

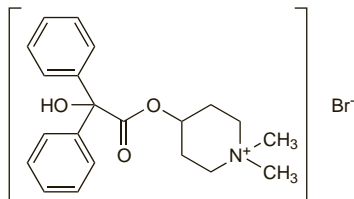
**Parapenzolate Bromide** (USAN, rINN)

Bromuro de parapenzolato; Parapenzolate, Bromure de; Parapenzolati Bromidum; Sch-3444. 4-Benzoyloxy-1,1-dimethylpiperidinium bromide.

Парапензолат Бромид

$C_{21}H_{26}BrNO_3 = 420.3$ .

CAS — 5634-41-3.

**Profile**

Parapenzolate bromide is a quaternary ammonium antimuscarinic that has been used for the relief of visceral spasms.

**Preparations**

**Proprietary Preparations** (details are given in Part 3)

**Multi-ingredient:** **Chile:** Tranvagal†.

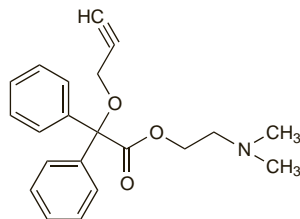
**Pargeverine Hydrochloride** (rINN)

Pargeverina, hidrocloreto de; Pargévérine, Chlorhydrate de; Pargaverini Hydrochloridum; Propinox Hydrochloride. 2-(Dimethylamino)ethylidiphenyl(2-propyloxy)acetate hydrochloride.

Паргеверина Гидрохлорид

$C_{21}H_{23}NO_3 \cdot HCl = 373.9$ .

CAS — 13479-13-5 (pargeverine); 2765-97-1 (pargeverine hydrochloride).



(pargeverine)

**Profile**

Pargeverine is reported to possess antimuscarinic and smooth-muscle relaxant properties and has been used in the treatment of gastrointestinal and smooth muscle spasm.

**Preparations**

**Proprietary Preparations** (details are given in Part 3)

**Arg.:** Nova Paratopina; Pasmosedan†; Sertal; **Chile:** Bevitex; Bramedil; Pasmocalm†; Viadil; Viplan; Viproxil; **Mex.:** Bipasmin; Plidan; **Port.:** Vagopax; **Venez.:** Plidan.

**Multi-ingredient:** **Arg.:** Apasmo Compuesto; Binex; Espasmo Dolex; Nova Paratopina Compositum; Pasmosedan Compuesto; Propalgin; Sertal Compuesto; **Chile:** Bramedil Compuesto; Scopanil; Viadil Compuesto; Viplan Compuesto; Viproxil Compuesto; **Mex.:** Firac Plus; Plidan Compuesto; **Venez.:** Dologinex; Plidan Compuesto.

**Pentaerythritol**

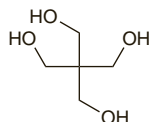
Pentaeritritol; Tetramethylolmethane. 2,2-Bis(hydroxymethyl)propane-1,3-diol.

Пентаэритритол

$C_5H_{12}O_4 = 136.1$ .

CAS — 115-77-5.

ATC Vet — QA06AD14.



The symbol † denotes a preparation no longer actively marketed

**Profile**

Pentaerythritol is an osmotic laxative used in the treatment of constipation (p.1693) in oral doses of 5 to 15 g daily.

**Preparations**

**Proprietary Preparations** (details are given in Part 3)

**Fr.:** Auxitran; Hydracu†.

**Peppermint Leaf**

Black Mint; Borsosmentalevél; Hoja de Menta; Hortelã-Pimenta; Liść mięty pieprzowej; List máty peprné; Menta piperita, hoja de; Menth. Pip.; Mentha Piperita; Menthae piperitae folium; Menthe Poivrée; Menthe poivrée, feuille de; Pepparmyntblad; Peppermint; Pfefferminzblätter; Piparmintunlehti; Pipirmėčių lapai; White Mint.

Листья Мята Перечной

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

**Ph. Eur. 6.2** (Peppermint Leaf). The whole or cut dried leaves of *Mentha × piperita*, containing not less than 1.2% v/w of essential oil if whole, or not less than 0.9% v/w if cut. It has a characteristic and penetrating odour and a characteristic aromatic taste. Protect from light.

**USNF 26** (Peppermint). The dried leaf and flowering top of *Mentha piperita* (Labiatae). It has an aromatic, characteristic odour and a pungent taste, and produces a cooling sensation in the mouth.

**Peppermint Oil**

Borsosmentaolaj; Essence de Menthe Poivrée; Essência de Hortelã-Pimenta; Menta piperita, aceite essencial de; Menthae piperitae aetheroleum; Menthae Piperitae Etheroleum; Menthe poivrée, huile essentielle de; Nane Yağı; Öl. Menth. Pip.; Olejek miętowy; Oleum Menthae Piperitae; Pepparmyntolja; Pfefferminzöl; Piparmintuöljy; Pipirmėčių eterinis aliejus; Silice máty peprné.

Масло Мята Перечной

CAS — 8006-90-4.

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

**Ph. Eur. 6.2** (Peppermint Oil). It is obtained by steam distillation from the fresh overground parts of the flowering plant of *Mentha × piperita*. It contains 30.0 to 55.0% menthol, 14.0 to 32.0% menthone, and 2.8 to 10.0% menthyl acetate, 3.5 to 14.0% cineole, 1.5 to 10.0% isomenthone, 1.0 to 9.0% menthofuran, 1.0 to 5.0% limonene, not more than 4.0% pulegone, and not more than 1.0% carvone; the ratio of eucalyptol content to limonene content is greater than two.

It is a colourless, pale yellow, or pale greenish-yellow liquid with a characteristic odour and taste followed by a sensation of cold. Miscible with alcohol and with dichloromethane. Store in well-filled, airtight containers. Protect from light and heat.

**USNF 26** (Peppermint Oil). The volatile oil distilled with steam from the fresh overground parts of the flowering plant *Mentha piperita* (Labiatae), rectified by distillation, and neither partially nor wholly dementholised. It yields not less than 5% of esters calculated as menthyl acetate and not less than 50% of total menthol, free and as esters.

It is a colourless or pale yellow liquid with a strong, penetrating, characteristic odour and a pungent taste, followed by a sensation of cold when air is drawn into the mouth. Soluble 1 in 3 of alcohol (70%) with not more than slight opalescence. Store in airtight containers at a temperature not exceeding 40°.

**Storage.** The Pharmaceutical Society of Great Britain's Department of Pharmaceutical Sciences found that PVC bottles softened and distorted fairly rapidly in the presence of peppermint oil, which should not be stored or dispensed in such bottles.<sup>1</sup>

1. Department of Pharmaceutical Sciences of the Pharmaceutical Society of Great Britain. Plastic medicine bottles of rigid PVC. *Pharm J* 1973; **210**: 100.

**Adverse Effects and Precautions**

Peppermint oil can be irritant and may rarely cause hypersensitivity reactions. Reported reactions include erythematous skin rash, headache, bradycardia, muscle tremor, and ataxia. Heartburn has also been reported.

**Effects on the cardiovascular system.** Idiopathic atrial fibrillation occurred in 2 patients addicted to 'peppermints'. Normal rhythm was restored when peppermint-sucking ceased.<sup>1</sup>

1. Thomas JG. Peppermint fibrillation. *Lancet* 1962; **i**: 222.

**Hypersensitivity.** Exacerbation of asthma, with wheezing and dyspnoea, was associated with the use of paste-based toothpastes containing peppermint or wintergreen as a flavouring.<sup>1</sup>

1. Spurlock BW, Dailey TM. Shortness of (fresh) breath—toothpaste-induced bronchospasm. *N Engl J Med* 1990; **323**: 1845–6.

**Interactions**

Adverse effects may be more likely if peppermint oil is taken with alcohol. Enteric-coated capsules containing peppermint oil

should not be taken immediately after food or with antacids. There is some evidence that peppermint oil can inhibit the cytochrome P450 isoenzyme CYP3A4, and may affect the clearance of drugs whose metabolism is mediated by this enzyme.

**References**

1. Dresser GK, *et al.* Evaluation of peppermint oil and ascorbyl palmitate as inhibitors of cytochrome P4503A4 activity in vitro and in vivo. *Clin Pharmacol Ther* 2002; **72**: 247–55.

**Uses and Administration**

Peppermint oil is an aromatic carminative that relaxes gastrointestinal smooth muscle and relieves flatulence and colic. Enteric-coated capsules containing peppermint oil are used for the relief of symptoms of the irritable bowel syndrome or gastrointestinal spasm secondary to other disorders. Usual oral doses in adults and adolescents from the age of 15 years are 0.2 mL three times daily, (increased to 0.4 mL three times daily if necessary) for up to 2 to 3 months. The capsules should be taken half to one hour before food and swallowed whole, not chewed.

Peppermint oil is used as a flavour and with other volatile agents in preparations for respiratory-tract disorders. It is also used in aromatherapy.

Peppermint leaf, the source of the oil, has also been used for its carminative and flavouring properties.

**Gastrointestinal disorders.** Menthol (p.2340), the major constituent of peppermint oil, has properties similar to those of calcium-channel blockers on smooth muscle such as that in the human gut.<sup>1</sup> Reviews<sup>2,3</sup> of the use of peppermint oil in irritable bowel syndrome (p.1699) concluded that there was some evidence of its benefit.

The relaxant effect of peppermint oil on the gastrointestinal tract has been used to reduce spasm during endoscopy by giving solubilised peppermint oil directly into the lumen, through the accessory channel of the endoscope. It has been described as effective during colonoscopy<sup>4</sup> and may be more effective than intramuscular hyoscine butylbromide during upper gastrointestinal endoscopy.<sup>5</sup> Addition of peppermint oil to barium enema has also been tried and appears to reduce spasm<sup>6,7</sup> and the need for intravenous antispasmodics.<sup>6</sup>

1. Grigoleit H-G, Grigoleit P. Pharmacology and preclinical pharmacokinetics of peppermint oil. *Phytomedicine* 2005; **12**: 612–16.
2. Pittler MH, Ernst E. Peppermint oil for irritable bowel syndrome: a critical review and metaanalysis. *Am J Gastroenterol* 1998; **93**: 1131–5.
3. Grigoleit H-G, Grigoleit P. Peppermint oil in irritable bowel syndrome. *Phytomedicine* 2005; **12**: 601–6.
4. Asao T, *et al.* An easy method for the intraluminal administration of peppermint oil before colonoscopy and its effectiveness in reducing colonic spasm. *Gastrointest Endosc* 2001; **53**: 172–7.
5. Hiki N, *et al.* Peppermint oil reduces gastric spasm during upper endoscopy: a randomized, double-blind, double-dummy controlled trial. *Gastrointest Endosc* 2003; **57**: 475–82.
6. Sparks MJW, *et al.* Does peppermint oil relieve spasm during barium enema? *Br J Radiol* 1995; **68**: 841–3.
7. Asao T, *et al.* Spasmolytic effect of peppermint oil in barium during double-contrast barium enema compared with Buscopan. *Clin Radiol* 2003; **58**: 301–5.

**Preparations**

**BP 2008:** Concentrated Peppermint Emulsion; Gastro-resistant Peppermint Oil Capsules; Peppermint Spirit;

**USNF 26:** Peppermint Water;

**USP 31:** Peppermint Spirit.

**Proprietary Preparations** (details are given in Part 3)

**Austral.:** Mintec; **Austria:** Colpermin; **Cz.:** China-Oel†; Colpermin; Gal-lentee†; Ki-Min-To†; Mata Piepoma†; Matovy; Nat Maty Pepme; **Fr.:** Loca-biotat; **Ger.:** Chiana†; China-Oel†; Euminz; Inspirol Heilpflanzenöl; Meda-calm; Mentacur†; spasma gallo sanol N; Wildkrauterol special K; **Gr.:** Colpermin; **Hong Kong:** Colpermin; **Irl.:** Colpermin; **Israel:** China Oel; Colpermin; Po Sum On Medicated Oil; **Ital.:** Carmint; Mintoil; **Mex.:** Col-permin†; **NZ:** Mintec; **Port.:** Colominte; **S.Afr.:** Pepermentdruppels; **Singapore:** Colpermin; **Switz.:** Chiana-Oel; Colpermin; **Thai.:** Colpermin; **Turk.:** China Oel; Colpermin; **UK:** Colpermin; Equilon Herbal; Mintec; Ob-bekjaers.

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

**Phenamazide Hydrochloride**

Fenamazida, hidrocloreto de; Phenamacide Hydrochloride. (±)-α-Aminobenzeneacetic acid 3-methylbutyl ester hydrochloride.

$C_{13}H_{15}NO_2 \cdot HCl = 257.8$ .

CAS — 84580-27-8 (phenamazide); 31031-74-0 (phenamazide hydrochloride).

**Profile**

Phenamazide is an antimuscarinic with actions similar to those of atropine (p.1219). It has been used as the hydrochloride in the treatment of visceral spasms.

**Preparations**

**Proprietary Preparations** (details are given in Part 3)

**Ger.:** Aklonin†.