

Agricultural Liming Material Analysis – Determining Quality and Value

There are three analyses performed on agricultural liming materials (ag-lime) to determine the (1) **percent Effective Neutralizing Power (ENP)** and (2) **Minimum Pounds of ENP per Ton**.

These three analyses are: (1) Chemical purity or **Calcium Carbonate Equivalent (CCE)**; (2) Fineness or **Fineness Index (FI)**; and (3) **Moisture Content**.

1. The CCE analysis consist of determining the combined total of calcium/magnesium carbonate and oxide contained in an ag-lime. CCE is expressed as a percentage of 100% PURE calcium carbonate. Pure calcium carbonate is the standard by which all ag-lime chemical purity is compared.
2. The Fineness Index (FI) analysis relates particle “sizing” to the neutralizing efficiency of ag-lime over a three-year period. The analysis is performed by mechanically sieving ag-lime through 8-, 20-, AND 60-mesh sieves for a specified time.

Ag-lime passing each sieve size is weighed and divided by the total weight of the sample analyzed to determine the portion (percentage) of ag-lime which passed through each sieve size. The ag-lime portion passing the 8-mesh sieve is subtracted from the portion passing the 20-mesh sieve to describe the portion “sized” at 8-20 mesh. The same calculation is done with ag-lime passing the 20-mesh sieve from the portion passing the 60- mesh sieve. This calculation is not done with the ag-lime passing the 60-mesh sieve because such material is 100% available within a three-year period.

After this process, each sieve or particle size portion is multiplied by its own Fineness Efficiency Factor (FEF) to determine the FI score for each sieve size. FEF is the relative percentage of ag- lime at specific sieve or particle size portion range that will neutralize soil acidity over a three-year period. The combined sum of the resulting fineness indexes for the three sieves or particle sizes equals the total FI.

3. Moisture content is expressed as a percentage. The moisture content is determined by wet vs. dried weight. The percent moisture is converted to percent dry matter when determining the minimum pounds of ENP per ton (Min. Lbs. ENP/ton).

Determine the percent ENP by multiplying the % CCE by the FI.

The Min. Lbs. of ENP/ton is determined by multiplying the percent ENP by 2,000 pounds and by the percent dry matter of the ag-lime. The Min. Lbs. ENP/ton equals the pounds of pure calcium carbonate that is available over a three-year period in a ton of the ag-lime. **The Min. Lbs. ENP/ton is required information on the ag-lime distribution label.** The Min. Lbs. ENP/ton listed on an official ag-lime analysis report is the highest number that an ag-lime producer, distributor, or dealer can use on the ag-lime distribution label. The producer, distributor, or dealer may list a lower quality rating on a label to compensate for possible variations of the ag-lime supply/ stockpile.

Example: Determining the percent ENP and Min. Lbs. ENP/Ton using the following analysis results:

- Percent CCE = 90%
- Fineness Index = 65 (see table below)
- Percent Moisture = 5% or 95% Dry Matter

FI Determination						
U.S. Sieve Size	% Passing Each Sieve	Difference Passing Each Sieve	Multiply Difference By	Fineness Efficiency Factor	Equals	Finess Index Per Sieve
8	93	93-70=23	X	0.2	=	4.6
20	70	70-46=24	X	0.6	=	14.4
60	46	46-00=46	X	1.0	=	46.0
Total Fineness Index (FI) = 4.6+14.4+46.0=65						

Calculating the % ENP:

$\% \text{ CCE (90)} \times \text{FI (65)} \div 100 = 58.5\% \text{ ENP (Effective Neutralizing Power)}$

Calculating the Min. Lbs. ENP/Ton:

$2000 \text{ pounds ag-lime/ton at 5\% moisture} \times (58.5\% \text{ ENP} \div 100) \times (95\% \text{ Dry Matter} \div 100) = 2000 \times .585 \times .95 = 1,112 \text{ Min. Lbs. ENP/Ton}$

Value: In this case, a ton of ag-lime with a Min. Lbs. ENP/Ton of 1,112, priced at \$15.00 per ton prices out at 1.35 cents per lb. of ENP ($\$15.00/\text{Ton} \times 100 \div 1,112 \text{ Min. Lbs. ENP/Ton} = 1.35 \text{ cents per pound of ENP}$).

Want More Information or Have Questions

Email to aglime.mda@state.mn.us

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