Analysis of Total Dissolved P by Acid Persulfate Digestion

After Lathja K, Driscoll CT, Jarrell WM (1999) Soil phosphorus: characterization and total element analysis. In: Robertson GP, Coleman DC, Bledsoe CS, Sollins P et al (eds) Standard soil methods for long-term ecological research. Oxford University Press, Oxford

Potassium persulfate oxidizes dissolved organic P to ortho-P, and total dissolved P is measured as soluble reactive P. Organic P is then calculated as total dissolved P minus inorganic P in solution. This is for P analysis only – if organic N is also desired, then alkaline persulfate oxidation is performed instead.

Materials

1. 50 ml volumetrics
2. Potasium persulfate, low-N ($K_2S_2O_8$)
3. 0.9 M (20x diln) H_2SO_4
4. Autoclave
5. 0.6 M NaOH
6. p-nitrophenyl phosphate ($C_6H_4NNa_2O_6P.6H_2O$)

Standards

1. Make 1 mg P/ml p-nitrophenyl phosphate stock (1198 mg in 100 ml)
2. Pipette 7.5 ml stock into 100 ml volumetric and dilute to volume with DI water
3. 1 ml of this into another 100 ml volumetric and dilute to volume = 0.75 µg P/ml solution
4. Pipette 0, 1, 2, 3, 4, 5 ml of this into a 50 ml volumetric and take to 5 ml, treat like a sample = 0, 0.15, 0.30, 0.45, 0.60, 0.75 µg P/ml standards

Procedure

1. Pipette 5 ml of each sample and all 6 standards into separate 50 ml volumetrics
2. Add 10 ml of 0.9 mol/L H_2SO_4
3. Add approximately 0.8 g $K_2S_2O_8$ (as a pre-weighed scoop)
4. Cover with tinfoil or cap tightly
5. Autoclave at 121 ^oC and 17 psi for 50 min
6. Take to volume
7. Pipette 10 ml into scintillation vial (x2) and neutralize (each) with 1 ml 0.6 M NaOH
8. Freeze until analysis for soluble reactive P on Lachat