parenteral routes may be used, particularly when oral therapy is not possible; the doses stated above may be given orally or parenterally. In the UK, oral treatment is commonly given as a mixture containing 1 mg/mL of methadone hydrochloride.

For details of doses in children, see below.

For the control of intractable **cough** associated with terminal lung cancer, methadone hydrochloride is usually given in the form of a linctus in a dose of 1 to 2 mg every 4 to 6 hours, but reduced to twice daily on prolonged use.

Administration. Although duration of action after single doses of methadone is similar to that of morphine, it increases considerably with multiple dosing of methadone because of the long elimination half-life (see under Pharmacokinetics, above). The minimum effective dose of methadone can be difficult to titrate for the individual patient. A fixed 10-mg oral dose with a flexible patient-controlled dosage interval has been used in patients with chronic cancer pain.[1] Dosage not more frequently than every 4 hours during the first 3 to 5 days, followed by a fixed dose every 8 to 12 hours depending on the patient's requirements, was advised.

A suggested initial dose for patients who need to switch from oral morphine to methadone because of poor pain control is one tenth of the total daily dose of morphine, but not greater than 100 mg, given at intervals determined by the patient, typically every 8 hours.[2]

When switching from oral to parenteral use it was suggested[3] that the dose of methadone should be halved and adjusted thereafter as necessary.

Evidence of the prolonged effect of methadone was demonstrated when a single intravenous bolus dose of 20 mg resulted in postoperative analgesia lasting about 25 hours.[4] An initial 2-hour loading intravenous infusion of methadone 100 to 200 micrograms/kg per hour to provide rapid analgesia followed by infusion at a lower maintenance rate of 10 to 20 micrograms/kg per hour for continuous pain relief has been used in burn patients.[5] Methadone has also been given by continuous subcutaneous infusion for severe cancer pain[6,7] although this route has been associated with local tissue irritation and induration. Epidural methadone has been used successfully in doses of up to 5 mg for analgesia in association with bupivacaine.[8,9] Intermittent and continuous epidural infusion of methadone has also been tried[10] in postoperative analgesia.

A small case series[11] found topical methadone powder to be effective for pain relief of open, exudative wounds.

1. Säwe J, *et al.* Patient-controlled dose regimen of methadone for chronic cancer pain. *BMJ* 1981; **282:** 771–3.
2. Morley JS, *et al.* Methadone in pain uncontrolled by morphine. *Lancet* 1993; **342:** 1243.
3. Säwe J. High-dose morphine and methadone in cancer patients: clinical pharmacokinetic considerations of oral treatment. *Clin Pharmacokinet* 1986; **11:** 87–106.
4. Gourlay GK, *et al.* Methadone produces prolonged postoperative analgesia. *BMJ* 1982; **284:** 630–1.
5. Denson DD, *et al.* Pharmacokinetics of continuous intravenous infusion of methadone in the early post-burn period. *J Clin Pharmacol* 1990; **30:** 70–5.
6. Mathew P, Storey P. Subcutaneous methadone in terminally ill patients: manageable local toxicity. *J Pain Symptom Manage* 1999; **18:** 49–52.
7. Makin MK, Morley JS. Subcutaneous methadone in terminally-ill patients. *J Pain Symptom Manage* 2000; **19:** 237–8.
8. Drenger B, *et al.* Extradural bupivacaine and methadone for extracorporeal shock-wave lithotripsy. *Br J Anaesth* 1989; **62:** 82–6.
9. Martin CS, *et al.* Extradural methadone and bupivacaine in labour. *Br J Anaesth* 1990; **65:** 330–2.
10. Prieto-Alvarez P, *et al.* Continuous epidural infusion of racemic methadone results in effective postoperative analgesia and low plasma concentrations. *Can J Anaesth* 2002; **49:** 25–31.
11. Gallagher RE, *et al.* Analgesic effects of topical methadone: a report of four cases. *Clin J Pain* 2005; **21:** 190–2.

Administration in children. Methadone is not licensed for use in children. However, it has been tried[1] intravenously in children aged 3 to 7 years to prevent postoperative **pain**; a dose of 200 micrograms/kg was given perioperatively followed postoperatively by 50 micrograms/kg every 10 minutes until the patient was both comfortable and adequately alert. Methadone has also been tried[2] orally for the treatment of severe pain in hospitalised children; daily doses ranged from 200 to 600 micrograms/kg for up to 6 weeks.

Methadone is used for the management of **neonatal abstinence syndrome** (p.102). The *BNFC* suggests an initial oral dose of 100 micrograms/kg increased by 50 micrograms/kg every 6 hours until symptoms are controlled; once stabilised, the total daily dose is given in 2 divided doses for maintenance. When withdrawing methadone, the dose should be reduced over 7 to 10 days.

1. Berde CB, *et al.* Comparison of morphine and methadone for prevention of postoperative pain in 3- to 7-year-old children. *J Pediatr* 1991; **119:** 136–41.
2. Shir Y, *et al.* Oral methadone for the treatment of severe pain in hospitalized children: a report of five cases. *Clin J Pain* 1998; **14:** 350–3.

Cancer pain. Methadone is used as an alternative to morphine in the treatment of severe cancer pain (p.5). A better understanding of its pharmacokinetics and of equianalgesic doses may address early concerns about the risk of cumulative toxicity associated with prolonged use. However, its long terminal half-life makes it less suitable for the treatment of breakthrough pain.

Methadone has been given by the oral, rectal, and parenteral routes.

References.

1. Ayonrinde OT, Bridge DT. The rediscovery of methadone for cancer pain management. *Med J Aust* 2000; **173:** 536–40.
2. Bruera E, Sweeney C. Methadone use in cancer patients with pain: a review. *J Palliat Med* 2002; **5:** 127–38.
3. Bruera E, *et al.* Methadone versus morphine as a first-line strong opioid for cancer pain: a randomized, double-blind study. *J Clin Oncol* 2004; **22:** 185–92.
4. Moryl N, *et al.* Methadone in the treatment of pain and terminal delirum [sic] in advanced cancer patients. *Palliat Support Care* 2005; **3:** 311–17.
5. Mannino R, *et al.* Methadone for cancer-related neuropathic pain: a review of the literature. *J Opioid Manag* 2006; **2:** 269–76.
6. Nicholson AB. Methadone for cancer pain. Available in The Cochrane Database of Systematic Reviews; Issue 4. Chichester: John Wiley; 2007 (accessed 26/06/08).

Opioid dependence. The treatment of opioid dependence is discussed on p.101. In the UK, oral liquid preparations of methadone hydrochloride 1 mg/mL are widely used for this purpose. It is important to note that these preparations are 2.5 times **stronger** than Methadone Linctus (BP 2008), and although some are licensed for analgesia in severe pain, many are licensed for the treatment of opioid dependence only. Methadone Oral Solution (1 mg/mL) (BP 2008) is available as a ready-to-use solution or may be prepared from Methadone Hydrochloride Oral Concentrate. However, most commercially available preparations in the UK still follow an earlier formula formerly listed in the Drug Tariff Formulary (DTF):

Methadone Mixture 1 mg/mL
methadone hydrochloride 10 mg
Green S and Tartrazine Solution (BP 1980) 0.02 mL
Compound Tartrazine Solution (BP 1980) 0.08 mL
syrup, unpreserved 5 mL
chloroform water, double-strength to 10 mL.

Some commercially available forms of DTF Methadone Mixture 1 mg/mL use a preservative system based on hydroxybenzoate esters rather than chloroform; however, syrup preserved with hydroxybenzoate esters may be unsuitable for extemporaneous dispensing (see under Incompatibility, above).

References.

1. Ghodse AH, *et al.* Comparison of oral preparations of heroin and methadone to stabilise opiate misusers as inpatients. *BMJ* 1990; **300:** 719–20.
2. Wolff K, *et al.* Measuring compliance in methadone maintenance patients: use of a pharmacologic indicator to "estimate" methadone plasma levels. *Clin Pharmacol Ther* 1991; **50:** 199–207.
3. Wilson P, *et al.* Methadone maintenance in general practice: patients, workload, and outcomes. *BMJ* 1994; **309:** 641–4.
4. Farrell M, *et al.* Methadone maintenance treatment in opiate dependence: a review. *BMJ* 1994; **309:** 997–1001.
5. Henry JA. Methadone: where are we now? *Hosp Med* 1999; **60:** 161–4.
6. Faggiano F, *et al.* Methadone maintenance at different dosages for opioid dependence. Available in The Cochrane Database of Systematic Reviews; Issue 3. Chichester: John Wiley; 2003 (accessed 28/08/08).
7. Mattick RP, *et al.* Methadone maintenance therapy versus no opioid replacement therapy for opioid dependence. Available in The Cochrane Database of Systematic Reviews; Issue 2. Chichester: John Wiley; 2003 (accessed 26/06/08).
8. Amato L, *et al.* Methadone at tapered doses for the management of opioid withdrawal. Available in The Cochrane Database of Systematic Reviews; Issue 3. Chichester: John Wiley; 2005 (accessed 26/06/08).
9. NICE. Methadone and buprenorphine for the management of opioid dependence: Technology Appraisal Guidance 114 (issued January 2007). Available at: http://www.nice.org.uk/nicemedia/pdf/TA114Niceguidance.pdf (accessed 26/06/08)

Preparations

BP 2008: Methadone Injection; Methadone Linctus; Methadone Oral Solution (1 mg per mL); Methadone Tablets;
USP 31: Methadone Hydrochloride Injection; Methadone Hydrochloride Oral Concentrate; Methadone Hydrochloride Oral Solution; Methadone Hydrochloride Tablets; Methadone Hydrochloride Tablets for Oral Suspension.

Proprietary Preparations (details are given in Part 3)
Arg.: Gobbidona; ***Austral.:*** Biodone†; Physeptone; ***Austria:*** Heptadon; ***Belg.:*** Mephenon; ***Braz.:*** Metadon; Mytedom; ***Canad.:*** Metadol; ***Chile:*** Amidona†; ***Fin.:*** Dolmed; ***Hong Kong:*** Physeptone†; ***Hung.:*** Depridol; Metadon; ***Irl.:*** Phymet DTF; Physeptone†; Pinadone DTF; ***Israel:*** Adolan; ***Ital.:*** Eptadone; ***Malaysia:*** Aseptone; ***Neth.:*** Symoron; ***NZ:*** Biodone; Methatabs; Pallidone; ***S.Afr.:*** Physeptone; ***Singapore:*** Physeptone†; ***Spain:*** Metasedin; ***Switz.:*** Ketalgine; ***UK:*** Eptadone; Martindale Methadone Mixture DTF; Methadose; Physeptone; Synastone; ***USA:*** Diskets; Dolophine; Methadose.

Methyl Butetisalicylate

Butetisalicilato de metilo; Methyl Diethylacetylsalicylate. Methyl *O*-(2-ethylbutyryl)salicylate.

$C_{14}H_{18}O_4$ = 250.3.

Profile

Methyl butetisalicylate is a salicylic acid derivative that has been used similarly to methyl salicylate (p.85) as a rubefacient for the relief of musculoskeletal, joint, and soft-tissue pain.

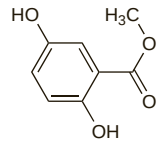
Preparations

Proprietary Preparations (details are given in Part 3)
Ital.: Dolodermi.

Methyl Gentisate

Gentisato de metilo. 2,5-Dihydroxybenzoic acid methyl ester.

$C_8H_8O_4$ = 168.1.
CAS — 2150-46-1.



Profile

Methyl gentisate has been used topically for the relief of musculoskeletal and joint pain.

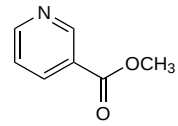
Preparations

Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Ital.:*** Reumacort.

Methyl Nicotinate *(USAN)*

Méthyle, nicotinate de; Methyli Nicotinas; Methylis nicotinas; Methyl-nikotinát; Metilo nikotinatas; Metylnikotinat; Metyylinikotinaatti; Nicotinato de metilo. Methyl pyridine-3-carboxylate.

$C_7H_7NO_2$ = 137.1.
CAS — 93-60-7.



Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Methyl Nicotinate). A white or almost white powder. M.p. 40° to 42°. Very soluble in water, in alcohol, and in dichloromethane. Protect from light.

Profile

Methyl nicotinate is used in topical preparations as a rubefacient.

Preparations

Proprietary Preparations (details are given in Part 3)
UK: Pickles Chilblain Cream.

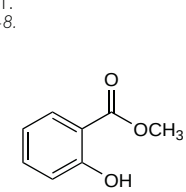
Multi-ingredient: ***Arg.:*** Infrarub†; Medex Rub; ***Austral.:*** Deep Heat; ***Austria:*** Berggeist; ***Belg.:*** Algipan; Emerxil; Percutalgine; Rado-Spray†; ***Canad.:*** Arthricare for Women Multi-Action†; Arthricare Triple Medicated†; Midalgan†; ***Chile:*** Frixio; Konirub; Mentobalsam; ***Fr.:*** Algipan; Capsic; Cliptol Sport†; Decontractyl; Gel Rubefiant; Percutalgine; Sedartryl†; ***Ger.:*** Doloneuro†; Forapin E†; Kytta-Balsam f; Rheuma Bad; Spondylon; Tetesept Badekonzentrat Rheuma Bad†; ***Gr.:*** Faragel-Forte; ***India:*** Algipan; Flamar; Medicreme; Relaxyl; ***Indon.:*** Remakrim; ***Irl.:*** Algipan; ***Israel:*** Deep Heat Spray; ***Ital.:*** Altadrine; Balsamo Sifcamina; Relaxar; Sedalpan; ***Neth.:*** Cremor capsici comp; Cremor Capsici compositus; Kruidvat Spierbalsem; ***Pol.:*** Deep Heat; ***Port.:*** Midalgan†; ***S.Afr.:*** Deep Heat Spray; Infrarub; Sloan's Heat Rub; ***Singapore:*** Deep Heating Spray†; ***Spain:*** Doctofril Antiinflamat; Doctomitil†; Radio Salil; ***Switz.:*** Kytta Baume; Midalgan; Radalgin; ***Thai.:*** Percutalgine†; ***UK:*** Cremalgin; Deep Heat Spray; Dubam; Fiery Jack; Radian-B Red Oils; Ralgex; Ralgex Heat Spray (low-odour); Red Oil; Transvasin Heat Spray; ***USA:*** Arthricare Odor Free; Arthricare Triple Medicated; Musterole.

Methyl Salicylate

Methyl Sal.; Méthyle, salicylate de; Methyli Salicylas; Methylis salicylas; Methyl-salicylát; Metilsalicilatas; Metilsalisilat; Metil-szalicilát; Metylsalicylat; Metylu salicylan; Metyylisalisylaatti; Salicilato de metilo. Methyl 2-hydroxybenzoate.

Метилсалицилат

$C_8H_8O_3$ = 152.1.
CAS — 119-36-8.



NOTE. Methyl salicylate and methyl salicylate liniment have been known previously as oil of wintergreen, wintergreen, and wintergreen oil. Wintergreen oil has also been known as sweet birch oil.

Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *Viet.* Also in *US-NF.*
Ph. Eur. 6.2 (Methyl Salicylate). A colourless or slightly yellow

liquid. Very slightly soluble in water; miscible with alcohol, and with fatty and essential oils. Protect from light.

USNF 26 (Methyl Salicylate). It is produced synthetically or is obtained from the leaves of *Gaultheria procumbens* (Ericaceae) [wintergreen] or from the bark of *Betula lenta* (Betulaceae) [sweet or black birch]. The source of the methyl salicylate must be indicated on the label.

A colourless, yellowish, or reddish liquid having the characteristic odour of wintergreen. Slightly soluble in water; soluble in alcohol and in glacial acetic acid. Store in airtight containers.

Storage. Certain plastic containers, such as those made from polystyrene, are unsuitable for liniments or ointments containing methyl salicylate.

Adverse Effects, Treatment, and Precautions

Salicylate intoxication can occur after ingestion or topical application of methyl salicylate (see Overdosage, below).

Overdosage. Ingestion of methyl salicylate poses the threat of severe, rapid-onset salicylate poisoning because of its liquid concentrated form and lipid solubility.[1] It is readily absorbed from the gastrointestinal tract and most is rapidly hydrolysed to free salicylate. The symptoms, which may appear within 2 hours of ingestion, are similar to those of salicylate poisoning in general (see Adverse Effects of Aspirin, p.20), although methyl salicylate is expected to be more toxic because of its lipid solubility. There have been reports of fatalities after ingestion of as little as 4 mL in a child and 6 mL in an adult, although the adult lethal dose is estimated to be 30 mL.[1] Topical Chinese herbal medicinal preparations may contain methyl salicylate in variable amounts, and salicylate poisoning has been reported in a 40-year-old man after a total body application of such a preparation.[2] Salicylate poisoning has also been reported in a woman who had attempted suicide by ingesting Red Flower Oil, a topical Chinese herbal oil.[3] The authors also noted that some patients took small amounts of this preparation orally in an attempt to enhance its analgesic effects.

1. Chan TYK. Potential dangers from topical preparations containing methyl salicylate. *Hum Exp Toxicol* 1996; **15:** 747–50.
2. Bell AJ, Duggin G. Acute methyl salicylate toxicity complicating herbal skin treatment for psoriasis. *Emerg Med (Fremantle)* 2002; **14:** 188–90.
3. Chan TH, *et al.* Severe salicylate poisoning associated with the intake of Chinese medicinal oil ('Red Flower Oil'). *Aust N Z J Med* 1995; **25:** 57.

Percutaneous absorption. Like other salicylates, methyl salicylate may be absorbed through intact skin.[1] Percutaneous absorption is enhanced by exercise, heat, occlusion, or disruption of the integrity of the skin. The amount absorbed will also be increased by application to large areas of skin.

Results from a study in healthy subjects showed that a considerable amount of salicylic acid may be absorbed through the skin after topical application of products containing methyl salicylate.[2] Both the rate and extent of absorption increased after repeated application; the bioavailability of the ointment preparation used in the study increased from 15% after the second dose to 22% after the third to eighth dose. The authors recommend that topical analgesic preparations containing methyl salicylate or other salicylates should be used with caution in patients at increased risk of developing salicylate adverse effects (see Precautions of Aspirin, p.22).

Results from another study[3] showing high tissue to plasma ratios after topical application of a methyl salicylate formulation suggest that direct penetration and not recirculation in the blood is responsible for the salicylate concentrations found. The results also showed that methyl salicylate is extensively metabolised to salicylic acid in the dermal and subcutaneous tissues after topical application.

However, for a study suggesting limited absorption from a patch preparation containing camphor, menthol, and methyl salicylate, see Menthol, p.2340.

1. Chan TYK. Potential dangers from topical preparations containing methyl salicylate. *Hum Exp Toxicol* 1996; **15:** 747–50.
2. Morra P, *et al.* Serum concentrations of salicylic acid following topical applied salicylate derivatives. *Ann Pharmacother* 1996; **30:** 935–40.
3. Cross SE, *et al.* Is there tissue penetration after application of topical salicylate formulations? *Lancet* 1997; **350:** 636.

Interactions

Absorption of methyl salicylate through the skin can occur after excessive topical application (see above), and interactions would be expected to be as for other salicylates (see Interactions of Aspirin, p.23).

Anticoagulants. Potentiation of *warfarin* anticoagulation has been reported[1-3] after topical application of methyl salicylate preparations.

1. Littleton F. Warfarin and topical salicylates. *JAMA* 1990; **263:** 2888.
2. Tam LS, *et al.* Warfarin interactions with Chinese traditional medicines: danshen and methyl salicylate medicated oil. *Aust N Z J Med* 1995; **25:** 258.
3. Joss JD, LeBlond RF. Potentiation of warfarin anticoagulation associated with topical methyl salicylate. *Ann Pharmacother* 2000; **34:** 729–33.

Uses and Administration

Methyl salicylate is a salicylic acid derivative that is irritant to the skin and is used topically in rubefacient preparations for the relief of pain in musculoskeletal, joint, and soft-tissue disorders. It is also used for minor peripheral vascular disorders such as chilblains and as an ingredient in inhalations for the symptomatic relief of upper respiratory-tract disorders.

Wintergreen oil is also used in aromatherapy.

Preparations

BP 2008: Kaolin Poultice; Methyl Salicylate Liniment; Methyl Salicylate Ointment; Surgical Spirit.

Proprietary Preparations (details are given in Part 3)
Arg.: Aspi-Rub†; Rati Salil Gel; ***Austral.:*** Linsal†; ***Canad.:*** Deep Heating; ***Chile:*** Parche Calorub; ***Ger.:*** Hewedolor N; ***India:*** Dolocide Plus; ***Mex.:*** Balsamo Nordin; Friccion Don Juan; Tolan; ***S.Afr.:*** Thermo-Rub; ***Thai.:*** Mygesal; ***UK:*** Numark Muscle Rub; ***USA:*** Argesic†; Exocaine†; Gordogesic; ***Venez.:*** Novofric†; Ultrafil†.

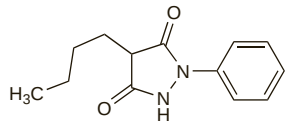
Multi-ingredient: numerous preparations are listed in Part 3.

Mofebutazone *(rINN)*

Mofebutatsoni; Mofebutazon; Mofebutazona; Mofébutazone; Mofebutazonum; Monobutazone; Monophenylbutazone. 4-Butyl-1-phenylpyrazolidine-3,5-dione.

Мофебутазон

$C_{13}H_{16}N_2O_2$ = 232.3.
CAS — 2210-63-1.
ATC — M01AA02; M02AA02.
ATC Vet — QM01AA02; QM02AA02.



Profile

Mofebutazone, a derivative of phenylbutazone (p.117), is an NSAID (p.96). It has been used in the management of musculoskeletal and joint disorders. The sodium salt has been given by intramuscular injection.

Preparations

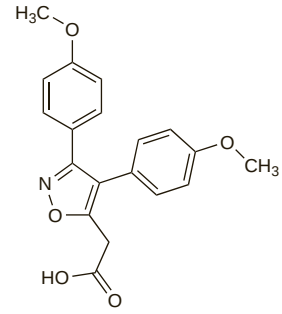
Proprietary Preparations (details are given in Part 3)
Ger.: Mofesal N†.

Mofezolac *(rINN)*

Mofézolac; Mofezolaco; Mofezolacum; N-22. 3,4-Bis(*p*-methoxyphenyl)-5-isoxazoleacetic acid.

Мофезолак

$C_{19}H_{17}NO_5$ = 339.3.
CAS — 78967-07-4.



Profile

Mofezolac is an NSAID (p.96) given orally in the management of pain and musculoskeletal and joint disorders.

Preparations

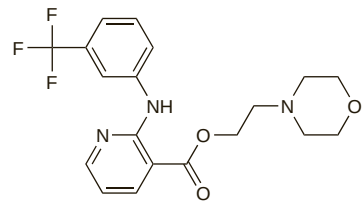
Proprietary Preparations (details are given in Part 3)
Jpn: Disopain.

Morniflumate *(USAN, rINN)*

Morniflumato; Morniflumatum; UP-164. 2-Morpholinoethyl 2-(α,α,α-trifluoro-*m*-toluidino)nicotinate.

Морнифлумат

$C_{19}H_{20}F_3N_3O_3$ = 395.4.
CAS — 65847-85-0.
ATC — M01AX22.
ATC Vet — QM01AX22.



Profile

Morniflumate, the morpholinoethyl ester of niflumic acid (p.95), is an NSAID (p.96). It has been used in inflammatory conditions in doses of 700 mg given twice daily by mouth or rectally as suppositories.

Preparations

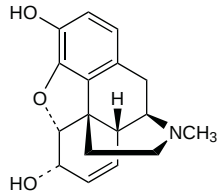
Proprietary Preparations (details are given in Part 3)
Fr.: Nifluril; ***Ital.:*** Flomax; Flumarin; Morniflu; Niflam; ***Spain:*** Niflactol.

Morphine *(BAN)* ⊗

Morfiini; Morfin; Morfina; Morphinum. 7,8-Didehydro-4,5-epoxy-17-methylmorphinan-3,6-diol.

Морфин

$C_{17}H_{19}NO_3$ = 285.3.
CAS — 57-27-2 (anhydrous morphine); 6009-81-0 (morphine monohydrate).
ATC — N02AA01.
ATC Vet — QN02AA01.



NOTE. The following terms have been used as 'street names' (see p.vi) or slang names for various forms of morphine:
Adolf; Block; China White; Cube; Dreamer; Drug store dope; Drugstore dope; Emsel; First line; German boy; God's drug; Goma; Hard stuff; Hospital Heroin; Hows; Hydrogen Bomb; M; Miss Emma; Mister blue; Mojo; Monf; Monkey; Morf; Morfs; Morfa; Morphia; Morphina; Morpho; Morphy; Mr. Blue; M.S.; MS; Mud; Murphy; Nasty; Nazi; Sweet Jesus; Sweet Morpheus; Tar; Unkie; White Stuff.

Morphine Hydrochloride *(BANM)* ⊗

Morfiinihydrokloridi; Morfin Hidroklorür; Morfina, hidrocloruro de; Morfin-hidroklorid; Morfin-hydrochlorid trihydrát; Morfinhydroklorid; Morfino hidrochloridas; Morfiny chlorowodorek; Morphine, chlorhydrate de; Morphini hydrochloridum; Morphini Hydrochloridum Trihydricum; Morphinii Chloridum; Morphinum Chloratum.

Морфина Гидрохлорид

$C_{17}H_{19}NO_3$,HCl,3H_2O = 375.8.
CAS — 52-26-6 (anhydrous morphine hydrochloride); 6055-06-7 (morphine hydrochloride trihydrate).

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, *Jpn*, and *Viet.*
Ph. Eur. 6.2 (Morphine Hydrochloride). Colourless, silky needles, cubical masses or a white or almost white, crystalline powder. It is efflorescent in a dry atmosphere. Soluble in water; slightly soluble in alcohol; practically insoluble in toluene. Protect from light.

Incompatibility. See under Morphine Sulfate, below.

Morphine Sulfate ⊗

Morfiinisulfaatti; Morfin Sülfat; Morfina, sulfato de; Morfino sulfatas; Morfinsulfat; Morfin-sulfát pentahydrát; Morfin-szulfát; Morfiny siarczan; Morphine, sulfate de; Morphine Sulphate *(BANM)*; Morphini sulfas; Morphini Sulfas Pentahydricus.

Морфина Сульфат

($C_{17}H_{19}NO_3)_2$,H_2SO_4,5H_2O = 758.8.
CAS — 64-31-3 (anhydrous morphine sulfate); 6211-15-0 (morphine sulfate pentahydrate).

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, and *US.*
Ph. Eur. 6.2 (Morphine Sulphate). A white or almost white, crystalline powder. Soluble in water; very slightly soluble in alcohol; practically insoluble in toluene. Protect from light.
USP 31 (Morphine Sulfate). White, feathery, silky crystals, cubical masses of crystals, or a white crystalline powder. Is odourless and when exposed to air it gradually loses water of hy-