

- 66 Duong N-H, *et al.* A homogeneity study using NIR spectroscopy: tracking magnesium stearate in Bohle bin-blender. *Drug Dev Ind Pharm* 2003; 29(6): 679–687.
- 67 Swaminathan V, *et al.* Measurement of the surface energy of lubricated pharmaceutical powders by inverse gas chromatography. *Int J Pharm* 2006; 312(1–2): 158–165.
- 68 Das SC, *et al.* Use of surface energy distributions by inverse gas chromatography to understand mechanofusion processing and functionality of lactose coated with magnesium stearate. *Eur J Pharm Sci* 2011; 43(4): 325–333.
- 69 Zhou Q, *et al.* Characterization of the surface properties of a model pharmaceutical fine powder modified with a pharmaceutical lubricant to improve flow via a mechanical dry coating approach. *J Pharm Sci* 2011; 100(8): 3421–3430.
- 70 Zhou Q, *et al.* Investigation of the extent of surface coating via mechanofusion with varying additive levels and the influences on bulk powder flow properties. *Int J Pharm* 2011; 413(1–2): 36–43.
- 71 Faqih AM, *et al.* Effect of moisture and magnesium stearate concentration on flow properties of cohesive granular materials. *Int J Pharm* 2007; 336(2): 338–345.
- 72 Wurster DE, *et al.* The influence of magnesium stearate on the Hiestand tableting indices and other related mechanical properties of maltodextrins. *Pharm Dev Technol* 2005; 10(4): 461–466.
- 73 Likitlersuang S, *et al.* The effect of binary mixture composition and magnesium stearate concentration on the Hiestand tableting indices and other related mechanical properties. *Pharm Dev Technol* 2007; 12(5): 533–541.
- 74 He X, *et al.* Mechanistic study of the effect of roller compaction and lubricant on tablet mechanical strength. *J Pharm Sci* 2007; 96(5): 1342–1355.
- 75 Kushner J IV, *et al.* Examining the impact of excipient material property variation on drug product quality attributes: A quality-by-design study for a roller compacted, immediate release tablet. *J Pharm Sci* 2011; 100(6): 2222–2239.
- 76 Ebba F, *et al.* Stress relaxation studies of granules as a function of different lubricants. *Eur J Pharm Biopharm* 2001; 52(2): 211–220.
- 77 Guchardi R, *et al.* Influence of fine lactose and magnesium stearate on low dose dry powder inhaler formulations. *Int J Pharm* 2008; 348(1–2): 10–17.
- 78 *Food Chemicals Codex*. [online] Bethesda, MD: United States Pharmacopeia. <http://publications.usp.org> (accessed 31 March 2017).

20 General References

- Bohidar NR, *et al.* Selecting key pharmaceutical formulation factors by regression analysis. *Drug Dev Ind Pharm* 1979; 5: 175–216.
- Butcher AE, Jones TM. Some physical characteristics of magnesium stearate. *J Pharm Pharmacol* 1972; 24: 1P–9P.
- European Directorate for the Quality of Medicines and Healthcare (EDQM). European Pharmacopoeia – State Of Work Of International Harmonisation. *Pharmeuropa* 2011; 23(4): 713–714. www.edqm.eu/site/-614.html (accessed 2 December 2011).
- Ford JL, Rubinstein MH. An investigation into some pharmaceutical interactions by differential scanning calorimetry. *Drug Dev Ind Pharm* 1981; 7: 675–682.
- Johansson ME. Granular magnesium stearate as a lubricant in tablet formulations. *Int J Pharm* 1984; 21: 307–315.
- Jones TM. The effect of glidant addition on the flowability of bulk particulate solids. *J Soc Cosmet Chem* 1970; 21: 483–500.
- Pilpel N. Metal stearates in pharmaceuticals and cosmetics. *Manuf Chem Aerosol News* 1971; 42(10): 37–40.
- York P. Tablet lubricants. In: Florence AT, ed. *Materials Used in Pharmaceutical Formulation*. London: Society of Chemical Industry, 1984: 37–70.
- Zanowiak P. Lubrication in solid dosage form design and manufacture. In: Swarbrick J, Boylan JC, eds. *Encyclopedia of Pharmaceutical Technology*. 9. New York: Marcel Dekker, 1990: 87–112.

21 Authors

LV Allen Jr, PE Luner.

22 Date of Revision

4 May 2017.

Magnesium Sulfate

1 Nonproprietary Names

BP: Dried Magnesium Sulfate

USP–NF: Magnesium Sulfate

2 Synonyms

Epsom salts; E518; magnesii sulphas; magnesium sulphate; sulphuric acid, magnesium salt.

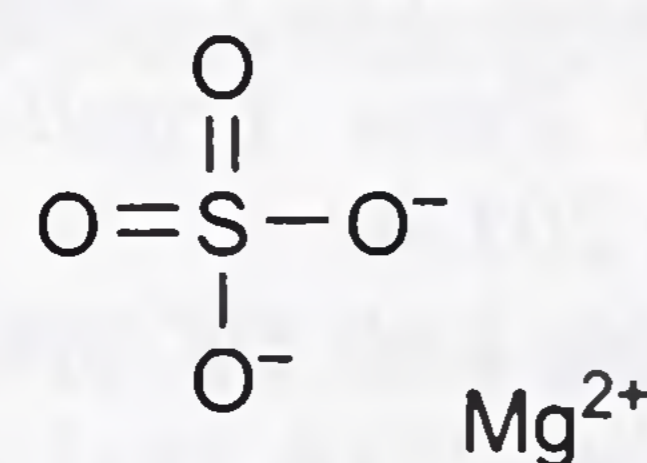
3 Chemical Name and CAS Registry Number

Anhydrous magnesium sulfate [7487-88-9]

4 Empirical Formula and Molecular Weight

MgSO₄ 120.37

5 Structural Formula



6 Functional Category

Vaccine adjuvant.

7 Applications in Pharmaceutical Formulation or Technology

Magnesium sulfate is used in solid oral dosage forms. It has also been used as an adjuvant during general anaesthesia.^(1,2)

8 Description

Magnesium sulfate occurs as a colorless crystal or a granular crystalline powder and has a saline bitter taste. It effloresces in warm dry air.

9 Pharmacopeial Specifications

See Table I.

10 Typical Properties

Density 2.65 g/cm³

Bulk density 600 kg/m³

M