New Zealand Leather & Shoe Research Association Inc.

Fitzherbert Science Centres, Dairy Farm Road, Palmerston North
PO Box 8094, Hokowhitu, Palmerston North 4446
Ph:(06)355 9028 Fax:(06)354 1185
Email: info@lasra.co.nz

LASRA Report NP-16-3641

Attention: Peter Dunn
The OdourZone
624 George Street
Dunedin 9016

Report Details:
Report Reference: NP-16-3641
Date Registered: 15-02-2016
Client Order Number:
Submitted by: Peter Dunn

Sample Information

Reference	email 12-2-16
Number of Samples	1
Sample Type	Leather Products
Testing	Assess odour reduction properties

Results

Sample 1: Aveho liquid

Test	Method	Requirement	Result
Assess odour reduction properties	Olfactory sensitisation	-	Odours from wear, and chemical odours known to be associated with wear were shown to be significantly reduced on an on-going basis

analyses/assessment by : PR
data checked by : MA
report checked by : PR
date : 15-Feb-2016
signed :

designation of signee : Peter Roy
Senior Technical Officer

Technical Service :2.50

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The following information is provided at the request of the client to assist in the interpretation of test results against the requirements of a standard, a specification, guidelines or similar.
This supplementary information is not IANZ endorsed.

Comments:

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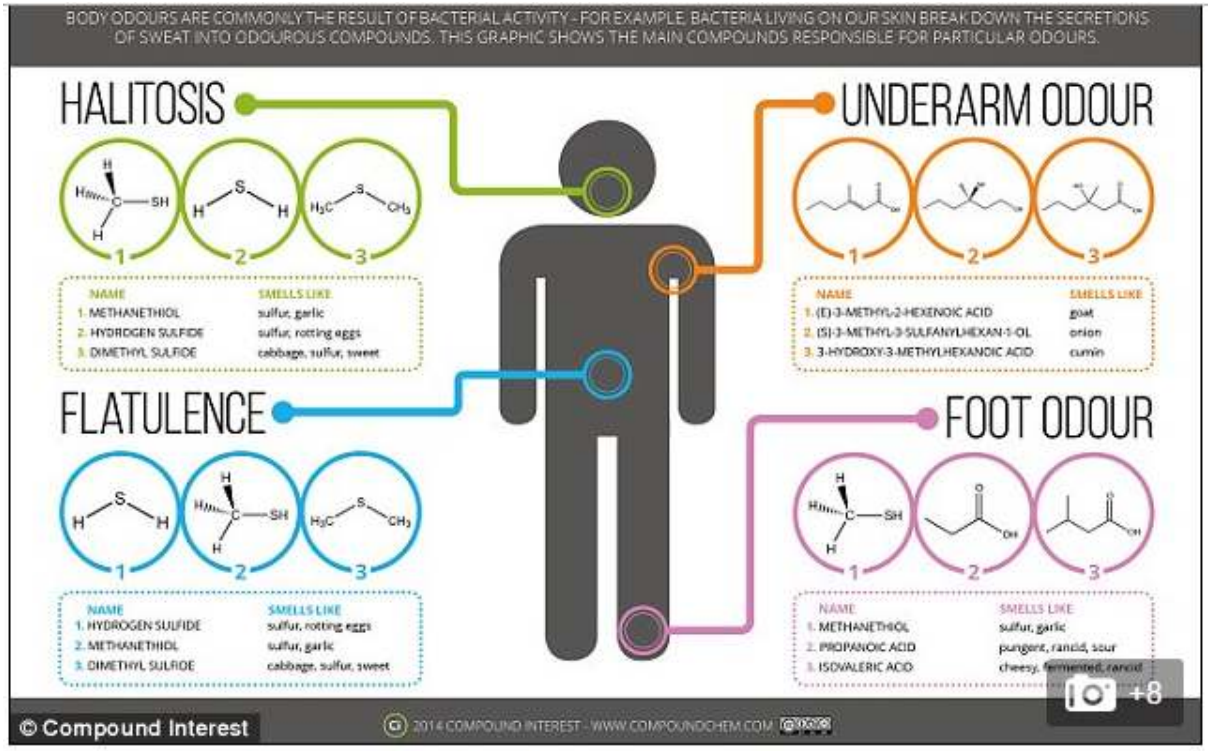

Brace yourself: A British graduate chemist and secondary school teacher has created an infographic (pictured) to pinpoint the chemical compounds and the particular smells they bring to underarm odours and even flatulence

The anonymous blogger started publishing his infographics four months ago after creating some posters to brighten up his classroom and hopes to explain the chemistry of everyday substances and problems on his **Compound Interest** blog, where he also sells his creations.

It is well known that in most cases, halitosis, or bad breath, is the product of bacteria in the mouth, which produce waste products and chemical compounds.

CHEMISTRY OF BODY ODOURS

Bad breath is the result of three main chemical compounds: methanethiol, hydrogen sulphide and dimethyl sulphide.

They produce a blend of odours including sulphur, garlic, rotting eggs and cabbage.

Flatulence is a blend of the same three chemical compounds responsible for bad breath.

Feet really do smell cheesy as the result of three main chemical compounds: methanethiol, propanoic acid and isovaleric acid.

The result is a horrible odour reminscient of sulphur, garlic, sourness and cheese.

Underarm odour is largely the product of another three compounds: (E)-3-methyl-2-hexenoic acid, (S)-3-methyl-3-sulfanylhexan-1-ol and 3-hydroxy-3-methylhexanoic acid.

Most people's sweaty armpits smell of a combination of goat, onion and cumin.

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Introduction:
A sample of Aveho in solution was received for assessment of its ability to decrease/neutralise odours in footwear resulting from wear.
Wear odours in footwear are caused by the gaseous excretion products of bacteria growing on the foot and result from these bacteria feeding on sweat and oils emitted by the skin. Bacteria are known to thrive in warm and moist conditions so footwear components represent and on-going challenge to any odour removal/neutralisation process.
The greater the bio activity on the foot, the greater the level of gaseous excretion from the bacterial population, and hence the stronger smell. The chemical vapours produced include:
Methanethiol
Propanoic acid
Isovaleric acid

The odours produced being reminiscent of sulphur, garlic, soured cheese

Experimental process:
Aveho was challenged 4 ways to cover the kinds of chemicals and odours listed above, these challenges were:
1. A pair of well-worn foot-beds from boots worn repeatedly for some 3 years
2. Ammonia solution
3. Garlic Salt
4. Live wear of Aveho treated leather circles attached to hose/socks inside winter boots

Experiment 1. Worn foot-beds
Samples of worn foot-bed inserts from well-worn boots were selected for a live duration test. One foot-bed was treated by wiping Aveho solution on the upper cloth (top cloth) surface and allowing it to soak in and then drying in laboratory conditions (23^{o}C and 50% relative humidity overnight). These samples were then sealed in plastic bags with a moist paper tissue and stored at 30 to 40^{0} C. Regular assessment using olfcatory detection was conducted to assess the odour present in the two worn foot beds.
Over a period of 8 weeks (2 months) the Aveho treated sample continued to emit only the odours known to be emitted by the materials and cements used in the manufacture of the foot-beds. The untreated sample continued to emit the odours, familiar of wear as detected by the owner and verified by him.

Experiment 2. Treated vs untreated tissue/laboratory paper
20ml of deionised water, with the addition of 0.5 ml of ammonia in liquid form, was added to a biological testing sample jar. A sheet of tissue dipped in Aveho solution was placed over the jar mouth and the lid screwed on. Over successive days the odour of Ammonia was significantly reduced and as the Aveho solution dried, the ammonia odour further decreased to barely detectable levels. Note Ammonia smell/odour was not eliminated but was reduced noticeable as detected by three separate staff members. At completion of 3 weeks the ammonia had volatilized away.
Experiment 3. Aveho applied to boot leather
Control samples of leather were selected and divided. One half was treated with Aveho by wiping Aveho soaked tissue on to the flesh side (normally the inside of a leather upper), and allowed to dry in the laboratory atmosphere (23^{o}C and 50% relative humidity overnight).
In the meantime we applied an amount of garlic salt roughly equal to one half culinary teaspoon to the bottom of a biological sample jar. Garlic salt was selected as more regular than natural garlic, as its retained ability to produce sulphurous and garlic odours on a more controlled basis than natural gloves of garlic.

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Samples of untreated leather as a control, and a treated leather were sealed over the mouth of the jars so as to be airtight. Screw tops were fitted to seal the system.
The jars were stored at 50° C and inspected every 2 days by 3 or more people by olfactory means over a 4 week period.
In all cases the untreated control leather permittted garlic odour to reach the olfactory senses. In the treated samples, only the favourable odour of leather was detected. This indicated that the garlic and sulphurous odours were neutralised or removed by Aveho, whilst the characteristic and desirable odours normally associated with leather were not. Our considerable experience with leathers shows that the “smell” of leather is one of the favourable experiences of leather and can indeed be a selling point. We were pleasantly surprised and impressed that Aveho took away the unpleasant garlic related smells, leaving the leather smells behind.

Experiment 4 Aveho treated leather samples taped inside worn boots

Samples prepared as for Experiment 3 above were applied using a strip of double sided tape to socks/hose worn by one staff member whilst wearing winter combat boots in the summer months in New Zealand. Despite the obvious discomfort of the activity, the wearer self-monitored the leather samples on a daily basis as the thought of inflicting actual wear smell upon colleagues was not deemed appropriate or pleasant. Our wearer in all cases found the untreated sample of leather had absorbed wear odour and released it upon removal, whilst no wear odour was detected from the Aveho treated sample.

Findings:

Aveho gave positive results in our four experiments which targetted the kinds of chemicals known to be emitted by worn shoes. These odours were reduced in the case of Ammonia (for which Aveho solution received at LASRA was NOT targetted) or in the other chemicals. In wear tests our wear odours were removed/neutralised by Aveho treated materials like paper or leather, and we note this was the case over an on-going wear related trial.

Conclusions:

Aveho solution was easily applied to all of our substrates for these tests. We found we could wet a cloth and wipe it on, spray it on, or pour it on to typical footwear substrates. Aveho solution absorbed and dried, remaining active on or in the substrates even after some 2 to 3 months of testing the effects of Aveho, its performance persisted and remained active in worn shoes and tests representing wear.

Suggestions:

Aveho solution could be sprayed or wiped on to a fabric or leather, allowed to dry and the normal manufacturing process may be followed with the proviso of avoiding wet cement lamination.
Binders to permanently attach Aveho are untried and lamination has also yet to be trialled.
The concern is that wet solvent or water based lamination cement may damage or physically cover over the Aveho particles applied to a material. We would suggest manufacturers allow cement to become tacky before sticking to an Aveho treated material surface. This process could be explored as a way to affix Aveho into material to prevent leaching away by sweat or wetting.
Another option is to apply liberal coatings of Aveho to interlinings to be sandwiched between outer materials and linings. Such interlining materials include foams felts and fabrics.
To get the best effect of Aveho odour reduction/neutralisation, continuous films of non-porous cements should be avoided and not be applied to Aveho treated surfaces wet, rather they should be allowed to become tacky before fitting these components to uppers or to foot-beds.

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Other options for Aveho include incorporation into fabric bolts, rolls or sheets; and to insole materials as well as foot-beds as discussed.

On the basis of our test findings Aveho could be applied to any woven, knitted or non-woven material by simple spray or wipe techniques and used in the suggested areas mentioned in the original laboratory report, and or those suggested above.

date : 15-Feb-2016
signed :

designation of signee : Peter Roy
Senior Technical Officer