Formulas for Land Application of Residuals – Page 1 of 2

Dry weight concentration $\quad mg/kg = \dfrac{mg/L}{\%\ solids}$

Wet weight concentration $\quad mg/L = mg/kg \times \%\ solids$

Pounds per dry ton $\quad lbs/dry\ ton = mg/kg \times 0.002$

$$Dry\ tons = \frac{gallons \times 8.34\ lbs/gal \times \%\ solids}{2000\ lbs/ton}$$

$$Gallons = \frac{dry\ tons \times 2000\ lbs/ton}{8.34\ lbs/gal \times \%\ solids}$$

Pounds per year (lbs/year) = mg/L x MGY (annual effluent application) x 8.34 lb/gal

Dry tons per acre $\quad dry\ tons/ac = \dfrac{\#\ dry\ tons}{\#\ acres}$

Pounds per acre $\quad lbs/ac = lbs/dry\ ton \times dry\ tons/ac$

Dry tons per acre $\quad dry\ tons/ac = wet\ tons/ac \times \%\ solids$

Plant Available Nitrogen (PAN), mg/kg

For *Surface* Application: $\quad [MR \times (TKN - NH_4^+)] + (0.5 \times NH_4^+) + NO_3^- + NO_2^-$

For *Subsurface* Application: $\quad [MR \times (TKN - NH_4^+)] + NH_4^+ + NO_3^- + NO_2^-$

$$Application\ Rate\ (dry\ tons/ac) = \frac{PAN\ residuals\ need\ to\ supply\ (lb/ac)}{PAN\ in\ residuals\ (lb/dry\ ton)}$$

Wet tons per acre $\quad wet\ tons/ac = \dfrac{dry\ tons/ac}{\%\ solids}$

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Gallons per cubic yard $gal/yd^3 = \frac{201.974\ gal}{yd^3}$

Cubic yards to dry tons = yd^3 x % solids x 201.974 gal/yd^3 x 8.34 lbs/gal x 1 dry tons/2000 lbs = dry ton

Dry tons to cubic yards = $\frac{\text{dry tons x 2000 lbs/dry ton}}{\text{\% solids x 201.974 gal/yd}^3 \text{ x 8.34 lbs/gal}} = yd^3$

Acres needed = $\frac{\text{dry tons produced}}{\text{application rate (dry tons/ac)}}$

Pounds per acre = lbs/dry ton x dry tons/acre

Lime Based Agronomic Loading Rate (dry tons/ac) = $\frac{\text{Recommended tons lime/ac}}{\text{\% CCE of residuals}}$

Lime Based Application Rate (dry tons/ac) = ALE of residuals/1 ton ag-lime x Recommended tons ag-lime/acre

Sodium Adsorption Ratio (SAR) = $\frac{Na^+}{\sqrt{\frac{1}{2}(Ca^{2+} + Mg^{2+})}}$ **Units are milliequivalents/liter (meq/L)

**Milliequivalents/liter (meq/L) = $\frac{\text{concentration (mg/L)}}{\text{equivalent weight}}$

Exchangeable Sodium Percentage (ESP) = $\frac{\text{Na meq/100g}}{\text{CEC meq/100g}} \times 100$

1 acre = 43560 square feet