

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

**Ph. Eur. 6.2** (Magnesium Acetate Tetrahydrate). Colourless crystals or a white or almost white, crystalline powder. Freely soluble in water and in alcohol. A 5% solution in water has a pH of 7.5 to 8.5.

**Equivalence.** Each g of magnesium acetate (tetrahydrate) represents about 4.7 mmol of magnesium and the equivalent of bicarbonate. Magnesium acetate (tetrahydrate) 8.83 g is equivalent to about 1 g of magnesium.

### Magnesium Ascorbate

Magnesium, ascorbato de.

$(C_6H_7O_6)_2Mg = 374.5$ .

CAS — 15431-40-0.

**Equivalence.** Each g of magnesium ascorbate (anhydrous) represents about 2.7 mmol of magnesium. Magnesium ascorbate (anhydrous) 15.4 g is equivalent to about 1 g of magnesium.

### Magnesium Aspartate

Bázisos magnézium-aszpartát-dihidrát; Magnesii aspartas dihydricus; Magnesii Hydrogenoaspartas Dihydricus; Magnesium, aspartato de; Magnésium (aspartate de) dihydrát; Magnesium Aspartate Dihydrate; Magnesiumaspartaattidihydraatti; Magnesiumaspartatdihydrát; Magnesium-hydrogen-aspartát dihydrát; Magnio aspartatas dihidratas. Magnesium aminosuccinate dihydrate; Magnesium di[(S)-2-aminohydrogenobutane-1,4-dioate].

$C_8H_{12}MgN_2O_8 \cdot 2H_2O = 324.5$ .

CAS — 18962-61-3 (anhydrous magnesium aspartate); 2068-80-6 (anhydrous magnesium aspartate or magnesium aspartate dihydrate); 7018-07-7 (magnesium aspartate tetrahydrate);

ATC — A12CC05.

ATC Vet — QA12CC05.

**Pharmacopoeias.** *Eur.* (see p.vii) includes the dihydrate form of the (S)-aspartate. *Ger.* includes the tetrahydrate form of the racemic aspartate.

**Ph. Eur. 6.2** (Magnesium Aspartate Dihydrate; Magnesium Aspartate BP 2008). A white or almost white, crystalline powder or colourless crystals. Freely soluble in water. A 2.5% solution in water has a pH of 6.0 to 8.0.

**Equivalence.** Each g of magnesium aspartate (dihydrate) represents about 3.1 mmol of magnesium. Magnesium aspartate (dihydrate) 13.4 g is equivalent to about 1 g of magnesium.

Each g of magnesium aspartate (tetrahydrate) represents about 2.8 mmol of magnesium. Magnesium aspartate (tetrahydrate) 14.8 g is equivalent to about 1 g of magnesium.

### Magnesium Chloride

Chlorid hořečnatý; Chlorure de Magnésium Cristallisé; Cloreto de Magnésio; E511; Magnesii chloridum; Magnesium, cloruro de; Magnesium Chloratum; Magnésium, chlorure de; Magnesiumklorid; Magnesiumkloridi; Magnézium-klorid; Magnezu chlorek; Magnio chloridas.

$MgCl_2 \cdot xH_2O = 95.21$  (anhydrous); 203.3 (hexahydrate).

CAS — 7786-30-3 (anhydrous magnesium chloride); 7791-18-6 (magnesium chloride hexahydrate).

ATC — A12CC01; B05XA11.

ATC Vet — QA12CC01; QB05XA11.

**Pharmacopoeias.** *Eur.* (see p.vii), *US*, and *Viet.* include the hexahydrate.

*Eur.* also includes magnesium chloride 4.5-hydrate.

**Ph. Eur. 6.2** (Magnesium Chloride Hexahydrate; Magnesii Chloridum Hexahydricum). Colourless, hygroscopic crystals. Very soluble in water; freely soluble in alcohol. Store in airtight containers.

**Ph. Eur. 6.2** (Magnesium Chloride 4.5-Hydrate; Magnesii Chloridum 4.5-Hydricum; Partially Hydrated Magnesium Chloride BP 2008). A white or almost white, hygroscopic, granular powder. Very soluble in water; freely soluble in alcohol. Store in airtight containers.

**USP 31** (Magnesium Chloride). Colourless, odourless, deliquescent flakes or crystals, which lose water when heated to 100° and lose hydrochloric acid when heated to 110°. Very soluble in water; freely soluble in alcohol. pH of a 5% solution in water is between 4.5 and 7.0. Store in airtight containers.

**Equivalence.** Each g of magnesium chloride (hexahydrate) represents about 4.9 mmol of magnesium and 9.8 mmol of chloride. Magnesium chloride (hexahydrate) 8.36 g is equivalent to about 1 g of magnesium.

### Magnesium Gluceptate

Magnesium, glucoheptonato de; Magnesium Glucoheptonate.

$C_{14}H_{26}MgO_{16} = 474.7$ .

The symbol † denotes a preparation no longer actively marketed

**Equivalence.** Each g of magnesium gluceptate (anhydrous) represents about 2.1 mmol of magnesium. Magnesium gluceptate (anhydrous) 19.5 g is equivalent to about 1 g of magnesium.

### Magnesium Gluconate

Magnesii gluconas; Magnesium, gluconato de; Magnésium, gluconate de. Magnesium D-gluconate hydrate.

$C_{12}H_{22}MgO_{14} \cdot (+xH_2O) = 414.6$  (anhydrous).

CAS — 3632-91-5 (anhydrous magnesium gluconate); 59625-89-7 (magnesium gluconate dihydrate).

ATC — A12CC03.

ATC Vet — QA12CC03.

**Pharmacopoeias.** In *Eur.* (see p.vii), which allows either anhydrous or hydrated forms, and in *US*, which allows either anhydrous or the dihydrate.

**Ph. Eur. 6.2** (Magnesium Gluconate). A white or almost white, amorphous, hygroscopic, crystalline or granular powder. Freely soluble in water; slightly soluble in alcohol; very slightly soluble in dichloromethane. Store in airtight containers.

**USP 31** (Magnesium Gluconate). Colourless crystals or a white powder or granules. Is odourless. Freely soluble in water; very slightly soluble in alcohol; insoluble in ether. pH of a 5% solution in water is between 6.0 and 7.8.

**Equivalence.** Each g of magnesium gluconate (anhydrous) represents about 2.4 mmol of magnesium. Magnesium gluconate (anhydrous) 17.1 g is equivalent to about 1 g of magnesium.

### Magnesium Glycerophosphate

Glycerofosforečnan hořečnatý; Magnesii glycerophosphas; Magnesium, glicerofosfato de; Magnesium Glycerinophosphate; Magnésium, glycérophosphate de; Magnesiumglycerofosfat; Magnesiumglycerofosfaatti; Magnézium-glicerofoszfát; Magnio glicerofosfatas.

$C_3H_7MgO_6P \cdot (+xH_2O) = 194.4$  (anhydrous).

CAS — 927-20-8 (anhydrous magnesium glycerophosphate).

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

**Ph. Eur. 6.2** (Magnesium Glycerophosphate). A mixture, in variable proportions, of magnesium (R,S)-2,3-dihydroxypropyl phosphate and magnesium 2-hydroxy-1-(hydroxymethyl)ethyl phosphate. It may be hydrated. A white or almost white, hygroscopic powder. Practically insoluble in alcohol; dissolves in dilute solutions of acids. Store in airtight containers.

**Equivalence.** Each g of magnesium glycerophosphate (anhydrous) represents about 5.1 mmol of magnesium. Magnesium glycerophosphate (anhydrous) 8 g is equivalent to about 1 g of magnesium.

### Magnesium Lactate

Magnesii lactas; Magnesium, lactato de; Magnésium, lactate de; Magnesiumlakttaatti; Magnesiumlaktat; Magnesium-laktát; Magnezu mleczan. Magnesium 2-hydroxypropionate.

$C_6H_{10}MgO_6 = 202.4$ .

CAS — 18917-93-6.

ATC — A12CC06.

ATC Vet — QA12CC06.

**Pharmacopoeias.** *Eur.* (see p.vii) includes the dihydrate.

**Ph. Eur. 6.2** (Magnesium Lactate Dihydrate; Magnesii Lactas Dihydricus). A white or almost white, crystalline or granular powder. Slightly soluble in water; soluble in boiling water; practically insoluble in alcohol. A 5% solution in water has a pH of 6.5 to 8.5.

**Equivalence.** Each g of magnesium lactate (anhydrous) represents about 4.9 mmol of magnesium. Magnesium lactate (anhydrous) 8.33 g is equivalent to about 1 g of magnesium.

### Magnesium Phosphate

Magnesium, fosfato de; Tribasic Magnesium Phosphate; Trimagnesium Phosphate.

$Mg_3(PO_4)_2 \cdot 5H_2O = 352.9$ .

CAS — 7757-87-1 (anhydrous magnesium phosphate); 10233-87-1 (magnesium phosphate pentahydrate).

ATC — B05XA10.

ATC Vet — QB05XA10.

**Pharmacopoeias.** In *US*.

*Ger.* includes Magnesium Hydrogen Phosphate Trihydrate ( $MgHPO_4 \cdot 3H_2O = 174.3$ ).

**USP 31** (Magnesium Phosphate). A white, odourless, powder. Almost insoluble in water; readily soluble in dilute mineral acids.

**Equivalence.** Each g of magnesium phosphate (pentahydrate) represents about 8.5 mmol of magnesium and 5.7 mmol of phosphate. Magnesium phosphate (pentahydrate) 4.84 g is equivalent to about 1 g of magnesium.

### Magnesium Pidolate (*pINN*)

Magnesii pidolas; Magnésium, pidolate de; Magnesium Pyroglutamate; Magnesiumpidolaatti; Magnesiumpidolat; Magnesiumpidolát; Magnézium-pidolát; Magnio pidolatas; Pidolate de Magnesium; Pidolato de magnesio. Magnesium 5-oxopyrrolidine-2-carboxylate.

Магния Пидолат

$(C_5H_6NO_3)_2Mg = 280.5$ .

CAS — 62003-27-4.

ATC — A12CC08.

ATC Vet — QA12CC08.

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

**Ph. Eur. 6.2** (Magnesium Pidolate). An amorphous, white or almost white, hygroscopic powder. Very soluble in water; practically insoluble in dichloromethane; soluble in methyl alcohol. A 10% solution in water has a pH of 5.5 to 7.0. Store in airtight containers.

**Equivalence.** Each g of magnesium pidolate (anhydrous) represents about 3.6 mmol of magnesium. Magnesium pidolate (anhydrous) 11.5 g is equivalent to about 1 g of magnesium.

### Magnesium Sulfate

S18; Epsom Salts; Magnesii sulfas; Magnesium, sulfato de; Magnésium, sulfate de; Magnesium Sulphate; Magnesiumsulfatti; Magnesiumsulfat; Magnézium-szulfát; Magnezu siarczan; Magnio sulfatas; Sal Amarum; Sel Anglais; Sel de Sedlitz; Sírán hořečnatý.

$MgSO_4 \cdot xH_2O = 120.4$  (anhydrous); 246.5 (heptahydrate).

CAS — 7487-88-9 (anhydrous magnesium sulfate); 10034-99-8 (magnesium sulfate heptahydrate).

ATC — A06AD04; A12CC02; B05XA05; D11AX05; V04CC02.

ATC Vet — QA06AD04; QA12CC02; QB05XA05; QD11AX05; QV04CC02.

**Pharmacopoeias.** *Chin.*, *Eur.* (see p.vii), *Int.*, *Jpn.* and *Viet.* include the heptahydrate. *US* allows the dried form, the monohydrate, or the heptahydrate form.

The dried form is included in *Br.*

**Ph. Eur. 6.2** (Magnesium Sulphate Heptahydrate; Magnesii Sulfas Heptahydricus). A white or almost white, crystalline powder or brilliant, colourless crystals. Freely soluble in water; very soluble in boiling water; practically insoluble in alcohol.

The BP 2008 gives Epsom Salts as an approved synonym.

**BP 2008** (Dried Magnesium Sulphate). A white odourless or almost odourless powder, prepared by drying magnesium sulfate (heptahydrate) at 100° until it has lost about 25% of its weight; it contains 62 to 70% of  $MgSO_4$ . Freely soluble in water; more rapidly soluble in hot water.

The BP gives Dried Epsom Salts as an approved synonym.

**USP 31** (Magnesium Sulfate). It is the dried form, monohydrate, or the heptahydrate. Small, colourless crystals, usually needle-like. It effloresces in warm dry air. Soluble 1 in 0.8 of water and 1 in 0.5 of boiling water; freely but slowly soluble 1 in 1 of glycerol; sparingly soluble in alcohol. pH of a 5% solution in water is between 5.0 and 9.2.

**Equivalence.** Each g of magnesium sulfate (heptahydrate) represents about 4.1 mmol of magnesium. Magnesium sulfate (heptahydrate) 10.1 g is equivalent to about 1 g of magnesium.

### Adverse Effects

Excessive parenteral doses of magnesium salts lead to the development of hypermagnesaemia, important signs of which are respiratory depression and loss of deep tendon reflexes, both due to neuromuscular blockade. Other symptoms of hypermagnesaemia may include nausea, vomiting, flushing of the skin, thirst, hypotension due to peripheral vasodilatation, drowsiness, confusion, slurred speech, double vision, muscle weakness, bradycardia, coma, and cardiac arrest.

Hypermagnesaemia is uncommon after oral magnesium salts except in the presence of renal impairment. Ingestion of magnesium salts may cause gastrointestinal irritation and watery diarrhoea.

**Effects on the gastrointestinal tract.** There are isolated reports of paralytic ileus in patients receiving magnesium salts.<sup>1,2</sup> Delayed intestinal transit has also been reported in a neonate who received an intramuscular overdose of magnesium.<sup>3</sup> See also Pregnancy, under Precautions, below.

- Hill WC, et al. Maternal paralytic ileus as a complication of magnesium sulfate tocolysis. *Am J Perinatol* 1985; **2**: 47–8.
- Golzarian J, et al. Hypermagnesaemia-induced paralytic ileus. *Dig Dis Sci* 1994; **39**: 1138–42.
- Narchi H. Neonatal hypermagnesaemia: more causes and more symptoms. *Arch Pediatr Adolesc Med* 2001; **155**: 1074.