KCl extraction

Background

A KCl solution is a common extractant for inorganic nitrogen and exchangeable acidity. Inorganic nitrogen comprises ammonium, nitrate and nitrite. Exchangeable ammonium is most commonly extracted from moist samples immediately after sampling with 2M KCl (Mc Keague, 1976; Keeney and Nelson, 1982; Maynard and Kalra, 1993). Nitrate is water-soluble and hence is also extracted by the KCl extract. Nitrite is seldom present in detectable amounts except in fertilized neutral to alkaline soils. Air-drying the soil may result in large changes to concentrations of both nitrate and ammonium.

The 2M KCl extraction solution is recommended because it provides quantitative extraction of inorganic N, it does not interact with exchangeable N, and can be safely stored before analysis (Keeney and Nelson, 1982). Analysis should proceed within 24h of extraction and extracts should be stored at 4°C. If analysis is delayed, samples should be frozen. Frozen KCl extracts will keep indefinitely (Carter, 1993).

The recommended procedure for exchangeable acidity (H^+ and Al^{3+}) is a 1M KCl extraction. It is possible to analyze for inorganic N on these extracts, which saves time and consumables.

Safety/ Protective equipment

Equipment

- Solution 1M KCl
- 50mL screw cap centrifuge tubes
- Cylinder or auto dispenser
- Shaker
- Whatman #42 filter (2.5 µm pore size)

Extraction procedure (ucalgary lab manual, modified after Keeney and Nelson, 1982):

1. Prepare 1 M KCl solution.
2. Weigh 10 g (5 g for organic horizons) of 2 mm sieved soil into a 50 mL screw cap centrifuge tube. If possible, use field-moist soil. Record the mass to the nearest mg.
3. Add 30 mL 1M KCl solution with a graduated cylinder or an auto-dispenser.
4. Place on a shaker for 30 min at 200 rpm.
5. Let samples sit for 30 min.
6. Filter with a Whatman #42 filter (2.5 µm pore size). Organic samples may require two filtering stages.
7. Analyse for inorganic N and exchangeable acidity the day after extraction or freeze indefinitely.