symptomatic relief of sore throat. Flurbiprofen sodium is used in eye drops to inhibit intra-operative miosis and to control postoperative inflammation of the anterior segment of the eye.

For **pain and inflammation**, flurbiprofen is given in usual oral doses of 150 to 200 mg daily in divided doses, increased to 300 mg daily in acute or severe conditions if necessary. A modified-release preparation for once-daily use is also available. Patients with dysmenorrhoea may be given an initial dose of 100 mg followed by 50 to 100 mg every four to six hours to a maximum total daily dose of 300 mg. Doses given rectally as suppositories are similar to those given by orally.

For the relief of **sore throat**, a lozenge containing 8.75 mg of flurbiprofen may be sucked or allowed to dissolve slowly in the mouth every 3 to 6 hours to a maximum daily dose of 5 lozenges. It is recommended that treatment should be limited to a maximum of 3 days.

To inhibit intra-operative miosis during **ocular surgery** one drop of flurbiprofen sodium 0.03% is instilled into the eye every 30 minutes beginning 2 hours before surgery and ending not less than 30 minutes before surgery. To control postoperative inflammation the same dosage regimen is used before ocular surgery followed 24 hours after surgery by the instillation of one drop 4 times daily for 1 to 3 weeks. Flurbiprofen sodium eye drops have also been used in the topical treatment of cystoid macular oedema.

Flurbiprofen axetil has been given in some countries by intravenous injection for severe pain.

The *R*-enantiomer, tarenflurbil, is under investigation in the management of Alzheimer's disease.

Preparations

BP 2008: Flurbiprofen Eye Drops; Flurbiprofen Suppositories; Flurbiprofen Tablets;
USP 31: Flurbiprofen Sodium Ophthalmic Solution; Flurbiprofen Tablets.

Proprietary Preparations (details are given in Part 3)

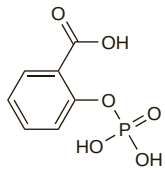
Arg.: Clinadol; Flurbic; Flurbid†; Luarprofeno; Tolerane; ***Austral.:*** Ocufen; Strepfen; ***Austria:*** Froben; Oculfur†; ***Belg.:*** Froben; Oculfur; ***Braz.:*** Ocufen; Targus; ***Canad.:*** Ansaid; Froben; Novo-Flurprofen; Ocufen; ***Chile:*** Ansaid; Distex; Ocufen; ***Cz.:*** Ansaid†; Flugalin†; Oculfur†; Strepfen; TransActLAT†; ***Denm.:*** Flurofen; ***Fr.:*** Cebutid; Ocufen; Strefen; ***Ger.:*** Dobendan Direkt; Dobrofen†; Oculfur; ***Gr.:*** Bedice†; Bonatol-R; Fladolef-B†; Flurofen; Fluroptic; Inflaflur; Oculfur; ***Hong Kong:*** Ocufen†; ***Hung.:*** Flugalin; Oculfur†; Strepfen; ***India:*** Arflur†; Cadiflur; Froben; Oculfur; ***Irl.:*** Froben; Ocufen†; Strepsils Intensive; ***Ital.:*** Benactiv; Froben; Ocufen; Tantum Activ Gola; Transact Lat; ***Jpn:*** Ropion; ***Malaysia:*** Acustop Cataplasma; ***Mex.:*** Ansaid; Ocufen; ***Neth.:*** Froben; ***NZ:*** Froben†; Ocufen†; Strepfen; ***Pol.:*** Flugalin; Strepsils Intensive; ***Port.:*** Edolfene; Froben; Oculfur†; Reupax†; Strepfen; Transact Lat; ***Rus.:*** Strepfen (Стрепфен); ***S.Afr.:*** Froben; Ocufen; TransAct; ***Singapore:*** Acustop Cataplasma†; Ocufen†; ***Spain:*** Froben; Neo Artrol†; Oculfur; ***Switz.:*** Froben; Oculfur; ***Thai.:*** Flurozin; ***Turk.:*** Majezik; ***UK:*** Froben; Ocufen; Strefen; ***USA:*** Ansaid; Ocufen; ***Venez.:*** Flurben†; Ocufen†.

Fosfosal *(rINN)*

Fosfosalum; UR-1521. 2-Phosphono-oxybenzoic acid.

Фосфосал

$C_7H_7O_6P$ = 218.1.
CAS — 6064-83-1.



Profile

Fosfosal is a salicylic acid derivative (see Aspirin, p.20). It has been given in usual oral doses of up to 3.6 g daily for the treatment of pain.

Preparations

Proprietary Preparations (details are given in Part 3)
Spain: Aydolid; Disdolen; Protalgia.

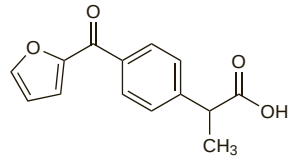
Multi-ingredient: ***Spain:*** Aydolid Codeina; Disdolen Codeina.

Furprofen

Furprofeno. 4-(2-Furanylcarbonyl)-α-methylbenzeneacetic acid.

Фурпрофен

$C_{14}H_{12}O_4$ = 244.2.
CAS — 66318-17-0.



Profile

Furprofen, a propionic acid derivative, is an NSAID (p.96) that has been given by mouth for the relief of pain.

Preparations

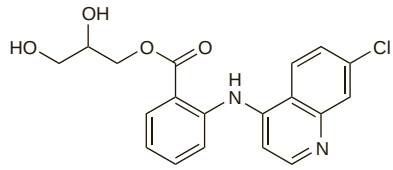
Proprietary Preparations (details are given in Part 3)
Ital.: Dolex†.

Glafenine *(rINN)*

Glafenina; Glafénine; Glafeninum; Glaphenine. 2,3-Dihydroxypropyl *N*-(7-chloro-4-quinolyl)anthranilate.

Глафенин

$C_{19}H_{17}ClN_2O_4$ = 372.8.
CAS — 3820-67-5.
ATC — N02BG03.
ATC Vet — QN02BG03.



Profile

Glafenine, an anthranilic acid derivative, is an NSAID (p.96) that was used for the relief of all types of pain. However, its high incidence of anaphylactic reactions has led to its withdrawal from the market in most countries. Glafenine hydrochloride was also used.

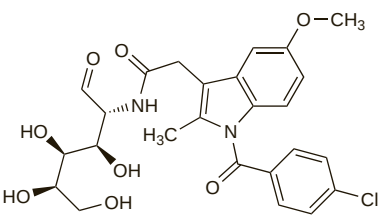
Adverse effects and precautions. Glafenine is a common cause of anaphylaxis. There may be hepatotoxicity (sometimes fatal), nephrotoxicity, and gastrointestinal disturbances. It should be stopped at the first sign of any allergic reaction. Crystallisation of glafenine in the urinary tract has also occurred. Cross-reactivity with floctafenine has been reported.

Glucametacin *(rINN)*

Glucametacina; Glucamétacine; Glucametacinum. 2-{2-[1-(4-Chlorobenzoyl)-5-methoxy-2-methylindol-3-yl]acetamido}-2-deoxy-D-glucose.

Глюкаметацин

$C_{25}H_{27}ClN_2O_8$ = 518.9.
CAS — 52443-21-7.



Profile

Glucametacin, a derivative of indometacin (p.66), is an NSAID (p.96) that has been given orally in musculoskeletal, joint, periarticular, and soft-tissue disorders.

Preparations

Proprietary Preparations (details are given in Part 3)
Braz.: Teoremin; ***Mex.:*** Teoremac.

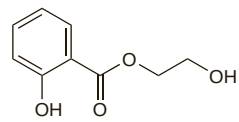
Multi-ingredient: ***Chile:*** Fibrorelax.

Glycol Salicylate

Ethylene Glycol Monosalicylate; Glycoli Salicylas; Glykolisalisylaatti; Glykolsalicylat; Hidroksietilo salicilatas; Hidroxietil-szalicilát; Hydroksietyylisalisylaatti; Hydroxietylsalicylat; Hydroxyaethyli Salicylas; Hydroxyéthyle, salicylate d'; Hydroxyethylis salicylas; Hydroxyethyl-salicylát; Salicilato de glicol. 2-Hydroxyethyl salicylate.

Гликоль Салицилат

$C_9H_{10}O_4$ = 182.2.
CAS — 87-28-5.



Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Hydroxyethyl Salicylate). An oily, colourless or almost colourless liquid or colourless crystals. M.p. about 21°. Sparingly soluble in water; freely soluble in alcohol; very soluble in acetone and in dichloromethane. Protect from light.

Profile

Glycol salicylate is a salicylic acid derivative used similarly to methyl salicylate (p.85) in topical rubefacient preparations in usual concentrations of 5 to 15% for the relief of muscular and rheumatic pain. Dipropylene glycol salicylate has been used in similar preparations.

Preparations

Proprietary Preparations (details are given in Part 3)

Cz.: Lumbinon†; ***Ger.:*** Auroanalin N†; Dolo-Arthrosenex N; Dolo-Arthrosenex NH; Dolo-Rubriment H†; Etrat Sportgel HES; Kytta†; Lumbinon†; Mobilat Akut HES; Phardol mono; Phlogont Rheuma†; Phlogont†; Rheubalmin N†; Salhumin Gel; Traumasenex; zuk Schmerzgel, zuk Schmerzsalbe†.

Multi-ingredient: ***Arg.:*** Infrarub†; Venostasin; ***Austral.:*** Deep Heat; Goanna Analgesic Ice†; ***Austria:*** Ambenat; Etrat; Igitur-Rheumafluid; Menthoneurin; Mobilisin; Moviflex; Rheumex; Rubizon-Rheumagel; Rubriment; Sportino Akut†; Venostasin compositum; ***Belg.:*** Algipan; Emerxil; Mobilisin; Percutalgine; Rado-Salil; Rado-Spray†; Stilene; ***Braz.:*** Etrat†; Mobilisin Composto; Venostasin†; ***Canad.:*** Midalgan†; ***Cz.:*** Arnidol; Dolo-Rubriment†; Rheuma-Salbe†; Rubriment-N†; ***Fin.:*** Moviflex†; ***Fr.:*** Algipan; Cortisal; Le Thermogene†; Lumbalgine; Percutalgine; ***Ger.:*** ABC Warme-Salbe†; Ambene N; Arthrodestal N†; Auroanalin Thermo; Caye Rheuma-Balsam; Dolo Mobilat†; Doloneuro†; DoloVisano Salbe†; Essaven Sport†; Etrat Sportgel†; Heparin Plus†; Hot Thermo; Infrotto Ultra†; Lumbinon Thermo†; Menthoneurin-Salbe; mikanil†; Ostochont†; Phardol Rheuma†; Phardol Warme-Balsam†; Phlogont-Thermal; Rheubalmin Thermo†; Rheuma Bad; Rheuma-Salbe N; Rheuma-Salbe†; Rubriment-N†; Sportino Akut; Tetesept Badekonzentrat Rheuma Bad†; Thermo-Menthoneurin†; Thermo-Rheumon N†; Thermosenex; Togal Mobil-Gel†; Trauma-Puren†; Venoplant AHS†; Vertebralon N†; Warme-Gel†; zuk thermo†; ***Gr.:*** Bayolin; ***Hong Kong:*** New Patecs A; Prelloran†; Salomethyl; ***Hung.:*** Bayolin†; Mobilisin†; Nicoflex; ***India:*** Algipan; ***Irl.:*** Algipan; ***Israel:*** Deep Heat Spray; ***Ital.:*** Balsamo Sifcamina; Disalgil†; Mobilisin; Salonpas; Sloan; ***Malaysia:*** Salonpas; ***Neth.:*** Cremor capsici comp; Cremor Capsici compositus; Kruidvat Spierbalsem; ***Pol.:*** Deep Heat; Lumbolin; ***Port.:*** DM Creme; DM Gel; Midalgan†; ***S.Afr.:*** Deep Heat Spray; Infrarub; ***Singapore:*** Deep Heating Spray†; Saak†; ***Spain:*** Movilisin; ***Switz.:*** Assan; Assan thermo; Demotherm Pommade contre le rhumatisme†; Dolo Demotherm; Dolo-Arthrosenex; Dolo-Arthrosenex sine Heparino†; Dolo-Veniten†; Histalgane; Histalgane mite; Midalgan; Mobilisin; Phlebostasin compositum†; Prelloran†; Radalgin; Remexal; Sportusal; Sportusal Spray sine heparino; Venoplant comp; Venucreme; Venugel; ***Thai.:*** Percutalgine†; ***UK:*** Cremalgin; Deep Heat Spray; Dubam; Fiery Jack; Ralgex; Ralgex Freeze Spray; Ralgex Heat Spray (low-odour); Salonair; Salonpas; Transvasin Heat Spray.

Gold Keratinate

Aurothiopolypeptide; Queratinato de oro.

CAS — 9078-78-8.

Profile

Gold keratinate is a gold compound with a gold content of about 13%; It has similar actions and uses to those of sodium aurothiomalate (p.122). It has been given by intramuscular injection as the calcium salt for the treatment of rheumatoid arthritis.

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Aurochobet.

Golimumab *(USAN, rINN)*

CNTO-148; Golimumabum. Immunoglobulin G1, anti-(human tumor necrosis factor α) (human monoclonal CNTO 148 γ1-chain), disulfide with human monoclonal CNTO 148 κ-chain, dimer.

Голимумаб

CAS — 476181-74-5.

Profile

Golimumab is a human monoclonal antibody to tumour necrosis factor α, a pro-inflammatory mediator (see Infliximab, p.71), that

is being investigated in the management of rheumatoid arthritis, psoriatic arthritis, and ankylosing spondylitis.

◊ References.

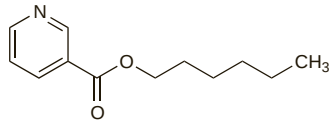
1. Zhou H, *et al.* Pharmacokinetics and safety of golimumab, a fully human anti-TNF-α monoclonal antibody, in subjects with rheumatoid arthritis. *J Clin Pharmacol* 2007; **47:** 383–96.
2. Kay J, *et al.* Golimumab in patients with active rheumatoid arthritis despite treatment with methotrexate: a randomized, double-blind, placebo-controlled, dose-ranging study. *Arthritis Rheum* 2008; **58:** 964–75.

Hexyl Nicotinate

Heksyylinikotinaatti; Hexylnicotinatum; Hexylnikotinat; Nicotinato de hexilo. *n*-Hexyl nicotinate.

$C_{12}H_{17}NO_2$ = 207.3.

CAS — 23597-82-2.



Profile

Hexyl nicotinate is used in topical preparations as a rubefacient.

Preparations

Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***Belg.:*** Transvane; ***Irl.:*** Transvasin; ***Port.:*** Hipodor†; ***UK:*** Transvasin Heat Rub.

Hydrocodone Hydrochloride *(BANM, rINNM)*

Hidrocloruro de hidrocodona; Hydrocodone, Chlorhydrate d'; Hydrocodoni Hydrochloridum.

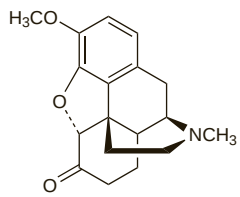
Гидрокодона Гидрохлорид

$C_{18}H_{21}NO_3$,HCl,2 / H_2O = 380.9.

CAS — 25968-91-6 (anhydrous hydrocodone hydrochloride).

ATC — R05DA03.

ATC Vet — QR05DA03.



(hydrocodone)

Hydrocodone Tartrate *(BANM, rINNM)*

Dihydrocodeinone Acid Tartrate; Hydrocodone Acid Tartrate; Hydrocodone Bitartrate *(USAN)*; Hydrocodone, Tartrate d'; Hydrocodoni Bitartras; Hydrocodoni Tartras; Hydrocone Bitartrate; Tartrato de dihidrocodeinona; Tartrato de hidrocodona. 6-Deoxy-3-*O*-methyl-6-oxomorphine hydrogen tartrate hemipentahydrate; (–)-(5*R*)-4,5-Epoxy-3-methoxy-9a-methylmorphinan-6-one hydrogen tartrate hemipentahydrate.

Гидрокодона Тартрат

$C_{18}H_{21}NO_3$,$C_4H_6O_6$,2 / H_2O = 494.5.

CAS — 125-29-1 (hydrocodone); 143-71-5 (anhydrous hydrocodone tartrate); 34195-34-1 (hydrocodone tartrate hemipentahydrate).

ATC — R05DA03.

ATC Vet — QR05DA03.

NOTE. Compounded preparations of hydrocodone tartrate may be represented by the following names:

- Co-hycodAPAP (*PEN*)—hydrocodone tartrate and paracetamol.
  The following terms have been used as 'street names' (see p.vi) or slang names for various forms of hydrocodone tartrate:
  Cough Syrup; Vikes.

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

Ph. Eur. 6.2 (Hydrocodone Hydrogen Tartrate 2.5-Hydrate). White or almost white, hygroscopic, crystalline powder. Freely soluble or soluble in water; sparingly soluble in alcohol; practically insoluble in cyclohexane. A 2% solution in water has a pH of 3.2 to 3.8. Store in airtight containers. Protect from light.

USP 31 (Hydrocodone Bitartrate). Fine, white crystals or crystalline powder. Soluble in water; slightly soluble in alcohol; insoluble in chloroform and in ether. pH of a 2% solution in water is between 3.2 and 3.8. Store in airtight containers. Protect from light.

Profile

Hydrocodone, a phenanthrene derivative, is an opioid analgesic (p.101) related to codeine (p.37) and has similar actions, but is more potent on a weight-for-weight basis. Hydromorphone (below) is one of the metabolites of hydrocodone.

Hydrocodone is used mainly as the tartrate in combination preparations for the relief of irritant cough, though it has no particular advantage over codeine. Hydrocodone tannate has been used similarly. Hydrocodone tartrate is also used for the relief of moderate to moderately severe pain, usually with paracetamol. The usual oral dose of hydrocodone tartrate in such combination preparations is 5 to 10 mg every 4 to 6 hours.

For details of doses in children, see below.

Hydrocodone hydrochloride is given orally and also by injection. The polistirex derivative (a hydrocodone and sulfonated diethenylbenzene-ethenylbenzene copolymer complex) is used in modified-release preparations.

Hydrocodone has also been used in the treatment of dyspnoea.

Abuse. The abuse or overuse of preparations containing hydrocodone and paracetamol has been associated with *sensorineural hearing loss.*[1,2] Cochlear implants improved the hearing loss in some of the patients.

A case of *palatal perforation* associated with intranasal abuse of a crushed preparation of hydrocodone and paracetamol has also been reported.[3]

1. Friedman RA, *et al.* Profound hearing loss associated with hydrocodone/acetaminophen abuse. *Am J Otol* 2000; **21:** 188–91.
2. Ho T, *et al.* Hydrocodone use and sensorineural hearing loss. *Pain Physician* 2007; **10:** 467–72.
3. Jewers WM, *et al.* Palatal perforation associated with intranasal prescription narcotic abuse. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005; **99:** 594–7.

Administration in children. Hydrocodone tartrate may be given as part of a combination preparation for the relief of irritant cough in children aged from 6 to 12 years in usual oral doses of 2.5 mg every 4 to 6 hours. Older children may be given the usual adult dose (see above).

Pharmacokinetics. References.

1. Hutchinson MR, *et al.* CYP2D6 and CYP3A4 involvement in the primary oxidative metabolism of hydrocodone by human liver microsomes. *Br J Clin Pharmacol* 2004; **57:** 287–97.

Preparations

USP 31: Hydrocodone Bitartrate and Acetaminophen Tablets; Hydrocodone Bitartrate and Homatropine Methylbromide Tablets; Hydrocodone Bitartrate Tablets.

Proprietary Preparations (details are given in Part 3)

Belg.: Biocodone; ***Canad.:*** Hycodan; ***Ger.:*** Dicodid; ***Switz.:*** Dicodid†; Hydrocodeinon.

Multi-ingredient: ***Arg.:*** Hidronovag Complex; ***Canad.:*** Coristine-DH†; Dalmacol; Dimetane Expectorant DC; Hycomine; Novahistex DH; Novahistine DH; ratio-Calmydone; ratio-Coristex-DH; Tussionex; Vasofrinic DH; ***India:*** Cardiazol-Dicodid†; ***USA:*** Alor; Anaplex HD; Anexsia; Atuss EX†; Atuss G; Atuss HC; Atuss HD; Atuss HS; Atuss HX; Bancap HC; Ceta Plus; Co-Gesic; Co-Tuss V; Codal-DH; Codiclear DH; Codimal DH; Cophene XP; Cordron-HC; Cyndal HD†; Cytuss HC; Cytuss-HC NR; Damason-P; De-Chlor G; De-Chlor HC; De-Chlor HD†; De-Chlor MR; De-Chlor NX; Deconamine CX; Dolacet; Donatussin DC; Drocon-CS; Duocet; Duratuss HD; Dytan-HC; ED Tuss HC; ED-TLC; Endagen-HD; Endal-HD; Endal-HD Plus; Entex HC; Entuss Expectorant; Entuss-D; Entuss-D Jr; H-Tuss-D†; Histex HC; Histinex D; Histinex HC; Histinex PV; Histussin D†; Histussin HC; Hy-KXP; Hy-Phen; Hycet; HycoClear Tuss; Hycodan; Hycomine Compound; Hycotuss; Hydex PD; Hydro DP; Hydro PC†; Hydro-GP; Hydro-Tussin HD; Hydro-Tussin HG; Hydrocet; Hydrocodone CP; Hydrocodone GF; Hydrocodone HD; Hydrogesic; Hydromet; Hydron CP; Hydron EX; Hydron KGS; Hydron PSC; Hydropane; Hyphed; HyTan; Ibudone; Iodal; Iotussin HC; Kwelcof; Levall 5.0; Liquicet; Lorcet 10/650; Lorcet Plus; Lorcet-HD; Lortab; Lortab ASA; Lortuss HC; Marcof; Margesic H; Maxi-Tuss HCG; Maxi-Tuss HCX; Maxidone; Nalex DH; Nalex Expectorant; Narcof; Nariz HC; Neo HC; Norco; Notuss PD; Notuss-Forte; Oncet; P-V-Tussin; Pancof XP; Pancof-HC; Pancof-XL; Para-Hist HD; Pneumotussin; Poly-Tussin; Pro-Red; Protuss-D†; Protuss†; Relacon-HC; Relasin-HCX; Reprexain; S-T Forte 2; SRC Expectorant; Stagesic; Su-Tuss HD; T-Gesic; Tusana-D; Tusdec-HC; Tusnel-HC; Tussafed HC†; Tussafed-HCG; Tussafin Expectorant; Tussanil DH; Tussend; Tussigon; Tussionex Pennkinetic; Tusso-DF; Tusso-HC; Tussplex; Tyrodone; Unituss HC; Vanex Expectorant; Vanex-HD; Vazotuss HC; Vicodin; Vicodin Tuss; Vicoprofen; Vitussin; Xodol; Z-Cof HC; Zamicet; Zydone; Zymine HC.

Hydromorphone Hydrochloride

(BANM, rINNM) ⊗

Dihydromorphinone Hydrochloride; Hidrocloruro de dihidromorfinona; Hidrocloruro de hidromorfona; Hidromorfono hidrochloridas; Hydromorfon-hydrochlorid; Hydromorfonhydroklorid; Hydromorfonihydrokloridi; Hydromorphone, chlorhydrate d'; Hydromorphoni hydrochloridum. 6-Deoxy-7,8-dihydro-6-oxomorphine hydrochloride; (–)-(5*R*)-4,5-Epoxy-3-hydroxy-9a-methylmorphinan-6-one hydrochloride.

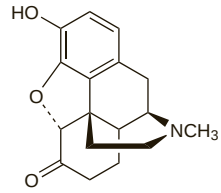
Гидроморфона Гидрохлорид

$C_{17}H_{19}NO_3$,HCl = 321.8.

CAS — 466-99-9 (hydromorphone); 71-68-1 (hydromorphone hydrochloride).

ATC — N02AA03.

ATC Vet — QN02AA03.



(hydromorphone)

NOTE. The following terms have been used as 'street names' (see p.vi) or slang names for various forms of hydromorphone:
Dillies; HillBilly Heroin; Hospital heroin.

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

Ph. Eur. 6.2 (Hydromorphone Hydrochloride). A white or almost white, crystalline powder. Freely soluble in water; very slightly soluble in alcohol; practically insoluble in dichloromethane. Protect from light.

USP 31 (Hydromorphone Hydrochloride). A fine white, or practically white, odourless, crystalline powder. Soluble 1 in 3 of water; sparingly soluble in alcohol; practically insoluble in ether. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°. Protect from light.

Incompatibility. Colour change from pale yellow to light green occurred when solutions of minocycline hydrochloride or tetracycline hydrochloride were mixed with hydromorphone hydrochloride in 5% glucose injection.[1] Mixtures of hydromorphone hydrochloride and dexamethasone sodium phosphate exhibited concentration-dependent incompatibility.[2] White cloudiness, haziness, or precipitation developed 4 hours after mixing thiopental sodium and hydromorphone hydrochloride.[3]

Stability of mixtures of fluorouracil and hydromorphone hydrochloride in 0.9% sodium chloride or 5% glucose depended on the concentration of fluorouracil present.[4] Hydromorphone hydrochloride 0.5 mg/mL with fluorouracil 1 mg/mL was stable for at least 7 days at 32° and for at least 35 days at 23°, 4°, or –20°. When the concentration of fluorouracil was increased to 16 mg/mL, hydromorphone was noted to decompose incurring unacceptable losses after 3 days at 32° or after 7 days at 23°, but was stable for at least 35 days at 4° or –20°.

1. Nieves-Cordero AL, *et al.* Compatibility of narcotic analgesic solutions with various antibiotics during simulated Y-site injection. *Am J Hosp Pharm* 1985; **42:** 1108–9.
2. Walker SE, *et al.* Compatibility of dexamethasone sodium phosphate with hydromorphone hydrochloride or diphenhydramine hydrochloride. *Am J Hosp Pharm* 1991; **48:** 2161–6.
3. Chiu MF, Schwartz ML. Visual compatibility of injectable drugs used in the intensive care unit. *Am J Health-Syst Pharm* 1997; **54:** 64–5.
4. Xu QA, *et al.* Stability and compatibility of fluorouracil with morphine sulfate and hydromorphone hydrochloride. *Ann Pharmacother* 1996; **30:** 756–61.

Dependence and Withdrawal

As for Opioid Analgesics, p.101.

Adverse Effects, Treatment, and Precautions

As for Opioid Analgesics in general, p.102.

UK licensed product information contra-indicates the use of hydromorphone hydrochloride in patients with hepatic impairment; however, product information in the USA permits its cautious use although doses may need to be reduced. It should also be used with caution and given in reduced doses to those with renal impairment.

Effects on the nervous system. Myoclonus has been reported[1] in a 55-year-old man given relatively low doses of intravenous hydromorphone with a total daily dose of 4 mg on day 1 and 6 mg on day 2; symptoms resolved when the drug was stopped on day 3. A chart review[2] for neuroexcitatory symptoms in 48 patients with terminal illnesses on hydromorphone found 13 cases of agitation, 9 of myoclonus, and 4 of seizures; maximal dose and treatment duration were noted to increase the risk of neurotoxicity.

1. Patel S, *et al.* A myoclonic reaction with low-dose hydromorphone. *Ann Pharmacother* 2006; **40:** 2068–70.
2. Thwaites D, *et al.* Hydromorphone neuroexcitation. *J Palliat Med* 2004; **7:** 545–50.

Interactions

For interactions associated with opioid analgesics, see p.103.

Alcohol. The FDA received data from pharmacokinetic studies in healthy subjects which showed that significantly higher peak plasma concentrations of hydromorphone were achieved, as a result of dose-dumping, when alcohol was ingested with once-daily hydromorphone modified-release capsules (*Palladone;*