usNeo™

- Deodorant and Antibacterial
- Protects Against Body Odour
- Active Against Corynebacteries
- Preserves Skin Flora

Description (400937.00.2)

usNeo is a plant-derived active based on the dextro-rotary form of usnic acid extracted from the alpine lichen Usnea barbata. It has an excellent antibacterial profile against Gram positive bacteria and in particular those known to cause body odour, while preserving normal skin flora.

- Plant-derived solvent, approved by Ecocert as a natural raw material
- Naturally-derived complexing agent from molasses
- Preservative-free (self preserving system)
- Not tested on animals
- pH 7.0-8.0
- Compatible with aluminium salts

INCI

US. Propanediol, Usnea Barbata (Lichen) Extract, Tromethamine, Tetrasodium Glutamate Diacetate, Water, Sodium Hydroxide
EU. Propanediol, Usnea Barbata Extract, Tromethamine, Tetrasodium Glutamate Diacetate, Aqua, Sodium Hydroxide

(Please refer to proprietary composition declaration for up-to-date INCI listing.)

Properties

- Protects against body odour forming bacteria
- Deodorant and antibacterial
- Active against corynebacteries
- Preserves the normal skin flora

Usnic Acid

Usnic acid has known antimicrobial properties and has been used in traditional medicine in many countries to treat various ailments including dermal problems. In addition to the claims tests performed, usnic acid has also shown to have the following properties in the literature:

- Antibacterial, especially effective against Gram positive bacteria. Usnic acid is known to be effective against: Staphylococcus aureus and MRSA[1,2], Staphylococcus epidermidis[11], Streptococcus mutans[3], Propionibacterium acnes[4] and Corynebacteria[11]
- Anti-inflammatory[5,6]
- Anti-oxidant, UVB protectant[7,8]
- Promotes wound-healing[9,10]

Recommended Applications & Use Levels

Applications:

- Deodorants (sticks, emulsions, pump sprays), antimicrobial deodorant bar and liquid soaps
- Skin care products for blemished, acneic and problem skin, foot care products and anti-odour products

Recommended use level: 1-5%

In Vitro Activity

Minimum Inhibitory Concentrations (MIC)

Good activity against Gram positive bacteria; limited activity against Gram negative bacteria and fungi.

Microorganism	ATCC / DSM N°	Comments	Minimum Inhibitory Concentration (MIC) of usNeo™
Staphylococcus aureus	ATCC 6538	Normal skin flora; causes skin infections	0.01-0.025%
Staphylococcus epidermidis	ATCC 12228	Normal skin flora; can cause internal infections	0.01-0.025%
Propionibacterium acnes	ATCC 6919	Causative organism of acne	0.1-0.25%
Corynebacterium jeikeium	DSM 7171	Causes body odour	0.01-0.025%
Corynebacterium xerosis	DSM 20743	Causes body odour	0.05-0.25%
Corynebacterium amycolatum	ATCC 49368	Causes body odour	0.01%
Streptococcus mutans	ATCC 25175	Causes dental caries	0.01-0.025%
Steptococcus faecalis	ATCC 19433	Faecal contaminant	0.01-0.025%
Candida albicans	ATCC 10231	Yeast, gut flora; causes skin infections	0.05%

In Vivo Activity

Comparative assessment of deodorant efficacy

Body odour is caused by the breakdown of components in sweat by certain Gram positive bacteria. The Sniff Test enables the evaluation of deodorant efficacy on volunteers under stringent test conditions.

Sniff test protocol

In individual tests, a panel of 20 volunteers with a strong under arm sweat odour applied a product containing one of the test actives on one arm pit and a blank product with no active on the other, over 5 days. Olfactory expert grading of the intensity of under arm sweat odour was carried out.

- Deodorant actives tested:
  - 2% usNeo™
  - 1% ethyl hexyl glycerine
  - 0.3% triclosan

- Test conditions:
  - Pre-conditioning phase: for several days prior to test only perfume-free, skin-pH neutral liquid soap free of bactericidal ingredients used and no deodorants or antiperspirants permitted
  - Application: repetitive daily application over 5 consecutive days, left and right axilla (arm pit), randomized. Showering allowed with skin pH neutral soap

- Assessment:
  - Measurement
    t_0 taken 24 hours after last shower in pre-conditioning phase followed by measurements taken at 12, 24 and 48 hours after last shower at end of application period
  - Intensity of sweat odour
    Rated according to following scale:
    - 1 = not detectable
    - 2 = low
    - 3 = detectable
    - 4 = strong
    - 5 = extremely strong

  - Microbiological assessment
    Under arm swabs were taken at t_0 and at 24 hours from 10 of the 20 volunteers to quantify aerobic and anaerobic underarm population. The determination of total bacterial counts enabled the effect of the deodorant actives on normal skin flora to be evaluated.

Results & Conclusions

Sniff Test

- Figure 1 shows the graded under arm odour level on volunteers using a formulation containing 2% usNeo compared to a blank over 48 hours
- 2% usNeo shows effective reduction of odour at 24 hours

Scale for intensity of sweat odour:
1 = not detectable
2 = low
3 = detectable
4 = strong
5 = extremly strong

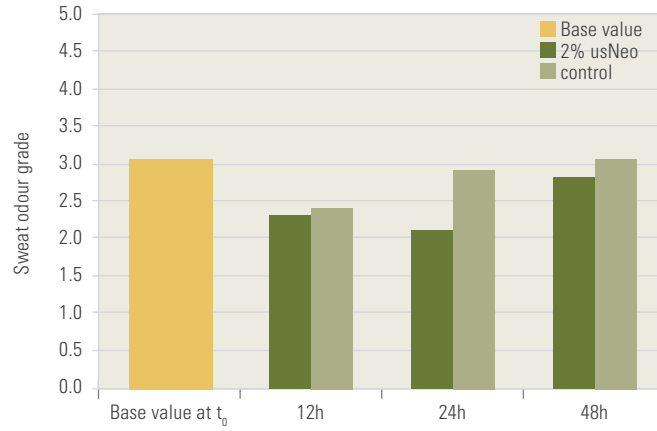

Fig. 1 Effect of 2% usNeo on graded odour reduction

- Figure 2 shows % odour reduction and was calculated from the Sniff Test results using the following formula:

$$\% \text{ odour reduction} = \left(1 - \frac{\text{value at } t_x}{\text{value at } t_0}\right) \times 100$$

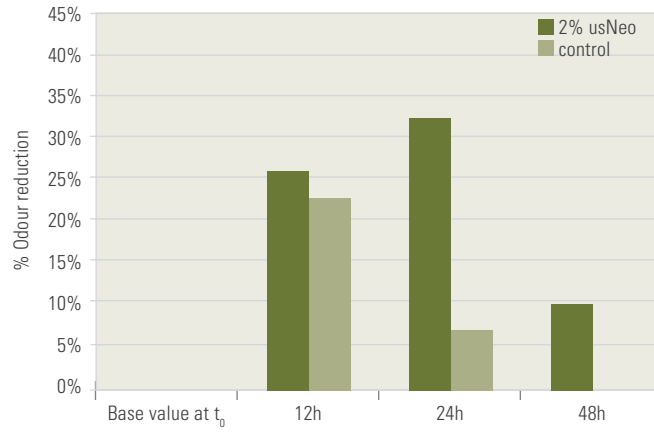

Fig. 2 Effect of 2% usNeo on % odour reduction

- Figure 3 shows after 24 hours a formulation containing 2% usNeo resulted in a 32% reduction in underarm odour compared to the control. This compared with a 29% reduction for 0.3% triclosan and 13% reduction for 1% ethyl hexyl glycerine (Fig. 3)

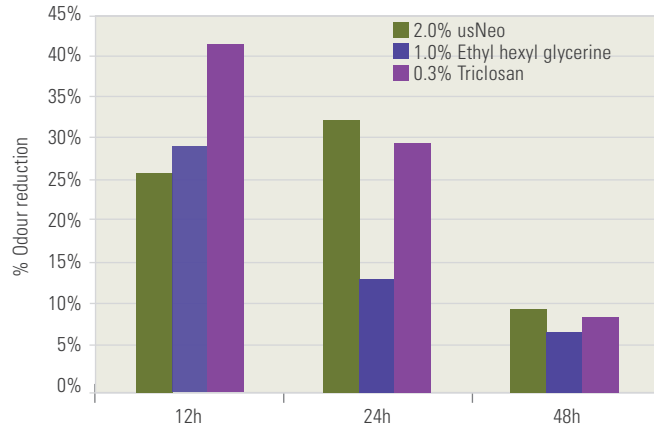

Fig. 3 Comparative efficacy of deodorant actives

Determination of Total Underarm Bacterial Count

- Figure 4 shows the comparative log reduction of total bacterial flora by 2% usNeo, 1% ethyl hexyl glycerine and 0.3% triclosan
- 2% usNeo shows the lowest overall bacterial reduction of skin flora compared to the competitive deodorant actives tested while having the best results in the Sniff Test.

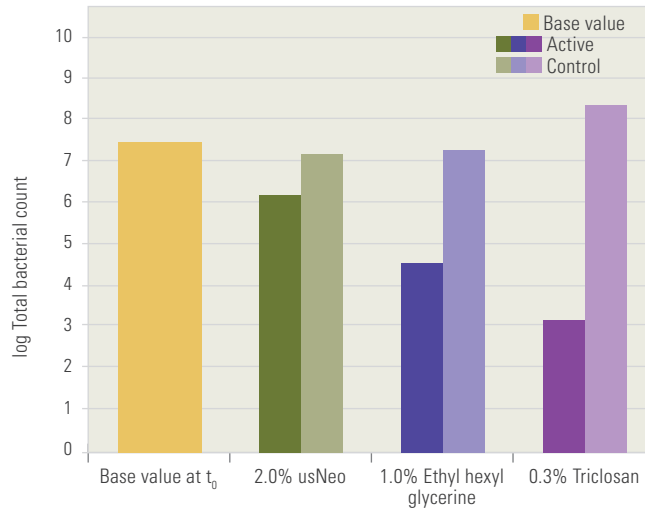

Fig. 4 Effect of deodorant actives on total bacterial skin flora 24 hours after application

Deodorant Active	Concentration	Reduction in Bacteria on Skin		
		Aerobes	Anaerobes	Total
usNeo™	2%	87%	86%	86%
Ethyl hexyl glycerine	1%	99%	99%	99%
Triclosan	0.3%	100%	100%	100%

Formulation Recommendations

- Solubility
  The solubilities of usNeo and other deodorant actives are shown in the table below

Deodorant Active	Distilled Water	Alcohol Abs. 99.9%	Alcohol 10%	Propylene Glycol	Butylene Glycol	Glycerine 86.5%	Olive Oil
usNeo™	2%	2%	2%	100%	100%	10%	-
Ethyl hexyl glycerine	0.1%	-	0.2%	30%	>50%	1%	-
Triclosan	0.001%	100%	-	100%	-	0.15%	60%

- Compatible with aluminium hydroxychloride salts
- A frame formulation is available on request

Safety & Regulatory

Toxicology:

- Not phototoxic (according to OECD guideline N° 432)
- Not mutagenic using AMES test (according to OECD guideline N° 471)
- Not a skin irritant (using epicutaneous test for assessment of skin irritating potential)
- Allergen certificate (2003 / 15 / EC Annex III)

REACH: Compliant with the REACH regulation (EC) No 1907/2006 and its amendment

Compliance

- Not tested on animals
- Usnic acid is not on the List of Approved Preservatives in EU Cosmetic Directive. usNeo is targeted as a deodorant active, to give antibacterial activity to a product

References

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