

WORMS. Sodium hypochlorite in aqueous solution at a concentration of 3.75% (or greater) is an effective ovicide for *Echinococcus* and may be used on hard surfaces, glassware, and sinks.¹

1. Craig PS, Macpherson CNL. Sodium hypochlorite as an ovicide for *Echinococcus*. *Ann Trop Med Parasitol* 1988; **82**: 211–13.

WOUNDS. Hypochlorite solutions are now generally considered to be too irritant for use in the management of wounds (p.1585). Studies suggest that they may delay wound healing if repeatedly applied to open wounds.^{1,2} It has been suggested that they may be of use in debriding burns (p.1578) or necrotic chronic wounds,³ but also that any benefit that might be seen from the desloughing of necrotic tissue might be produced by damage of the superficial cell layer leading to separation⁴ or from tissue hydration produced by wet dressing packs.⁵ However, some burns units have found that hypochlorite as Dakin's solution (see Chlorinated Lime, p.1638) produces better healing than other antibacterials.⁶

See also p.1624.

1. Thomas S, Hay NP. Wound healing. *Pharm J* 1985; **235**: 206.
2. Lineweaver W, et al. Topical antimicrobial toxicity. *Arch Surg* 1985; **120**: 267–70.
3. Leaper DJ. Eusol. *BMJ* 1992; **304**: 930–1.
4. Anonymous. Local applications to wounds—I: cleansers, antibacterials, debriders. *Drug Ther Bull* 1991; **29**: 93–5.
5. Thomas S. Milton and the treatment of burns. *Pharm J* 1986; **236**: 128–9.
6. Murphy KD, et al. Current pharmacotherapy for the treatment of severe burns. *Expert Opin Pharmacother* 2003; **4**: 369–84.

Preparations

BP 2008: Dilute Sodium Hypochlorite Solution; Strong Sodium Hypochlorite Solution;

USP 31: Sodium Hypochlorite Solution; Sodium Hypochlorite Topical Solution.

Proprietary Preparations (details are given in Part 3)

Arg.: Antibacter†; **Austral.:** Milton; **Belg.:** Dakincooper; **Braz.:** Líquido de Dakin†; **Canada.:** Dakin's Solution; Hygeol; **Fr.:** Dakin; **Ger.:** Maranon H†; **Israel.:** Chlorasol; **Ital.:** Amukine Med; **Milton.:** **Singapore.:** Milton Anti-Bacterial; **UK.:** Chlorasol†; Milton.

Multi-ingredient: **Fr.:** Amukine; **Mex.:** Amuchina†; **Switz.:** Amuchina Med.

Sodium Nitrate

E251; Natrii Nitras; Natrium Nitricum; Nitrato sódico; Sodu azotan.

NaNO₃ = 84.99.

CAS — 7631-99-4.

NOTE. Crude sodium nitrate is known as Chile Saltpetre.

Profile

Sodium nitrate has similar actions to potassium nitrate (p.1658) and is used as a preservative in foods, particularly in meat products.

Crude sodium nitrate is used as a fertilizer.

Handling. Sodium nitrate has been used for the illicit preparation of explosives or fireworks; care is required with its supply.

Poisoning. Cyanosis and methaemoglobinemia has been reported¹ in 3 patients after eating sausages that had been preserved mistakenly with a mixture of sodium nitrate and sodium nitrite rather than with potassium nitrate (saltpetre). The name saltpetre is used as a generic term for a number of potassium- or sodium-based preservatives used in food manufacture.

1. Kennedy N, et al. Faulty sausage production causing methaemoglobinemia. *Arch Dis Child* 1997; **76**: 367–8.

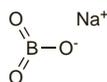
Sodium Perborate Monohydrate (USAN)

NaBO₃·H₂O = 99.81.

CAS — 7632-04-4 (anhydrous sodium perborate); 10332-33-9 (sodium perborate monohydrate).

ATC — A01AB19.

ATC Vet — QA01AB19.



(anhydrous)

Sodium Perborate

Natrii perboras; Natrio perboratas; Natriumperboraahti; Natriumperborat; Nátrium-perborát; Perborato sódico; Perboritan sodný; Sod. Perbor; Sodium, perborate de; Sodium Perborate Tetrahydrate.

NaBO₃·4H₂O = 153.9.

CAS — 10042-94-1.

ATC — A01AB19.

ATC Vet — QA01AB19.

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

Ph. Eur. 6.2 (Sodium Perborate, Hydrated; Sodium Perborate BP 2008). Colourless prismatic crystals or a white or almost white powder, stable in crystalline form. Sparingly soluble in water, with slow decomposition. It dissolves in dilute mineral acids. Store in airtight containers.

Adverse Effects

Frequent use of toothpastes containing sodium perborate may cause blistering and oedema. Hypertrophy of the papillae of the tongue has also been reported. The effects of swallowed sodium perborate are similar to those of boric acid (p.2268).

Uses and Administration

Sodium perborate is a mild disinfectant and deodorant. It readily releases oxygen in contact with oxidisable matter and has been used in aqueous solutions for purposes similar to weak solutions of hydrogen peroxide.

Sodium perborate is used for tooth whitening and has also been used, with calcium carbonate, as a toothpowder. A freshly prepared solution is used as a mouthwash.

The monohydrate is used similarly.

Preparations

Proprietary Preparations (details are given in Part 3)

Arg.: Hifamoni†; **Canada.:** Aмосan; **India:** Steradent; **Ital.:** Kavosan†; **Neth.:** Bocasan; **USA:** Aмосan.

Multi-ingredient: **Arg.:** Oral-B Enjuague Bucal Aмосan†; **Austral.:** Aмосan; **Belg.:** Aмосan; **Braz.:** Anginotricin; Malvatricin Branqueador; **Otcinerin.:** Fr.: Bactident; Hydralin; **Hong Kong.:** Hydralin; **Spain:** Lema C; **Switz.:** Saltrates Rodell†; **USA:** Trichotine; **Venez.:** Novafix.

Sodium Percarbonate

Percarbonato sódico; Sodium Carbonate Peroxide.

Na₂CO₃·1/2H₂O₂ = 157.0.

CAS — 15630-89-4.

Profile

Sodium percarbonate has similar uses to sodium perborate (above).

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Arg.:** Ascoxal†; **Austral.:** Ascoxal; **Fin.:** Ascoxal†; **Mex.:** Ascoxal; **Norw.:** Ascoxal†; **Swed.:** Ascoxal†; **Switz.:** Desaquick forte†.

Sorbates

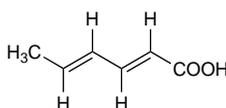
Sorbatos.

Sorbic Acid

Acide sorbique; Acidum sorbicum; E200; Kwas sorbowy; Kyselina sorbová; Sórbito, ácido; Sorbiinihappo; Sorbinsyra; Sorbo rūgštis; Sorbinsav. (E,E)-Hexa-2,4-dienoic acid.

C₆H₈O₂ = 112.1.

CAS — 22500-92-1.



Pharmacopoeias. In *Chin.* and *Eur.* (see p.vii). Also in *USNF*.

Ph. Eur. 6.2 (Sorbic Acid). A white or almost white, crystalline powder. Slightly soluble in water; freely soluble in alcohol. Protect from light.

USNF 26 (Sorbic Acid). A free-flowing white crystalline powder with a characteristic odour. Soluble 1 in 1000 of water, 1 in 10 of alcohol, 1 in 8 of dehydrated alcohol, 1 in 15 of chloroform, 1 in 30 of ether, 1 in 8 of methyl alcohol, and 1 in 19 of propylene glycol. Store in airtight containers at a temperature not exceeding 40°. Protect from light.

Incompatibility. The incompatibility of sorbates is discussed under Potassium Sorbate, below.

Potassium Sorbate

E202; Kalii sorbas; Kalio sorbatas; Kaliumsorbatti; Kaliumsorbát; Kalium-sorbát; Kálium-szorbát; Potassium, sorbate de; Sorbato potásico. Potassium (E,E)-hexa-2,4-dienoate.

C₆H₇KO₂ = 150.2.

CAS — 590-00-1; 24634-61-5.

Pharmacopoeias. In *Eur.* (see p.vii). Also in *USNF*.

Ph. Eur. 6.2 (Potassium Sorbate). White or almost white granules or powder. Very soluble in water; slightly soluble in alcohol. Protect from light.

USNF 26 (Potassium Sorbate). White crystals or powder with a characteristic odour. Soluble 1 in 4.5 of water, 1 in 35 of alcohol, and 1 in more than 1000 of chloroform and of ether. Store in airtight containers at a temperature not exceeding 40°. Protect from light.

Incompatibility. Sorbic acid can be inactivated by oxidation and to some extent by nonionic surfactants and plastics. Activity of the sorbates may be reduced by increases in pH.¹

1. Cook W. Sorbic acid. In: Rowe RC, et al., eds. *Handbook of pharmaceutical excipients*. 5th ed. London and Chicago: The Pharmaceutical Press and the American Pharmaceutical Association, 2006: 710–12.

Adverse Effects and Precautions

The sorbates can be irritant and have caused contact dermatitis.

Hypersensitivity. References to allergic-type skin reactions¹ and non-allergic irritant-type reactions^{2,3} with potassium sorbate or sorbic acid.

1. Saihan EM, Harman RRM. Contact sensitivity to sorbic acid in 'Unguentum Merck'. *Br J Dermatol* 1978; **99**: 583–4.

2. Soschin D, Leyden JJ. Sorbic acid-induced erythema and edema. *J Am Acad Dermatol* 1986; **14**: 234–41.

3. Fisher AA. Erythema limited to the face due to sorbic acid. *Cutis* 1987; **40**: 395–7.

Uses

Potassium sorbate and sorbic acid possess antifungal, and to a lesser extent antibacterial, activity. They are relatively ineffective above a pH of about 6. They are used as preservatives in pharmaceutical preparations in concentrations of up to 0.2%, in enteral formulas, foods, and in cosmetic preparations.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: **Austral.:** Caprilate; **Ger.:** Klyasma Sorbit; Saseem; **Ital.:** Evasen Dischetti; Evasen Líquido; **Mex.:** Adapettes; **UK.:** Relaxit; **USA:** Clear Eyes Contact Lens Relief; **Venez.:** Saxacid.

Sulfites and Sulfur Dioxide

Sulfitos y dióxido de azufre.

Potassium Bisulfite

Bisulfito potásico; E228; Potassium Bisulphite; Potassium Hydrogen Sulphite.

KHSO₃ = 120.2.

CAS — 7773-03-7.

Potassium Metabisulfite

Dipotassium Pyrosulphite; Disiřčitan draselny; E224; Kalii Disulfis; Kalii metabisulfis; Kalio metabisulfitas; Kaliummetabisulfitti; Kaliummetabisulfít; Metabisulfito potásico; Potassium, metabisulfite de; Potassium Metabisulphite; Potassium Pyrosulphite; Potasu pirościarczyny.

K₂S₂O₅ = 222.3.

CAS — 16731-55-8.

Pharmacopoeias. In *Eur.* (see p.vii). Also in *USNF*.

Ph. Eur. 6.2 (Potassium Metabisulphite). A white or almost white powder or colourless crystals. Freely soluble in water; slightly soluble in alcohol. A 5% solution in water has a pH of 3.0 to 4.5. Store in airtight containers. Protect from light.

USNF 26 (Potassium Metabisulfite). White or colourless, free-flowing crystals, crystalline powder, or granules, usually with an odour of sulfur dioxide. Gradually oxidises in air to the sulfate. Soluble in water; insoluble in alcohol. Its solutions are acid to litmus. Store in well-filled airtight containers at a temperature not exceeding 40°.

Incompatibility and stability. The incompatibility and stability of sulfites are discussed under Sulfur Dioxide, below.

Sodium Bisulfite

Bisulfito sódico; E222; Sodium Bisulphite; Sodium Hydrogen Sulphite.

NaHSO₃ = 104.1.

CAS — 7631-90-5.

Pharmacopoeias. In *Chin.* and *Jpn.*, described in both as consisting of a mixture of sodium bisulfite and sodium metabisulfite.

Sodium Metabisulfite

Disiřčitan sodný; Disodium Pyrosulphite; E223; Metabisulfito sódico; Natrii Disulfis; Natrii metabisulfis; Natrii Pyrosulfis; Natrio metabisulfitas; Nátrium-disulfít; Natriummetabisulfitti; Natriummetabisulfít; Sodium Disulphite; Sodium, metabisulfite de; Sodium Metabisulphite; Sodium Pyrosulphite; Sodu pirościarczyny.

Na₂S₂O₅ = 190.1.

CAS — 7681-57-4.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), and *Jpn.* Also in *USNF*.

Ph. Eur. 6.2 (Sodium Metabisulphite). Colourless crystals or a white or almost white crystalline powder. Freely soluble in water; slightly soluble in alcohol. A 5% solution in water has a pH of 3.5 to 5.0. Protect from light.

USNF 26 (Sodium Metabisulfite). White crystals or a white to yellowish crystalline powder with an odour of sulfur dioxide. Freely soluble in water and in glycerol; slightly soluble in alcohol. Store in well-filled airtight containers at a temperature not exceeding 40°.

Incompatibility and stability. The incompatibility and stability of sulfites are discussed under Sulfur Dioxide, below.

Sodium Sulfite

Anhydrous Sodium Sulphite; E221; Exsiccated Sodium Sulphite; Natrii Sulfis; Natrii sulfis anhydricus; Natrii Sulfis Siccatus; Natrii Sulphis; Natrio sulfitas, bevandenis; Natriumsulfitti, vedetön; Natriumsulfitt, vattenfritt; Siñžitan sodný; Sodium (sulfite de) anhydre; Sodium Sulphite; Sodu siarczyn; Sulfito sódico; Vízmentes nátrium-szulfitt.

$\text{Na}_2\text{SO}_3 = 126.0$.
CAS — 7757-83-7.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), and *Jpn.* Also in *USNF*.

Eur. also includes the heptahydrate.

Ph. Eur. 6.2 (Sodium Sulphite, Anhydrous; Natri Sulfis Anhydricus). A white or almost white powder. Freely soluble in water; very slightly soluble in alcohol. Store in airtight containers.

Ph. Eur. 6.2 (Sodium Sulphite Heptahydrate; Natrii Sulfis Heptahydricus). Colourless crystals. Freely soluble in water; very slightly soluble in alcohol.

USNF 26 (Sodium Sulfite). Colourless crystals. Freely soluble in water; very slightly soluble in alcohol. Store in airtight containers.

Incompatibility and stability. The incompatibility and stability of sulfites are discussed under Sulfur Dioxide, below.

Sulfur Dioxide

Dióxido de azufre; E220; Kükürt Dioksit; Siarki dwutlenek; Sulphur Dioxide.

$\text{SO}_2 = 64.06$.
CAS — 7446-09-5.

Pharmacopoeias. In *USNF*.

USNF 26 (Sulfur Dioxide). A colourless non-flammable gas with a strong suffocating odour characteristic of burning sulfur. It condenses readily under pressure to a colourless liquid that boils at -10° and has a wt per mL of about 1.5 g. Soluble 36 in 1 of water and 114 in 1 of alcohol by vol. at 20° and standard pressure. Soluble in chloroform and in ether. Store in cylinders. It is usually packaged under pressure in liquid form.

Incompatibility and stability. Sulfite antioxidants can react with and inactivate sympathomimetics such as adrenaline.¹ Measures need to be taken to prevent such a reaction if sulfites have to be used. Cisplatin is another compound that can be inactivated.² Phenylmercuric nitrate may be inactivated or its activity enhanced.^{3,4} Sulfites are reported to react with chloramphenicol.¹ Hydrogen peroxide generation has been reported on exposure to light of amino acid solutions containing sulfites.⁵ When used in foods there can be a noticeable taste and a reduction in thiamine content.⁶ Stability is affected by air and moisture,⁷ and there is decomposition at very low pH.⁷ There can be adsorption on to rubber closures.⁸

- Higuchi T, Schroeter LC. Reactivity of bisulfite with a number of pharmaceuticals. *J Am Pharm Assoc (Sci)* 1959; **48**: 535–40.
- Garren KW, Repta AJ. Incompatibility of cisplatin and Reglan Injectable. *Int J Pharmaceutics* 1985; **24**: 91–9.
- Richards RME, Reary JME. Changes in antibacterial activity of thiomersal and PMN on autoclaving with certain adjuvants. *J Pharm Pharmacol* 1972; **24** (suppl): 84P–89P.
- Collins AJ, et al. Incompatibility of phenylmercuric acetate with sodium metabisulfite in eye drop formulations. *J Pharm Pharmacol* 1985; **37** (suppl): 123P.
- Brawley V, et al. Effect of sodium metabisulfite on hydrogen peroxide production in light-exposed pediatric parenteral amino acid solutions. *Am J Health-Syst Pharm* 1998; **55**: 1288–92.
- FAO/WHO. Evaluation of the toxicity of a number of antimicrobials and antioxidants: sixth report of the joint FAO/WHO expert committee on food additives. *WHO Tech Rep Ser* 228 1962.
- Stewart JT. Sodium metabisulfite. In: Rowe RC, et al. eds. *Handbook of pharmaceutical excipients*. 5th ed. London and Chicago: The Pharmaceutical Press, and the American Pharmaceutical Association 2006: 690–2.
- Schroeter LC. Sulfurous acid salts as pharmaceutical antioxidants. *J Pharm Sci* 1961; **50**: 891–901.

Adverse Effects and Precautions

Gastric irritation due to liberation of sulfurous acid can follow ingestion of sodium metabisulfite and other sulfites. Large doses of sulfites may cause gastrointestinal upsets, respiratory or circulatory failure, and CNS disturbances.

Concentrated solutions of salts of sulfurous acid are irritant to skin and mucous membranes.

Sulfur dioxide is highly irritant to the eyes, skin, and mucous membranes. Inhalation results in irritation of the respiratory tract which may lead to bronchoconstriction and pulmonary oedema; very high concentrations may cause respiratory arrest and asphyxia. Contact with liquid sulfur dioxide results in acid burns. Allergic reactions including anaphylaxis and deaths have been reported.

The symbol † denotes a preparation no longer actively marketed

Hypersensitivity. Hypersensitivity reactions including bronchospasm, anaphylaxis, and some deaths have occurred in subjects, especially those with a history of asthma or atopic allergy, exposed to sulfites used as preservatives in foods.¹ These reactions have led to restrictions by the FDA on such use.² There have been case reports of reactions to sulfites in medicines;^{3,9} such reports are considered to be few in number and the FDA has not extended the restriction on sulfites in foods to apply to their use in drugs since it was felt that in certain cases there was no suitable alternative to a sulfite.² It was even accepted that adrenaline recommended for use in treating allergic reactions could itself contain sulfite and that its presence should not preclude use of the adrenaline preparation even in sulfite-sensitive patients.²

- Anonymous. Sulfites in drugs and food. *Med Lett Drugs Ther* 1986; **28**: 74–5.
- Anonymous. Warning for prescription drugs containing sulfites. *FDA Drug Bull* 1987; **17**: 2–3.
- Baker GJ, et al. Bronchospasm induced by metabisulphite-containing foods and drugs. *Med J Aust* 1981; **ii**: 614–17.
- Twarog FJ, Leung DYM. Anaphylaxis to a component of isotherarine (sodium bisulfite). *JAMA* 1982; **248**: 2030–1.
- Koepke JW, et al. Dose-dependent bronchospasm from sulfites in isotherarine. *JAMA* 1984; **251**: 2982–3.
- Mikolich DJ, McCloskey WW. Suspected gentamicin allergy could be sulfite sensitivity. *Clin Pharm* 1988; **7**: 269.
- Deziel-Evans LM, Hussey WC. Possible sulfite sensitivity with gentamicin infusion. *DICP Ann Pharmacother* 1989; **23**: 1032–3.
- Campbell JR, et al. Allergic response to metabisulfite in lido-caine anesthetic solution. *Anesth Prog* 2001; **48**: 21–6.
- Riemersma WA, et al. Type IV hypersensitivity to sodium metabisulfite in local anaesthetic. *Contact Dermatitis* 2004; **51**: 148.

Pharmacokinetics

Sulfites and metabisulfites are oxidised in the body to sulfate and excreted in the urine. Any sulfurous acid or sulfur dioxide is also converted to sulfate.

Uses

Sulfur dioxide and the sulfites that produce sulfur dioxide and sulfurous acid are strong reducing agents and are used as antioxidants. Concentrations of the sulfites in pharmaceutical preparations have ranged from 0.01 to 1.0%. At higher concentrations and preferably at an acid pH sulfur dioxide and the sulfites exhibit antimicrobial activity.

Sulfur dioxide and the sulfites are used in the food industry as antioxidants, antimicrobial preservatives, and anti-browning agents. They are used in wine making where tableted sodium metabisulfite is commonly known as Campden Tablets. Concentrations of sulfites above 500 ppm impart a noticeable unpleasant taste to preparations. There is concern over the risk of severe allergic reactions arising from the use of sulfites in foods (see Hypersensitivity, above).

Tar Acids

Alquitrán, ácidos de.

Description. Tar acids are phenolic substances derived from the distillation of coal tar or petroleum fractions. The lowest boiling fraction of coal tar, distilling at 188° to 205° , consists of mixed cresol isomers. The middle fraction, known as 'cresylic acids', distils at 205° to 230° and consists of cresols and xylenols. The 'high-boiling tar acids', distilling at 230° to 290° , consist mainly of alkyl homologues of phenol, with naphthalenes and other hydrocarbons. Cresol is described on p.1641.

- Black Fluids** are homogeneous solutions of coal-tar acids, or similar acids derived from petroleum, or any mixture of these, with or without hydrocarbons and with a suitable emulsifying agent.
- White Fluids** are finely dispersed emulsions of coal-tar acids, or similar acids derived from petroleum, or any mixture of these, with or without hydrocarbons.
- Modified Black Fluids and Modified White Fluids** may contain, as an addition, any other active ingredients, but if these are used, the type and amount must be disclosed, if required.

Adverse Effects and Treatment

As for Phenol, p.1656.

Tar acids are generally very irritant and corrosive to the skin, even when diluted to concentrations used for disinfection.

Poisoning. A report of fatal self-poisoning in a 59-year-old man after the ingestion of about 250 mL of a xylene-containing disinfectant (*Stericol Hospital Disinfectant*).¹

- Watson ID, et al. Fatal xylene self-poisoning. *Postgrad Med J* 1986; **62**: 411–12.

Uses

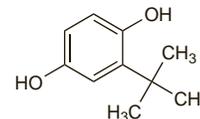
Tar acids are the phenolic components of coal tar and are used in the preparation of a range of fluids of varied activity used for household and general disinfection purposes.

Hydrocarbons are often used to enhance the activity of the tar acids in disinfectant fluids; they also help to reduce crystallisation of phenols.

Tertiary Butylhydroquinone

Butilhidroquinona terciaria; TBHQ, 2-tert-butylhydroquinone.

$\text{C}_{10}\text{H}_{14}\text{O}_2 = 166.2$.
CAS — 1948-33-0.



Profile

Tertiary butylhydroquinone is an antioxidant preservative used in foods. It has some antimicrobial activity.

Tetrabromocresol

3,4,5,6-Tetrabromo-*o*-cresol.

$\text{C}_7\text{H}_4\text{Br}_4\text{O} = 423.7$.
CAS — 576-55-6.



Profile

Tetrabromocresol is a brominated phenolic antiseptic. It has been used for hand disinfection and is applied topically in preparations for the treatment of fungal infections of the skin and bromhidrosis.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: *Austral:* Pedoz; *Ger:* Gehwol Fungizid†.

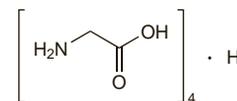
Tetraglycine Hydroperiodide

Tetraglicina, hidroperioduro de.

Гидропериодид Тетраглицина

$\text{C}_{16}\text{H}_{42}\text{I}_7\text{N}_6\text{O}_{16} = 1490.9$.

CAS — 7097-60-1.



Profile

Tetraglycine hydroperiodide is an iodine-based disinfectant that is used in the emergency treatment of drinking water (p.1623).

Preparations

Proprietary Preparations (details are given in Part 3)

UK: Potable Aqua; **USA:** Potable Aqua.

Thiomersal (BAN, rINN)

Mercuriothiolate; Mercuriothiolate Sodique; Sodium Ethyl Mercuriothiosalicylate; Thimerosal; Thiomersalate; Thiomersalum; Thiomersaali; Thiomersal; Thiomersalis; Tiomerzál. Sodium (2-carboxyphenylthio)ethylmercury.

Тиомерсал

$\text{C}_9\text{H}_9\text{HgNaO}_2\text{S} = 404.8$.

CAS — 54-64-8.

ATC — D08AK06.

ATC Vet — QD08AK06.

