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South African Coal Ash

SARS Tax Exemption No: 930012713

MORE FOOD PRODUCTION - USE LIME GET FROM QUARRIES

19 August 2021

Dear all,

Agricultural Lime, or Aglime, is a soil conditioner most commonly produced from finely crushed limestone. It provides a source of calcium and magnesium for plants, increases the pH of acidic soil, enhances water penetration, and improves the uptake of nitrogen, phosphorus, and potassium rNPK. For farmers, this means lower crop production costs, but for quarries with the proper chemistry for Aglime production, it equals another product to sell.

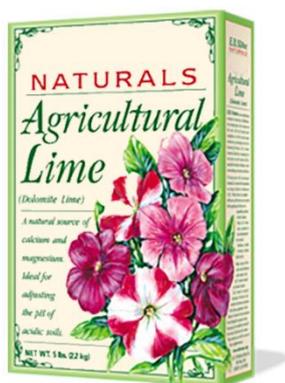


Reducing soil acidity reduces unfavourable conditions caused by iron, aluminum, and manganese. It also increases the availability of critical plant nutrients (nitrogen, phosphorus, and potassium) by providing an environment that allows micro-organisms to break down organic matter, and it increases the effectiveness of herbicides.

When Aglime comes into contact with the acids in the soil, calcium (Ca) moves to the surface of the soil particles, replacing the acidity. The acidic H⁺ ions react with the carbon-ate (CO₃) to form carbon dioxide (CO₂) and water (H₂O). The result is a soil that is less acidic (has a higher pH).

Why does size matter for Aglime?

The smaller the particle size, the higher the percentage is absorbed in the soil within the first year of application. Particles smaller than 50 mesh – 100 mesh are completely absorbed within the first of application – 10 percent effective.



Particles between the 10-mesh x 50 mesh sizes are 50 percent effective over a three-year period. Materials larger than 10-mesh are considered too large to dissolve within a three-to-four-time period. The decision of what mesh size to use depends on how rapidly the farmer wants the full value of Aglime to be realized.

AGLIME MATERIALS, CHEMICAL COMPOSITION, AND CALIUM CARBONATE EQUIVALENT (CCE)

The second major factor that determines Aglime quality is chemical composition. Chemical composition determines an Aglime material's amount of acid it can neutralize. Pure calcium carbonate (CaCO_3) has an acid neutralizing value of 100 percent. When an Aglime material is evaluated, it is compared to calcium carbonate, and its neutralizing value is called the Calcium Carbonate Equivalent (CCE) value or percent CCE.

Aglime Materials, Chemical Composition, and Calcium Carbonate Equivalent (CCE)

Dolomitic Limestone	$\text{CaCO}_3\text{-MgCO}_3$	95-108
Burned or Quick Lime	CaO (calcium oxide)	150-175
Hydrated or Slacked Lime	Ca(OH)_2 (calcium hydroxide)	120-135
Marl	CaCO_3	70-90
Power Plant Ashes	CaCO_3	90-100
Ground Oyster Shells	Ca Oxides	40-100
Cement Kiln Dusts	Ca Mg & K Oxides	25-50
Wood Ashes	Ca Mg & K Oxides	40-50
Gypsum	CaSO_4	None
Byproducts & Biosolids	Variable	Variable

LIMESTONE



Testing your feed materials is the next step and should determine the following: feed size (PSD), energy consumption (horsepower per ton per hour or kW per ton at the target PSD), wear metal estimate per ton of throughput and finished product particle size distribution.

In conclusion, the production of Aglime can be achieved in many ways, and each operation will have its own set of specific requirements that influence final production. When deciding what crusher type is the best for a specific operation, it is important to consider the following: local market conditions, state specifications, existing equipment and facilities, maintenance requirements, total power consumption and existing capacity, and auxiliary capital equipment.

Agronomists in many states can assist to evaluate the economics of the soil chemistry and how Aglime can be used to reduce fertilizer use, improve crop yields, and lower costs.



TYPES OF CRUSHING METHODS USED FOR AGLIME PRODUCTION

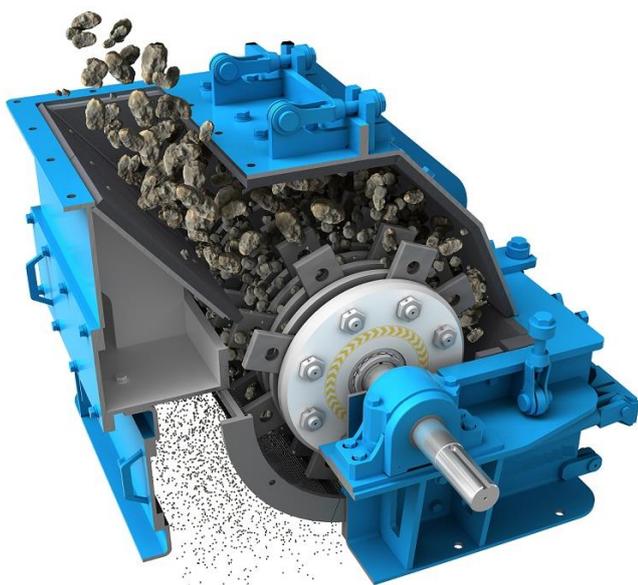
The primary crushing method used is impact with Cage Mills, Hammer Mills, and Vertical Shaft Impactors (VSI).

CAGE MILLS

Final product size is controlled by pin spacing and cage speeds. Cage mills have lower maintenance than a hammer mill. HP/ton ratio is approximately 7:1 and produces a Particle Size Distribution (PSD) that passes most state specs without screening. Cage mills handle moisture well because there are no screens or grate bars.



HAMMER MILLS



Final product size is typically controlled by grate bars or perforated screens, which can be high maintenance because of the many hammers and grate bars or screens to replace. The highest HP/ton ratio is approximately 10:1. It doesn't handle moisture well due to blinding of the screen / grates and it cannot handle uncrushable items.

VERTICAL SHAFT IMPACTORS (VSI)

Final size is controlled by rotor speed, but a VSI can't grind fine enough to pass some state Aglime specs and requires screening after crushing. HP/ton

ration is approximately 3:1 with high throughput. Moisture can cause buildup problems.

WHERE SHOULD I START?

Determining the chemistry of your material's Calcium Carbonate Equivalent (CCE) is the place to start. You will need to determine the amount of Aglime material required to equal one ton of pure calcium carbonate. For example, if your material is Dolomitic Limestone, with a CCE of 95, the rate per acre equivalent to Calcitic Limestone, with a CCE of 100, would be 1.05.

Aglime Materials, Chemical Composition, and Calcium Carbonate Equivalent (CCE)

MATERIAL	COMPOSITION	CCE (%)
Calcium Carbonate	CaCO ₃ (pure)	100
Calcitic Limestone	CaCO ₃	80-100

Yours sincerely,

Belinda Heichler
SACAA President

