

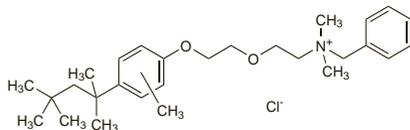
Methylbenzethonium Chloride (BAN, rINN)

Cloruro de metilbencetonio; Methylbenzethonii Chloridum; Méthylbenzéthonium, Chlorure de. Benzyl-dimethyl-2-[2-[4-(1,1,3,3-tetramethylbutyl)-*o*-tolyl]oxy]ethylammonium chloride monohydrate.

Метилбензетония Хлорид

$C_{28}H_{44}ClNO_2 \cdot H_2O = 480.1$.

CAS — 25155-18-4 (anhydrous methylbenzethonium chloride); 1320-44-1 (methylbenzethonium chloride monohydrate).

**Pharmacopoeias.** In US.

USP 31 (Methylbenzethonium Chloride). White hygroscopic crystals with a mild odour. Soluble 1 in 0.8 of water, 1 in 0.9 of alcohol, 1 in more than 10 000 of chloroform, and 1 in 0.7 of ether. Solutions are neutral or slightly alkaline to litmus. Store in airtight containers.

Profile

Methylbenzethonium chloride is a quaternary ammonium disinfectant and antiseptic with actions and uses similar to those of other cationic surfactants (see Cetrimide, p.1634). It is used topically for minor infections or irritation of the skin.

Leishmaniasis. Topical treatment of cutaneous leishmaniasis (p.824) with methylbenzethonium chloride 5 or 12% and paromomycin sulfate has proved beneficial.

Preparations

USP 31: Methylbenzethonium Chloride Lotion; Methylbenzethonium Chloride Ointment; Methylbenzethonium Chloride Topical Powder.

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Israel:** Leshcutan; **Ital:** Traumid†; **Mex:** Nor-forms†; **USA:** Acnotex; Dermasept Antifungal; Drytex; Finac; Orasept.

Methylrosanilinium Chloride (BAN, rINN)

Cl Basic Violet 3; Cloruro de metilrosanilina; Colour Index No. 42555; Crystal Violet; Violet krystaliczny; Gentian Violet; Hexamethylpararosaniline Chloride; Jansiyen Moru; Kristal Viyole; Kristalviolett; Methylrosaniline Chloride; Methylrosanilinium chloridum; Méthylrosanilinium, chlorure de; Methylrosanilinium-chlorid; Metilrozaniolinio chloridas; Metilrozaniolinium Klorür; Methylrosaniliniumklorid; Methylrosaniliniumklorid; Pyocitaninum Caeruleum; Viola Crystallina. 4-[4,4'-Bis(dimethylamino)benzhydrylidene]cyclohexa-2,5-dien-1-ylidenedimethylammonium chloride.

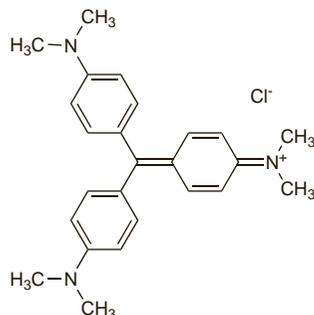
Метилрозанилиния Хлорид

$C_{25}H_{30}ClN_3 = 408.0$.

CAS — 548-62-9.

ATC — D01AE02; G01AX09.

ATC Vet — QD01AE02; QG01AX09.



NOTE. The name methyl violet—Cl Basic Violet 1; Colour Index No. 42535—has been used as a synonym for methylrosanilinium chloride, but is applied to a mixture of the hydrochlorides of the higher methylated pararosanilines consisting principally of the tetramethyl-, pentamethyl-, and hexamethyl- compounds.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, and *US*. *Jpn* includes a mixture of hexamethylpararosaniline hydrochloride with the tetramethyl- and pentamethyl- compounds.

Ph. Eur. 6.2 (Methylrosanilinium Chloride). A dark green, hygroscopic, shiny powder. It contains not more than 10% of pentamethyl-*p*-rosanilinium chloride. It is also known as crystal violet and gentian violet. Sparingly soluble in water; freely soluble in

alcohol and in dichloromethane. Store in airtight containers.

USP 31 (Gentian Violet). A dark green powder or greenish, glistening pieces with a metallic lustre, and with not more than a faint odour. Sparingly soluble in water; soluble 1 in 10 of alcohol and 1 in 15 of glycerol; soluble in chloroform; insoluble in ether.

Incompatibility. The antimicrobial activity of methylrosanilinium chloride may be reduced through incompatibilities, decreasing pH, or through combination with organic matter.

The antibacterial activity of methylrosanilinium chloride was inhibited in suspensions of bentonite with which it formed a stable complex.¹

1. Harris WA. The inactivation of cationic antiseptics by bentonite suspensions. *Australas J Pharm* 1961; **42**: 583-8.

Adverse Effects and Precautions

Topical application of methylrosanilinium chloride can produce irritation and ulceration of mucous membranes. Ingestion of methylrosanilinium chloride during prolonged or frequent treatment for oral candidiasis has resulted in oesophagitis, laryngitis, and tracheitis; ingestion may also cause nausea, vomiting, diarrhoea, and abdominal pain. In the UK it is recommended that methylrosanilinium chloride should not be applied to mucous membranes or open wounds. Contact with the eyes or broken skin should be avoided. Methylrosanilinium chloride may stain skin and clothing.

Animal carcinogenicity has restricted its use.

Carcinogenicity. Methylrosanilinium chloride has been shown *in vitro* to be capable of interacting with DNA of living cells,¹ and has demonstrable carcinogenicity *in mice*.²

- Rosenkranz HS, Carr HS. Possible hazard in use of gentian violet. *BMJ* 1971; **3**: 702-3.
- MAFF Food Advisory Committee. Final report on the review of the Colouring Matter in Food Regulations 1973: FdAC/REP/4. London: HMSO, 1987.

Effects on the skin and mucous membranes. Necrotic skin reactions have been reported after the use of topical 1% aqueous solutions of methylrosanilinium chloride;¹ areas affected include the submammary folds, gluteal fold, genitalia, and toe-webs. Similar reactions were observed in 2 patients after use of 1% methylrosanilinium chloride or brilliant green on stripped skin.¹ Oral ulceration developed in all of 6 neonates treated with aqueous methylrosanilinium chloride 0.5 or 1% for oral candidiasis.²

In the UK it is recommended that methylrosanilinium chloride should not be applied to mucous membranes or open wounds.

- Björnberg A, Mobergen H. Necrotic skin reactions caused by 1% gentian violet and brilliant green. *Acta Derm Venereol (Stockh)* 1972; **52**: 55-60.
- Horsfield P, et al. Oral irritation with gentian violet. *BMJ* 1976; **2**: 529.

Effects on the urinary tract. Severe haemorrhagic cystitis rapidly occurred in a 32-year-old woman after accidental injection through the urethra of a solution of methylrosanilinium chloride 1% and alcohol 2%.¹ Two cases of severe cystitis were also reported after instillation into the bladder of an undiluted solution containing methylrosanilinium chloride and brilliant green 1:1 (Bonney's blue).² Haemorrhagic cystitis has also been reported in a 16-month-old boy after a diluted solution of methylrosanilinium chloride 1% was instilled into his bladder during an inguinal herniorrhaphy.³

- Walsh C, Walsh A. Haemorrhagic cystitis due to gentian violet. *BMJ* 1986; **293**: 732.
- Christmas TJ, et al. Bonney's blue. *Lancet* 1988; **ii**: 459-60.
- Kim SJ, et al. Hemorrhagic cystitis due to intravesical instillation of gentian violet completely recovered with conservative therapy. *Yonsei Med J* 2003; **44**: 163-5.

Porphyria. Methylrosanilinium chloride has been associated with acute attacks of porphyria and is considered unsafe in porphyric patients.

Uses and Administration

Methylrosanilinium chloride is a triphenylmethane antiseptic dye effective against some Gram-positive bacteria, particularly *Staphylococcus* spp., and some pathogenic fungi such as *Candida* spp. It is much less active against Gram-negative bacteria and ineffective against acid-fast bacteria and bacterial spores. Its activity increases as pH increases.

Methylrosanilinium chloride has been applied topically as a 0.25 to 2.0% aqueous solution or as a cream for the treatment of bacterial and fungal infections, but in the UK its use is now restricted to application to unbroken skin because of concern over *animal* carcinogenicity. It has also been used as a 0.5% solution with brilliant green 0.5% (Bonney's blue) for skin marking before surgery.

Preparations

USP 31: Gentian Violet Cream; Gentian Violet Topical Solution.

Proprietary Preparations (details are given in Part 3)

Pol: Ploktanina; **Spain:** Vigencial; **Turk:** Viojen.

Multi-ingredient: **Chile:** Calmante de Afas†; **Faxet:** **Hung:** Dermaforine†.

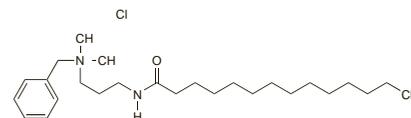
Miramistin

Myramistin. Alkylamidopropylmethylbenzylammonium chloride.

Мирамистин

$C_{26}H_{47}N_2OCl = 439.1$.

CAS — 126338-77-0; 15809-19-5.

**Profile**

Miramistin is a quaternary ammonium antiseptic used for disinfection of the skin and mucous membranes. It is also included in topical preparations for skin disorders when prone to infection.

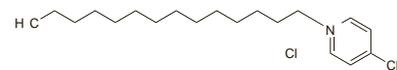
Miripirium Chloride (rINN)

Cloruro de miripirio; Miripirii Chloridum; Miripirium, Chlorure de; Myristyl-gamma-picolinium Chloride. 4-Methyl-1-tetradecylpyridinium chloride.

Мирипирия Хлорид

$C_{20}H_{36}ClN = 326.0$.

CAS — 7631-49-4 (miripirium); 2748-88-1 (miripirium chloride).

**Profile**

Miripirium chloride is used as an antimicrobial preservative in some pharmaceutical products.

Hypersensitivity. Two patients who had a delayed hypersensitivity reaction to retrobulbar injection of methylprednisolone acetate suspension (*Depo-Medrol*)¹ were found on intradermal testing to be sensitive to methylprednisolone and to miripirium chloride, included as a preservative in the formulation. A similar case of contact allergy has been reported² in a 56-year-old woman who received an intra-articular injection of methylprednisolone acetate. Patch testing showed allergy to the preservative miripirium chloride.

- Mathias CGT, Robertson DB. Delayed hypersensitivity to a corticosteroid suspension containing methylprednisolone. *Arch Dermatol* 1985; **121**: 258-61.
- Färm G, Eriksson I. Contact allergy to miripirium chloride in *Depo-Medrol*. *Contact Dermatitis* 2001; **44**: 127.

Miristalkonium Chloride (BAN, rINN)

Cloruro de miristalconio; Miristalkonii Chloridum; Miristalkonium, Chlorure de; Myristylbenzalkonium Chloride. Benzyl-dimethyltetradecylammonium chloride.

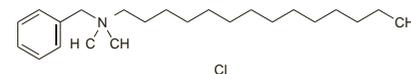
Миристалкония Хлорид

$C_{23}H_{42}ClN = 368.0$.

CAS — 139-08-2.

ATC — R02AA10.

ATC Vet — QR02AA10.

**Profile**

Miristalkonium chloride is a quaternary ammonium antiseptic with actions and uses similar to those of other cationic surfactants (see Cetrimide, p.1634). It has been used in creams and lotions for disinfection of the skin and has been an ingredient of sprays used for the treatment of minor infections of the mouth and throat. It is also used as a vaginal spermicide.

Preparations

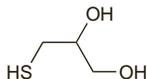
Proprietary Preparations (details are given in Part 3)

Fr: Alpagelle.

Multi-ingredient: **Fr:** Sterlane; **Ital:** Eburdent F.

Monothioglycerol

α -Monothioglycerol; Monotioiglicerol; Thioglycerol. 3-Mercapto-propane-1,2-diol.
 $C_3H_6O_2S = 108.2$.
 CAS — 96-27-5.

**Pharmacopoeias.** In *USNF*.

USNF 26 (Monothioglycerol). A colourless or pale yellow, viscous, hygroscopic liquid with a slight odour of sulfide. Freely soluble in water; miscible with alcohol; insoluble in ether. A 10% solution in water has a pH of 3.5 to 7.0. Store in airtight containers.

Profile

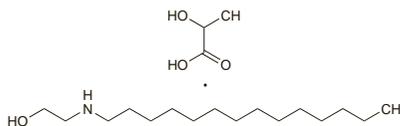
Monothioglycerol is used as an antioxidant preservative in pharmaceutical preparations. It has some antimicrobial activity.

Myralact (BAN, pINN)

Miralacto; Myralactum. (2-Hydroxyethyl)tetradecylammonium lactate.

Миралакт

$C_{19}H_{41}NO_4 = 347.5$.
 CAS — 15518-87-3.

**Profile**

Myralact is an antiseptic included in multi-ingredient preparations intended for the topical treatment of vaginal infections.

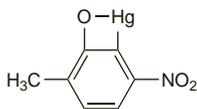
Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Hong Kong:** Ginetris†.

Nitromersol

5-Methyl-2-nitro-7-oxa-8-mercurabicyclo[4.2.0]octa-1,3,5-triene.
 $C_7H_5HgNO_3 = 351.7$.
 CAS — 133-58-4.

**Pharmacopoeias.** In *US*.

USP 31 (Nitromersol). A brownish-yellow to yellow odourless powder or granules. Very slightly soluble in water, in alcohol, in acetone, and in ether; soluble in solutions of alkalis and of ammonia with the formation of salts. Store in airtight containers. Protect from light.

Incompatibility. Nitromersol is incompatible with metals and sulfides. Its antimicrobial activity may be diminished in the presence of organic material.

Adverse Effects and Treatment

As for Mercury, p.2341.

Uses and Administration

Nitromersol is a mercurial antiseptic effective against some bacteria. It is not effective against spores or acid-fast bacteria. It has been used for superficial skin infections and for disinfection of the skin prior to surgical treatment.

Preparations

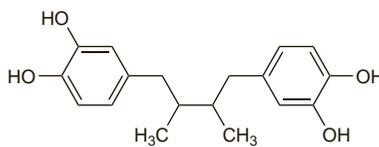
USP 31: Nitromersol Topical Solution.

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Austral:** Butesin Picrate†; **Chile:** Butesin.

Nordihydroguaiaretic Acid

Acidum Nordihydroguaiareticum; NDGA; Nordihydroguaiarético, ácido; Nordihydroguajareittiha ppo; Nordihydroguajaretsyra. 4,4'-(2,3-Dimethyltetramethylene)bis(benzene-1,2-diol).
 $C_{18}H_{22}O_4 = 302.4$.
 CAS — 500-38-9.

**Profile**

Nordihydroguaiaretic acid has been used as an antioxidant preservative. Allergic contact dermatitis has been reported.

Noxytiolin (BAN, rINN)

Noxytiolina; Noxythiolin; Noxytioline; Noxytiolinum. 1-Hydroxymethyl-3-methyl-2-thiourea.

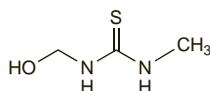
НОКСИТИОЛИН

$C_3H_8N_2OS = 120.2$.

CAS — 15599-39-0.

ATC — B05CA07.

ATC Vet — QB05CA07.

**Adverse Effects and Treatment**

When noxytiolin is given initially by irrigation for the treatment of the purulent infected bladder there may be an intense reaction with a burning sensation and the passage of large fibrin clumps. Giving it with a local anaesthetic such as tetracaine hydrochloride may control the pain.

Breath odour. A pervasive sweet breath odour characteristic of decaying vegetables has been noted in patients treated with peritoneal dialysis fluid containing noxytiolin.¹ The odour was attributed to unidentified sulfur metabolites.

1. Stewart WK, Fleming LW. Use your nose. *Lancet* 1983; i: 426.

Uses and Administration

Noxytiolin is an antiseptic with wide antibacterial and antifungal actions. It may act by slowly releasing formaldehyde in solution.

For instillation into, or irrigation of, the peritoneal cavity or other body cavities, a 1 or 2.5% solution is used. Solutions of noxytiolin should be warmed to 37° before instillation or irrigation. Treatment is usually for 3 to 7 days. The normal total daily amount used in adults should not exceed 5 g for instillation or 10 g for continuous irrigation.

Action. Although noxytiolin has generally been thought to act, at least in part, by slowly releasing formaldehyde into solution, it has been reported¹ that much smaller amounts are released than have previously been thought and that the antimicrobial effects of noxytiolin solutions cannot be attributed solely to the presence of formaldehyde. There is evidence *in vitro* that noxytiolin might reduce the adherence of micro-organisms to epithelial surfaces.²

1. Gorman SP, *et al.* Formaldehyde release from noxythiolin solutions. *Pharm J* 1984; 234: 62-3.

2. Anderson L, *et al.* Clinical implications of the microbial anti-adherence properties of noxythiolin. *J Pharm Pharmacol* 1985; 37 (suppl): 64P.

Infections of the pleural cavity. Three patients with pleural empyema or pneumonectomy space infection were treated by irrigation of the cavity with noxytiolin 1% in normal saline for 3 hours, followed by drainage for 1 hour, the cycle being repeated 4-hourly. Infection was eradicated within 21 days in all 3 patients.¹

1. Rosenfeldt FL, *et al.* Comparison between irrigation and conventional treatment for empyema and pneumonectomy space infection. *Thorax* 1981; 36: 272-7.

Preparations

Proprietary Preparations (details are given in Part 3)

Fr: Noxyflex; **Ir:** Noxyflex S; **UK:** Noxyflex S.

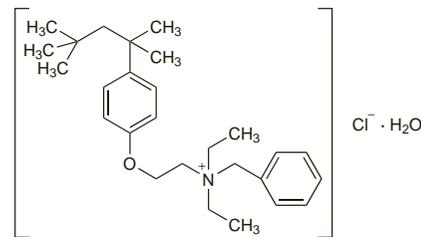
Octafonium Chloride (BAN, rINN)

Cloruro de octafonio; Octafonii Chloridum; Octafonium, Chlorure d'; Octaphonium Chloride; Phenoctide. Benzyl-diethyl-2-[4-(1,1,3,3-tetramethylbutyl)phenoxy]ethylammonium chloride monohydrate.

Октафония Хлорид

$C_{27}H_{42}ClNO \cdot H_2O = 450.1$.

CAS — 15687-40-8 (anhydrous octafonium chloride); 78-05-7 (anhydrous octafonium chloride).

**Profile**

Octafonium chloride is a quaternary ammonium antiseptic with actions and uses similar to those of other cationic surfactants (see Cetrimide, p.1634). It is used in topical preparations for skin disinfection.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **S.Afr.:** Germolene; **UK:** Germolene.

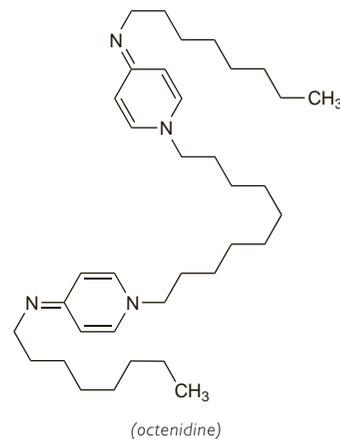
Octenidine Hydrochloride (BANM, USAN, rINN)

Hidrocloruro de octenidina; Octénidine, Chlorhydrate d'; Octenidini Hydrochloridum; Win-41464 (octenidine); Win-41464-2 (octenidine hydrochloride); Win-41464-6 (octenidine saccharin). 1,1',4,4'-Tetrahydro-N,N'-dioctyl-1,1'-decamethylenedi-(4-pyridylideneamine) dihydrochloride.

Октенидина Гидрохлорид

$C_{36}H_{62}N_4 \cdot 2HCl = 623.8$.

CAS — 71251-02-0 (octenidine); 70775-75-6 (octenidine hydrochloride).



(octenidine)

Profile

Octenidine is a bispyridine bactericidal antiseptic with some antiviral and antifungal activity. It has been used as the hydrochloride for skin and mucous membrane disinfection.

Preparations

Proprietary Preparations (details are given in Part 3)

Fr: Phisomair.

Multi-ingredient: **Austria:** Octeniderm; Octenisept; **Ger.:** Neo Kodan†; Octenisept; **Gr.:** Octeniderm; Octenisept; **Switz.:** Octeniderm; Octenisept.

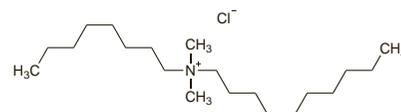
Octyldecyldimethylammonium Chloride

Decyldimethyloctylammonium Chloride; Decyloctyl dimethylammonium Chloride; Octyl Decyl Dimethyl Ammonium Chloride. N,N-Dimethyl-N-octyl-1-decanaminium chloride.

Октилдецилдиметиламоний Хлорид

$C_{30}H_{44}ClN = 334.0$.

CAS — 32426-11-2.

**Profile**

Octyldecyldimethylammonium chloride is a quaternary ammonium disinfectant used in preparations for disinfection of hard surfaces and the skin.