



TEXAS RESEARCH INSTITUTE for ENVIRONMENTAL STUDIES

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## Water Analyses

### **Hardness** (\$15 per sample)

Water hardness is a measure of the amount of calcium and magnesium salts in water. Calcium and magnesium enter water mainly through the weathering of rocks. The more calcium and magnesium in water, the harder the water.

### **Alkalinity** (\$15 per sample)

Alkalinity is the acid neutralizing capacity of solutes in a water sample, reported in milliequivalents per liter. Alkalinity consists of the sum of titratable carbonate and noncarbonate chemical species in a filtered water sample.

### **pH** (\$5 per sample)

This test is a measure of the acidity or basicity of a solution in a range from 0 to 14. Acidic solutions are from 0-6, neutral solutions are from 6-9, and basic solutions are from 9-14.

### **Conductivity** (\$5 per sample)

Conductivity is a measure of the ability of a solution to conduct electricity and is linked directly to the total dissolved solids (T.D.S.). Conductivity measurements give an indication as to the presence of soluble salts.

### **Total Dissolved Solids (TDS)** (\$15 per sample)

TDS is a measure of the combined content of all inorganic and organic substances contained in a liquid in molecular, ionized, or suspended form. The principal application of TDS is in the study of water quality for streams, rivers and lakes, although TDS is not generally considered a primary pollutant. It is also used as an indication of aesthetic characteristics of drinking water and as an aggregate indicator of the presence of a broad array of chemical contaminants.

### **Total Suspended Solids (TSS)** (\$15 per sample)

TSS is a measure of the amount of non-filterable residue in solution and is a water quality parameter used to assess the quality of drinking water and wastewater after treatment in a wastewater treatment plant.

### **Turbidity** (\$15 per sample)

Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (such as whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria.

### **Biochemical Oxygen Demand (BOD) (\$15 per sample)**

Biochemical oxygen demand (BOD) is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period. Higher BOD values indicate increasing contamination.

### **Chemical Oxygen Demand (BOD) (\$25 per sample)**

COD is commonly used to indirectly measure the amount of organic compounds in water. Most applications of COD determine the amount of organic pollutants found in surface water or wastewater, making COD a useful measure of water quality.

### **Salinity (\$5 per sample)**

Salinity is the saltiness or dissolved salt content of a body of water. Salinity is an important factor in determining many aspects of the chemistry of natural waters and of biological processes within it, and is a thermodynamic state variable that, along with temperature and pressure, governs physical characteristics like the density and heat capacity.

### **Total and Fecal Coliforms (\$30 per sample for both or \$15 for individual components)**

Coliform bacteria are a commonly used bacterial indicator of sanitary quality of foods and water. They are defined as rod-shaped Gram-negative non-spore forming and motile or non-motile bacteria which can ferment lactose with the production of acid and gas when incubated at 35–37°C. Coliforms can be found in the aquatic environment, in soil and on vegetation; they are universally present in large numbers in the feces of warm-blooded animals. While coliforms themselves are not normally causes of serious illness, they are easy to culture, and their presence is used to indicate that other pathogenic organisms of fecal origin may be present. Such pathogens include disease-causing bacteria, viruses, or protozoa and many multicellular parasites.

### **Hexane Extractable Material (Oils and Greases) (\$50 per sample)**

This method is for determination of n-hexane extractable material (HEM; oil and grease) and n-hexane extractable material that is not adsorbed by silica gel (SGT-HEM; non-polar material) in surface and saline waters and industrial and domestic aqueous wastes. Extractable materials that may be determined are relatively non-volatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related materials.

### **Nitrates/Nitrites (\$70 per sample for both or \$35 for individual components)**

Nitrates and nitrites are nitrogen-oxygen chemical units which combine with various organic and inorganic compounds. The greatest use of nitrates is as a fertilizer. Once taken into the body, nitrates are converted to nitrites.



## **Soil Analyses**

### **Total Petroleum Hydrocarbons (TPH) (\$85 per sample)**

Total petroleum hydrocarbon (TPH) is a term used for any mixture of hydrocarbons that are found in crude oil. There are several hundred of these compounds, but not all occur in any one sample. Crude oil is used to make petroleum products which can contaminate the environment.

### **Soil Salinity (\$5 per sample)**

Soil salinity is the salt content in the soil; the process of increasing the salt content is known as salinization. Salts occur naturally within soils and water. Salination can be caused by natural processes such as mineral weathering or by the gradual withdrawal of an ocean. It can also come about through artificial processes such as irrigation.

### **Soil pH (\$5 per sample)**

This is a measure of the soil acidity or alkalinity and is a measure of the pH of the soil solution, which is considered the active pH that affects plant growth.

### **Extractable (plant available) macro and micro nutrients** (\$84 and \$56 per sample)

Macro (calcium, magnesium, potassium, sodium, phosphorus, sulfur) and micronutrients (copper, iron, manganese, zinc) are required by plants in order to grow, be healthy, and produce.

### **Buffer pH (BpH)** (\$5 per sample)

This is a value that is generated in the laboratory, it is not an existing feature of the soil. This test is performed in order to develop lime recommendations. The BpH is the resulting sample pH after the adding a liming material.

### **Nitrate as N** (\$35 per sample)

Nitrate is used as food by plants for growth and production. The level of nitrate in soil varies widely, depending upon the type of soil, climate conditions, rainfall and fertilizing practices. Nitrate N is used to determine appropriate fertilizer recommendations.

### **Total Nitrogen** (\$45 per sample)

This test is used for measuring the amount of nitrogen in soil that is available for use by plants as a nutrient.

### **Agriculture Soil Analysis 1** (\$10 per sample)

This analysis measures pH, salinity, Nitrate, Phosphorus, Potassium, Calcium, Sodium, and Sulfur.

### **Agriculture Soil Analysis 2** (\$15 per sample)

This analysis measures (pH, salinity, electrical conductance, Nitrate, Phosphorus, Potassium, Calcium, Sodium, Sulfur, Magnesium, Zinc, Copper, Iron, Manganese,



## **Forage Analyses**

### **Dry Matter** (\$15 per sample)

Dry matter is the feed without the moisture (dry matter = 100% – Moisture). It represents everything in the sample other than water, including protein, fiber, fat, minerals, etc.

### **Crude Protein** (\$45 per sample)

Crude protein is an estimate of the protein content of the feed. The normal range is 6 to 20% on a dry matter basis. Crude protein includes both true protein and non-protein nitrogen.

### **Neutral Detergent Fiber** (\$45 per sample)

Neutral detergent fiber (NDF) is a measure of hemicellulose, cellulose, and lignin, which represent the fibrous bulk of forage. These components are called cell wall or structural carbohydrates. They give the plant rigidity, enabling it to support itself as it grows. Cellulose and hemicellulose can be partially broken down by microbes in the rumen to provide energy to the animal. NDF is negatively correlated with intake; a high percent NDF reduces forage intake. A normal range is 30 to 60 percent on a DM basis.

### **Acid Detergent Fiber** (\$45 per sample)

Acid detergent fiber (ADF) is a measure of cellulose and lignin. ADF is negatively correlated with overall digestibility; high ADF feed is less digestible. A normal range is 25 to 45 percent on a DM basis.

### **Total Digestible Nutrients** (\$15 per sample)

Total digestible nutrients (TDN) is the sum of the digestible protein, digestible NSC, digestible NDF, and 2.25 times the digestible fat.

### **Relative Feed Value** (\$15 per sample)

Relative feed value (RFV) ranks feed based on digestibility (ADF) and intake (NDF) potential. An RFV of 100 is considered the average score. The higher the RFV, the better the forage quality.

### **Minerals (macro and micro) (\$84 and \$56 per sample)**

Minerals make up 3 to 5% of an animal's body dry weight. They have multiple functions within the animal. They are classified into two groups: **macro-minerals** (calcium, phosphorus, sodium, magnesium, potassium, sulfur), are present at greater levels in the animal body or needed in relatively larger amounts in the diet, and **micro-minerals** (copper, iron, manganese, molybdenum, zinc), which are present at lower levels or needed in very small amounts..

### **Nitrates (\$35 per sample)**

Nitrates can be accumulated by forage plants under stressed conditions such as drought, freezing, or heavy fertilization. Corn, sorghum, sudangrass, and oat hay are nitrogen accumulators even without added stress to the plant.

### **Forage Analysis 1 (\$15 per sample)**

(Dry matter, Crude protein, Neutral detergent fiber, Acid detergent fiber, Total digestible nutrients, and Relative Feed Value)

### **Forage Analysis 2 (\$25 per sample)**

(Dry matter, Crude protein, Neutral detergent fiber, Acid detergent fiber, Total digestible nutrients, Relative Feed Value, and Minerals)