CONVERSION OF TEST RESULTS AND OTHER EQUATIONS

Soils

General

Solids

On a weight basis: ug/g = mg/kg = g/tonne = ppm

On a volume basis: µg/mL = mg/L = g/m^3 (or $g.m^{-3}$) = ppm

A) Milliequivalents/100g to milligrams/kilogram (me/100g to mg/kg)

Formula: mg/kg = [me/100g] x [atomic weight/charge] x [$1000g.kg^{-1}$ / 100g] = me/100g x Factor

Element	Atomic weight	Charge	Factor
Potassium	39.1	1	391
Calcium	40.08	2	200
Magnesium	24.31	2	122
Sodium	22.99	1	230

Results from this laboratory can be converted to other units, using the following formulae:

B) To MAF Units:

For pH:	As is
For Phosphorus:	As is
For Potassium:	K(me/100g) x 20.8 x VW = K(MAF)
For Calcium:	Ca(me/100g) x 1.29 x VW = Ca (MAF)
For Magnesium:	Mg(me/100g) x 23.3 x VW = Mg(MAF)
For Sodium:	Na(me/100g) x 53 x VW = Na (MAF)

NB: VW = Volume weight (= Laboratory Bulk Density, BD)

Note: Our cation results are given in the soil test units millieqivalents per 100grams (me/100g). This is based on a weight of soil, and to convert to units based on a volume of soil, the volume weight (previously referred to as bulk density) must be known. These conversion factors have been derived from in-house experimentally determined relationships between exchangeable cations, measured at pH 7 from 1M Ammonium Acetate (30 minute extraction) and the MAF "Quicktest" method (2 minute extraction under same conditions). They do not apply if other methods of analysis have been used.

C) To µg/mL:

For Phosphorus:	As is
For Potassium:	K (me100g) x 391 x VW = K (µg/mL)
For Calcium:	Ca (me/100g) x 200 x VW = Ca (µg/mL)
For Magnesium:	Mg (me/100g) x 122 x VW = Mg (µg/mL)
For Sodium:	Na (me/100g) x 230 x VW = Na (µg/mL)

Micrograms per millilitre (µg/mL) is the same as milligrams per litre (mg/L), or parts per million on a volume basis.

D) To kg/ha:

First convert all results to µg/mL, then:
(1) multiply by 1.5 (if sampled to 15 cm), or
(2) multiply by 0.75 (if sampled to 7.5 cm)

For results reported as mg/kg: kg/ha = mg/kg result x VW(g/ml) x sample depth (cm) x 0.1
For results reported as %: kg/ha = %result x 10000 x VW(g/ml) x sample depth (cm) x 0.1

E) To lb/acre:

First, convert all results to µg/mL, then
(1) multiply by 1.32 (if sampled to 15 cm), or
(2) multiply by 0.66 (if sampled to 7.5 cm)

Soluble Salts (SS%) = EC (mS/cm) x 0.35 [EC on 1:5 soil:water extraction]

This is using an empicial factor assuming an approximate relationship between EC and total dissolved salts (TDS ~ EC x 700), although this factor is dependent on the type of salts present.

Note: 1 mS/cm = 1 dS/m = 1000 uS/cm)

Mineral N (kgN/ha) = MinN (mg/kg) x depth of soil sample (cm) x relevant bulk density (g/cm3) x 0.1

NB: Typical bulk density for 0-30cm sample of a silt loam is 1.1 g/cm3

Typical bulk density for 30-60cm sample of a silt loam is 1.3 g/cm3

The bulk density of lighter soils (0-60cm) may be closer to 1.1 g/cm3 and for heavier soils the bulk density may be closer to 1.5 g/cm3.

Available N (as kgN/ha) = AMN (ug/g) x VW (g/ml) x 1.5 [for 15cm sample depth]

NB: AMN = Anaerobic Mineralisable Nitrogen. "Available N" is the potentially available N (or Anaerobic Mineralisable N) reported as kg Nitrogen per hectare, assuming a 15cm sample has been taken.

Organic Matter (soils) = Total C x 1.72[1]

Organic Matter (composts) =Total C x 1.72[2]

Note 1: assumes all total carbon measured is in organic form. NZ soils are typically low in inorganic C.

Note 2: the relationship between carbon and organic matter varies according to organic matter type and soil type, if soil is present in the compost. Commonly used conversion factors range from 1.65 to 2.2

Feeds

Crude Protein (CP) = N% x 6.25

Metabolisable Energy (ME) = DOMD x 0.16 [forage & silage]

Metabolisable Energy (ME) = (DOMD x 0.14) + (CFat x 0.25) [grains & meals]

Note: Results denoted _DM% are on a dry weight basis (i.e. have been corrected for residual moisture content. All other results are reported on a "virtually-dry" basis, but may contain some residual moisture; typically 3-5%).

To convert results reported on a dry weight basis to fresh weight basis use:

Results (as received basis) = Results (dry matter basis) x (%Dry Matter /100)

Definitions

Milliquivalent (often abbreviated to me or meq) – one millequivalent is the atomic weight of a particular element expressed in grams divided by 1000 and by the number of positive charges on the cation. e.g. one milliequivalent of Calcium ($Ca^{2}+$) = (40/2)/1000 = 20 mg

NB: meq/100g = cmol+/kg

MAF (Quicktest) Units – MAF Units are an empirical number relating a particular soil test (sample volume/extractant volume/extraction time) relative to pasture production (DM Yield). This is for simplicity to provide whole number units and care should be taken converting these values into units measured by other methods. While "quick-test" cations are closely related to exchangeable cations, the (2-minute) method does not extract the exchangeable cations quantitatively as measured by column leaching procedures.

Volume Weight (or lab bulk density) – this is the mass in grams of a given volume of soil that has been dried and sieved <2mm (reported by convention as g/ml)

Field Bulk Density – this is the dry weight of a given volume of fresh soil received as an intact core i.e. includes all components in a soil core including particles > 2mm in size (reported by convention as (g/cm^{3}).