Ash and Moisture Analysis with prepASH 340 Series of Sewage Sludge from Wastewater Treatment

prepASH 390 Series

3 Burning	High Temperature	Improved Safety	Weighing Samples

Sewage sludge has valuable agronomic properties in agriculture. In using sewage sludge account must be taken of the nutrient needs of the plants without, however, impairing the quality of the soil and of surface and ground water. Some heavy metals present in sewage sludge may be toxic to plants and humans.

The sewage sludge contains mainly the microbes of the biological treatment of wastewater, sand, and water. Dry mass and ash determination are done in the standard analysis of sewage sludge and in wastewater (usually done after filtration to reduce the water).

This analysis gives first information on organic and inorganic content of the sludge.

Use of sewage sludge in agriculture

https://environment.ec.europa.eu/topics/waste-and-recycling/sewage-sludge_en

The European Union regulates use of sewage sludge in agriculture to prevent harmful effects on soil, vegetation, animals, and humans. In particular it sets limits on the concentrations of certain substances in these sludges, bans the use of these sludges in certain cases and regulates the treatment of sludge. ACT Council Directive 86/278/EEC of 12 June 1986 on the

protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (See amending acts)

PrepASH® - optimal solution for the water treatment analysis

● 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 desiccator 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

Ash and Moisture Analysis with prepASH 340 Series of Sewage Sludge from Wastewater Treatment

prepASH 390 Series

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

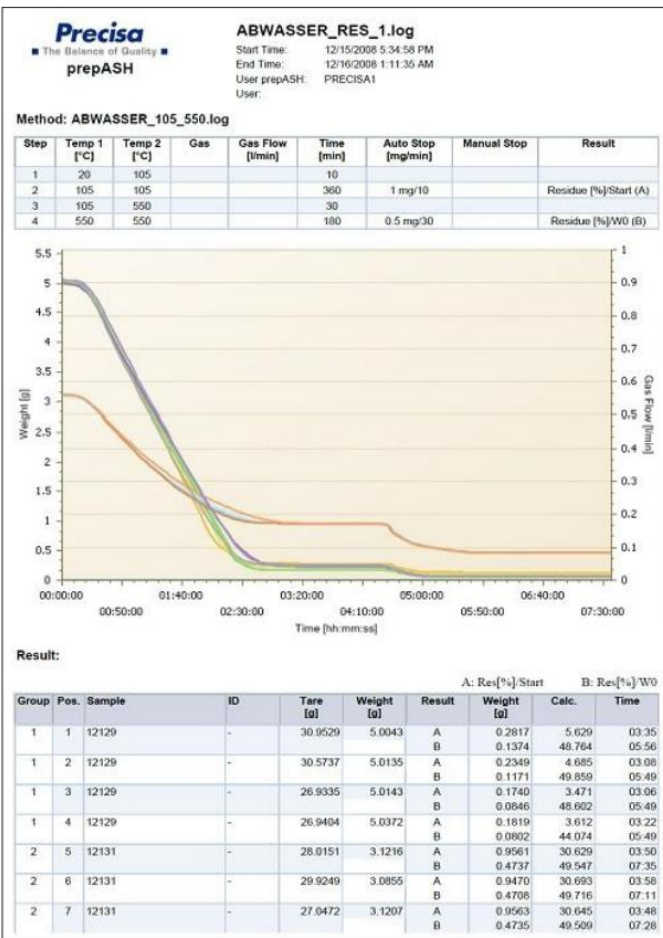**Precisa** ■ The Balance of Quality ■ prepASH

ABWASSER_RES_1.log
Start Time: 12/15/2008 5:34:58 PM
End Time: 12/16/2008 1:11:35 AM
User prepASH: PRECISA1
User:

Method: ABWASSER_105_550.log

Step	Temp 1 [°C]	Temp 2 [°C]	Gas	Gas Flow [l/min]	Time [min]	Auto Stop [mg/min]	Manual Stop	Result
1	20	105			10			
2	105	105			360	1 mg/10		Residue (%)/Start (A)
3	105	550			30			
4	550	550			180	0.5 mg/30		Residue (%)/W0 (B)

Result:

A: Res[%]/Start   B: Res[%]/W0

Group	Pos.	Sample	ID	Tare [g]	Weight [g]	Result	Weight [g]	Calc.	Time
1	1	12129	-	30.9529	5.0043	A	0.2817	5.629	03:35
						B	0.1374	48.764	05:56
1	2	12129	-	30.5737	5.0135	A	0.2349	4.685	03:08
						B	0.1171	49.859	05:49
1	3	12129	-	26.9335	5.0143	A	0.1740	3.471	03:06
						B	0.0846	48.602	05:49
1	4	12129	-	26.9404	5.0372	A	0.1819	3.612	03:22
						B	0.0802	44.074	05:49
2	5	12131	-	28.0151	3.1216	A	0.9561	30.629	03:50
						B	0.4737	49.547	07:35
2	6	12131	-	29.9249	3.0855	A	0.9470	30.693	03:58
						B	0.4708	49.716	07:11
2	7	12131	-	27.0472	3.1207	A	0.9563	30.645	03:48
						B	0.4735	49.509	07:28

Precisa ■ The Balance of Quality ■ prepASH

ABWASSER_RES_1.log
Start Time: 12/15/2008 5:34:58 PM
End Time: 12/16/2008 1:11:35 AM
User prepASH: PRECISA1
User:

Result:

A: Res[%]/Start   B: Res[%]/W0

Group	Pos.	Sample	ID	Tare [g]	Weight [g]	Result	Weight [g]	Calc.	Time
2	8	12131	-	27.2395	3.1226	A	0.9559	30.613	04:10
						B	0.4741	49.600	07:36
3	9	12136	-	27.8015	5.0009	A	0.2222	4.443	04:19
						B	0.0614	27.611	05:41
3	10	12136	-	28.7898	5.0538	A	0.2537	5.019	04:06
						B	0.0715	28.186	05:41
3	11	12136	-	23.3292	5.0445	A	0.2442	4.841	03:59
						B	0.0683	27.951	05:41

Statistic: A: Res[%]/Start   B: Res[%]/W0

Group: 1	A-Result	A-Calc.	B-Result	B-Calc.
mean	0.21813	4.34038	0.10483	47.92468
std	0.05027	1.01089	0.02725	2.56205
rstd	23.04829	23.24215	25.99314	5.35717
n	4	4	4	4

Group: 2	A-Result	A-Calc.	B-Result	B-Calc.
mean	0.95383	30.64503	0.47303	49.59288
std	0.00455	0.03441	0.00150	0.08998
rstd	0.47733	0.11229	0.31799	0.18145
n	4	4	4	4

Group: 3	A-Result	A-Calc.	B-Result	B-Calc.
mean	0.24003	4.76790	0.06707	27.91603
std	0.01616	0.29482	0.00516	0.28912
rstd	6.73160	6.18344	7.69640	1.03567
n	3	3	3	3

Note:

Sample description:
12129 Digested sludge, input in the centrifuge
12131 Dewatered digested sample (ca.30% dry weight)
12136 Raw sludge thickening centrifuge

prepASH 129: filtered wastewater/sludge samples

Sample information:

Wastewater/Sludge Samples

Analysis procedure: Samples are filtered with an ash free filter, dried and ashed.

The steps for the complete analysis in prepASH are listed in detail below. The samples used for this application have already been filtered and dried by the customer, therefore only the ashing step has been done in prepASH.

All fundamental data and operating parameters, such as changes in sample weight, temperature, gases, etc. are stored and graphically displayed. Automatic calculation of results.

Method

Step	Time	Temp 1	Temp 2	Auto Stop	Gas
1	30 min	25°C	550°C		
2	3 h*	550°C	550°C		
3	30 min	550°C	550°C		
4	30 min	550°C	550°C		

Ash and Moisture Analysis with prepASH 340 Series of Sewage Sludge from Wastewater Treatment

prepASH 390 Series
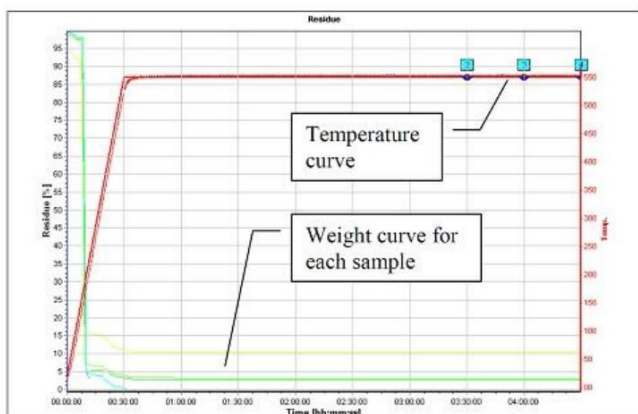
*3 hours given by customers method. Samples would reach stable weight much earlier (see graphic)

Results

No.	Sample Name	Weight	Ash [g] after 3 h	Ash [g] after 3.5 h	Ash [g] after 4 h
1	87 LUMMEN	0.1103	0.0116	0.0115	0.0116
2	92 LUMMEN	0.0912	0.0029	0.0029	0.0029
3	103 LUMMEN	0.0897	0.0023	0.0023	0.0023
4	filter	0.0784	-0.0001	-0.0001	0.0000

prepASH – optimal solution to determine ash

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

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 program"
Measuring tare of crucible one by one		AUTOMATICAL PROCEDURE
Sampling		Sampling
Weighing + documentation of each crucible		AUTOMATICAL + entering the sample name/ID
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 exicator		
Back weighing for stable results (repeat?)		
Calculation and documentation (ash)		

Ash and Moisture Analysis with prepASH 340 Series of Sewage Sludge from Wastewater Treatment

prepASH 390 Series

Procedure for automatic measurement of the samples:

1. Tare all crucibles (done fully automatic in prepASH)
2. Put empty filters into crucibles, weigh in (done in prepASH)
3. Filter the samples
4. Enter filters with samples into crucibles (make sure to enter the filters in the same crucibles as in step (2))
5. Start run (drying and ashing fully automatic)

Data in grey are automatically given, data in blue have to be calculated in prepDATA.

Dry mass and ash can be correlated to the volume too.

No.	Sample Name	Tara=automatic taring in step 1	Filter Weight [g] = weighing in step 2	Filter + Drymass = result after drying in prepASH	Dry mass in [g] = E-D	Ash [g] = result after ashing in prepASH	Ash [%] rel to dry mass = G/F*100%
1	Probe 1	29.1619	0.0969	0.6680	0.5711	0.0175	3.06
2	Probe 2	29.5602	0.1196	0.6643	0.5447	0.0176	3.23
3	Probe 3	30.0026	0.0991	0.6481	0.5490	0.0171	3.11
4	Probe 4	28.5821	0.1010	0.7960	0.6950	0.0177	2.55