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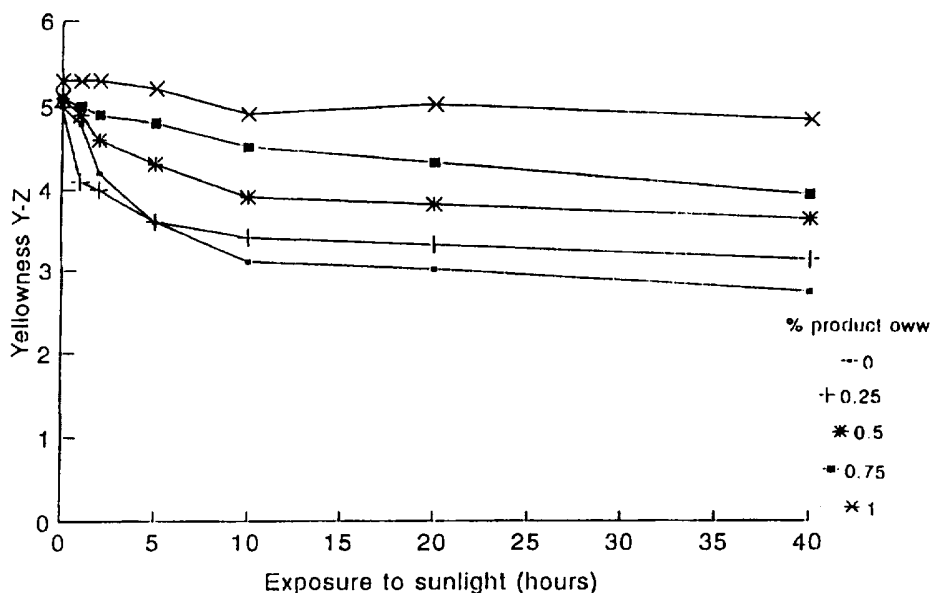
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(54) Title: A METHOD OF PREVENTING PHOTBLEACHING OF WOOL AND/OR OTHER NATURAL FIBRES



(57) Abstract

A method of treating wool and/or other natural fibres with a chemical compound, the compound undergoing photoyellowing at a similar rate to the rate at which the wool and/or natural fibres undergoes photobleaching. The chemical compound is applied in an amount which ensures the photoyellowing of the chemical compound cancels out the photobleaching of the natural fibres. The chemical compounds are preferably syntans and may consist of condensation products of aromatic sulphonic and/or sulphonic acids. Other suitable compounds include optical brightening agents, tannins, and aromatic sulphonic acids.

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A METHOD OF PREVENTING PHOTBLEACHING OF
WOOL AND/OR OTHER NATURAL FIBRES

FIELD OF THE INVENTION

This invention relates to a method for reducing or preventing bleaching which wool and other similar natural fibres undergo when the wool and/or natural fibres are first exposed to sunlight, such as behind glass.

BACKGROUND OF THE INVENTION

Photobleaching (sometimes called "first fade" or "red fade") is seen as a rapid but limited on-tone fading of the natural creamy yellow of wool.

Yellowness induced from processing eg, dry-heat, hydrothermal or alkali yellowing is also photobleachable.

The bulk of the photobleaching occurs within 5-10 hours of the wool being exposed behind glass to midsummer sunlight and continues at a slower rate for another 40-50 hours.

The colour change caused by photobleaching is a cause of a significant number of consumer complaints particularly in the case of carpets. It is noticeable when furniture is moved revealing a colour difference between the areas of carpet which have been exposed to sunlight and those which have been unexposed.

The primary object of the present invention is to reduce or prevent this initial colour change in wool or wool blend furnishings which occurs on exposure to sunlight thus eliminating consumer complaints due to this cause.

SUMMARY OF THE INVENTION

According to one aspect of the present invention there is provided a method of treating natural fibres with a chemical compound, the chemical compound undergoing photoyellowing at a similar rate to the rate at which the natural fibres undergo photobleaching, the chemical compound being applied in such an amount so the photoyellowing of the chemical compound on the natural fibres cancels out the photobleaching of the natural fibres.

The preferred class of chemical compounds are known industrially as syntans and may consist of condensation products of aromatic sulphones and/or sulphonic acids.

However other compounds which similarly undergo a photoyellowing at a similar rate to the photobleaching of wool or the like fibres are also suitable. These may include optical brightening agents, tannins, aromatic sulphonic acids etc.

BRIEF DESCRIPTION OF THE DRAWINGS

Further aspects of the invention will become apparent from the following description, which is given by way of example only and with reference to the accompanying drawings in which:

Figure 1 shows a graph of the change in yellowness of wool felts treated with an aromatic sulphonic acid condensation product over a period of 40 hours exposure to sunlight;

Figure 2 shows a graph of the change in yellowness of whiter wool felts treated with an aromatic sulphonic acid condensation product over a period of 40 hours exposure to sunlight;

Figure 3 shows a graph of the change in yellowness of treated and untreated yarns over a period of 40 hours exposure to sunlight; and

Figure 4 shows a graph of the change in yellowness of treated and untreated yarns over a period of 40 hours exposure to sunlight.

DESCRIPTION OF THE PREFERRED EXAMPLES

Particular examples of the invention are set out below.

Example 1

Two scoured loose wool samples of different yellowness were treated with a condensation product of arylsulphonic acids as follows:

Wool samples (20g) were treated in a laboratory dyeing apparatus at 75°C with 0, 0.5% and 1% of product on weight of wool (oww).

These samples were rinsed, dried at 60°C then hand carded and packed into a glass ended container at a packing density of 0.10g/cc.

Yellowness values (Y-Z tristimulus values) were measured using a Hunterlab Spectrocolorimeter using a 2° observer and illuminant C before and after exposure to 40 hours midsummer sunlight (Christchurch, NZ).

Results were:

	Initial Y-Z value	Y-Z value after 40 hours sunlight	$\Delta(Y-Z)$
Untreated sample 1	5.1	0.6	4.5
Sample 1 & 0.5% product	5.7	3.6	2.1
Sample 1 & 1.0% product	5.8	4.6	1.2
Untreated sample 2	4.2	1.5	1.7
Sample 2 & 0.5% product	4.2	3.9	0.3
Sample 2 & 1.0% product	4.4	4.2	0.2

Thus the change in yellowness for the wool samples after 40 hours sunlight exposure was reduced by 73% and 88% respectively.

Example 2

Two wool felts of different yellowness were treated with 0, 0.25, 0.5, 0.75 and 1% of an aromatic sulphonic acid. The samples were then exposed to midsummer sunlight behind glass and the yellowness measured after 1, 2, 5, 10, 20, and 40 hours using a Hunterlab Spectrocolorimeter as in Example 1.

The results are shown in Figures 1 and 2.

It can be seen in Figures 1 and 2 that wools of different original yellowness require different amounts of chemical to prevent a colour change. Figure 1 shows that increasing amounts of an aromatic sulphonic acid condensation product reduce the extent of photobleaching. At 1% oww there is a minimal colour change. Results for a whiter wool (Figure 2) show best results are obtained at a treatment rate of 0.5%oww.

Example 3

The treatment was applied during the dyeing of a commercial production yarn batch of two tonnes. The

dyeing was carried out in a longclose single stick hank dyeing machine using Sandolan MF dyes (Sandoz) at 0.8%. As well as the standard auxiliaries 1% hydroxylammonium sulphate (HAS) and 0.5% of an aromatic sulphonic acid were added at the beginning of the dyeing. The wool blend had a Y-Z value of 4.6. Samples from this treated batch as well as untreated samples from a previously dyed batch and the untreated, undyed wool were exposed behind 2 mm picture glass to mid-summer sunlight (Christchurch, NZ). Colour measurements were taken prior to exposure and after 1, 2, 5, 10, 20 and 40 hours after exposure using a Hunterlab Spectrocolorimeter. The change in yellowness is recorded as $\Delta(Y-Z)$ and this is shown in Figure 3. In Figure 3 it can be seen that after 40 hours exposure to sunlight the treated yarn changed by 0.3 Y-Z units (ie, indiscernible) whereas the untreated yarn changed by 2.3 Y-Z units. (A change in $\Delta(Y-Z) > 1$ is said to be visibly discernible.)

Example 4

The treatment was applied during commercial loose stock dyeing to a 2.8 tonne batch of wool with an initial Y-Z value of 3.0. Dyeings consisted of 12 lots each of 235 kg dyed with 2:1 premetallised dyes to a light beige shade (0.013% dye). The treatment was applied with other dyeing auxiliaries included 1% HAS. The level of

the aromatic sulphonic acid was 0.4%. The 12 dyeings were blended and processed into yarn which received a scour in a 5 bowl tape scour. This was followed by another 5 bowl chemical setting treatment using 10 g/L of sodium metabisulphite. The yarn was similarly exposed behind 2 mm picture glass to mid-summer sunlight for 40 hours. An untreated control sample and an undyed/untreated wool sample were also exposed. Colour measurements were taken using a Hunterlab Spectrocolorimeter at 0, 1, 2, 5, 10, 20 and 40 hours exposure. The $\Delta(Y-Z)$ values (change in yellowness) are shown in Figure 4. Figure 4 shows that after 40 hours exposure the treated yarn has changed by 0.2 Y-Z units and the untreated yarn has changed by 1.5 Y-Z units.

This example shows the treatment is fast to tapescouring and chemical setting if applied during dyeing.

The wool can be treated during scouring, at the dyeing stage or on a continuous carpet processing line. The treatment can be applied to loose wool, wool yarn, wool fabric or carpet.

The level of compound applied depends on the initial yellowness of the wool and the dyestuffs used but can be adjusted so that there is little or no colour change due to photobleaching behind glass.

The addition of 1-2% of hydroxylammonium sulphate (HAS) with the dyeing auxiliaries significantly reduces dyebath yellowing and hence reduces the required amount of syntan compound. For this reason it is recommended that 1-2% HAS be used in conjunction with the syntan compound.

Thus by this invention there is provided a method of reducing or preventing the bleaching of wool and other similar natural fibres during exposure to sunlight, such as behind glass.

Particular examples of this invention have been described and it is envisaged that improvements and modifications can take place without departing from the scope thereof and of the appended claims.

CLAIMS

1. A method of treating natural fibres with a chemical compound, the chemical compound undergoing photoyellowing at a similar rate to the rate at which the natural fibres undergo photobleaching, wherein the chemical compound is applied in such an amount so the photoyellowing of the chemical compound cancels out the photobleaching of the natural fibres.
2. A method as claimed in Claim 1 wherein the chemical compound comprises a condensation product of a aromatic sulphones.
3. A method as claimed in Claim 1 wherein the chemical compound comprises a condensation product of a sulphonic acid.
4. A method as claimed in Claim 1 wherein the chemical compound comprises an optical brightening agent, tanning, or aromatic sulphonic acids.
5. A method as claimed in any one of the preceding claims wherein the chemical compound is applied during scouring, dyeing or processing of the natural fibres.

6. A method as claimed in any one of the preceding claims wherein the natural fibre is wool.
7. A method as claimed in claim 6 wherein the chemical compound is applied to loose wool, wool yarn, wool fabric or carpet.
8. A method as claimed in any one of the preceding claims wherein the amount of chemical compound applied to the natural fibres depends on the initial yellowness of the wool.
9. A method of treating natural fibres as claimed in Claim 1 and substantially as herein described with reference to the Examples and the accompanying drawings.

1/4

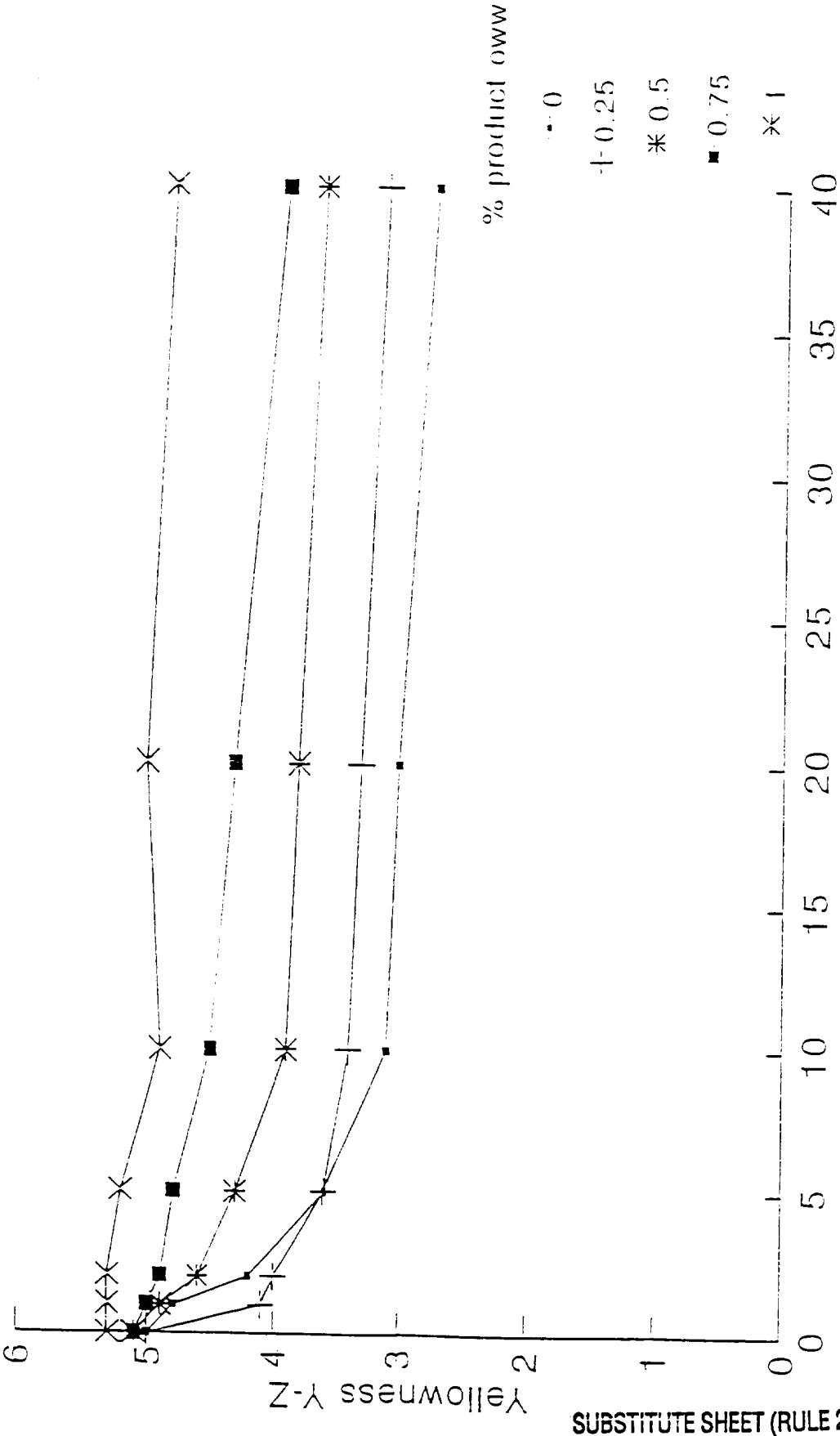


FIGURE 1

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2/4

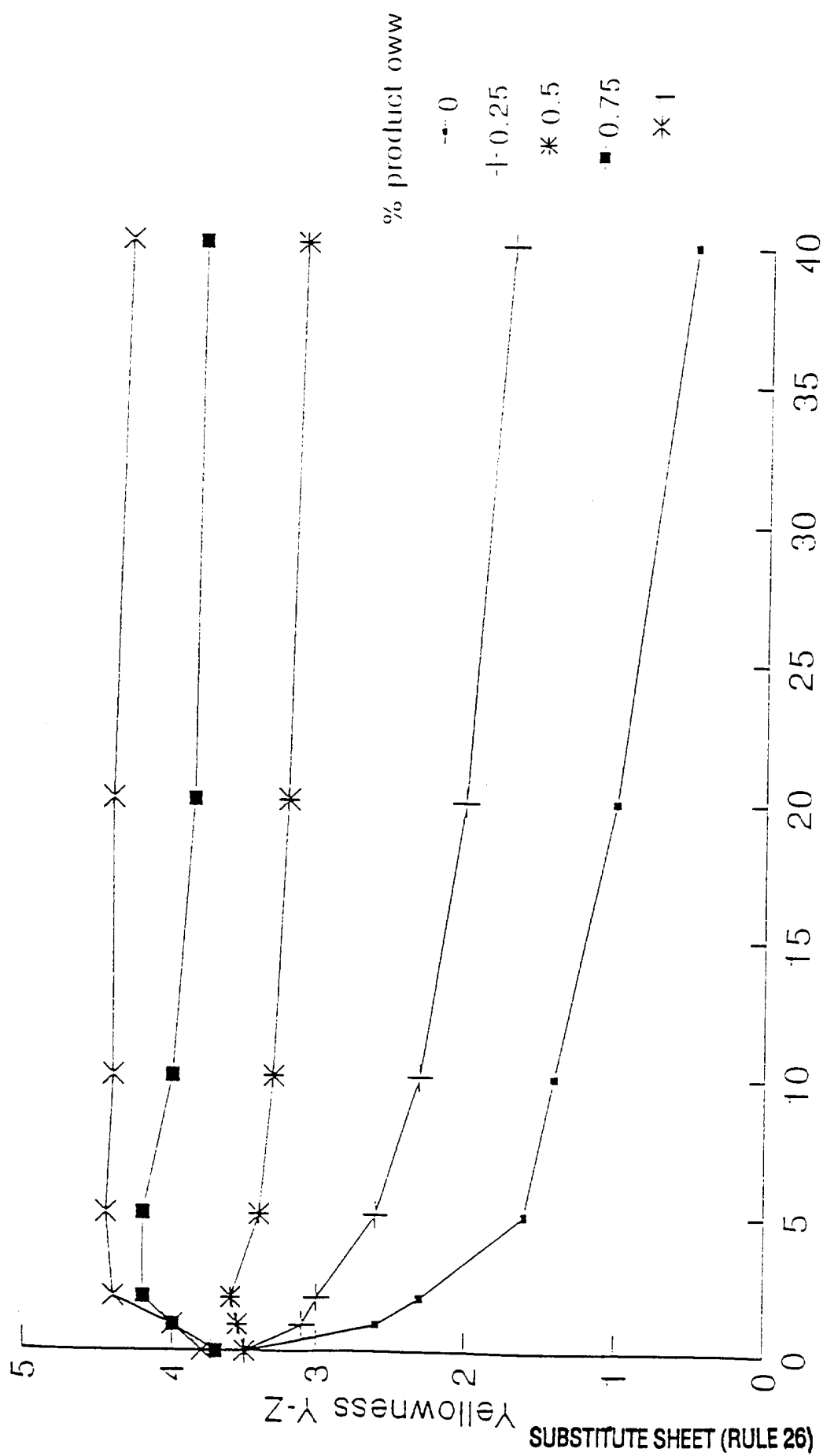
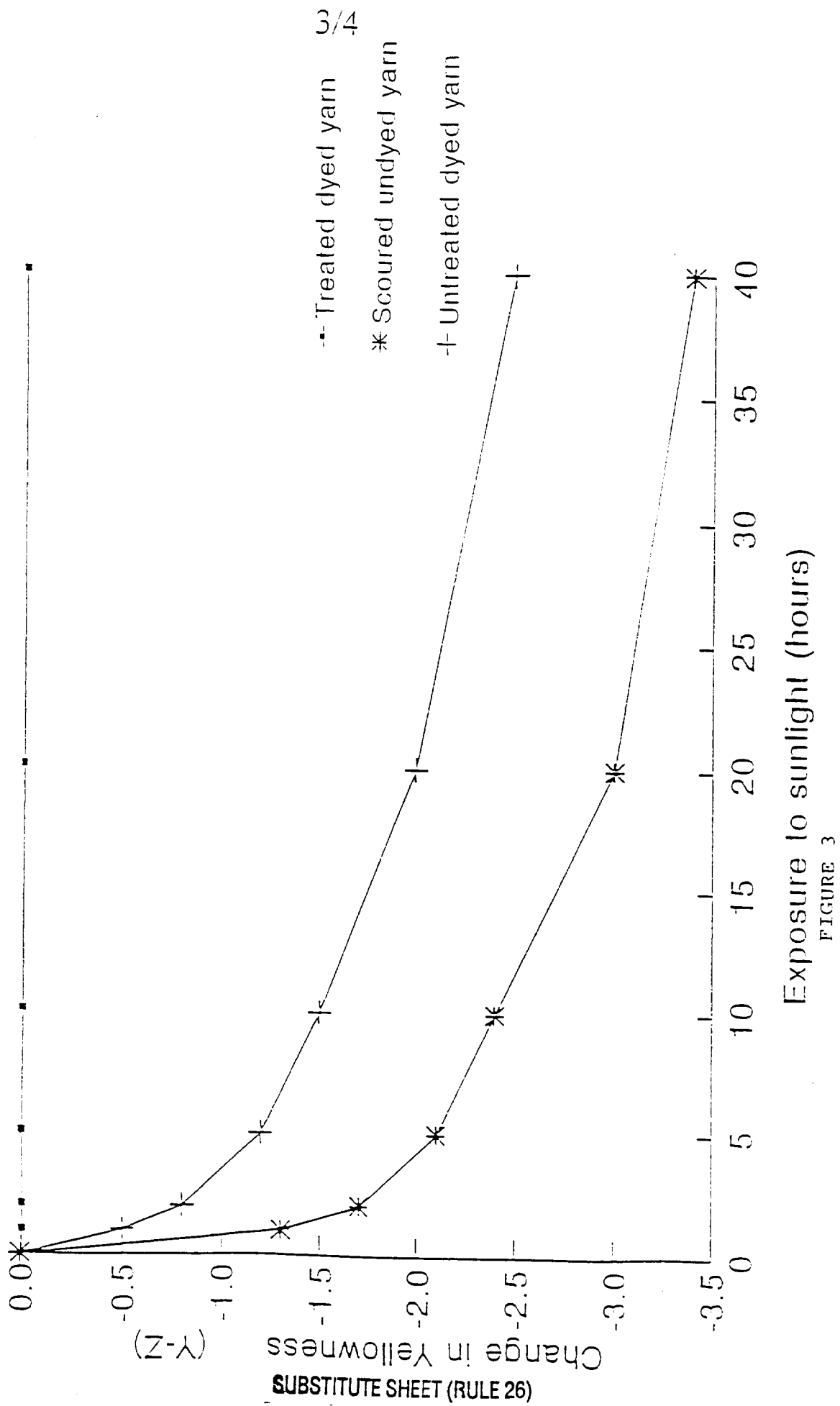


FIGURE 2



4/4

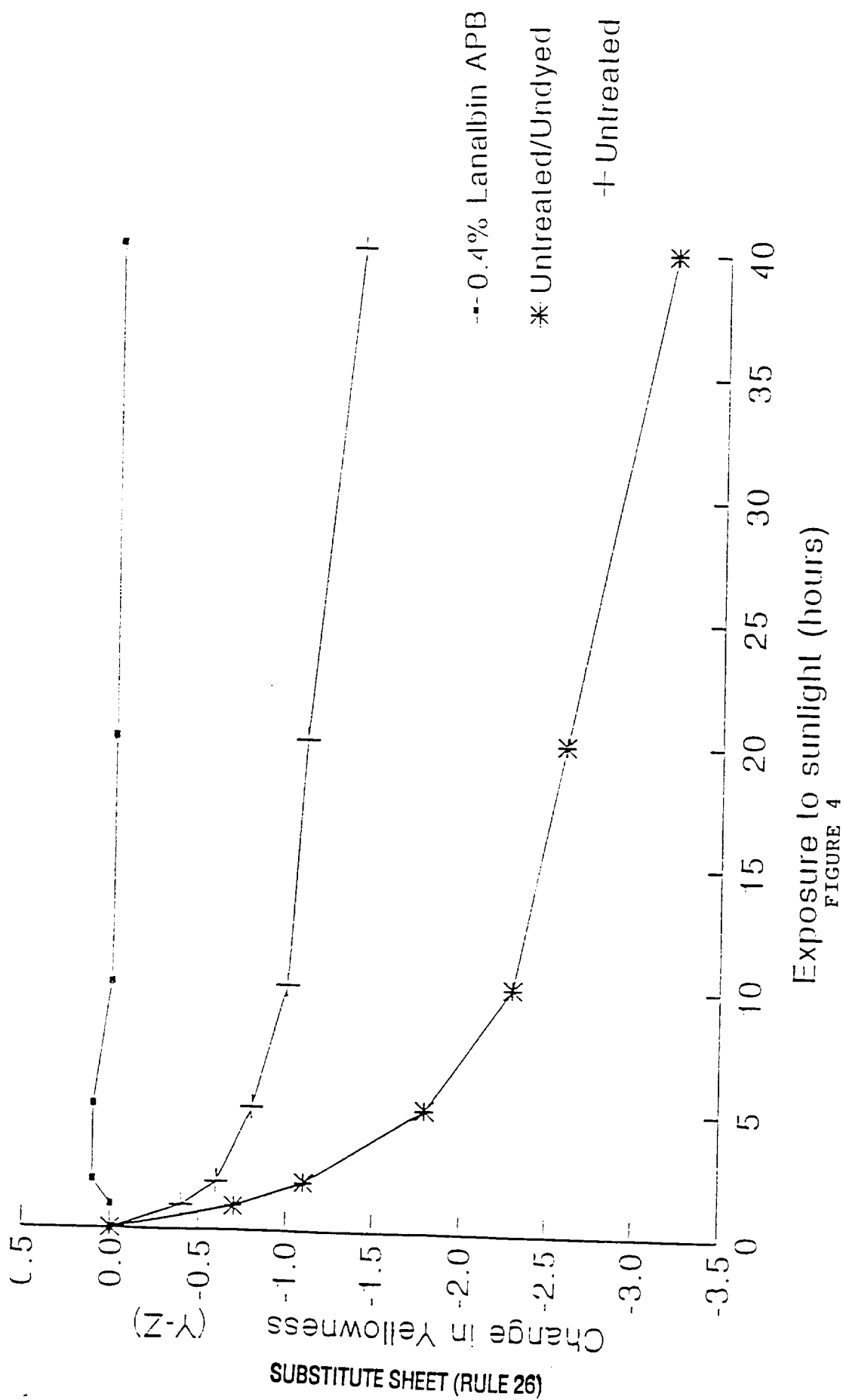


FIGURE 4

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NZ 95/00070

A. CLASSIFICATION OF SUBJECT MATTERInt Cl⁶: D06M 13/268, 13/256

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: D06M 13/268, 13/256

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 112120 A (C.S.I.R.O.) 7 December 1982	1-9
X	GB 2186004 A (Wool Development International Ltd) 5 August 1987	1-9
X	GB 1230145 A (I.W.S. Nominee Co. Ltd) 28 April 1971	1-9

☐ Further documents are listed in the continuation of Box C☐ See patent family annex

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Date of the actual completion of the international search
29 September 1995

Date of mailing of the international search report

31 October 1995

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INTERNATIONAL SEARCH REPORT**Information on patent family members**

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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EP	112120	AU	22670/83	US	4668235	US	4770667
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