

Ash and moisture analysis with prepASH 340 Series for the Agriculture

Moisture and ash are crucial analytical values in agricultural samples and are often needed as calculation reference for other analytical parameters too.

Furthermore ashing is part of the sample preparation for the analysis of individual elements in the mineral content. Information about the quantity of individual elements in ground, fertilizer, manure, plants and animal feed helps to make decision about which fertilizer must be used for the optimal growth and nutrition value of the plants. Automation of the moisture and ash analysis brings efficiency, quality and security into the laboratory.

Unlike animals plants don't need organic C to grow (C autotrophy). With help of the sun light plants produce sugar out of water and CO₂ (photosynthesis). Nevertheless the plants needs more than water and air to grow: the so called macronutrients and micronutrients are taken up with water from the soil. Since the plants are harvested and not decomposed on site the nutrients have to be replaced by fertilizing.



1. Analysis of soil, plants, fertilizer

Samples: dried and grinded plants: grain, potato, grass, silage, corn,
ground
fertilizer

Aim of the analysis – determination of mineral content (ash), in order to examine the quality from the samples.

The total of inorganic is determined by ashing the sample. For the determination of minerals ash will be dissolved in the acid and quantity of individual elements will be identified: potassium, calcium, magnesium, zinc, chrome, copper.

Materials balance is the aim of research



If ground contains insufficient content of minerals or a specific elements (limiting factor), plants will not come up. To much fertilizer will rise the cost of production unnecessarily and pollute the environment (ground water, soil).

Heavy metal are not wanted and are problematical when fertilizing with sewage sludge.

Standard Method with muffle oven:

Analysis of moisture: 2 hours at 130C, Analysis of ash: 3 hours at 550C



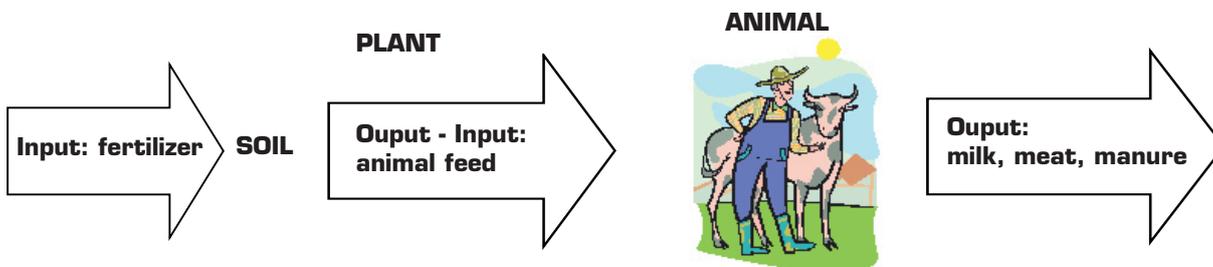
2. Analysis of Animal food and Manure

Phosphorus is one of the macronutrition. It is important to give the phosphorus back to the soil for an optimum growth. Phosphorus is part of the so called N-P-K-fertilizer as well as of manure. But in lakes phosphorus is the limiting factor for plant growth too. Phosphorus input from over-fertilized fields and, before banned, mainly from washing agent leads to eutrophic lakes. So a materials balance is the aim of a sustainable fertilizing.



Samples: manure, compost, animal feed (silage, maize, wheat)

Aim of the analysis – determination of mineral content (ash), in order to examine the phosphorus content from the samples. The total of mineral content is determined by ashing the sample. In further analysis of the ash gives the content of phosphorus.



Standard Method with muffle oven: Analysis of moisture: 2 hours at 130C, Analysis of ash: 3 hours at 550C

Applications available from Precisa:

- prepASH 0004 Palm expeller.
- prepASH 0506a Sugar beets.
- prepASH 0006 Pet food.
- prepASH 0506c Pasturage.
- prepASH 0007 Pig food.
- prepASH 0506c Pasturage.
- prepASH 0024 Gras silage.
- prepASH 0506b Soy straw.
- prepASH 0025 Maize silage.
- prepASH 0506d Wheat.

Working Steps of moisture and ash determination

Standard Method with oven	vs.	prepASH
Heating out crucibles for constant weight before	Dry matter	Possibility to pre-define a "heating out
Measuring tare of crucible one by one		AUTOMATICAL PROCEDURE
Sampling		Sampling
Weighing + documentation of each crucible		AUTOMATICAL + entering the sample
Samples in drying oven + START		START PROGRAM
Removing samples from oven + cool down		RESULTS (moisture)
Back weighing Samples, calculation (moisture)		
Pre-ashing with rapid incinerator or hot plate	Ash	RESULTS (ash)
Samples in muffle furnace		
Removing samples + cooling down in exsiccator		
Calculation and documentation (ash)		
Back weighing for stable results (repeat?)		

Reference customer: Agroscope (Official webpage of Agroscope <http://www.art.admin.ch/aktuell/>)

Agroscope Reckenholz-Tänikon ART, the Swiss Federal Research Station for Agriculture, was assigned by the Swiss Agency for the Environment, Forests and Landscape (SAEFL) to analyse the requirements for developing a GMP monitoring programme in Switzerland. Studies and researches: genetically modified plants, ecological monitoring, deliberate release, commercial cultivation.

Customers: laboratories.

Samples per year: 6000-8000 for ash analysis / 60 samples a day.

Agroscope uses 2 prepASHs since 2005 and is pleased with the reliable and precise results of prepASH.

Most important advantages of the prepASH stated by Mr Hans-Ruedi Bosshard (Dipl. Chem. HTL, Head of Plants analysis team):

- Automatic analysis of moisture and ash in one run & elimination of the sample weighing after moisture and ash analysis, which helped to reduce manual work of the laboratory assistant till **>50%**
- Analysis in the controlled environment, which is impossible, using the muffle oven
- Faster analysis through the use of auto stop criteria

Reference Method with muffle oven: Analysis of moisture: 2 hours at 130C, Analysis of ash: 3 hours at 550C

prepASH – optimal solution to determine ash

Reduced time and effort prepASH is a fully automatic drying and ashing machine, so no multiple weighing back after time consuming cooling down in the dessicator but automatic calculation of results. Working in groups of similar samples in a single run will rise efficiency of and optimise time of analysis.

Improved safety and efficiency No more dangerous analysis with the open flame. With prepASH Analyses can be done in time slots unused or hardly ever used so far, e.g. at night.

Increased quality up to 20% of each ash determination has to be re-analysed because of faulty/undefined results. prepASH is highly repeatable and reliable!

Detailed analysis reports Due to the permanent recording of measurements during the entire process and the automatic saving of the final results, all data are retrievable at any moment.