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## Potassium Magnesium Sulfate: Langbeinite

**Module 3.3-15** Langbeinite is a unique source of plant nutrition since three essential nutrients are naturally combined into one mineral. It provides a readily available supply of K, Mg, and S to growing plants.

**Production.** Langbeinite is a distinctive geological material found in only a few locations in the world. Commercial supplies of langbeinite come from underground mines near Carlsbad, New Mexico (USA), which were first commercially developed in the 1930s. These deposits were formed millions of years ago when a variety of salts, including langbeinite, were left behind after the evaporation of ancient ocean beds. These salt deposits were buried deep beneath hundreds of meters of sediment. The langbeinite deposit is currently mined with large boring machines, washed to remove impurities, and then crushed to various particle sizes. Langbeinite is considered a potash (or K-containing) fertilizer, even though it also contains valuable Mg and S. Traces of iron oxide impurities give some langbeinite particles a reddish tint.

### Chemical Properties

Chemical formula:	$K_2SO_4 \cdot 2MgSO_4$
$K_2O$ content:	21 to 22%
Mg content:	10 to 11%
S content:	21 to 22%
Water solubility (20°C)	240 g/L
Solution pH:	approx. 7



**Agricultural Use.** Langbeinite is a popular fertilizer, especially where several nutrients are needed to provide adequate plant nutrition. It has an advantage of having K, Mg, and S all contained within a single particle, which helps provide a uniform distribution of nutrients when it is spread in the field. Due to economics, langbeinite may not be recommended to meet the entire K requirement of a crop. Instead, application rate may be based on the need for Mg and/or S.



*Underground mining operation*

Langbeinite is totally water soluble, but is slower to dissolve than some other common K fertilizers because the particles are denser than other K sources. Therefore, it is not suitable for dissolving and application through irrigation systems unless finely ground. It has a neutral pH, and does not contribute to soil acidity or alkalinity. This differs from other common sources of Mg (such as dolomite) which will increase soil pH and from elemental S or ammonium sulfate which will lower the soil pH.

It is frequently used in situations where a fertilizer free of  $Cl^-$  is desirable, such as with crops sensitive to  $Cl^-$  (some vegetables and certain tree crops). Langbeinite is a nutrient-dense fertilizer with a relatively low

overall salt index. Particular sources of langbeinite have been certified for use in organic crop production in some countries.

**Management Practices.** Langbeinite has no restrictions for environmental or nutritional use when used at typical agronomic rates. One form of langbeinite is sold as a feed grade dietary source of K, Mg, and S for animals and poultry. All three of these nutrients are required for animal nutrition and each has a specific metabolic role required for optimal animal health. This feed material is recognized as safe by government agencies. As with all plant nutrients, best management practices should be observed to properly utilize this resource. A particular particle size should be matched with the specific need.

**Non-agricultural Use.** There are no major industrial applications for langbeinite outside of agriculture.

**Source:** <http://www.ipni.net/specifics>