

Profile

Magnesium peroxide is used as an antiseptic. It is also an ingredient of preparations for gastrointestinal disorders.

Preparations

Proprietary Preparations (details are given in Part 3)

Ger.: Ozovit†.

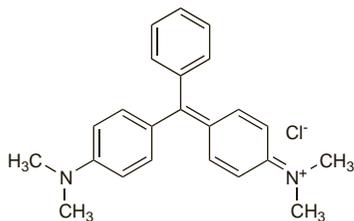
Multi-ingredient: **Israel:** Digestif-Ara†; **Ital.:** Carbonesia; Ektogan; **Switz.:** Desaquick extra fresh†; Desaquick fresh†; Magenpulver Hafter†.

Malachite Green

Aniline Green; China Green; CI Basic Green 4; Colour Index No. 42000; Diamond Green B; Verde de malaquita; Viride Malachitum; Zieleń malachitowa. [4-(4-Dimethylaminobenzhydrylidene)cyclohexa-2,5-dienylidene]dimethylammonium chloride.

CAS — 569-64-2.

ATC Vet — QP53AX16.

**Profile**

Malachite green is a triphenylmethane antiseptic dye with actions similar to those of brilliant green (p.1632). It has been used for skin disinfection.

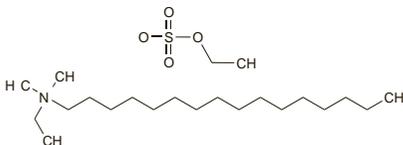
Mecetronium Etilsulfate (BAN, rINN)

Etilsulfato de mecetronio; Mecetronii Etilsulfas; Mecetronium Etilsulfate (USAN); Mecetronium Etilsulphate; Mécétronium, Etilsulfate de. Ethylhexadecyldimethylammonium ethyl sulphate.

Мещетрония Этилсульфат

C₂₂H₄₉NO₄S = 423.7.

CAS — 3006-10-8.

**Profile**

Mecetronium etilsulfate is a quaternary ammonium antiseptic with actions and uses similar to those of other cationic surfactants (see Cetrimide, p.1634). It is active against bacteria, including mycobacteria, fungi, and viruses, including hepatitis B virus. It is used in alcoholic solution for disinfection of the skin and hard surfaces.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Fr.:** Sterillium†; **Ger.:** Bacillo; St-Tissues; Sterillium; **Gr.:** Sterillium; **Neth.:** Sterillium; **Switz.:** Sterillium†.

Merbromin (rINN)

Disodium 2,7-dibromo-4-hydroxymercurifluorescein; Merbromina; Merbromine; Merbrominum; Mercurescéine Sodique; Mercurochrome; Mercurodibromofluorescein; Merkürokrom. The disodium salt of [2,7-dibromo-9-(2-carboxyphenyl)-6-hydroxy-3-oxo-3H-xanthen-5-yl]hydroxymercury.

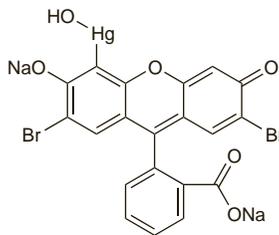
Мербромин

C₂₀H₈Br₂HgNa₂O₆ = 750.7.

CAS — 129-16-8.

ATC — D08AK04.

ATC Vet — QD08AK04.



NOTE: The use of the name Merbromin is limited; in some countries it is a trade-mark.

Pharmacopoeias. In *Fr., It., Jpn., and Viet.*

Incompatibility. Merbromin is incompatible with acids, most alkaloidal salts, many local anaesthetics, metals, and sulfides. Activity may be reduced in the presence of organic material.

Adverse Effects and Treatment

As for Mercury, p.2341.

◇ General references.

1. Risher JF, *et al.* Organic mercury compounds: human exposure and its relevance to public health. *Toxicol Ind Health* 2002; **18**: 109-60.

Toxicity. Reports of merbromin toxicity have included contact dermatitis¹ and epidermal cell toxicity.² A fatality has occurred after transcutaneous absorption of merbromin during treatment of infected omphalocele (umbilical hernia)^{3,4} and death due to shock, with aplastic anaemia, has followed application to surgical wounds and decubitus areas.⁵ Anaphylaxis has also occurred.⁶ Extensive absorption after ingestion has also been reported.⁷ There has also been a case report⁸ of severe encephalopathy and meningitis within 24 hours of an accidental intrathecal application into a CSF fistula.

1. Camarasa G. Contact dermatitis from mercurochrome. *Contact Dermatitis* 1976; **2**: 120.
2. Anonymous. Topical antiseptics and antibiotics. *Med Lett Drugs Ther* 1977; **19**: 83-4.
3. Yeh T-F, *et al.* Mercury poisoning from mercurochrome therapy of infected omphalocele. *Lancet* 1978; **11**: 210.
4. Yeh TF, *et al.* Mercury poisoning from mercurochrome therapy of an infected omphalocele. *Clin Toxicol* 1978; **13**: 463-7.
5. Slee PHJT, *et al.* A case of Merbromin (mercurochrome) intoxication possibly resulting in aplastic anemia. *Acta Med Scand* 1979; **205**: 463-6.
6. Galindo PA, *et al.* Mercurochrome allergy: immediate and delayed hypersensitivity. *Allergy* 1997; **52**: 1138-41.
7. Magarey JA. Absorption of mercurochrome. *Lancet* 1993; **342**: 1424.
8. Stark AM, *et al.* Accidental intrathecal mercury application. *Eur Spine J* 2004; **13**: 241-3.

Uses and Administration

Merbromin is a mercurial antiseptic that has been used for disinfection of skin and wounds.

Preparations

Proprietary Preparations (details are given in Part 3)

Arg.: Rojobacter†; **Belg.:** Medichrom; **Braz.:** Mercurio Cromo†; **Fr.:** Pharmadose mercurescéine†; Soluchrom; **Ger.:** Mercurchrom†; **Gr.:** Merbromin; Mercurochrome; **Ital.:** Cromocur†; **S.Afr.:** Red Seal; **Spain:** Cinfacromin; Cromer Orto; Merchromina; Mercurin; Mercurobromo; Mercurina Brota; Super Cromer Orto; **Turk.:** Mersol.

Multi-ingredient: **S.Afr.:** Achromide; Daromide; Ung Vernleish; **Spain:** Argentocromo†; Mercurona; **Venez.:** Thimerfa†.

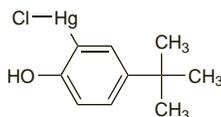
Mercurobutol (rINN)

L-542; Mercurobutolum. 4-tert-Butyl-2-chloro-mercuriphenol.

Меркуробутол

C₁₀H₁₃ClHgO = 385.3.

CAS — 498-73-7.



Pharmacopoeias. In *Fr.*

Profile

Mercurobutol is an organic mercurial antiseptic with antifungal properties. It has been used in the treatment of infections of the skin and mucous membranes.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Gr.:** Sabeny†.

Metalkonium Chloride (rINN)

Cloruro de metalconio; Dodecarbonyl Chloride; Metalkonii Chloridum; Métalkonium, Chlorure de. Benzyl(dodecylcarbamoylmethyl)dimethylammonium chloride.

Металкония Хлорид

C₂₃H₄₁ClN₂O = 397.0.

CAS — 100-95-8.

**Profile**

Metalkonium chloride is an antiseptic used for skin disinfection.

Preparations

Proprietary Preparations (details are given in Part 3)

Ital.: Theotex.

Methylated Spirits

Alcoholes desnaturalizados.

CAS — 8013-52-3 (ethyl alcohol-methyl alcohol mixture; industrial methylated spirit).

Description. Three classes of methylated spirits are listed under the Methylated Spirits Regulations, 1987 (SI 1987: No. 2009): industrial methylated spirits, mineralised methylated spirits, and denatured ethanol (denatured alcohol).

Industrial Methylated Spirits is defined as 95 parts by volume of spirits mixed with wood naphtha (mostly methyl alcohol—p.2024) 5 parts by volume. **Mineralised methylated spirits** is spirits mixed with wood naphtha 9.5 parts by volume and crude pyridine 0.5 parts by volume, and to every 2000 litres of this mixture is added 7.5 litres of mineral naphtha (petroleum oil) and 3 g of synthetic organic dyestuff (methyl violet). This is the only variety that may be sold in Great Britain for general use. **Denatured ethanol** is 999 parts by volume of spirits (of a strength not less than 85%) mixed with 1 part by volume of tertiary butyl alcohol, and to this mixture is added Bitrex (denatonium benzoate) 10 mg/litre.

As Industrial Methylated Spirit may contain small amounts of acetone it should not be used for the preparation of iodine solutions, since an irritating compound is formed by reaction between iodine and acetone; for such preparations Industrial Methylated Spirit (Ketone-free) should be used.

Pharmacopoeias. **Br.** includes Industrial Methylated Spirit and Industrial Methylated Spirit (Ketone-free).

BP 2008 (Industrial Methylated Spirit). A mixture of 19 volumes of ethyl alcohol of an appropriate strength with 1 volume of approved wood naphtha. Two strengths are available containing 99% and 95% v/v alcohol (also known as 74 OP and 66 OP respectively). It is a colourless, clear, mobile, volatile liquid with an odour which is spirituous and of wood naphtha. B.p. is about 78°.

The BP 2008 gives Industrial Methylated Spirits and IMS as approved synonyms.

BP 2008 (Industrial Methylated Spirit (Ketone-free)). A mixture of the same strength as Industrial Methylated Spirit, but it is substantially free from ketones, containing not more than the equivalent of 500 ppm of acetone.

Adverse Effects

As for Alcohol, p.1625, and Methyl Alcohol, p.2024. Adverse effects are due chiefly to consumption of methylated spirits rather than its topical use as a disinfectant.

Uses and Administration

Industrial methylated spirit, in a concentration of about 70%, is the usual form in which alcohol (p.1625) is used for disinfection. It is applied externally for its astringent action, but mucous membranes and excoriated skin surfaces must be protected. It may be used for skin preparation before injection.

Methylated spirits may be used in the form of Surgical Spirit (BP 2008), a mixture of methyl salicylate (0.5% v/v), diethyl phthalate (2% v/v), and castor oil (2.5% v/v) in industrial methylated spirit.

Preparations

BP 2008: Surgical Spirit.

Proprietary Preparations (details are given in Part 3)

Ital.: Esson Gel.

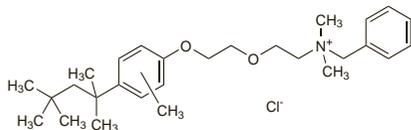
Methylbenzethonium Chloride (BAN, rINN)

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; Hexamethylparosaniline Chloride; Jansiyen Moru; Kristal Viyole; Kristalviolett; Methylrosaniline Chloride; Methylrosanilinium chloridum; Méthylrosanilinium, chlorure de; Methylrosanilinium-chlorid; Metilrozaniolinio chloridas; Metilrozaniolinium Klorür; Methylrosaniliniumchlorid; Methylrosaniliniumchlorid; Pyocitaninum Caeruleum; Viola Crystallina. 4-[4,4'-Bis(dimethylamino)benzhydrylidene]cyclohexa-2,5-dien-1-ylidenedimethylammonium chloride.

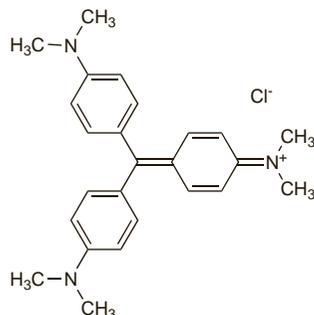
Метилрозанилиния Хлорид

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

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 parosanilines consisting principally of the tetramethyl-, pentamethyl-, and hexamethyl- compounds.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, and *US*. *Jpn* includes a mixture of hexamethylparosaniline 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 Aftas†; *Faxet:* *Hung:* Dermaforine†.

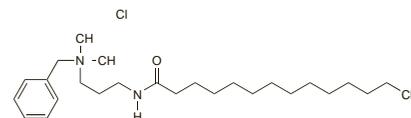
Miramistin

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.

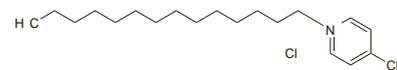
Miripirium Chloride (rINN)

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.

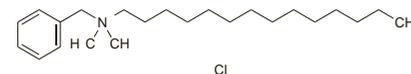
Миристалкония Хлорид

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

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.