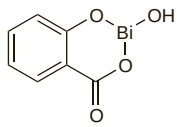
Bismuth Salicylate

Basic Bismuth Salicylate; Bázisos bizmut-szalicilát; Bismuth Oxysalicylate; Bismuth, sous-salicylate de; Bismuth Subsalicylate *(USAN)*; Bismuthi subsalicylas; Bismuto subsalicilatas; Salicilato de bismuto; Salicylan bismutitý zásaditý; Vismutsubsalicylat; Vismuttisubsalisylaatti.

Салицилат Висмута

$C_7H_5BiO_4$ = 362.1.

CAS — 14882-18-9.



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

Ph. Eur. 6.2 (Bismuth Subsalicylate). A complex of bismuth and salicylic acid. It contains not less than 56% and not more than 59.4% of Bi, calculated with reference to the dried substance. A white or almost white powder. Practically insoluble in water and in alcohol; dissolves in mineral acids with decomposition. Protect from light.

USP 31 (Bismuth Subsalicylate). A basic salt corresponding to $C_7H_5BiO_4$ and containing not less than 56.0% and not more than 59.4% of Bi and not less than 36.5% and not more than 39.3% of total salicylates. It is a fine, odourless, white to off-white microcrystalline powder. Practically insoluble in water, in alcohol, and in ether. It reacts with alkalis and mineral acids. Store in airtight containers. Protect from light.

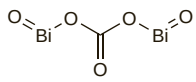
Bismuth Subcarbonate *(USAN)*

Basic Bismuth Carbonate; Basisches Wismutkarbonat; Bázisos bizmutkarbonát; Bism. Carb.; Bismuth Carbonate; Bismuth Oxycarbonate; Bismuth, sous-carbonate de; Bismuthi subcarbonas; Bismuto subkarbonatas; Bismutylum Carbonicum; Carbonato de Bismutila; Subcarbonato de bismuto; Uhličitan bismutitý zásaditý; Vismutsubkarbonat; Vismuttisubkarbonaatti.

Основный Углекислый Висмут

CBi_2O_5 = 510.0.

CAS — 5892-10-4 (anhydrous bismuth subcarbonate); 5798-45-8 (bismuth subcarbonate hemihydrate).



(anhydrous bismuth subcarbonate)

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), and *US*.

Ph. Eur. 6.2 (Bismuth Subcarbonate). A white or almost white powder. Practically insoluble in water and in alcohol. It dissolves in mineral acids with effervescence. Protect from light.

USP 31 (Bismuth Subcarbonate). A white or almost white powder. Practically insoluble in water, in alcohol, and in ether; dissolves in dilute acids with effervescence. Protect from light.

Bismuth Subcitrate Potassium *(USAN)*

10012777; Biskalcitrate potassium; Bismuth Biscalcitrate; Bismuth biskalcitrate. Bismuth pentapotassium dihydroxide bis(2-hydroxypropane-1,2,3-tricarboxylate hydrate).

Основный Калиевый Цитрат Висмута

$C_{12}H_{14}BiK_5O_{17}$ = 834.7.

CAS — 880149-29-1.

NOTE. Do not confuse with bismuth citrate (p.1710) or tripotassium dicitratobismuthate (colloidal bismuth subcitrate, p.1711).

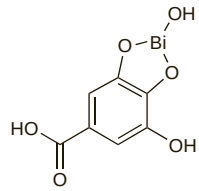
Bismuth Subgallate *(USAN)*

Basic Bismuth Gallate; Basisches Wismutgallat; Bázisos bizmutgallát; Bism. Subgall.; Bismuth Oxygallate; Bismuth, sous-gallate de; Bismuthi subgallas; Bismuto subgalatas; Bizmut Subgalat; Bizmutu galusan zasadowy; Gallan bismutitý zásaditý; Subgalato de bismuto; Vismutsubgallat; Vismuttisubgallaatti.

Основный Галловокислый Висмут

$C_7H_5BiO_6$ = 394.1.

CAS — 99-26-3.



Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *US*.

Ph. Eur. 6.2 (Bismuth Subgallate). A complex of bismuth and gallic acid. It contains not less than 48% and not more than 51% of Bi, calculated with reference to the dried substance. A yellow powder. Practically insoluble in water and in alcohol; dissolves in mineral acids with decomposition and in alkali hydroxides, producing a reddish-brown liquid. Protect from light.

USP 31 (Bismuth Subgallate). A basic salt containing 52 to 57% of Bi_2O_3 when dried at 105° for 3 hours. It is an odourless amorphous bright yellow powder. Practically insoluble in water, in alcohol, in chloroform, and in ether; insoluble in very dilute mineral acids; dissolves readily with decomposition in warm, moderately dilute hydrochloric, nitric, or sulfuric acids; readily dissolves in solutions of alkali hydroxides to form a clear yellow liquid which rapidly becomes deep red. Store in airtight containers. Protect from light.

Bismuth Subnitrate

Basic Bismuth Nitrate; Basisches Wismutnitrat; Bázisos bizmut-nitrát; Bism. Subnit.; Bismuth Hydroxide Nitrate Oxide; Bismuth Nitrate, Heavy; Bismuth Oxynitrate; Bismuth, sous-nitrate de; Bismuth (Sous-Nitrate de) Lourd; Bismuthi subnitras; Bismuthyl Nitrate; Bismuto subnitratas; Bismuto subnitratas sunkusis; Bizmut Subnitrat; Bizmutu azotan zasadowy; Bizmutu(III) azotan zasadowy; Magistery of Bismuth; Nitrato de Bismutilo; Subazotato de Bismuto; Subnitrato de bismuto; Vismutsubnitrat; Vismuttisubnitraatti; White Bismuth.

Основный Азотнокислый Висмут

$Bi_5O(OH)_9(NO_3)_4$ = 1462.0.

CAS — 1304-85-4.

ATC — A02BX12.

ATC Vet — QA02BX12.

Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *US*.

Fr. also includes Bismuth (Sous-Nitrate de) Léger (Bismuthi Subnitras Levis) which is described as a variable mixture of bismuth hydroxide, carbonate, and subnitrate.

Ph. Eur. 6.2 (Bismuth Subnitrate, Heavy). It contains not less than 71% and not more than 74% of Bi, calculated with reference to the dried substance. A white or almost white powder. Practically insoluble in water and in alcohol; dissolves in mineral acids with decomposition.

USP 31 (Bismuth Subnitrate). A basic salt containing not less than 79% of Bi_2O_3 calculated on the dried basis. It is a white, slightly hygroscopic powder. Practically insoluble in water and in alcohol; readily dissolves in nitric and hydrochloric acids.

Tripotassium Dicitratobismuthate

Bizmut Subsitrat; Colloidal Bismuth Subcitrate; Dicitratobismutato tripotásico; Tripotasyum Disitratobizmutat.

Висмут Трикалия Дицитрат

CAS — 57644-54-9.

ATC — A02BX05.

ATC Vet — QA02BX05.

NOTE. Do not confuse with bismuth citrate (p.1710) or bismuth subcitrate potassium (p.1711).

Adverse Effects, Treatment, and Precautions

The bismuth compounds listed above are insoluble or very poorly soluble, and bismuth toxicity does not appear to be common if they are used for limited periods. However, excessive or prolonged dosage may produce symptoms of bismuth poisoning, and for this reason long-term systemic therapy is not recommended. Reversible encephalopathy (see below) was once a problem in some countries, notably France and Australia; bone and joint toxicity had also occurred, sometimes associated with the encephalopathy. This led to restrictions on the use of bismuth salts and a virtual disappearance of these toxic effects.

Nausea and vomiting have been reported. Darkening or blackening of the faeces and tongue may occur due to conversion to bismuth sulfide in the gastrointestinal tract.

The effects of *acute bismuth intoxication* include gastrointestinal disturbances, skin reactions, stomatitis, and discoloration of mucous membranes; a characteristic blue line may appear on the gums. There may be renal failure and liver damage.

Other adverse effects may not be related to the bismuth content. With bismuth subnitrate given orally there is a risk of the nitrate being reduced in the intestines to nitrite and the development of methaemoglobinaemia. Absorption of salicylate occurs from oral bismuth salicylate and therefore the adverse effects, treatment of adverse effects, and precautions of aspirin (p.20) should be considered.

Gastric lavage should be considered in overdosage; activated charcoal by mouth and the use of a chelating agent such as dimercaprol, succimer, or unithiol have been recommended (see also Overdosage, below). Renal function should be monitored for 10 days after acute overdosage.

Bismuth compounds should not be given to patients with moderate to severe renal impairment.

Encephalopathy. Reviews[1,2] and reports[3-11] of bismuth encephalopathy. Many of the original reports implicated bismuth subgallate or subnitrate, in most but not all cases at high doses or for prolonged periods; toxicity has also occurred with other salts.[6-9] Patients receiving the subcitrate (480 mg daily) or the subnitrate (1.8 g daily) for 8 weeks in the treatment of *Helicobacter pylori* infection, showed no evidence of neurological changes compared with a control group.[12]

1. Winship KA. Toxicity of bismuth salts. *Adverse Drug React Acute Poisoning Rev* 1983; **2:** 103–21.
2. Slikkerveer A, de Wolff FA. Pharmacokinetics and toxicity of bismuth compounds. *Med Toxicol Adverse Drug Exp* 1989; **4:** 303–23.
3. Morrow AW. Request for reports: adverse reactions with bismuth subgallate. *Med J Aust* 1973; **1:** 912.
4. Martin-Bouyer G. Intoxications par les sels de bismuth administrés par voie orale: enquête épidémiologique. *Therapie* 1976; **31:** 683–702.
5. Stahl JP, *et al.* Encéphalites au sel insoluble de bismuth: toujours d'actualité. *Nouv Presse Med* 1982; **11:** 3856.
6. Hasking GJ, Duggan JM. Encephalopathy from bismuth subsalicylate. *Med J Aust* 1982; **2:** 167.
7. Weller MPI. Neuropsychiatric symptoms following bismuth intoxication. *Postgrad Med J* 1988; **64:** 308–10.
8. Mendelowitz PC, *et al.* Bismuth absorption and myoclonic encephalopathy during bismuth subsalicylate therapy. *Ann Intern Med* 1990; **112:** 140–1.
9. Playford RJ, *et al.* Bismuth induced encephalopathy caused by tri potassium dicitrato bismuthate in a patient with chronic renal failure. *Gut* 1990; **31:** 359–60.
10. Von Bose MJ, Zaudig M. Encephalopathy resembling Creutzfeldt-Jakob disease following oral, prescribed doses of bismuth nitrate. *Br J Psychiatry* 1991; **158:** 278–80.
11. Teepker M, *et al.* Myoclonic encephalopathy caused by chronic bismuth abuse. *Epileptic Disord* 2002; **4:** 229–33.
12. Noach LA, *et al.* Bismuth salts and neurotoxicity: a randomised, single-blind and controlled study. *Hum Exp Toxicol* 1995; **14:** 349–55.

TOPICAL APPLICATION. Encephalopathy has been associated with the use of bismuth iodoform paraffin paste (BIPP) for the packing of wound cavities after surgery to the head and neck, although there is some debate as to whether the bismuth or the iodoform component is responsible—see p.1650.

Overdosage. Bismuth salicylate or tripotassium dicitratobismuthate in recommended doses are rarely associated with serious adverse effects but there are reports of renal failure,[1-6] encephalopathy,[7-9] and neurotoxicity[1] in acute[1-6,8] or chronic[7,9] overdose. Bismuth has been detected in the blood, urine, stools, and kidneys of these patients; a blood concentration of 1.6 micrograms/mL was found[2] 4 hours after an oral dose of 9.6 g.

The optimal treatment of bismuth overdosage is unknown. Gastric lavage, purgation, and hydration should be considered, even if the patient presents late, as bismuth may be absorbed from the colon.[1,2] Chelating agents may be effective; unithiol has been reported to increase the renal clearance of bismuth with a reduction in the blood concentration.[7] Haemodialysis may be necessary[1-3] but whether this hastens tissue clearance is uncertain. Haemodialysis plus unithiol treatment has been reported to successfully eliminate bismuth.[6] Peritoneal dialysis has also been effectively used in a paediatric patient.[5]

Prolonged ingestion of bismuth salicylate in excessive doses by an elderly diabetic was associated with hearing disturbances, vertigo, acid–base abnormalities and mild clotting disturbances.[10] The toxicity was thought to be due to the salicylate component.

1. Hudson M, Mowat NAG. Reversible toxicity in poisoning with colloidal bismuth subcitrate. *BMJ* 1989; **299:** 159.
2. Taylor EG, Klenerman P. Acute renal failure after colloidal bismuth subcitrate overdose. *Lancet* 1990; **335:** 670–1.
3. Huwez F, *et al.* Acute renal failure after overdose of colloidal bismuth subcitrate. *Lancet* 1992; **340:** 1298.