# Magnesia in Place of Lime (Hugot)

Magnesia (MgO) to replace a share of the hydrated lime used in clarification on an equal-alkalinity basis (Hugot ch. 28), and the lime still needed.

**Method:** Hugot; Handbook of Cane Sugar Engineering; ...

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Crushing rate | 100.00 | t/h |
| Hydrated lime $Ca(OH)_2$ per tonne cane (not CaO) | 0.80000 | kg/t |
| Share of the alkalinity supplied by magnesia<br>Hugot: 50–80 % is best. | 50.000 | % |
| MgO content of the magnesia product<br>100 % for pure MgO; enter the product's assay to get the product mass. | 100.00 | % |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Magnesia product per tonne cane | 0.21759 | kg/t |
| Hydrated lime still needed per tonne cane | 0.40000 | kg/t |
| Magnesia product per hour | 21.759 | kg/h |
| Hydrated lime replaced by 1 kg MgO | 1.8383 | |

**Notes for this case**

- Magnesia reacts slowly: give it about 20 minutes and use a grade finer than 325 mesh. It cuts scale in the evaporators.

## Formula and method

$$k = \frac{M_{Ca(OH)_2}}{M_{MgO}}, \quad d_M = \frac{x\, d_L}{k\, p_M}, \quad {d_L}' = (1 - x) d_L$$

### Variables

| | | |
|---|---|---|
| $A$ | Crushing rate | kg/s |
| $d_L$ | Hydrated lime per tonne cane | kg/kg |
| $x$ | Share of the alkalinity supplied by magnesia | - |
| $d_M$ | MgO per tonne cane | kg/kg |
| ${d_L}'$ | Hydrated lime still needed per tonne cane | kg/kg |
| $\dot{m}_M$ | MgO per hour | kg/s |
| $k$ | Hydrated lime replaced by 1 kg MgO | - |
| $p_M$ | MgO content of the magnesia product | - |

### Method and standards

Equal-alkalinity replacement.

### Assumptions and limits

- The lime dose is hydrated lime, $Ca(OH)_2$. A dose quoted as CaO (as in the milk-of-lime calculator) must first be multiplied by 74.09/56.08 = 1.32.
- The magnesia product mass allows for its MgO content p_M; at 100 % it is pure MgO.

### References

- Hugot
- Handbook of Cane Sugar Engineering

- 3rd ed. (Elsevier, 1986)
- ch. 28
- magnesia
- pp. 429–430
- Equivalence by molar mass: 1 MgO ≡ 1 $Ca(OH)_2$

## Report details

| | |
|---|---|
| Report reference | FCC-W7FW-1K1N (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:45 UTC |
| Calculator | Magnesia in Place of Lime (Hugot) |
| Method last reviewed | 13 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/sugar-ethanol/clarification/magnesia-lime-replacement

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.