The lethal oral dose is reported to be about 120 to 240 mL in adults; however, toxic symptoms may be produced by as little as 20 mL. Ketoacidosis and ketonuria commonly occur due to the presence of the major metabolite, acetone, in the circulation. Inhalation of isopropyl alcohol vapour has been reported to produce coma.

Application of isopropyl alcohol to the skin may cause dryness and irritation; suitable precautions should be taken to prevent absorption through the skin, particularly in infants.

Treatment of adverse effects is as for Alcohol, p.1626.

◊ General references.

1. WHO. 2-Propanol. *Environmental Health Criteria 103*. Geneva: WHO, 1990. Available at: http://www.inchem.org/documents/ehc/ehc/ehc103.htm (accessed 15/03/06)

Children. Reports of chemical skin burns caused by the topical application of isopropyl alcohol in premature infants.[1,2]

Haemorrhagic gastritis in a 2-year-old febrile child was attributed to topical absorption of isopropyl alcohol that had been used for sponge bathing and followed by wrapping the child tightly in a blanket.[3]

1. Schick JB, Milstein JM. Burn hazard of isopropyl alcohol in the neonate. *Pediatrics* 1981; **68:** 587–8.
2. Weintraub Z, Iancu TC. Isopropyl alcohol burns. *Pediatrics* 1982; **69:** 506.
3. Dyer S, *et al*. Hemorrhagic gastritis from topical isopropanol exposure. *Ann Pharmacother* 2002; **36:** 1733–5.

Rectal absorption. Intoxication and raised serum-creatinine concentrations due to absorption of isopropyl alcohol followed its use as a rectal douche.[1] An 85-year-old woman who accidentally received an isopropyl alcohol enema developed rapid CNS depression, renal failure, and metabolic acidosis. She became comatose within 15 minutes and died 12 hours later after a cardiac arrest. Post-mortem examination showed necrosis of the colon.[2]

1. Barnett JM, *et al*. Intoxication after an isopropyl alcohol enema. *Ann Intern Med* 1990; **113:** 638–9.
2. Haviv YS, *et al*. Accidental isopropyl alcohol enema leading to coma and death. *Am J Gastroenterol* 1998; **93:** 850–1.

Pharmacokinetics

Isopropyl alcohol is readily absorbed from the gastrointestinal tract but there appears to be little absorption through intact skin. The vapour may be absorbed through the lungs. Isopropyl alcohol is metabolised more slowly than ethyl alcohol and about 15% of an ingested dose is metabolised to acetone.

◊ For reports of rectal absorption of isopropyl alcohol, see above.

Uses and Administration

Isopropyl alcohol is an antiseptic with bactericidal properties similar to those of alcohol (p.1627). It is used for pre-operative skin cleansing in concentrations of about 60 to 70%, and is an ingredient of preparations used for disinfection of hands and surfaces. Its marked degreasing properties may limit its usefulness in preparations used repeatedly. It is also used as a solvent, especially in cosmetics, perfumes and pharmaceutical preparations, and as a vehicle for other disinfectant compounds.

Propyl alcohol (p.1660) is also used as an antiseptic.

Preparations

USP 31: Azeotropic Isopropyl Alcohol; Isopropyl Rubbing Alcohol.

Proprietary Preparations (details are given in Part 3)

Canad.: Alcojel†; Auro-Dri; Duonalc; ***Ger.:*** Aktivin; ***S.Afr.:*** Medi-Swab; ***Switz.:*** Avitracid†; ***Turk.:*** Opak; ***UK:*** Alcowipe; Medi-Swab; Sterets; Steriwipe; ***USA:*** Auro-Dri; ***Venez.:*** Gel Secante†.

Multi-ingredient: ***Arg.:*** Sincerum Dry; ***Austral.:*** Aqua Ear; Ear Clear for Swimmer's Ear; Unisolve†; ***Austria:*** Braunoderm; Dodesept; Dodesept Gefarbt; Dodesept N; Kodan; Marcocid; Mycopol; Octeniderm; Skinsept; ***Belg.:*** Braunoderm; ***Canad.:*** Baxedin 2% - 70%; Duonalc-E; Swim-Ear†; ***Chile:*** NP-27; Solarcaine Spray Aerosol; ***Cz.:*** Promanum N; Softa-Man; ***Fr.:*** Clinogel; Manugel; Spitaderm†; Sterillium†; ***Ger.:*** Autoderm Extra; Bacillol; Bacillol AF; Bacillol plus; Betaseptic; Braunoderm; Cutasept; Desmanol†; Dibromol; Freka-Steril; Gercid forte†; Helipur H plus N; Incidin; Incidin M Spray Extra†; Kodan Tinktur Forte†; Mucasept-A; Neo Kodan†; Olbas; Poly-Alkohol; Primasept Med†; Promanum N; Rutisept extra; Sagrosept†; Sekucid konz†; Skinman Soft; Skinsept F; Skinsept G; Softasept N; Spitacid; St-Tissues; Sterillium; ***Gr.:*** Chiro Des; Cutasept; Octeniderm; Sterillium; ***Hong Kong:*** Hibisol†; ***Indon.:*** Mexochrome; Spitaderm; ***Irl.:*** Biofreeze; Hibisol; ***Israel:*** Dryears; Monorapid; Skin Des; Sterets H; ***Ital.:*** Bergon†; Braunoderm; Citromed; Clorexan; Eso Ferri Alcolico Plus; Eso Ferri Plus; Esocetic Plus; Esocetic†; Panseptil; SaniSteril Strumenti Alcolico†; Sekucid; Spitaderm; ***Neth.:*** Hibisol; Spitaderm; Sterillium; ***NZ:*** Aqua Ear†; ***Port.:*** Braunoderm; Promanum; Softasept; ***Singapore:*** Tri-Cidal†; ***Switz.:*** Betaseptic; Braunoderm; Cutasept; Desamon; Dolo-Arthrosenex sine Heparino†; Ederphyt†; Hibital; Hibitane Teinture; Kodan Teinture forte; Octeniderm; Promanum N; Softa-Man; Softasept N; Sterillium†; ***UK:*** ChloraPrep; Hibisol; Manusept; Medi-Swab H; Sterets H; Swim-Ear; ***USA:*** BactoShield; Blue Ice Gel; Cresylate; Dri/Ear; Ear-Dry; Fungi-Nail; Klout; Swim-Ear; Tinver.

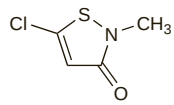
Isothiazolinones

Isotiazolinonas.

Methylchloroisothiazolinone

Metilcloroisotiazolinona. 5-Chloro-2-methyl-3(2*H*)-isothiazolone; 5-Chloro-2-methyl-4-isothiazolin-3-one.

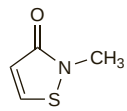
CAS — 26172-55-4.



Methylisothiazolinone

Metilisotiazolinona. 2-Methyl-3(2*H*)-isothiazolone; 2-Methyl-4-isothiazolin-3-one.

CAS — 2682-20-4.



Profile

A mixture of isothiazolinones consisting of methylchloroisothiazolinone and methylisothiazolinone (MCI/MI) in a ratio of about 3:1 is used as a preservative in industry and in cosmetic and household products. It is effective at very low concentrations against a wide spectrum of Gram-positive and -negative bacteria, yeasts, and fungi. The mixture is often referred to as Kathon CG, one of its proprietary names.

Isothiazolinones may cause contact dermatitis and local irritation.

Hypersensitivity. There have been reports of sensitisation and allergic contact dermatitis arising from the use of isothiazolinones in cosmetics, paints and from industrial exposure.[1-11] The incidence of allergy to methylchloroisothiazolinone and methylisothiazolinone (MCI/MI) is reported be dose-related and ranges from less than 1% to 8.4%.[4,8] A study[6] conducted in 4713 patients at 22 European contact dermatitis clinics over a 12 month period from 1988 to 1989 reported the frequency of positive reactions to 100 ppm MCI/MI to be 3%.

Most hypersensitivity reports are related to use in cosmetics, especially 'leave-on' products such as moisturising creams, while the risk attributed to their use in 'rinse-off' products such as shampoos is considered to be minimal.[4,7] A review[7] of such rinse-off products found that they were even well tolerated in MCI/MI sensitised people. Airborne contact dermatitis has been reported in people exposed to MCI/MI in paints.[9,10] Occupational contact allergy and dermatitis due to MCI/MI have also been reported,[11] and there has been a case report of occupational asthma developing in a worker 5 months after starting work in an isothiazolinone manufacturing plant.[5]

1. Björkner B, *et al*. Contact allergy to the preservative Kathon CG. *Contact Dermatitis* 1986; **14:** 85–90.
2. De Groot AC, Bos JD. Preservatives in the European standard series for epicutaneous testing. *Br J Dermatol* 1987; **116:** 289–92.
3. Fransway AF. Sensitivity to Kathon CG: findings in 365 consecutive patients. *Contact Dermatitis* 1988; **19:** 342–7.
4. De Groot AC, Herxheimer A. Isothiazolinone preservative: cause of a continuing epidemic of cosmetic dermatitis. *Lancet* 1989; **i:** 314–16.
5. Bourke SJ, *et al*. Occupational asthma in an isothiazolinone manufacturing plant. *Thorax* 1997; **52:** 746–8.
6. Menné T, *et al*. Contact sensitization to 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one (MCI/MI): a European multicentre study. *Contact Dermatitis* 1991; **24:** 334–41.
7. Fewings J, Menné T. An update of the risk assessment for methylchloroisothiazolinone/methylisothiazolinone (MCI/MI) with focus on rinse-off products. *Contact Dermatitis* 1999; **41:** 1–13.
8. Mowad CM. Methylchloro-isothiazolinone revisited. *Am J Contact Dermat* 2000; **11:** 115–18.
9. Bohn S, *et al*. Airborne contact dermatitis from methylchloroisothiazolinone in wall paint: abolition of symptoms by chemical allergen inactivation. *Contact Dermatitis* 2000; **42:** 196–201.
10. Reinhard E, *et al*. Preservation of products with MCI/MI in Switzerland. *Contact Dermatitis* 2001; **45:** 257–64.
11. Isaksson M, *et al*. Occupational contact allergy and dermatitis from methylisothiazolinone after contact with wallcovering glue and after a chemical burn from a biocide. *Dermatitis* 2004; **15:** 201–5.

Preparations

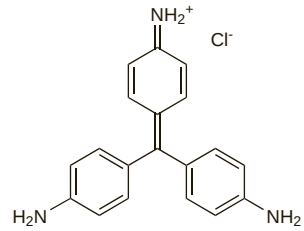
Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***Switz.:*** Saltrates†.

Magenta

Aniline Red; Basic Fuchsin; Basic Magenta; CI Basic Violet 14; Colour Index No. 42510; Fuchsine; Fucsina.

CAS — 569-61-9 (pararosaniline hydrochloride); 632-99-5 (rosaniline hydrochloride).



(pararosaniline hydrochloride)

Description. Magenta is a mixture of the hydrochlorides of pararosaniline {4-[(4-aminophenyl)(4-iminocyclohexa-2,5-dien-1-ylidene)-methyl]aniline} and rosaniline {4-[(4-aminophenyl)-(4-iminocyclohexa-2,5-dien-1-ylidene)methyl]-2-methylaniline}.

Pharmacopoeias. In *US*.

USP 31 (Basic Fuchsin). A mixture of rosaniline and pararosaniline hydrochlorides. It contains the equivalent of not less than 88% of rosaniline hydrochloride ($C_{20}H_{20}ClN_3$ = 337.8), calculated on the dried basis. A dark green powder or greenish glistening crystalline fragments with a bronze-like lustre and not more than a faint odour. Soluble in water, in alcohol, and in amyl alcohol; insoluble in ether.

Profile

Magenta is a triphenylmethane antiseptic dye effective against Gram-positive bacteria and some fungi. Magenta Paint (BPC 1973) (Castellani's Paint) was formerly used in the treatment of superficial dermatophytoses.

Decolorised magenta solution (Schiff reagent) is used as a test for the presence of aldehydes.

Concerns about possible carcinogenicity have restricted the use of magenta.

Carcinogenicity. The handling of magenta was not thought to induce carcinogenesis but its actual manufacture may produce tumours. The International Agency for Research on Cancer has concluded that the manufacturing process of magenta involves exposure to substances that are considered to be definite human carcinogens. Pararosaniline hydrochloride (Basic Red 9), and magenta containing it, are considered possibly carcinogenic to humans.[1] Magenta was also considered to be unsafe for use in food.[2]

1. IARC/WHO. Occupational exposures of hairdressers and barbers and personal use of hair colourants; some hair dyes, cosmetic colourants, industrial dyestuffs and aromatic amines. *IARC monographs on the evaluation of carcinogenic risks to humans volume 57* 1993. Available at: http://monographs.iarc.fr/ENG/Monographs/vol57/volume57.pdf (accessed 23/05/06)
2. FAO/WHO. Specifications for the identity and purity of food additives and their toxicological evaluation: food colours and some antimicrobials and antoxidants: eighth report of the joint FAO/WHO expert committee on food additives. *WHO Tech Rep Ser 309* 1965. Also available at: http://libdoc.who.int/trs/WHO_TRS_309.pdf (accessed 28/08/08)

Preparations

BPC 1973: Magenta Paint;
USP 31: Carbol-Fuchsin Topical Solution.

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***Ital.:*** Fucsina Fenica; ***Pol.:*** Pigmentum Castellani.

Magnesium Peroxide

Magnesii peroxidum; Magnesium Perhydrolum; Magnésium, peroxyde de; Magnesiumperoksidi; Magnesiumperoxid; Magnéziumperoxid; Magnio peroksidas; Peroxid hořečnatý; Peróxido de magnesio.

CAS — 1335-26-8; 14452-57-4.
ATC — A02AA03; A06AD03.
ATC Vet — QA02AA03; QA06AD03.

Pharmacopoeias. In *Eur.* (see p.vii).

Ph. Eur. 6.2 (Magnesium Peroxide). A mixture of magnesium peroxide and magnesium oxide. It contains not less than 22% and not more than 28% of MgO_2. A white or slightly yellow, amorphous, light powder. Practically insoluble in water and in alcohol; dissolves in mineral acids. Protect from light.

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†.

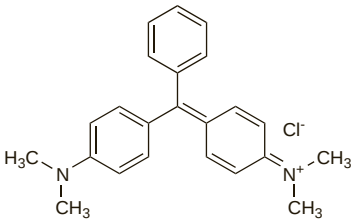
Multi-ingredient: ***Israel:*** Digestif-Ara†; ***Ital.:*** Carbonesia; Ektogan; ***Switz.:*** Desaquick extra fresh†; Desaquick fresh†; Magenpulver Hafter†.

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.

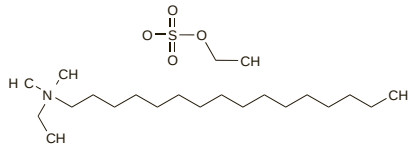
Mecetronium Etilsulfate *(BAN, rINN)*

Etilsulfato de mecetronio; Mecetronii Etilsulfas; Mecetronium Ethylsulfate *(USAN)*; Mecetronium Ethylsulphate; Mécétronium, Étilsulfate de. Ethylhexadecyldimethylammonium ethyl sulphate.

Мецетрония Этилсульфат

$C_{22}H_{49}NO_4S$ = 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.:*** Bacillol; 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-3*H*-xanthen-5-yl]hydroxymercury.

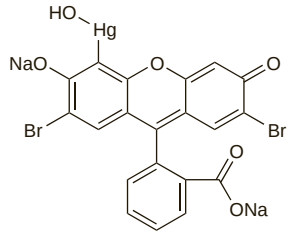
Мербромин

$C_{20}H_8Br_2HgNa_2O_6$ = 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 dermatitis[1] 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 report[8] 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; **i:** 210.
4. Yeh TF, *et al.* Mercury poisoning from mercurochrome therapy of an infected omphalocele. *Clin Toxicol* 1978; **13:** 463–7.
5. Slee PHTJ, *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 mercurescеine†; Soluchrom; ***Ger.:*** Mercuchrom†; ***Gr.:*** Merbromin; Mercurochrome; ***Ital.:*** Cromocur†; ***S.Afr.:*** Red Seal; ***Spain:*** Cinfacromin; Cromer Orto; Mercromina; Mercurin; Mercurobromo; Mercutina Brota; Super Cromer Orto; ***Turk.:*** Mersol.

Multi-ingredient: ***S.Afr.:*** Achromide; Daromide; Ung Vernleigh; ***Spain:*** Argentocromo†; Mercrotona; ***Venez.:*** Thimerfesa†.

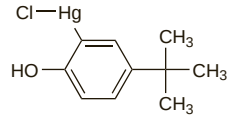
Mercurobutol *(rINN)*

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

Меркуробутол

$C_{10}H_{13}ClHgO$ = 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.:*** Sabenyl†.

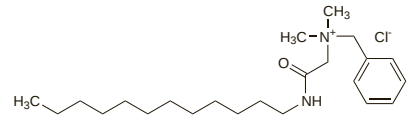
Metalkonium Chloride *(rINN)*

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

Металкония Хлорид

$C_{23}H_{41}ClN_2O$ = 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.: Esosan Gel.