AlkaMilk™

MAGNESIUM HYDROXIDE
POWDERS & SLURRIES

PRODUCT PROFILE & SPECIFICATIONS

High-purity alkalinity for water and wastewater treatment



AlkaMilk magnesium hydroxide powders and slurries provide acid neutralization, pH control and alkalinity supplementation. Select standard fine powder, ultra-fine powder or slurry to suit the treatment process.

✓ pH control | ✓ Alkalinity support | ✓ H_2S release management | ✓ Process flexibility

PRODUCT IDENTITY

Chemical formula	$Mg(OH)_2$
CAS number	1309-42-8
Molecular weight	58.32 g/mol
Appearance	White powder or slurry

Aqueous product pH: 10 – 11
(OCPE bulletin; test conditions to be confirmed).
This is ***not*** the wastewater operating setpoint.

PACKAGING OPTIONS

Powder – 25-kg (55.1-lb) Bags



- ✓ 25-kg (55.1-lb) bags
- ✓ 40 bags per pallet
- ✓ Standard (fine) – 4 µm
- ✓ Ultra-fine – 1 µm

Slurry – 275-Gallon Totes or Mini-Bulk



- ✓ 275-gallon totes
- ✓ Mini-bulk delivery

POWDER CHEMICAL DATA [1]

Parameter	Typical	Specification
Magnesium Hydroxide ($Mg(OH)_2$), %	98.7	98.0 min.
Magnesium Oxide (MgO), % (equivalent)	68.1	67.7 min.
Calcium Oxide (CaO), %	0.63	0.70 max.
Silicon Oxide (SiO_2), %	0.20	0.35 max.
Iron Oxide (Fe_2O_3), %	0.10	0.20 max.
Aluminum Oxide (Al_2O_3), %	0.06	0.15 max.
Chloride (as Cl), %	0.30	0.35 max.
Sulfate (reported as SO_3), %	0.01	0.25 max.
Loss on ignition, %	31	29.0 min.
Free moisture, %	0.34	2.0 max.

POWDER PHYSICAL DATA [1]

Parameter	Typical	Specification
Surface area, m^2/g	13	7 – 18
Passing 325 mesh, %	99.9	99.5 min.
Median particle size – standard (fine), µm	4	2 – 8
Median particle size – ultra-fine, µm	1.0	0.8 – 2.0
Loose bulk density, lb/ft^3	22	—
Tapped bulk density, lb/ft^3	36	—

Values reproduce OCPE powder data. MgO equivalent is an analytical expression, not additional MgO content. Powder values do not define delivered slurry properties; obtain grade-specific COA/SDS.

Reference

[1] OCPE, supplied AlkaMilk Product Bulletin, chemical and physical specifications.

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CHEMISTRY & APPLICATION ENGINEERING

Alkalinity on demand. A defined role in process control.



HOW IT WORKS

Magnesium hydroxide is a sparingly soluble base. It dissolves to release hydroxide ions, which neutralize acidity and add alkalinity to the wastewater.

$$Mg(OH)_{2(s)} \rightleftharpoons Mg^{2+} + 2\,OH^-$$

$$Mg(OH)_2 + 2\,H^+ \rightarrow Mg^{2+} + 2\,H_2O$$

The sparingly soluble solid dissolves as acidity is consumed. Particle size, mixing, temperature, contact time and wastewater chemistry govern useful reaction rate. Measure pH and total alkalinity separately.

APPLICATIONS AND ENGINEERING CONSIDERATIONS

APPLICATION	ENGINEERING ROLE	VERIFY IN THE FIELD
Collection systems & lift stations	Raise liquid pH to reduce the volatile H_2S fraction.	Liquid pH, dissolved total sulfide, headspace H_2S, downstream rebound.
Biological treatment	Replace alkalinity consumed during nitrification.	Ammonia-N, NO_x-N, alkalinity, pH, DO, SRT and temperature.
Industrial neutralization	Neutralize acid loads and support metal-hydroxide precipitation.	Titration curve, reaction time, dissolved metals and sludge separation.
Anaerobic digestion	Supplement buffering where alkalinity is deficient.	Volatile acids/alkalinity balance, pH, gas production and loading.
Nutrient recovery	Supply magnesium where controlled struvite recovery is intended.	Mg:N:P balance, pH, recovery and unwanted scaling.

ODOR & CORROSION

Higher pH shifts dissolved sulfide toward HS^- and lowers H_2S volatilization. It does not itself oxidize or remove total sulfide. Confirm downstream control and corrosion indicators.

NUTRIENT SUPPORT

Alkalinity supports biological ammonia oxidation; AlkaMilk is not a stand-alone nitrogen-removal process. Magnesium can support phosphate recovery only under suitable chemistry and solids-separation conditions.

OPERATING WINDOW

Select a process-specific pH target. Product pH 10-11 is not a treatment target or guaranteed upper limit. Avoid high-pH biomass stress and unintended carbonate/struvite deposition.

References: [2] US EPA, *Municipal Nutrient Removal Technologies Reference Document (2008), alkalinity/nitrification.* [3] Martin Marietta Magnesia Specialties, Wastewater *Treatment technical resources (magnesiaspecialties.com). General chemistry guidance; confirm AlkaMilk grade and site performance.*

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DOSING BASIS & ALKALI COMPARISON

Size the feed on useful alkalinity—not product volume alone.



THEORETICAL ALKALINITY CAPACITY

1 kg pure $Mg(OH)_2$ supplies 1.716 kg alkalinity as $CaCO_3$ equivalent.

At **98.7% assay:** **1.694** kg $CaCO_3$ equivalent/kg powder before utilization losses.

Calculated from molecular weights; capacity is not instantaneous reaction rate.

PURE ACTIVE MATERIAL	kg $CaCO_3$ EQUIVALENT PER kg	FEED CONSIDERATIONS
$Mg(OH)_2$	1.716	Powder or slurry; suspend solids and allow reaction time.
$Ca(OH)_2$	1.351	Solids handling; assess scale and sludge.
NaOH	1.251	Dissolved rapid-response alkali; control overshoot and corrosive handling.
$NaHCO_3$	0.596	Soluble bicarbonate; larger mass for equal theoretical capacity.

Compare delivered purity, concentration, useful recovery, density, freight, equipment and sludge costs. These are pure-active mass comparisons, not gallon-for-gallon replacement ratios.

FEED CALCULATION

Alkalinity load (kg/day as $CaCO_3$) = Q (ML/day) × ΔAlk (mg/L as $CaCO_3$)

Powder feed (kg/day) = load ÷ (1.716 × assay × utilization)

Slurry feed (kg/day) = load ÷ (1.716 × solids fraction × dry-solids assay × utilization)

Liquid feed (L/hour) = slurry kg/day ÷ (24 × density in kg/L)

Use decimal fractions. If the slurry assay already reports $Mg(OH)_2$ on an as-delivered basis, use that active fraction directly; do not multiply by solids twice.

ILLUSTRATIVE POWDER EXAMPLE

Q = 1.0 ML/day; alkalinity addition = 50 mg/L; assay = 0.987; assumed utilization = 0.90.

Load = 50 kg/day as $CaCO_3$.

Powder feed = 50 ÷ (1.716 × 0.987 × 0.90) = **32.8 kg/day.**

Illustration only; establish dose by titration and pilot testing.



NITRIFICATION ALKALINITY BALANCE [2]

Theoretical **consumption:** 7.14 kg as $CaCO_3$ per kg NH_4-N oxidized. Denitrification can recover about 3.57 kg as $CaCO_3$ per kg NO_3-N reduced.

Include influent alkalinity, acid loads and desired residual in the site balance.

[2] US EPA, Municipal Nutrient Removal Technologies Reference Document, 2008. Alkali equivalents: stoichiometric calculations (100.09/MW for divalent bases; 50.04/MW for monovalent bases).

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FEED SYSTEMS, HANDLING & QUALITY

Reliable alkalinity depends on reliable solids delivery.



STORAGE & FEED DESIGN

POWDER

- Keep dry in closed packaging; provide dust collection and controlled wetting. Prevent bridging and protect workers during bag unloading.

SLURRY

- Maintain a homogeneous suspension using grade-appropriate agitation. Design tanks and piping to avoid settled beds and dead legs.

METERING

- Select slurry-compatible pumps, valves and tubing. Provide flushing, cleanouts, calibration checks and backflow prevention; verify compatibility and equipment load ratings.

CONTROL

- Pace feed to flow or demand with downstream pH/alkalinity feedback. Allow mixing and reaction lag before adjusting the setpoint.

COMMISSIONING CHECK / ACCEPTANCE BASIS

Item	Acceptance Basis
Product verification	COA, current SDS, correct powder grade or slurry formulation.
Feed calibration	Weighed mass or calibrated volume at actual solids and density.
Reaction performance	Titration/contact-time tests at representative temperature and load.
Process performance	pH and residual alkalinity targets; ammonia, sulfide or metals endpoints.
Solids impact	Settling, line fouling, scale and sludge/ dewatering observations.
Alarm response	Low level, loss of agitation, pump failure and high/low process pH.

SAFETY & PRODUCT CLASSIFICATION

Use current **AlkaMilk** SDS for PPE, dust/splash control, first aid and spill response. Protect eyes and skin; avoid inhaling powder. Magnesium hydroxide supplies alkalinity, not peroxide-derived oxygen. Do not apply oxidizer placards or peroxide handling instructions to AlkaMilk.

GRADE-SPECIFIC DATA TO REQUEST

- Slurry $Mg(OH)_2$ wt%
- Total solids
- Density
- Viscosity/test temperature
- Particle size
- Settling/redispersion
- Aqueous pH/test method
- Shelf life/storage limits
- COA/SDS

PACKKAGING & SUPPLY





- 25-kg (55.1-lb) powder bags; 40 bags/pallet = 1,000 kg.
- Standard fine and ultra-fine powders.
- Slurry in 275-gallon totes or mini-bulk delivery.
- Confirm delivered formulation and shipment details.

PRODUCT SUITABILITY

- Evaluate the actual grade for its intended use.
- Potable-water projects require applicable chemical approvals; no drinking-water certification is implied by this sheet.

REFERENCES

[1] OCPE, supplied AlkaMilk Product Bulletin.
[4] Martin Marietta Magnesia Specialties, Mechanical Agitation of Slurries (2024) and Magnesium Hydroxide Slurry Metering (2024). magnesiaspecialties.com. General design references, not AlkaMilk slurry specifications.

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HOW ALKAMILK CONTROLS H_2S RELEASE

Buffered alkalinity. Lower volatilization. Measurable downstream control.



INTRODUCTION

AlkaMilk raises wastewater pH and adds alkalinity. This shifts dissolved sulfide toward the nonvolatile hydrosulfide ion (HS^-), reducing the fraction available to escape as H_2S gas. [1]

THE REACTION PATHWAY

$$Mg(OH)_{2(s)} \rightleftharpoons Mg^{2+} + 2\ OH^-$$

$$H_2S_{(aq)} \rightleftharpoons HS^- + H^+$$

$$H_2S_{(aq)} + OH^- \rightarrow HS^- + H_2O$$

Hydroxide neutralizes acidity and shifts the sulfide equilibrium. The primary mechanism is acid–base control, it does not require formation of an insoluble magnesium sulfide precipitate.

WHY pH MATTERS [1]

Wastewater pH	Dissolved H_2S fraction	HS^- fraction
7.0	50.0%	50.0%
8.0	9.1%	90.9%
8.5	3.1%	96.9%
9.0	1.0%	99.0%

Calculated equilibrium illustration using $pKa_1 = 7.0$:
H_2S fraction = $1 / (1 + 10^{(pH - pKa_1)})$.
Temperature and ionic strength change pKa. Values are liquid speciation, not gas-removal percentages.

ENGINEERING BENEFIT

Reducing H_2S release can lower odor loading and the sulfur available for biogenic sulfuric-acid attack. Maintain alkalinity through critical downstream release points.



PERSISTENCE & BIOLOGY

A retained solid alkalinity reserve may extend pH support as acid demand develops. Solids transport, retention and acid load determine duration. Any reduction in biological sulfide production must be measured; pH 8–8.5 does not establish elimination of sulfate-reducing bacteria.

VERIFY THE RESULT

Measure liquid pH and alkalinity, dissolved total sulfide and headspace H_2S at upstream and downstream locations, especially drops, junctions and headworks. Lower pH downstream can increase the H_2S fraction again. Gas control does not replace H_2S exposure controls.

Sources: [1] US EPA, *Design Manual: Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants*, 1985, EPA/625/1-85/018, Chapter 2.
[2] US EPA, *Hydrogen Sulfide Corrosion in Wastewater Collection and Treatment Systems*, 1991.

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ALKAMILK vs. CAUSTIC & IRON SALTS

Choose the mechanism that fits the collection system and the plant.



COMPARISON OF ALKAMILK, CAUSTIC SODA AND IRON SALTS

CRITERION	AlkaMilk $Mg(OH)_2$	Caustic soda NaOH	Iron salts $FeCl_3$ / $FeCl_2$ / $FeSO_4$
Primary H_2S mechanism	pH-driven shift toward HS^-.	pH-driven shift; high-pH shock programs also exist.	Sulfide binding/precipitation; ferric iron also participates in redox chemistry.
Alkalinity & response	Adds alkalinity; dissolution-controlled response.	Adds alkalinity; rapid dissolved-base response.	No alkalinity credit; acidity and hydrolysis can consume alkalinity.
Control strategy	Mix and retain solids; monitor downstream pH.	Meter carefully; manage overshoot.	Select iron species and dose for sulfide, pH and competing demand.
Solids handling	No iron-sulfide reaction sludge; unreacted solids or other precipitates may remain.	No direct precipitating cation; wastewater may still form solids.	Iron sulfides/hydroxides/ phosphates can add chemical solids.
Dewatering	Mg^{2+} may improve cation balance and floc structure; test.	High sodium relative to Ca/Mg can impair floc; not inevitable.	Can aid coagulation and dewatering; quantify added mass.
Phosphorus	Potential Mg-assisted recovery with appropriate chemistry.	pH adjustment only; supplies no magnesium or iron.	Established phosphate capture route; requires solids removal.
Handling	Lower intrinsic corrosivity than concentrated NaOH; SDS-based dust/splash PPE.	Corrosive; severe burns possible; dilution releases heat.	Many commercial solutions are acidic/corrosive; formulation-specific PPE.
Equipment	Slurry agitation, compatible metering and flushing.	Compatible caustic-rated materials and controls.	Compatible salt/acid-rated materials; inspect deposits.

THE ALKAMILK VALUE

Combine alkalinity supplementation with H_2S-release management while avoiding iron-sulfide solids from the odor-control reaction. Compare total installed and operating cost at equal verified treatment performance.

SETPOINT ≠ GUARANTEED LIMIT

Use a site-specific wastewater pH target. Neither a fixed upper pH of 8.5 nor universal immunity to scaling or material damage should be assumed. Product pH and operating pH are different.

FAIR COST BASIS

Compare chemical mass, active concentration, useful alkalinity, feed-system cost, maintenance, polymer, wet cake hauling and downstream process effects.

Sources:
[1] US EPA, *Odor and Corrosion Control Design Manual*, 1985; *Hydrogen Sulfide Corrosion* report, 1991.
[3] Higgins & Novak (1997), *Water Environment Research*; DOI: 10.2175/106143097X125380.
[4] CDC/NIOSH, *Pocket Guide: Sodium Hydroxide*.
[5] US EPA, *Ferric Chloride Supply Chain Profile* (2022).

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SLUDGE CONDITIONING & DEWATERING

Evaluate the cake—not just the chemical invoice.



WHY MAGNESIUM CAN HELP [3]

Magnesium is a divalent cation. Where calcium/magnesium are deficient relative to monovalent ions, Mg^{2+} addition may help restore floc structure and improve settling or dewatering. Response depends on the existing cation balance, sludge type, digestion and polymer program. It is not a guaranteed reduction in dry-solids production.

ALKAMILK

Supplies Mg^{2+} and alkalinity. Test whether cation correction improves cake solids, polymer demand or centrate quality. Include any unreacted mineral solids and phosphate/carbonate precipitates in the mass balance.

CAUSTIC SODA

Supplies sodium and alkalinity. High monovalent-to-divalent ratios can weaken biofloc in some systems. Do not assume every caustic program produces poor cake.

IRON SALTS

Add iron-bearing reaction solids, but can also improve coagulation and dewatering. Higher chemical dry mass does not automatically mean higher wet-cake volume. [5]

RESEARCH BASIS [3]

Full-scale sludge sampling and laboratory cation studies identify cation imbalance as a cause of settling/dewatering problems. Analyze Ca, Mg, Na and K before selecting a correction strategy.

ILLUSTRATIVE HAULING CALCULATION

Wet cake mass = dry solids ÷ cake-solids fraction

At unchanged 1.0 tonne/day dry solids:

20% cake solids	=	5.0 tonnes/day wet cake
25% cake solids	=	4.0 tonnes/day wet cake

20% less wet cake in this illustration.

Assumes unchanged dry-solids mass and capture.
This is arithmetic, not an AlkaMilk performance prediction.

EVIDENCE-BASED PILOT

Measure	Compare before and during trial
Cake dry solids	% dry solids at matched equipment settings
Polymer	kg active polymer per tonne dry solids
Throughput	dry-solids loading and operating hours
Capture & recycle	suspended solids and soluble P in filtrate/centrate
Mass balance	feed solids, added mineral mass and cake mass
Whole cost	chemical + polymer + power + maintenance + disposal

THE OPPORTUNITY

Drier cake can reduce wet tonnage and transport demand. Confirm the net benefit with a controlled field trial rather than a universal savings percentage.

Sources: [3] Higgins & Novak (1997): *Dewatering and settling of activated sludges: The case for using cation analysis.* DOI: 10.2175/106143097X125380; Laboratory results DOI: 10.2175/106143097X125371.
[5] US EPA, *Ferric Chloride Supply Chain Profile.*
[6] US EPA, *Fact Sheet: Centrifuge Thickening and Dewatering, EPA 832-F-00-053 (2000).*

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PHOSPHORUS HANDLING & STRUVITE

Use magnesium strategically—from alkalinity support to controlled nutrient recovery.



WHERE ALKAMILK FITS

AlkaMilk supplies magnesium and alkalinity. In suitable ammonium- and phosphate-rich streams, this can support controlled formation of struvite. Dissolution, pH, ion balance, mixing and retention govern the response. Dissolved phosphorus becomes a recoverable solid only when the process captures and removes it. [7]

STRUVITE CHEMISTRY

$$Mg^{2+} + NH_4^{+} + PO_4^{3-} + 6\,H_2O \rightleftharpoons MgNH_4PO_4 \cdot 6H_2O_{(s)}$$

Stoichiometric component balance; phosphate speciation depends on pH. Ideal crystal ratio Mg:N:P = 1:1:1 molar. Actual dosing must account for soluble magnesium, competing reactions and incomplete utilization.

TREATMENT OBJECTIVES AND ENGINEERING CONSIDERATIONS

TREATMENT OBJECTIVE	ENGINEERING APPROACH	MONITOR
Controlled recovery	Promote crystallization in a designed reactor with solids capture.	Orthophosphate-P, NH_4-N, dissolved Mg, pH, crystal capture.
Sidestream load management	Treat P-rich centrate or filtrate before recycle.	Soluble/total P, recycle flow and mass load.
Biosolids conditioning	Evaluate precipitation and cation balance within the selected sludge process.	Cake solids, polymer, capture and recycle P.
Scale prevention	Select feed point and operating window to control where precipitation occurs.	Deposit inspections, pump performance and pipe pressure.

OPPORTUNITY

Targeting magnesium addition can shift precipitation toward an intended treatment step, support phosphorus capture and reduce recycle loading where validated.

DESIGN CONSTRAINT

Uncontrolled magnesium addition and pH elevation can instead increase struvite deposition in pipes, pumps, centrifuges and valves. Test the precipitation location and provide access for cleaning. AlkaMilk is not a universal struvite inhibitor.

DOSE ON PHOSPHORUS MASS

kg P/day = flow (ML/day) × concentration (mg/L as P).

Distinguish mg/L as P from mg/L as PO_4; use molar ratios for reagent balances. Compare influent, captured solids, effluent and recycle streams.

NITROGEN BOUNDARY

Struvite captures one mole N per mole P. It does not replace a complete biological nitrogen-removal process.

PROGRAM CHECKLIST

- Bench precipitation test
- Mg:N:P balance
- pH/contact-time selection
- solids capture
- downstream scale survey
- operator sampling plan

Sources: [7] US EPA, *Nutrient Control Design Manual*, EPA/600/R-10/100 (2010), Chapters 3, 5 and 9.
[8] Fattah & Mavinic (2015), *Investigating techniques to determine magnesium addition requirements for the operation of a struvite crystallization process*. DOI: 10.1007/s13762-013-0448-0. General process principles; site performance requires validation.

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FROM COLLECTION SYSTEM TO TREATMENT PLANT

Maintain pH support. Verify sulfide fate. Protect the full process.



AlkaMilk provides alkalinity during wastewater transport.
A complete program follows sulfide from the dosing point through headworks and treatment, tracking both gas release and the remaining sulfur load.

1 EQUILIBRIUM CONTROL



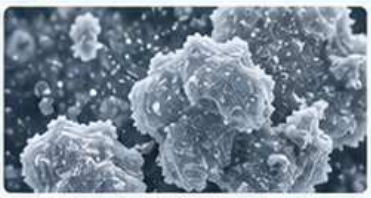
Elevated pH favors HS^- over dissolved H_2S. The shift is reversible: a fall in pH increases the H_2S fraction even before the wastewater becomes strongly acidic. Maintain the target through critical downstream release points.

2 BIOLOGICAL RESPONSE



Sulfide generation depends on biofilm, substrate, redox conditions, temperature and pH. Any suppression of sulfate-reducing activity is site-specific. Verify changes in total sulfide production rather than inferring them from lower gas readings alone.

3 PARTICLE-SURFACE INTERACTIONS



Technical-grade magnesium hydroxide may provide surfaces for sulfide association. Treat the extent and persistence of this contribution as formulation- and wastewater-dependent. High surface area alone does not establish irreversible sulfur removal; use filtered/unfiltered sulfide measurements and pH-rebound testing.

4 THE TREATMENT STEP



Under suitable oxygen supply and contact time, chemical and biological oxidation can convert sulfide to sulfur intermediates and sulfate. AlkaMilk supplies alkalinity; oxygen or another electron acceptor must come from the treatment process. Anaerobic digestion alone does not guarantee sulfide oxidation.

ILLUSTRATIVE COMPLETE OXIDATION BALANCE

$$HS^- + 2\,O_2 \rightarrow SO_4^{2-} + H^+$$

Stoichiometric endpoint only; actual pathways and oxygen demand depend on operating conditions. Neutralizing generated acidity can consume alkalinity.

HEADWORKS CHECKPOINT



Turbulence may strip H_2S before oxidation is complete. Verify headspace H_2S, dissolved sulfide, pH, alkalinity, oxygen transfer and contact time. Do not assume aeration immediately eliminates odor.

KEY VERIFICATION POINTS

LOCATION	VERIFY
Downstream sewer & lift stations	pH persistence, alkalinity and sulfide rebound
Force-main discharge & headworks	H_2S peaks during turbulence and flow changes
Biological treatment	DO, oxygen uptake, pH and sulfide conversion
Sludge & recycle streams	dissolved sulfide, phosphorus and return-load effects

WHOLE-SYSTEM VALUE: Evaluate odor, corrosion indicators, alkalinity, treatment performance and solids cost together.

References: [9] US EPA, *Process Design Manual for Sulfide Control in Sanitary Sewerage Systems* (1974). [10] US EPA, Detection, Control, and Correction of Hydrogen Sulfide Corrosion in Existing Wastewater Systems (1991). Surface-interaction contribution requires formulation-specific validation.

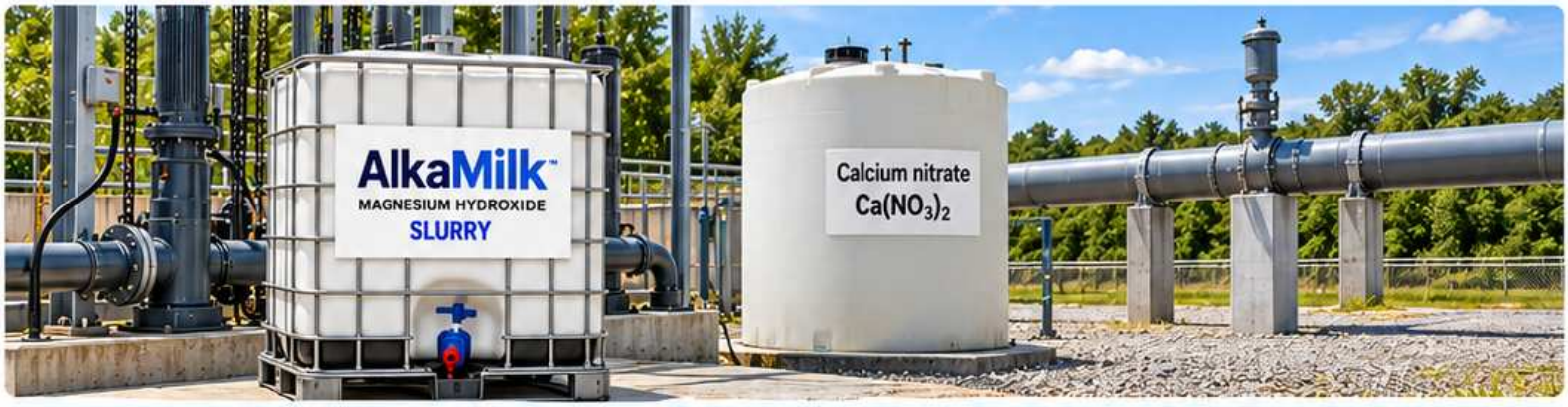
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ALKAMILK vs. CALCIUM NITRATE

Direct alkalinity. No added nitrate nitrogen. Different routes to sulfide control.



AlkaMilk adds magnesium hydroxide alkalinity to raise wastewater pH and reduce H_2S volatilization.
Calcium nitrate supplies nitrate as a biological electron acceptor; it does not release molecular oxygen. [11,12]

COMPARISON OF ALKAMILK AND CALCIUM NITRATE

ENGINEERING CRITERION	AlkaMilk — $Mg(OH)_2$	Calcium nitrate — $Ca(NO_3)_2$
Sulfide control	Raises pH; shifts dissolved sulfide toward HS^-.	Supports nitrate-reducing pathways that suppress sulfate reduction and can oxidize sulfide.
Alkalinity	Direct acid-neutralizing capacity; potential downstream buffer reserve.	No hydroxide supplied; net alkalinity depends on biological pathway.
Added nitrogen	$Mg(OH)_2$ contains no nitrogen.	Adds nitrate-N; track residual nitrate/nitrite and downstream TN load.
Gas contribution	Does not supply nitrate for N_2 generation.	Denitrification can produce N_2, gas accumulation is site-dependent.
Process demands	Mixing, solids transport, reaction time and pH feedback.	Biological activity, contact time, electron donors and residual-dose control.
Handling	Slurry agitation and SDS-based splash/dust controls.	Formulation-specific SDS, storage and material compatibility.

WHY CONSIDER ALKAMILK?

Combine H_2S-release management with direct alkalinity supplementation, without adding nitrate-N. A useful option where alkalinity is deficient, TN loading matters or nitrate-associated gas production is a concern.

CAN NITRATE CONTRIBUTE TO GAS BINDING?

YES — UNDER SUITABLE CONDITIONS. [11]

$$NO_3^- \rightarrow NO_2^- \rightarrow \ldots \rightarrow N_{2(g)}$$

N_2 produced by denitrification can join gas pockets at high points or low-pressure locations. A field study linked upstream nitrate discharge to substantial nitrogen-gas emissions in one force main. Hydraulic impairment depends on gas volume, pressure, pipe profile, flow and air-release performance; it is not inevitable. AlkaMilk avoids nitrate addition, but does not eliminate all sources of gas pockets.

ALKALINITY: AN IMPORTANT DISTINCTION [12]

$Mg(OH)_2$ provides direct alkalinity. Heterotrophic denitrification can generate approximately 3.57 kg alkalinity as $CaCO_3$ per kg nitrate-N reduced. Sulfide-oxidizing pathways can have a different net balance. Compare the actual nitrogen, sulfur and alkalinity balances.

FOG & BIOFILM: VERIFY IN THE FIELD [13]

Neither product should be presented as guaranteed mechancial pipe cleaning. At normal sewer treatment pH, AlkaMilk is not equivalent to concentrated-caustic cleaning. FOG chemistry, magnesium/calcium soaps and biofilm response are site-dependent; inspect deposits and validate any cleaning claim.

SITE REVIEW: retention time • downstream pH/alkalinity • headspace H_2S • residual NO_3-N/NO_2-N • TN load • high-point venting • FOG/scale inspections

References: [11] Easter, Ward & Poe (2016), *WEF Collection Systems Conference, force-main gas modeling and field study.* DOI: 10.2175/193864716821124809.
[12] US EPA, *Process Design Manual for Nitrogen Control* (1975); Jiang et al. (2009), *Sulfur transformation in rising main sewers receiving nitrate dosage.* PMID 19625067.
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