

Characterization Of PHS A Peat Humic Substance Extract Analysis Report

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Scope of Work

A study was done to determine the characteristics of a PHS a peat humic substance extracted from peat humus. It was appropriate to determine if it contains nutrients, which could affect biodegradation. The analysis included the determination of organics and inorganics, nitrogen, and phosphorus. Samples were scanned with a GC/MS spectrometer for selected organics. The laboratory testing procedure follows US EPA's method for solid waste (EPA, 1986).

Standard methods are also listed for reference (APHA, 1992). Organics and inorganics were determined by conducting the total solids (TS) and volatile solids (VS) experiments. VS represents the organic content and the difference between TS and VS would be the inorganic matter. Sample digestion and distillation was conducted first and colorimetric method was used to determine the content of nitrogen and phosphorus. Solvent extraction of the peat extract sample with methylene chloride using a separatory funnel was performed first; a GC/MS spectrometer (HP 6890 GC with 5972 MSD) was then used for organic composition analysis.

Results and Discussion

Appearance

The sample was brownish semi-solid with very heavy suspended solids with no visible foreign object other than brownish sediment.

Total Solids

EPA Method 160.3 were used. Sample was mixed and placed in a crucible and dried to 103-105°C.

Crucible = 42.0053 grams

Weight of sample = 39.2738 Grams

Crucible + Sample = 81.2791 grams

The dish was transferred to the oven heated to 103-105°C and no visible oil or grease was observed in the sample.

Results after Drying:

Crucible + Sample Residue = 47.7587 grams

Residue after drying = 5.7534 grams

Total Solids = 14.6494 %

Volatile Solids

EPA Method 160.4 used with residue from above total solid test and dried to 103-105°C

Crucible + Sample = 47.7587 Grams

Crucible was transferred to a muffle furnace and heated to 550°C for 3-hours and cooled.

Crucible + Sample = 47.7587 Grams

Weight of Residue = 5.7534 Grams

Crucible + Sample = 42.6156 Grams

Volatile Solids = 89.4%

Total Phosphorus

EPA Method 365.4 was used with Ascorbic Acid to determine the phosphorus content. After color developed a sample was scanned on HP 8453 UV Vis4 Spectrophotometer and calibration curve was prepared to determine the results. A 250ml diluted digested sample was used which represents 10ml of original sample; thus making the total phosphorus concentration.

250 ml sample = 63.22 mg/liter

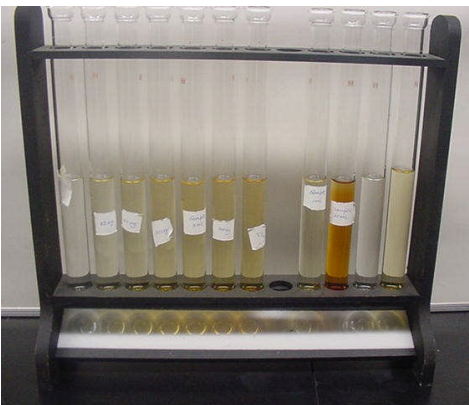
Total Kjeldahl Nitrogen

EPA Method 351.3 using 100 ml of a well mixed sample that was digested first with digestion reagents slowly, by controlling the heat. Once done, the sample was cooled and DI water was added and filtered and the filtrate diluted to 200ml. The filtrate was transferred to a Kjeldahl flask with 50 ml of 2% boric acid absorbent. Ammonia was determined by the Nesslerization Method.

200 ml sample = 58.3 mg/1,000 L

Organic Composition - GC/MS Analysis

Due to the nature of the sample, which contains large amount of suspended matter and solids, it was extremely difficult to extract the sample with methylene chloride. After several trials, on September 20, final samples were taken, once in the early morning to detect base-neutral (BN) compounds and once in late afternoon to detect the acid (ACD) compounds. 75 targeted compounds were selected for the analysis using EPA Method 625. Results of the GC/MS analysis indicates that there was only a small amount of some of those organics present.



Colorimetric method to determine Total Kjeldahl Nitrogen



Residue of the solids after total solids determination.



Residue on the filter paper after sample digestion.

Findings

- The sample contains 14.65% solids. The fixed solids content is 10.6%, which means, approximately 89.4% of the solids are organic matter.
- Phosphorus and TKN content are 63.22 mg/l and 58.3 mg/l, which indicates that the peat extract contains some nutrients.
- Results indicate the PHS main component is fibrous material, possibly cellulose.
- The GC/MS scan indicates PHS does not pose a threat to biological degradation.