an; Betaseptic; Braunol; Braunovidon; Wundesin; ***Belg.:*** Braunol; Iodex; Iso-Betadine; ***Braz.:*** Asteriodine†; Laboriodine; Marcodine; PVPI†; Sabofen†; ***Canad.:*** Betadine; Proviodine; ***Chile:*** Difexon; Neoyod†; ***Cz.:*** Betadine; Braunol; Braunovidon; Jodisol; Jodobac†; ***Fin.:*** Betadine; ***Fr.:*** Betadine; Polidone; ***Ger.:*** Betaisodona; Braunol; Braunovidon; Freka-cid; Inadine†; Jodobac†; Mercuchrom-Jod; Polydona; Polysept; Sepso J; Traumasept; ***Gr.:*** Betadine; Drapix; Eva Povi†; Lombocid†; Oxisept; Tinsole; ***Hong Kong:*** Betadine; Freka-cid; Proviodine; Videne; ***Hung.:*** Betadine; Colpo-Cleaner; Gyneiod†; ***India:*** Alphadine†; Betadine; Betadine-AD; Cipladine; Povidine; Wokadine; ***Indon.:*** Abodine; Asepta; Betadine; Corsasep; Duvodine; Forinfec; Isodine; Molexdine; Mugisept; Neo Iodine; Scansepta; Septadine; Vidisep; ***Irl.:*** Betadine; Inadine; Savlon Dry; ***Israel:*** Idovit; Iodiflor; Iodispray; Iodo-Vit; Massengill Medicated†; Polydine; Polysept; Yodon; ***Ital.:*** Asepsan; Betadine; Betaseptic; Braunol; Citro Jod; Destrobac; Eso-Jod; Esoform Jod 35 and 75; Gammadin; Golasept; Inadine; Iodosteril; Iodoten; Jodocur†; Jodogard; Oftasteril; Paniodal†; Paniodine†; Poviderm; ***Jpn:*** Finish; ***Malaysia:*** Betadine; Freka-cid; Poviderm; Septi-Aid; Summers Eve Medicated; ***Mex.:*** Isodine; Solvin†; Yodacua; Yodine; ***Neth.:*** Betadine; Braunol; ***NZ:*** Betadine; Biocil; Riodine; Viodine†; ***Philipp.:*** Bacticide; Betadine; Povidine; Zigmadone; ***Pol.:*** Betadine; Braunovidon; Jodi; Polodina-R; Polseptol; PV Jod; ***Port.:*** Betadine; Braunol; Dinasepte†; Ginoseptil; Iodolab; Isodine; Septil; ***Rus.:*** Betadine (Бетадин); Iodoxyd (Йодоксид); Wokadine (Вокадин); ***S.Afr.:*** Betadine; Dermadine; Drygel; Podine; Septadine; Septisooth; Steridine; Zedchem PVP-I; ***Singapore:*** Betadine; ***Spain:*** Acydona; Betadine; Betatul; Curadona; Iodina; Orto Dermo P; Sanoyodo; Topionic; ***Switz.:*** Betadine; Braunol; Braunosan; Braunosan H Plus; Braunovidon; Destrobac; Intersept; Jodoplex; ***Thai.:*** Annadine; Bactedene; Bemadine†; Betadine; Cavodine†; Eprodine†; Freka-cid; Isodine; Movidone; P-Vidine†; Povadine; Sepfadine†; Septidine; Upodine; Videne; X-Tardine; ***Turk.:*** Batticon; Betakon; Biokadin; Isosol; Polyod; Poviseptin; ***UK:*** Betadine; Inadine; Savlon Dry; Videne; ***USA:*** ACU-dyne; Betadine; Biodine; Efodine; Iodex; Massengill Medicated; Minidyne; Operand; Polydine; Summers Eve Medicated; ***Venez.:*** Betadine; Etiyodix†; Intradine; Intradyn; Iopovidona†; Jabodine†; Norlidine; Podival†; Povidine†; Yodasept†.

Multi-ingredient: ***Arg.:*** Merthiolate Iodopovidona; Pervinox D; ***Austria:*** Braunoderm; ***Belg.:*** Braunoderm; ***Braz.:*** Iodocaine†; ***Cz.:*** Jox; ***Ger.:*** Betaseptic; Braunoderm; Repithel; ***Hung.:*** Eczil†; Jox†; ***India:*** Eczo-Wokadine; ***Indon.:*** Kalpanax; Kopamex; ***Ital.:*** Braunoderm; Jodieci; ***Jpn:*** U-Pasta; ***Mex.:*** Bano Coloide; Riban; ***Port.:*** Braunoderm; ***Rus.:*** Jox (Мокс); ***Switz.:*** Betaseptic; Braunoderm; ***Turk.:*** Batiodin; ***USA:*** Anbesol; Orasol; ProTech.

Propamidine Isetionate *(BANM, rINNM)*

Isetionato de propamidina; M&B-782; Propamidine Isethionate; Propamidine, Isétionate de; Propamidini Isetionas. 4,4′-Trimethylenedioxydibenzamidine bis(2-hydroxyethanesulphonate).

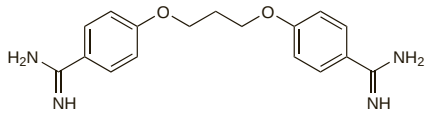
Пропамидина Изетионат

$C_{17}H_{20}N_4O_2.2C_2H_6O_4S$ = 564.6.

CAS — 104-32-5 (propamidine); 140-63-6 (propamidine isetionate).

ATC — D08AC03; S01AX15.

ATC Vet — QD08AC03; QS01AX15.



Profile

Propamidine isetionate is an aromatic diamidine antiseptic that is active against Gram-positive bacteria, but less active against Gram-negative bacteria and spore-forming organisms. It also has antifungal properties and is active against *Acanthamoeba*. Ophthalmic solutions containing 0.1% of propamidine isetionate are used for the treatment of conjunctivitis and blepharitis.

Acanthamoeba keratitis. The optimal regimen for the treatment of *Acanthamoeba* keratitis (p.822) has yet to be determined. Propamidine isetionate applied topically was the first drug used with some success.[1,2] It was used with an aminoglycoside such as neomycin or a neomycin-polymyxin-gramicidin preparation and a cure was achieved in about 50% of cases. Due to surface toxicity and poor *in-vitro* sensitivity of neomycin, propamidine was later used with chlorhexidine or polihexanide. However, poor cysticidal activity, chronic conjunctival infection, and resistance of some strains of *Acanthamoeba* to propamidine has prompted the suggestion that it should be replaced by another diamidine such as hexamidine.[3]

1. Murdoch D, *et al.* Acanthamoeba keratitis in New Zealand, including two cases with in vivo resistance to polyhexamethylene biguanide. *Aust N Z J Ophthalmol* 1998; **26:** 231–6.
2. Seal DV. Acanthamoeba keratitis update—incidence, molecular epidemiology and new drugs for treatment. *Eye* 2003; **17:** 893–905.
3. Perrine D, *et al.* Amoebicidal efficiencies of various diamidines against two strains of Acanthamoeba polyphaga. *Antimicrob Agents Chemother* 1995; **39:** 339–42.

Preparations

Proprietary Preparations (details are given in Part 3)
Austral.: Brolene; ***Irl.:*** Brolene; ***NZ:*** Brolene; ***S.Afr.:*** Brolene; ***UK:*** Brolene; Golden Eye Drops.

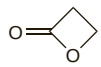
Propiolactone *(BAN, USAN, rINN)*

BPL; NSC-21626; 2-Oxetanone; Propanolide; Propiolactona; β-Propiolactone; Propiolactonum. Propiono-3-lactone.

Пропиолактон

$C_3H_4O_2$ = 72.06.

CAS — 57-57-8.



Profile

Propiolactone vapour is an irritant, mutagenic, possibly carcinogenic, disinfectant which is very active against most microorganisms including viruses. It is rather less effective against bacterial spores.

Propiolactone vapour has been used for the gaseous sterilisation of pharmaceutical and surgical materials and for disinfecting large enclosed areas. It has low penetrating power. Propiolactone liquid has also been used.

Propyl Alcohol

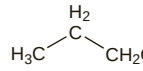
Alcohol propílico; Normal Propyl Alcohol; Primary Propyl Alcohol; Propanol; Propanoli; Propanolis; Propanolum. Propan-1-ol.

$CH_3.CH_2.CH_2OH$ = 60.10.

CAS — 71-23-8.

ATC — D08AX03.

ATC Vet — QD08AX03.



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

Ph. Eur. 6.2 (Propanol). A clear colourless liquid. Miscible with water and with dehydrated alcohol. Protect from light.

Adverse Effects and Treatment

As for Alcohol, p.1625; propyl alcohol is considered more toxic.

◊ References.

1. WHO. 1-Propanol. *Environmental Health Criteria 102.* Geneva: WHO, 1990. Available at: http://www.inchem.org/documents/ehc/ehc/ehc102.htm (accessed 15/03/06)

Uses and Administration

Propyl alcohol, an antiseptic with properties similar to those of alcohol (p.1627), is used in preparations for disinfection of the hands, skin, surfaces, and instruments.

Isopropyl alcohol (p.1651) is also used as an antiseptic.

Preparations

Proprietary Preparations (details are given in Part 3)
Ger.: Skinman Asept.

Multi-ingredient: ***Austria:*** Dodesept; Kodan; Marcocid; Octeniderm; ***Fr.:*** Anios DD; Sterillium†; ***Ger.:*** Aerodesin; Bacillol; Bacillol AF; Bacillol plus; Desmanol†; Freka-Steril; Hospisept; Incidin; Incidur Spray†; Kodan Tinktur Forte†; Meliseptol; Meliseptol Rapid; Neo Kodan†; Primasept Med†; Sagrosept†; Softa Man; St-Tissues; Sterillium; ***Gr.:*** Chiro Des; Octeniderm; Sterillium; ***Ital.:*** Softa Man; ***Neth.:*** Softa-Man; Sterillium; ***Singapore:*** Listerine Cool Mint; Listerine Fresh Burst; Listerine Tartar Control; ***Switz.:*** Kodan Teinture forte; Octeniderm; Softa-Man; Sterillium†.

Ritiometan *(rINN)*

Ritiométan; Ritiometán; Ritiometanum. (Methylidynetrithio)-triacetic acid.

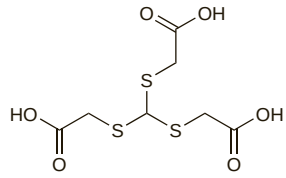
Ритиометан

$C_7H_{10}O_6S_3$ = 286.3.

CAS — 34914-39-1.

ATC — R01AX05.

ATC Vet — QR01AX05.



Profile

Ritiometan is used as the magnesium salt in an aerosol preparation for the treatment of infections of the nose and throat.

Preparations

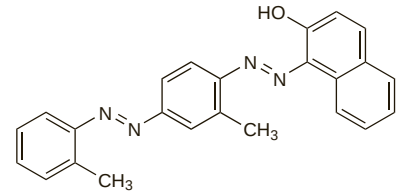
Proprietary Preparations (details are given in Part 3)
Fr.: Necyrane.

Scarlet Red

Biebrich Scarlet R Medicinal; CI Solvent Red 24; Colour Index No. 26105; Fat Ponceau R; Rojo escarlata; Rubrum Scarlatinum; Scharlachrot; Sudan IV. 1-[4-(o-Tolylazo)-o-tolylazo]naphth-2-ol.

$C_{24}H_{20}N_4O$ = 380.4.

CAS — 85-83-6.



Profile

Scarlet red is an antiseptic dye that has been used topically. It can be irritant. Scarlet red is not permitted as a food colour in the EU, as it is thought to be a genotoxic carcinogen.

Sodium Azide

Azida sódica; Sodu azydek.

N_3Na = 65.01.

CAS — 26628-22-8.

Adverse Effects and Precautions

Sodium azide is a potent vasodilator and the most common adverse effect, regardless of the route of exposure, is hypotension. Hypotension developing more than an hour after exposure is associated with more severe toxicity and fatality. Other severe symptoms include seizure, coma, arrhythmia, tachypnoea, pulmonary oedema, metabolic acidosis, and cardiorespiratory arrest. Milder symptoms include nausea, vomiting, diarrhoea, headache, dizziness, temporary loss of vision, palpitations, dyspnoea, temporary loss of consciousness, or decreased mental status. There is no specific antidote for sodium azide intoxication.

Solutions containing sodium azide must not be disposed of into drain pipelines containing copper, lead, or brass since highly explosive heavy metal azides may be produced.

◊ References to acute poisoning with sodium azide.

1. Edmonds OP, Bourne MS. Sodium azide poisoning in five laboratory technicians. *Br J Ind Med* 1982; **39:** 308–9.
2. Klein-Schwartz W, *et al.* Three fatal sodium azide poisonings. *Med Toxicol Adverse Drug Exp* 1989; **4:** 219–27.
3. Anonymous. Sodium azide contamination of hemodialysis water supplies. *JAMA* 1989; **261:** 2603.
4. Chang S, Lamm SH. Human health effects of sodium azide exposure: a literature review and analysis. *Int J Toxicol* 2003; **22:** 175–86.

Airbag deployment. Chemical and thermal burns have occurred after accidental perforation of airbags in motor vehicles and the release of sodium azide and other byproducts. Irritant contact dermatitis usually affecting the upper chest, arms, and face, and blunt trauma have also been reported.[1,2]

1. Corazza M, *et al.* Effects of airbag deployment: lesions, epidemiology, and management. *Am J Clin Dermatol* 2004; **5:** 295–300.
2. Suhr M, Kreusch T. Burn injuries resulting from (accidental) airbag inflation. *J Craniomaxillofac Surg* 2004; **32:** 35–7.

Effects on the nervous system. A study[1] to evaluate occupational neurotoxicity to sodium azide over a period of 3 years found that the only significant chronic symptom was trembling of the hands, occurring in 15 of 41 exposed workers compared with none of 42 controls. There was no difference between the 2 groups for other psychological or neuropsychological tests. Acute adverse effects most commonly reported by the exposed workers were heart palpitations, fatigue, nausea, vertigo, and irritated or red eyes.

1. Miljours S, Braun CMJ. A neuropsychotoxicological assessment of workers in a sodium azide production plant. *Int Arch Occup Environ Health* 2003; **76:** 225–32.

Haemodialysis. Of 10 investigations by the CDC[1] into outbreaks of disease caused by chemicals in haemodialysis facilities between 1979 and 1999, one was due to sodium azide. Inadequate rinsing of water filters resulted in the exposure of 9 patients to sodium azide in a dialysis centre. Patients experienced sudden hypotension, blurred vision, headache, nausea, vomiting, syncope, and 1 patient experienced cramps.

1. Arduino MJ. CDC investigations of noninfectious outbreaks of adverse events in hemodialysis facilities, 1979-1999. *Semin Dial* 2000; **13:** 86–91.

Uses

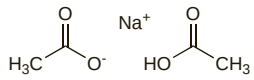
Sodium azide has been used as an antimicrobial preservative in laboratory reagents, serum samples, and dialysis equipment. It is also used in car airbags; sudden impact triggers an electrical charge causing the sodium azide to explode and nitrogen gas is released.

Sodium Diacetate

Diacetato de sodio; E262. Sodium hydrogen diacetate.

$CH_3COONa,CH_3COOH(+xH_2O)$.

CAS — 126-96-5 (anhydrous sodium diacetate).



Profile

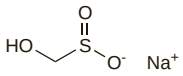
Sodium diacetate is used as a preservative in foods, particularly as an inhibitor of moulds and rope-forming micro-organisms in bread.

Sodium Formaldehyde Sulfoxylate

Formaldehído sulfoxilato sódico; Natrii Formaldehydosulfoxylas; Sodium Formaldehyde Sulphoxylate; Sodu formaldehydosulfoksylan. Sodium hydroxymethanesulphinate dihydrate.

$CH_3NaO_3S,2H_2O$ = 154.1.

CAS — 149-44-0 (anhydrous sodium formaldehyde sulfoxylate); 6035-47-8 (sodium formaldehyde sulfoxylate, dihydrate).



Pharmacopoeias. In *Pol.* Also in *USNF.*

USNF 26 (Sodium Formaldehyde Sulfoxylate). White crystals or hard white masses with the characteristic odour of garlic. Soluble 1 in 3.4 of water, 1 in 510 of alcohol, 1 in 175 of chloroform, and 1 in 180 of ether; slightly soluble in benzene. A 2% solution in water has a pH of 9.5 to 10.5. Store at 15° to 30°. Protect from light.

Profile

Sodium formaldehyde sulfoxylate is an antoxidant used as a preservative in pharmaceuticals. It has been used in the treatment of acute mercury poisoning (p.2342).

Sodium Hypochlorite

Hipoclorito sódico.

Гипохлорит Натрия

$NaOCl,5H_2O$ = 164.5.

CAS — 7681-52-9.

ATC — D08AX07.

ATC Vet — QD08AX07.

NOTE. The term 'liquid chlorine' has been used for solutions of sodium hypochlorite. These should not be confused with the pressurised form of chlorine gas (p.1638) which is also liquid and has been referred to similarly.

Pharmacopoeias. *Br., Fr.,* and *US* include sodium hypochlorite solutions.

BP 2008 (Dilute Sodium Hypochlorite Solution). It contains 1% of available chlorine. Store away from acids at a temperature not exceeding 20°. Protect from light.

BP 2008 (Strong Sodium Hypochlorite Solution). It contains not less than 8% of available chlorine. It should be diluted before use. Store away from acids at a temperature not exceeding 20°. Protect from light.

USP 31 (Sodium Hypochlorite Solution). It contains not less than 4% and not more than 6% w/w of anhydrous sodium hypochlorite. It is not suitable for application to wounds. Store in airtight containers. Protect from light.

USP 31 (Sodium Hypochlorite Topical Solution). It contains 0.025% sodium hypochlorite. Store in airtight containers. Protect from light.

Incompatibility. The antimicrobial activity of hypochlorites is rapidly reduced in the presence of organic material; it is also pH dependent being greater in acid pH although hypochlorites are more stable at alkaline pH.

Sodium hypochlorite solutions should not be mixed with solutions of strong acids or ammonia; the subsequent reactions release chlorine gas and tosylchloramide sodium gas, respectively.

Stability. The stability of sodium hypochlorite solutions increases with pH, solutions of pH 10 or more being most stable.[1] Stability studies have shown that solutions providing 0.04 to 0.12% 'available chlorine' stored in amber glass bottles at room temperature could carry a 23-month expiry date.[2]

1. Bloomfield SF, Sizer TJ. Eusol BPC and other hypochlorite formulations used in hospitals. *Pharm J* 1985; **235:** 153–5 and 157.
2. Fabian TM, Walker SE. Stability of sodium hypochlorite solutions. *Am J Hosp Pharm* 1982; **39:** 1016–17.

Adverse Effects

Hypochlorite solutions release hypochlorous acid upon contact with gastric juice and acids. Most patients ingesting hypochlorites will develop only mild gastrointestinal irritation. However, ingestion of small amounts of 3 to 5% hypochlorite solutions may result in irritation of the oropharynx, a burning sensation in the mouth and throat, and thirst. Nausea, vomiting, and haematemesis may occur. Ingestion of large amounts or more concentrated solutions causes irritation and corrosion of mucous membranes with chest and abdominal pain and tenderness, vomiting, haematemesis, watery diarrhoea and sometimes melaena. Ingestion of extremely large volumes may rarely cause hypernatraemia, hyperchloraemia, hypotension, and changes in mental status. In very severe cases ulceration or perforation of the oesophagus or stomach may occur leading to haemorrhage and shock.

Inhalation of the fumes is irritant to the eyes, nose, and respiratory tract. Sore throat, cough, bronchoconstriction, headache, ataxia, and confusion may develop. In severe cases dyspnoea and stridor due to laryngeal oedema may develop with breathlessness, wheeze, hypoxia, cyanosis, pneumonitis, and pulmonary oedema.

Hypochlorite solutions may be irritating to the skin and allergic contact dermatitis has been reported. Hypochlorite solutions may cause an alkali-type burn when splashed into the eye.

◊ General references.

1. Racioppi F, *et al.* Household bleaches based on sodium hypochlorite: review of acute toxicology and Poison Control Center experience. *Food Chem Toxicol* 1994; **32:** 845–61.

Effects on the blood. A child with G6PD deficiency had an acute haemolytic crisis after swimming for about 4 hours in an indoor pool containing very high concentrations of sodium hypochlorite.[1]

1. Ong SJ, Kearney B. Local swimming pool and G-6-PD deficiency. *Med J Aust* 1994; **161:** 226–7.

Effects on wound healing. For comment on the adverse effects of hypochlorite solutions on wound healing, see Disinfection: Wounds under Uses and Administration below.

Toxicity from mixing cleaning agents. Mixing the household cleaning agents bleach (5.25% sodium hypochlorite solution) and 4% phosphoric acid (p.2367) causes chlorine gas and water to be released. The chlorine in turn reacts with the water to form hydrochloric and hypochlorous acids. There have been case reports[1] of patients and hospital staff who have been accidentally exposed to chlorine gas as a result of mixing of these two cleaning agents. They had temporary illness and symptoms typical of chlorine toxicity; irritation of the eyes, nose and throat, headache, dizziness, nausea, cough, and chest pain or tightness. One patient had an acute exacerbation of asthma.

Tosylchloramide sodium gas is produced when common household cleaning agents containing sodium hypochlorite and ammonia (p.2256) are mixed together. On inhalation the water in the respiratory tract reacts with the tosylchloramide sodium gas to release ammonia, hydrochloric acid and oxygen free radicals. Numerous case reports have described the symptoms resulting from inhalation of these gases. A 12-month review[2] of 216 patients who reported to a regional poison information centre after exposure to tosylchloramide sodium gas as a result of mixing cleaning products found that only 1 patient, with a pre-existing respiratory-tract infection, required hospital admission for ongoing respiratory distress. The most frequent symptoms were cough and shortness of breath and other symptoms experienced were those commonly associated with exposure to chlorine gas (p.1638). Most (200) of the patients' symptoms resolved within 6 hours and 145 patients were treated at home, while 71 were referred for further medical care. Oxygen was given to 62 patients, bronchodilators to 9 patients and 3 patients received corticosteroids. Similar symptoms and findings were reported[3] when 2 groups of 36 soldiers were exposed to tosylchloramide sodium gas as a result of mixing sodium hypochlorite and ammonia containing cleaning agents. Only 2 soldiers required hospital admission for persistent respiratory symptoms, with one of them requiring a few days of treatment in intensive care. Another case report[4] described a previously healthy 53-year-old woman who experienced shortness of breath progressing to pneumonitis and requiring emergency tracheostomy after a similar exposure to tosylchloramide sodium gas.

1. CDC. Epidemiologic notes and reports: chlorine gas toxicity from mixture of bleach with other cleaning products—California. *MMWR* 1991; **40:** 619–21, 627–9. Corrections. *ibid.*; 646, 819.
2. Mrvos R, *et al.* Home exposures to chlorine/chloramine gas: review of 216 cases. *South Med J* 1993; **86:** 654–7.
3. Pascuzzi TA, Storrow AB. Mass casualties from acute inhalation of chloramine gas. *Mil Med* 1998; **163:** 102–4.
4. Tanen DA, *et al.* Severe lung injury after exposure to chloramine gas from household cleaners. *N Engl J Med* 1999; **341:** 848–9.

Toxicity during root canal irrigation. A review of case reports[1] where sodium hypochlorite had been inadvertently injected into the periapical tissues during root canal irrigation reported that most patients experienced immediate severe pain and swelling of the neighbouring soft tissue, which could possibly spread over the injured side of the face, upper lip and infra-orbital region. Other symptoms included bleeding from the root canal, interstitial bleeding with haemorrhage of the skin and mucosa, a chlorine taste, irritation of the throat, and reversible anaesthesia or paraesthesia.

1. Hülsmann M, Hahn W. Complications during root canal irrigation—literature review and case reports. *Int Endod J* 2000; **33:** 186–93.

Treatment of Adverse Effects

If sodium hypochlorite solution is ingested symptomatic care, including dilution with water, milk, or other demulcents should be given; opinion over the use of antacids is divided. Sodium thiosulfate 1 to 2.5% solution has been used but is of little or no value. If spilled on skin or eyes, washing with copious amounts of water is recommended.

Poisoning. A patient who accidentally received an intravenous infusion of 150 mL of a 1% solution of sodium hypochlorite experienced a slow heart rate, mild hypotension, and increased respiratory rate. The slow heart rate persisted for 3 days but other parameters returned to normal after symptomatic treatment.[1]

1. Marroni M, Menichetti F. Accidental intravenous infusion of sodium hypochlorite. *DICP Ann Pharmacother* 1991; **25:** 1008–9.

Precautions

Topically applied hypochlorites may dissolve blood clots and cause bleeding.

Uses and Administration

Sodium hypochlorite is a disinfectant and antiseptic with the brief and rapid actions of chlorine (see p.1638). Sodium hypochlorite pentahydrate contains about 43% of 'available chlorine' (see p.1638); anhydrous sodium hypochlorite contains about 95%. Powders and solutions are commonly used for the rapid disinfection of hard surfaces (see Disinfection in Creutzfeldt-Jakob Disease, p.1622 and in Hepatitis and HIV Infection, p.1623), food and dairy equipment, babies' feeding bottles, excreta, and water (p.1623). Solutions for use as domestic bleaches contain up to 5.25% of hypochlorite. Only diluted solutions containing up to 0.5% of 'available chlorine' are suitable for use on the skin and in wounds (but see Wound Disinfection, p.1624). Sodium hypochlorite solutions ranging from 0.5 to 5.25% are used in dentistry for root canal irrigation.

Solutions of hypochlorites used as disinfectants have included Labarraque's Solution containing sodium hypochlorite with an alkali, and Eau de Javel, containing sodium or potassium hypochlorite.

Disinfection. ***INSTRUMENTS.*** Needles and syringes should not usually be sterilised chemically. However, cleaning of injection equipment with hypochlorite has been suggested as a last resort in the absence of sterile equipment, to reduce the risk of HIV transmission associated with the enforced re-use of injection equipment by injection drug users.[1] Use of full-strength domestic bleach (about 5% sodium hypochlorite, about 2% of 'available chlorine') was reported to be effective for the cleaning of intravenous drug users' equipment; a 30-second contact time was required.[1,2] A 1 in 10 dilution of bleach was not effective after exposure for 5 minutes.[2] Despite rinsing with water, a low residual concentration of hypochlorite and microaggregates of blood are likely to remain on the cleaned instruments. Free chlorine is a potent oxidant and low concentrations of oxidants have been shown to enhance tissue inflammation *in vivo* as well as HIV-1 replication *in vitro*. This has led some researchers to suggest that there may be an increased possibility of an injection drug user contracting HIV-1 through the sharing of a bleach-cleaned blood-contaminated syringe as a consequence of the concomitant transmission of residual bleach; however, there is no epidemiological evidence to confirm this.[3]

1. Donoghoe MC, Power R. Household bleach as disinfectant for use by injecting drug users. *Lancet* 1993; **341:** 1658.
2. Watters JK, *et al.* Household bleach as disinfectant for use by injecting drug users. *Lancet* 1993; **342:** 742–3.
3. Contoreggi C, *et al.* Effects of varying concentrations of bleach on in vitro HIV-1 replication and the relevance to injection drug use. *Intervirology* 2000; **43:** 1–5.