the same reagent several times. It is always important to rinse out one reagent completely before a second one is tried.

Soft water should be used, especially when the material or garment is not to be washed as a whole.

Lustre is improved by rubbing over with a trace of olive oil.

The most frequent types of stain are caused by the uneven removal of oil from the fabric or by splashes of lubricating oil.. A dark or light stain due to oil can generally be quickly detected by ultra-violet light, which is in fact useful for investigating all types of stain.

Extensive investigations in connection with faults which arise through oils and soaps have been carried out by Hirst (*Jour. Textile Science,* 1930, **44**, p. 105).

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*According to L. L. Lloyd, copper stains should be treated with potassium cyanide prior to bleaching agents—Ed.

The various points in the lecture were fully illustrated by experiments, different stains being removed from a variety of hosiery goods.

COMMUNICATION

Porosity: A Primary Property of Textiles—Part I

N. H. CHAMBERLAIN, Ph.D.

(1) *Definition of Porosity*—J. Schofield (this *Jour.,* 1930, **46**, 368, 372, 401) has attempted to define and make observations upon an "important property of textile materials, hitherto unregarded," viz., the "porosity" of textile yarns and fabrics. This quantity is actually defined in three different ways in Schofield's papers. If

V_1 = the volume of a piece of wool fabric, (obtained by multiplying together its length, width, and "thickness");

V_2 = the volume of the actual wool present, (obtained by dividing the weight of the fabric by 1·31, the density of wool);

then, according to Schofield's first definition, the "porosity," P, of the fabric is equal to $V_1 - V_2$. At the head of Table V (p. 374), however, porosity is defined as $\dfrac{V_2}{V_1}$; and yet again, in the text just prior to this table, "coefficient of porosity" is given the value $\dfrac{V_1 - V_2}{V_1}$. It is clear that these definitions are mutually contradictory.

Further, if

Δ = Bulk density of the fabric (obtained by dividing its weight W by its Volume V_1),

then plainly

$$\Delta = \frac{W}{V_1} \text{ or } V_1 = \frac{W}{\Delta} \text{ and } V_2 = \frac{W}{1\cdot31}$$

Now if porosity, P, is defined as $\dfrac{V_2}{V_1}$, then

$$P = \frac{V_2}{V_1} = \frac{W}{1\cdot31} \times \frac{\Delta}{W} = \frac{\Delta}{1\cdot31} \text{ or } P = k\Delta$$

In other words "porosity" is merely the bulk density multiplied by a constant. It is incorrect to say that bulk density has been "hitherto unregarded" (see Speakman and Chamberlain, *J. Textile Inst.,* 1930, **21**, T29). Again, if the above definition is accepted, it is clear that porosity varies directly with bulk density; Schofield apparently considers that the relation is an inverse one (p. 369).

(2) *Thickness Measurement*—Passing now to the measurements of the thickness of fabrics recorded by Schofield, three points must be considered.

Firstly, the statement, regarding the pressure to be applied in the measurement of cloth thicknesses, that "pressures of 40 g./sq. cm. are relatively enormous . . . and for the objects of the following investigations are inapplicable and unrelated." Yet, upon examination, the axis of ordinates of the curve given