Interpreting Agricultural Lime Lab Reports

The Kentucky lime law is administered by the Kentucky Department of Agriculture (KDA). The Division of Regulatory Services cooperate with KDA to provide analysis of lime and interpretation of results. Samples are collected at quarries throughout the state by our inspectors and brought to our laboratories for testing. Results are made publicly available on our website (www.rs.uky.edu). This fact sheet describes the various parameters tested and how the results define agricultural lime quality.

The relative neutralizing value (RNV) is the most important parameter determined from laboratory analysis, which defines how well lime neutralizes soil acidity. RNV is presented as a percentage of completely effective material. Typical values for RNV range from 35 to 95%.

Two components in agricultural lime are analyzed to determine the RNV. They are calcium carbonate equivalence (CCE) and particle size. Calcium carbonate equivalence is the chemical property of the agricultural lime and particle size is the physical nature of the agricultural lime. Calcium carbonate equivalence is an inherent property of the rock that is mined. Particle size is a physical property controlled by how finely ground the rock is in preparing the agricultural lime product.

Calcium Carbonate Equivalence

Calcium Carbonate Equivalent (CCE) is the neutralizing value of a liming material compared to pure calcium carbonate. A CCE of 100% indicates the agricultural lime will neutralize the same amount of acidity per pound as pure calcium carbonate. Agricultural lime may consist of carbonate minerals other than calcium carbonate. The carbonate concentration is what is chemically analyzed and the concentration is presented with respect to the carbonate being present as calcium carbonate.

Particle Size

The finer the particles, the greater the reaction to neutralize soil acidity because there is more surface area of the carbonate minerals exposed to the soil. To determine the percent of the lime that will react to neutralize soil acidity, measurements are made on the amount of agricultural lime passing a 10 mesh and 50 mesh screen. The table below shows how much lime is expected to react at various particle sizes if the lime has a CCE of 100%.

Particle size	Reactive portion
> 10 mesh (2 mm)	0%
between 10 and 50 mesh	50%
< 50 mesh (0.3 mm)	100%

Relative Neutralizing Value

Relative neutralizing value (RNV) provides the overall ability of agricultural lime to react with soil acidity. Both the CCE and particle size are taken into account in determining the RNV using the equation below.

$$\%RNV = [\ \%CCE \times ((\%\ <10\ mesh) + (\%\ <50\ mesh))\ /\ 2\ ]\ /\ 100$$

Calcium and Magnesium

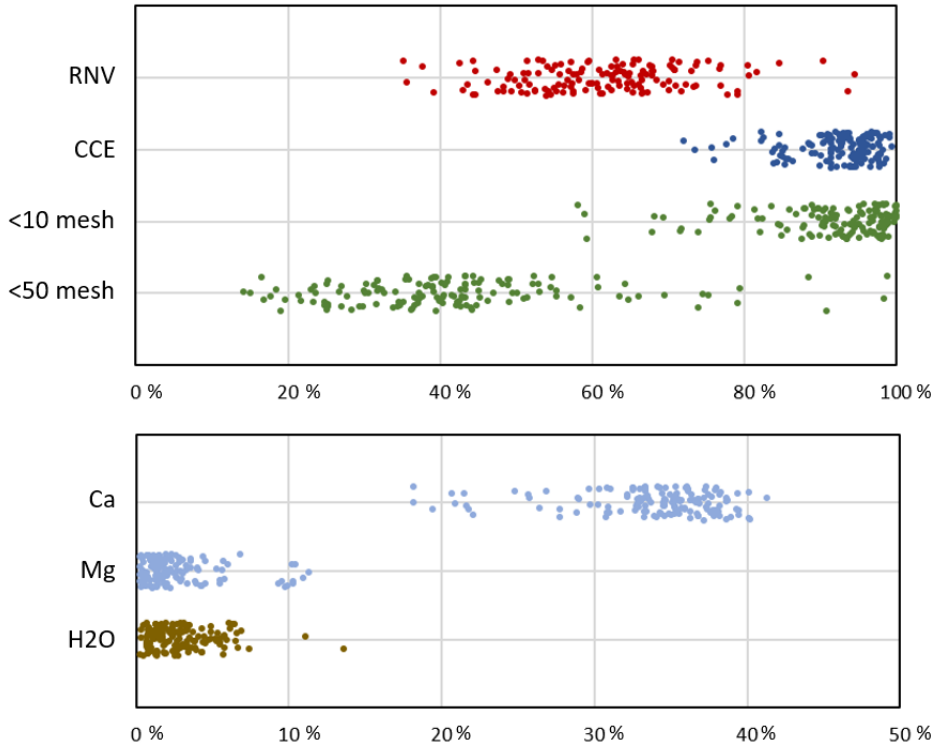
Calcium (Ca) and magnesium (Mg) concentrations are reported on the elemental basis as % Ca and % Mg. The concentrations of Ca and Mg are related to the type of carbonate minerals in the lime. Calcium is in the dominant carbonate mineral, calcite. Higher concentrations of Mg denote the presence of dolomite, which contains both Ca and Mg. Some sources report concentrations on the oxide basis such as % CaO and % MgO. Formulas to convert from one basis to the other are shown below.

$$\% CaO = 1.399 \times \% Ca \qquad \% Ca = 0.715 \times \% CaO$$

$$\% MgO = 1.658 \times \% Mg \qquad \% Mg = 0.603 \times \% MgO$$

The Ca and Mg concentrations in the lime do not directly determine the neutralizing value of the lime. Magnesium concentration may be useful for soils that are deficient in Mg, though this is rare. Calcium and Mg concentrations can be requested by some who balance of Ca and Mg levels in soils, although this has not proven to be valid by University research.

Moisture

The lime is dried to remove moisture before any other tests are performed. Therefore, the test parameters are all reported on a dry weight basis. The % moisture is determined but is not reported on reports because the moisture can change with time before being sold. A general rule of thumb for agricultural lime application is to increase lime rate by 0.5 tons/acre if agricultural lime is suspected to have moisture concentration of 7% or greater. Any moisture content less than 7% should not have an effect on application rates. Only 2% of samples in 2021 had moisture greater than 7%.

Distributions for the lime parameters are shown below for samples collected in 2021