

### Pharmacokinetics

Alizapride is well absorbed from the gastrointestinal tract. It is mainly excreted unchanged in the urine and has an elimination half-life of about 3 hours.

### Uses and Administration

Alizapride is a substituted benzamide similar to metoclopramide (p.1749), which is used to control nausea and vomiting (p.1700) associated with a variety of disorders. It is given as the hydrochloride but doses are expressed in terms of the base. Alizapride 50 mg is equivalent to about 55.8 mg of alizapride hydrochloride.

Alizapride hydrochloride is given in usual oral doses equivalent to 75 to 300 mg of alizapride daily in divided doses. For children's doses, see below. It is also given by intravenous or intramuscular injection in doses equivalent to 50 to 200 mg of alizapride daily.

For patients receiving cancer chemotherapy usual daily doses equivalent to alizapride 2 to 5 mg/kg have been given intravenously or intramuscularly in 2 divided doses, one 30 minutes before and one 4 to 8 hours after the cytotoxic regimen. For highly emetic regimens requiring doses above 5 mg/kg it may be given by intravenous infusion over 15 minutes every 2 hours for 5 doses, starting 30 minutes before the cytotoxic. It has been recommended that the total dose given with a course of chemotherapy does not exceed 4.5 g.

**Administration in children.** Alizapride hydrochloride has been given to children for the symptomatic treatment of nausea and vomiting in oral doses equivalent to 5 mg/kg of alizapride daily.

### Preparations

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

**Arg.:** Gastriveran; **Bel.:** Litan; **Braz.:** Superan; **Fr.:** Plitican; **Ger.:** Vergentan; **Ital.:** Limican; **Neth.:** Litan; **Port.:** Plitican†.

### Almagate (BAN, USAN, rINN)

Almagaati; Almagat; Almagat; Almagatas; Almagato; Almagatum; LAS-3876. Aluminium trimagnesium carbonate heptahydroxide dihydrate.

Альмагат

$\text{AlMg}_3(\text{CO}_3)(\text{OH})_7 \cdot 2\text{H}_2\text{O} = 315.0$ .

CAS — 66827-12-1 (almagate); 72526-11-5 (anhydrous almagate).

ATC — A02AD03.

ATC Vet — QA02AD03.

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

**Ph. Eur. 6.2** (Almagate). A white or almost white, fine crystalline powder. It contains 15.0 to 17.0% aluminium calculated as aluminium oxide, 36.0 to 40.0% magnesium calculated as magnesium oxide, and 12.5 to 14.5% carbonic acid calculated as carbon dioxide. Practically insoluble in water, in alcohol, and in dichloromethane. It dissolves with effervescence and heating in dilute mineral acids. The filtrate of a 4% suspension in water has a pH of 9.1 to 9.7. Store in airtight containers.

### Profile

Almagate is a hydrated aluminium-magnesium hydroxycarbonate. It is an antacid with general properties similar to those of aluminium hydroxide (p.1706) and magnesium carbonate (p.1743). It is given orally in doses of 1 to 1.5 g.

### Preparations

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

**Mex.:** Almax; **Spain:** Almax; Depreç†; Obetine.

### Almasilate (BAN, rINN)

Almasilato; Almasilatium; Aluminium Magnesium Silicate Hydrate; Magnesium Aluminium Silicate Hydrate; Magnesium Aluminium Silicate Hydrate.

Алмазилат

$\text{Al}_2\text{O}_3 \cdot \text{MgO} \cdot 2\text{SiO}_2 \cdot x\text{H}_2\text{O} = 262.4$  (anhydrous).

CAS — 71205-22-6; 50958-44-6.

ATC — A02AD05.

ATC Vet — QA02AD05.

### Profile

Almasilate is an artificial form of aluminium magnesium silicate hydrate. It is an antacid (p.1692) that is given orally in doses of up to about 1 g.

A hydrated native aluminium magnesium silicate (p.2141) is used as a suspending, thickening, and stabilising agent in pharmaceutical preparations. Attapulgit (p.1709) is another native form.

### Preparations

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

**Austria:** Gelusil†; **Ger.:** Gelusil; Megalac; Sinagel; **Spain:** Alubifar.

**Multi-ingredient:** **Austria:** Gastripan; **Ger.:** Gelusil-Lac; Neo-Pyodron N; Utililac N; **India:** Entasid; **Spain:** Dolcopin; **Switz.:** Gelusil N.

### Aloes

Acibar; Alavijų sultys, koncentruotos ir išdžiovintos (Cape aloes); Áloe, acibar; Aloe barbadensis (Barbados aloes); Aloe, Barbados (Barbados aloes); Aloe barbadoská (Barbados aloes); Aloe capensis (Cape aloes); Aloe, Kap (Cape aloes); Aloe kapská (Cape aloes); Aloès des Barbades (Barbados aloes); Aloès du Cap (Cape aloes); Alona barbadoska (Barbados aloes); Alona przylądkowa (Cape aloes); Barbadosi áloé (Barbados aloes); Barbadosin aloé (Barbados aloes); Kap-áloé (Cape aloes); Kapin aloé (Cape aloes); Tikrujų alavijų sultys, koncentruotos ir išdžiovintos (Barbados aloes).

Алоэ Барбадосское (Barbados aloes); Алоэ Канское (Cape aloes)

CAS — 8001-97-6; 67479-27-0 (aloe gum).

NOTE. Do not confuse with Aloe vera (p.1588).

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

**Ph. Eur. 6.2** (Aloes, Barbados; Aloe barbadensis). The concentrated and dried juice of the leaves of *Aloe barbadensis*. It contains not less than 28% of hydroxyanthracene derivatives expressed as barbaloin and calculated with reference to the dried drug. Dark brown masses, slightly shiny or opaque with a conchoidal fracture, or a brown powder. Partly soluble in boiling water; soluble in hot alcohol. Store in airtight containers. Protect from light.

The BP 2008 lists Curaçao Aloes as an approved synonym.

**Ph. Eur. 6.2** (Aloes, Cape; Aloe capensis). The concentrated and dried juice of the leaves of various species of *Aloe*, mainly *Aloe ferox* and its hybrids. It contains not less than 18% of hydroxyanthracene derivatives expressed as barbaloin and calculated with reference to the dried drug. Dark brown masses tinged with green and having a shiny conchoidal fracture, or a greenish-brown powder. Partly soluble in boiling water; soluble in hot alcohol; practically insoluble in ether. Store in airtight containers. Protect from light.

**USP 31** (Aloe). The dried latex of the leaves of *Aloe barbadensis* (*A. vera*) known in commerce as Curaçao Aloe, or of *A. ferox* and its hybrids, known in commerce as Cape Aloe (*Liliaceae*). It yields not less than 50% of water-soluble extractive. It has a characteristic, somewhat sour and disagreeable, odour. Curaçao Aloe is brownish-black, opaque masses with a fractured, uneven, waxy, and somewhat resinous surface. Cape Aloe is dusty to dark brown irregular masses, the surfaces of which are often covered with a yellowish powder. Its fracture is smooth and glassy.

### Adverse Effects and Precautions

As for Senna, p.1769, although aloes has a more drastic and irritant action.

### Uses and Administration

Aloes is an anthraquinone stimulant laxative (p.1693) but other less toxic drugs are generally preferred.

**Homoeopathy.** Aloes have been used in homoeopathic medicines under the following names: Aloe; Cape aloes; Aloe capensis; Aloe socotrina; Alo. soc.

### Preparations

**BP 2008:** Compound Benzoin Tincture;

**Ph. Eur.:** Aloes Dry Extract, Standardised;

**USP 31:** Compound Benzoin Tincture.

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

**Fr.:** Contre-Coups de l'Abbe Perdreigne; Vulcase; **Ger.:** Dr Janssens Teebohnen†; Krauterlax; Rheogen†; **Pol.:** Biostymina.

**Multi-ingredient:** **Arg.:** Genolaxante; **Austral.:** Herbal Cleanse†; Lexat†; Peritone; **Austria:** Artin; Dragees Neunzehn†; Waldheim Abführdragees forte; Waldheim Abführdragees mild; **Belg.:** Grains de Vals; **Braz.:** Camomila; Paratonic; **Canad.:** Extra Strong Formula 12†; Laxative†; **Chile:** Al-oelax; Bulgaxolax; **Cz.:** Dr Theiss Rheuma Creme†; Dr Theiss Schweden Kräuter; Dr Theiss Schwedenbitter; **Fr.:** Alco-Aloe; Ideolax†; Opobyl; Petites Pilules Carters; Tonilax; **Ger.:** Aristochol†; Chol-Kugelchen Neuz; Cholepan N; Pascoletten N†; **Israel:** Laxative Comp; **Ital.:** Frerichs Malfidass†; Grani di Vals; Lassativi Vetegali; Puntualax†; **Pol.:** Alax; Apinorm; Bioaron C; Boldaloin; Boldovera; Tabulettae Laxantes; **Rus.:** Doktor Mom (Доктор Мом); **S.Afr.:** Helmontskruie; Lewensessens; **Spain:** Moultons Herbal Extract, Tullington Tincture; Vonderkroonessens; **Switz.:** Alofedina; Crislaxo; Cynaro Bilina; Laxante Sanatorium; Nico Hepatocyn†; Opobyl; Pildoras Zeninas; **Switz.:** Padma-Lax; Padmed Laxan; Phytolaxin; Schweden-Mixtur H nouvelle formulation; **UK:** Dual-Lax Normal Strength; Laxative Tablets; Natural Herb Tablets; Out-of-Sorts; Senokot Dual Relief; Sure-Lax (Herbal); **USA:** Diaparene Corn Starch†; Vagisl.

### Aloglutamol

Trometamol Glucaldrate. 2-Amino-2-hydroxymethylpropane-1,3-diol gluconate dihydroxylaluminate.

АЛОГЛУТАМОЛ

$\text{C}_{10}\text{H}_{24}\text{AlNO}_{12} = 377.3$ .

CAS — 13755-41-4.

ATC — A02AB06.

ATC Vet — QA02AB06.

### Profile

Aloglutamol has been used as an antacid (p.1692).

### Preparations

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

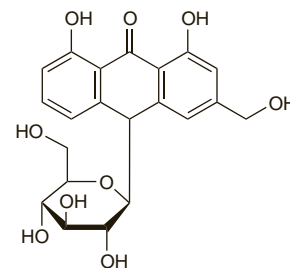
**Mex.:** Sabro.

### Aloin (BAN)

Alloin; Aloina.

АЛОИН

CAS — 5133-19-7; 8015-61-0; 1415-73-2 (barbaloin).



(barbaloin)

### Profile

Aloin is a crystalline substance obtained from aloes (see above). It consists of C-glycosides such as barbaloin. Aloin is an anthraquinone stimulant laxative. Like aloes it is very irritant and other less toxic laxatives are generally preferred. Aloin is used as a flavouring agent.

### Preparations

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

**Chile:** Felaxen†; **UK:** Calsalettes.

**Multi-ingredient:** **Austral.:** Ford Pills; **Braz.:** Pilulas Ross; **Canad.:** Bi-cholate; **Hung.:** Artin†; **Israel:** Laxative; Laxative Comp; **Ital.:** Boldina He; Cuscutine; Grani di Vals; **Mex.:** Redotex; Redotex NF; **S.Afr.:** Brooklax Pills; Doans Backache Pills; SB 3 Triple Action Pills; **Spain:** Laxante Bescansa Aloico; **UK:** Dual-Lax Extra Strong; Modern Herbs Laxative.

### Alosetron Hydrochloride (BANM, USAN, rINN)

Alosetron, Chlorhydrate d'; Alosetroni Hydrochloridum; GR-68755C; Hidrocloruro de alosetron. 2,3,4,5-Tetrahydro-5-methyl-2-[(5-methyl-imidazol-4-yl)methyl]-1H-pyrido[4,3-b]indol-1-one hydrochloride.

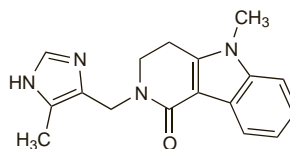
Алосетрона Гидрохлорид

$\text{C}_{17}\text{H}_{18}\text{N}_4\text{O} \cdot \text{HCl} = 330.8$ .

CAS — 122852-42-0 (alosetron); 122852-69-1 (alosetron hydrochloride).

ATC — A03AE01.

ATC Vet — QA03AE01.



(alosetron)

### Adverse Effects

Serious gastrointestinal adverse effects have occurred with alosetron, and as a result, it was withdrawn from the market in the USA and subsequently reintroduced with more restricted indications. These adverse effects include severe constipation leading to obstruction, ileus, perforation, impaction, toxic megacolon, and secondary ischaemia, as well as ischaemic colitis. Fatalities have been reported.

Other gastrointestinal effects reported include abdominal distension and pain, nausea, reflux, and haemorrhoids. Adverse effects reported rarely include cardiac arrhythmias, cholecystitis, altered bilirubin levels, tremor, headache, myalgia, malaise, fatigue, and CNS effects such as confusion, anxiety, depression, and sedation. Urticaria, skin reactions, nail disorders, and alopecia can occur. Hyperglycaemia, hypoglycaemia, and disorders of calcium and phosphate metabolism have been reported.

**Incidence of adverse effects.** The incidence of serious gastrointestinal adverse effects with alosetron has been reviewed.<sup>1</sup> Pooled data from clinical studies suggested that the rate of ischaemic colitis in patients taking alosetron was about 0.15%, or 6.4 cases per 1000 patient-years. Results from postmarketing surveillance (before and after its temporary withdrawal from the

US market) were estimated to represent a rate of 1 case per 1000 patient-years. Serious complications of constipation did not seem to be increased in the population of alosetron users.

- Chang L, *et al.* Incidence of ischemic colitis and serious complications of constipation among patients using alosetron: systematic review of clinical trials and post-marketing surveillance data. *Am J Gastroenterol* 2006; **101**: 1069–79.

### Precautions

Alosetron should be stopped immediately in patients who develop constipation or symptoms of ischaemic colitis such as new or worsening abdominal pain or blood in the stool. Treatment with alosetron should not be resumed in patients who develop ischaemic colitis.

Alosetron should not be used in patients with a history of severe or chronic constipation, intestinal obstruction or stricture, toxic megacolon, or gastrointestinal perforation or adhesions. It is also contra-indicated in patients with a history of ischaemic colitis, impaired intestinal circulation, thrombophlebitis, or hypercoagulable state, and those with current or previous inflammatory bowel disease or diverticulitis.

Alosetron should not be used in those with severe hepatic impairment or a history thereof; it should be used with caution in patients with mild to moderate hepatic impairment. Elderly patients may be at increased risk of severe complications if constipation develops.

### Interactions

Plasma concentrations of alosetron are markedly increased, and its half-life prolonged roughly threefold, when given with fluvoxamine; such a combination should be avoided. Licensed product information recommends that use with other moderate inhibitors of cytochrome P450 isoenzyme CYP1A2 (such as quinolone antibacterials and cimetidine) should be avoided unless clinically necessary, because of the risk of similar interactions. Ketoconazole also increases plasma alosetron concentrations; care should be taken if alosetron is used with this or other potent inhibitors of the CYP3A4 isoenzyme (including clarithromycin, telithromycin, HIV-protease inhibitors, voriconazole, and itraconazole).

### Pharmacokinetics

Alosetron is rapidly absorbed from the gastrointestinal tract; peak plasma concentrations are reached about 1 hour after an oral dose. Plasma concentrations are 30 to 50% lower in men than in women given the same oral dose; clearance is lower in women. Bioavailability is about 60%; the extent and rate of absorption are slightly reduced by food. Plasma protein binding is about 82%. Alosetron is extensively metabolised via cytochrome P450 isoenzymes, particularly CYP1A2, although CYP2C9 and CYP3A4 also play a role. Numerous metabolites are excreted in the urine and faeces; only 6% of a dose is recovered unchanged from the urine. The terminal elimination half-life of alosetron is reported to be about 1.5 hours.

#### References.

- Koch KM, *et al.* Sex and age differences in the pharmacokinetics of alosetron. *Br J Clin Pharmacol* 2002; **53**: 238–42.

### Uses and Administration

Alosetron is a 5-HT<sub>2</sub> antagonist used in the treatment of severe diarrhoea-predominant irritable bowel syndrome (p.1699) in women who have not responded to conventional therapy; effectiveness in men has not been established. It is given orally as the hydrochloride but doses are expressed in terms of the base; alosetron hydrochloride 1.12 mg is equivalent to about 1 mg of alosetron.

The initial dose is the equivalent of alosetron 500 micrograms twice daily for 4 weeks; if tolerated, the dose may then be increased if necessary to 1 mg twice daily. If symptoms are not adequately controlled after 4 weeks of treatment with the higher dose, alosetron should be stopped.

#### References.

- Lembo A, *et al.* Alosetron in irritable bowel syndrome: strategies for its use in a common gastrointestinal disorder. *Drugs* 2003; **63**: 1895–1905.
- Mayer EA, Bradesi S. Alosetron and irritable bowel syndrome. *Expert Opin Pharmacother* 2003; **4**: 2089–98.
- Cremonini F, *et al.* Efficacy of alosetron in irritable bowel syndrome: a meta-analysis of randomized controlled trials. *Neurogastroenterol Motil* 2003; **15**: 79–86.
- Andresen V, Hollerbach S. Reassessing the benefits and risks of alosetron: what is its place in the treatment of irritable bowel syndrome? *Drug Safety* 2004; **27**: 283–92.
- Lembo AJ, *et al.* Effect of alosetron on bowel urgency and global symptoms in women with severe, diarrhoea-predominant irritable bowel syndrome: analysis of two controlled trials. *Clin Gastroenterol Hepatol* 2004; **2**: 675–82.
- Chey WD, *et al.* Long-term safety and efficacy of alosetron in women with severe diarrhoea-predominant irritable bowel syndrome. *Am J Gastroenterol* 2004; **99**: 2195–2203.
- Chang L, *et al.* A dose-ranging, phase II study of the efficacy and safety of alosetron in men with diarrhoea-predominant IBS. *Am J Gastroenterol* 2005; **100**: 115–23.

### Preparations

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

**Arg.:** Lotronex†; **Mex.:** Lminos†; **USA:** Lotronex.

### Basic Aluminium Carbonate

Aluminium Hydroxycarbonate; Aluminum Carbonate, Basic (USAN); Carbonato básico de aluminio.

Основный Углекислый Алюминий

### Profile

Basic aluminium carbonate is a combination of aluminium hydroxide and aluminium carbonate. It is an antacid with general properties similar to those of aluminium hydroxide (below).

Basic aluminium carbonate has also been given orally as a phosphate binder in the treatment of hyperphosphataemia. For a discussion of the choice of phosphate binders, see Renal Osteodystrophy, p.1086.

### Preparations

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

**Multi-ingredient:** **Port.:** Gastropensan.

### Aluminium Formate

Aluminium Triformate.

Муравьинокислый Алюминий; Формиат Алюминия  
Al(CHO<sub>2</sub>)<sub>3</sub>·3H<sub>2</sub>O = 216.1.

CAS — 7360-53-4 (anhydrous aluminium formate).

### Profile

Aluminium formate has astringent properties and has been used in topical preparations for mouth disorders.

### Preparations

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

**Ger.:** Dynexan Zahnfleischtropfen.

**Multi-ingredient:** **Austria:** Cional; **Dynexan;** **Methymint;** **S.Afr.:** Dynexan.

### Aluminium Glycinate

Aluminio, glicinato de; Basic Aluminium Aminoacetate; Dihydroxyaluminium Aminoacetate. (Glycinate-N,O)dihydroxyaluminium hydrate.

Алюминия Глицинат

C<sub>2</sub>H<sub>6</sub>AlNO<sub>4</sub>(+xH<sub>2</sub>O) = 135.1 (anhydrous).

CAS — 13682-92-3 (anhydrous aluminium glycinate); 41354-48-7 (aluminium glycinate hydrate).

ATC — A02AB07.

ATC Vet — QA02AB07.

**Pharmacopoeias.** In *Br.* and *US*.

**BP 2008** (Aluminium Glycinate). A white or almost white, odourless or almost odourless, powder. It contains 34.5 to 38.5% of Al<sub>2</sub>O<sub>3</sub> calculated on the dried substance, and not more than 12% loss of weight on drying. Practically insoluble in water and in organic solvents; it dissolves in dilute mineral acids and in aqueous solutions of alkali hydroxides. A 4% suspension in water has a pH of 6.5 to 7.5.

**USP 31** (Dihydroxyaluminium Aminoacetate). A white, odourless, powder. It may contain small amounts of aluminium oxide and aminoacetic acid. It loses not more than 14.5% of its weight on drying. Insoluble in water and in organic solvents; soluble in dilute mineral acids and in solutions of fixed alkalis. A 4% suspension in water has a pH of 6.5 to 7.5.

### Profile

Aluminium glycinate is an antacid with general properties similar to those of aluminium hydroxide (below). It has been given in doses of up to 1 g by mouth.

### Preparations

**USP 31:** Dihydroxyaluminium Aminoacetate Magma.

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

**Denm.:** Almin.

**Multi-ingredient:** **Arg.:** Dafne; **Austria:** Gastripan; **Belg.:** Alucid; **Chile:** Sinacid; **Denm.:** Alminox; **Fr.:** Acidrine; **Ger.:** Acidrine†; **Gr.:** Novalox; **Indon.:** Acidrine; **Ital.:** Acidrine; **Pol.:** Proacid; **Spain:** Gastroglutal†; **Meteo-nit;** Natrocirol†; **Secrepat.**

Used as an adjunct in: **Austria:** Ambene N; **Indobene;** **Braz.:** Reumix†; **Somalglin;** **Chile:** Butartrol; **Flexono;** **Ger.:** Indomet-ratiopharm m†; **Ital.:** Aspirina 03; **Switz.:** Bonidon; **USA:** Buffex.

## Aluminium Hydroxide

Aluminio hidroksidas; Alumiinihidroksidi; Aluminii Hydroxidum; Aluminii oxidum hydricum; Aluminium Oxidum Hydricum; Aluminium (oxyde d') hydraté; Aluminiumhydroxid; Aluminium Hydroxide; Alumiynum Hidroksit; Glinu wodorotlenek; Hidróxido de aluminio; Hydroxid hlinitý; Wasserhaltiges Aluminiumoxid.

Алюминий Гидроксид

CAS — 21645-51-2 [Al(OH)<sub>3</sub>].

ATC — A02AB01.

ATC Vet — QA02AB01.

**NOTE.** Algeldrate (*USAN*, *pINN*) is defined as a hydrated aluminium hydroxide with the general formula of Al(OH)<sub>3</sub>·xH<sub>2</sub>O.

Compounded preparations of aluminium hydroxide may be represented by the following names:

- Co-magaldrox x/y (*BAN*)—where x and y are the strengths in milligrams of magnesium hydroxide and aluminium hydroxide respectively.

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

**Ph. Eur. 6.2** (Aluminium Oxide, Hydrated; Dried Aluminium Hydroxide BP 2008). It contains the equivalent of 47 to 60% Al<sub>2</sub>O<sub>3</sub>. It is a white or almost white, amorphous powder. Practically insoluble in water; it dissolves in dilute mineral acids and in solutions of alkali hydroxides. Store in airtight containers at a temperature not exceeding 30°.

**Ph. Eur. 6.2** (Aluminium Hydroxide, Hydrated, for Adsorption; Aluminii Hydroxidum Hydricum ad Adsorptionem). A white or almost white, translucent, viscous, colloidal gel. A supernatant may be formed upon standing. A clear or almost clear solution is obtained with alkali hydroxide solutions and with mineral acids. pH 5.5 to 8.5. Store at a temperature not exceeding 30°. Do not allow to freeze.

**USP 31** (Aluminum Hydroxide Gel). A suspension of amorphous aluminium hydroxide in which there is a partial substitution of carbonate for hydroxide. It is a white viscous suspension from which small amounts of clear liquid may separate on standing. It has a pH of between 5.5 and 8.0. Store in airtight containers. Avoid freezing.

**USP 31** (Dried Aluminium Hydroxide Gel). An amorphous form of aluminium hydroxide in which there is a partial substitution of carbonate for hydroxide. It contains the equivalent of not less than 76.5% of Al(OH)<sub>3</sub> and may contain varying quantities of basic aluminium carbonate and bicarbonate. The labelling requirements states that 1 g of dried aluminium hydroxide gel is equivalent to 765 mg of Al(OH)<sub>3</sub>. It is a white, odourless, tasteless, amorphous powder. Insoluble in water and in alcohol; soluble in dilute mineral acids and in solutions of fixed alkali hydroxides. A 4% aqueous dispersion has a pH of not more than 10.0. Store in airtight containers.

### Adverse Effects and Precautions

Aluminium hydroxide, like other aluminium compounds, is astringent and may cause constipation; large doses can cause intestinal obstruction.

Excessive doses, or even normal doses in patients with low-phosphate diets, may lead to phosphate depletion accompanied by increased bone resorption and hypercalciuria with the risk of osteomalacia.

Aluminium salts are not, in general, well absorbed from the gastrointestinal tract, and systemic effects are therefore rare in patients with normal renal function. However, care is necessary in patients with chronic renal impairment: osteomalacia or adynamic bone disease, encephalopathy, dementia, and microcytic hypochromic anaemia have been associated with aluminium accumulation in such patients given large doses of aluminium hydroxide as a phosphate-binding agent. Similar adverse effects have also been associated with the aluminium content of dialysis fluids.

Aluminium hydroxide used as an adjuvant in adsorbed vaccines has been associated with the formation of granulomas.

**Children.** For the suggestion that aluminium-containing antacids should not be used in infants, see Toxicity, below.

**Porphyria.** Aluminium hydroxide is considered by some to be unsafe in patients with porphyria because it has been shown to be porphyrinogenic in *animals*.

UK licensed product information states that aluminium hydroxide may be unsafe in patients with porphyria undergoing haemodialysis.

**Toxicity.** References to aluminium toxicity in dialysis patients and the possible association between aluminium ingestion and Alzheimer's disease are included under Aluminium (see p.2254).

Aluminium accumulation does not generally appear to be significant in patients with normal renal function taking therapeutic doses of aluminium-containing antacids, and there is little evidence that such antacids are a risk factor for Alzheimer's disease.<sup>1</sup> Elevated plasma-aluminium concentrations have been reported in infants with normal renal function given aluminium-containing antacids but there were no obvious signs of toxicity.<sup>2</sup> There have, however, been reports of phosphate depletion and rickets in a few infants caused by the use of antacids containing magnesium and aluminium hydroxides. In these cases the antacid had been started within a few months of birth and continued for up to 8 months. In reports that described a total of 3 infants,<sup>3,4</sup> the authors suggested that the use of soya-based infant feeding formulas, the phytates of which can interfere with mineral ab-