



Iso-pH titration method for estimating soil acidity

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In some countries it is accepted to estimate lime requirement (LR) by using hydrolytic acidity as suggested by Kappen, which is based on a single time extraction of hydrogen- and aluminum-ion with calcium-acetate. We could achieve more accurate results, if we measure the total surface acidity (TSA) of soils. For this reason it is an improvement to use a direct measurement method and equipment, which is suitable to estimate the results of long-term processes and TSA, via investigating the kinetic properties of desorption.

The method of measurement: A pH electrode is dipped into a continuously stirred soil suspension, containing background salt (e.g. KCl), and it is connected to a computer using an amplifier and A/D converter. A computer program has been developed which controls an automatic burette, which adds the base solution into the system if pH is less than the pre-adjusted value and stops adding if pH reaches this value.

For evaluation, the amount of added base vs. time data series can be used. With increasing time the amount of added base keeps to a constant (asymptotic) value. The program fits an exponential associate function on measured data, and outputs the asymptotic value connecting to infinite time, which can be used to calculate LR. The fitting error of parameters is about 0.3 %, which means, that the TSA value, based on these measured data and method can be estimated with high accuracy.

The measurement is fully automated. The evaluation is based on extrapolation so the precision of results increases with the number of measurement points and the length of measurement time. Depending on the application, a quick measurement with approximate results or a longer measurement with more precise results can be chosen. The needed length also depends on the properties of soil, as processes have different speed on different soil type. Experiences show, that after a while (about 8 hours) no

added precision can be achieved by longer measurements.