

Geochemical Analysis of Marine Sediment Sample

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EMP/ ELSRC

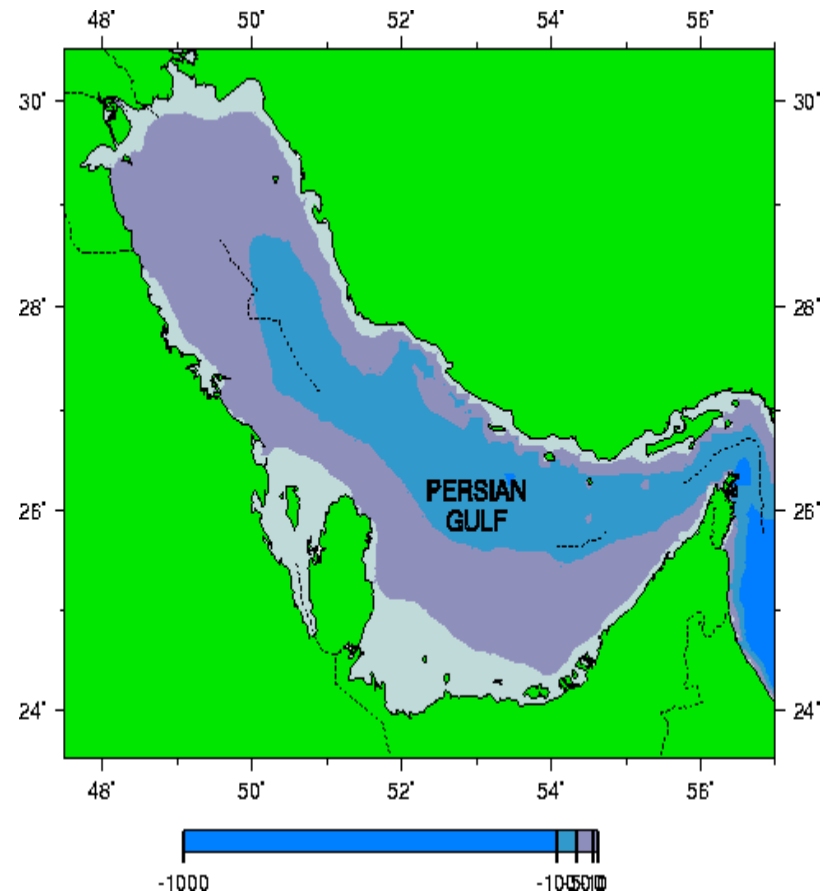
Marine Geochemistry

- Determination of Total Organic concentrations in Kuwait marine sediments.
- Granulometric and textural analysis of marine sediments.
- Total Suspended Solids analysis of seawater.
- Organic nitrogen and phosphorous determination.
- Trace metals determination and speciation in marine sediments like: cadmium, vanadium, chromium and etc.
- BOD (Biological Oxygen Demand) and COD (Chemical Oxygen Demand) of seawater samples.
- Particle size analysis of solid particles in water samples.
- Foraminiferal studies in relation to the species as a marine pollution indicator.

General Characteristics of Kuwait's Marine Environment

- **Dissolved Oxygen**

Dissolved oxygen in seawater is important to marine life. Concentrations of DO differs from one location to another (> 4.0 mg/l).



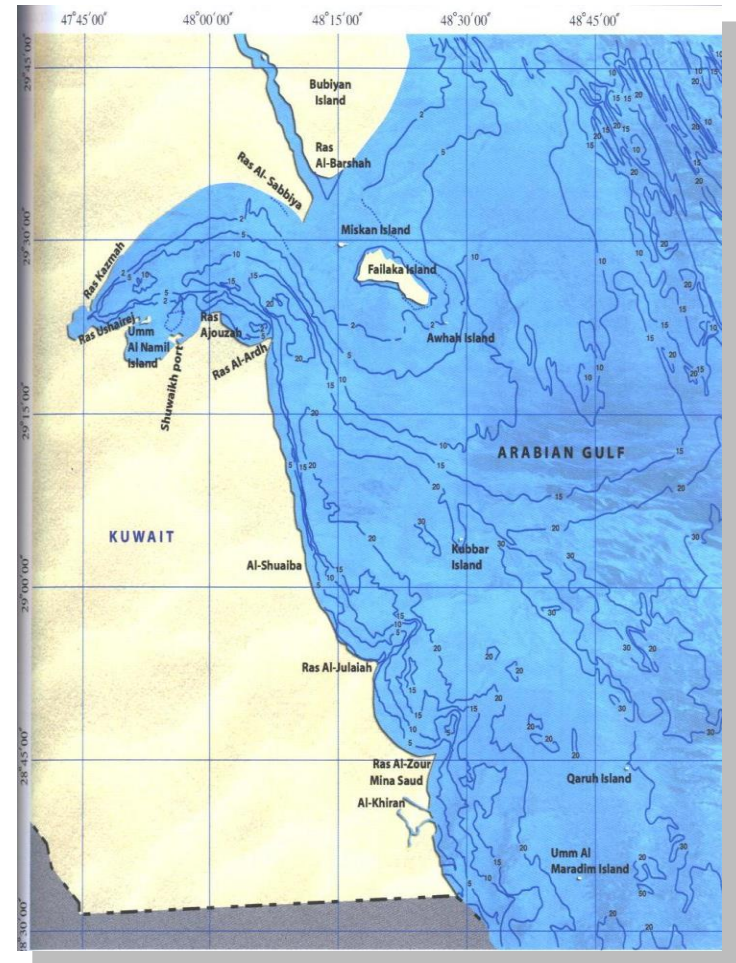
General Characteristics of Kuwait's Marine Environment

- Seawater Depth**

In general, water depths in the Arabian Gulf can differ at different sites with approximate maximum depth recorded was 40 m.

Northern Area: shallow, muddy seafloor, (5 m).

Southern Area: deep, sandy and silicious seafloor, (≥ 30 m).

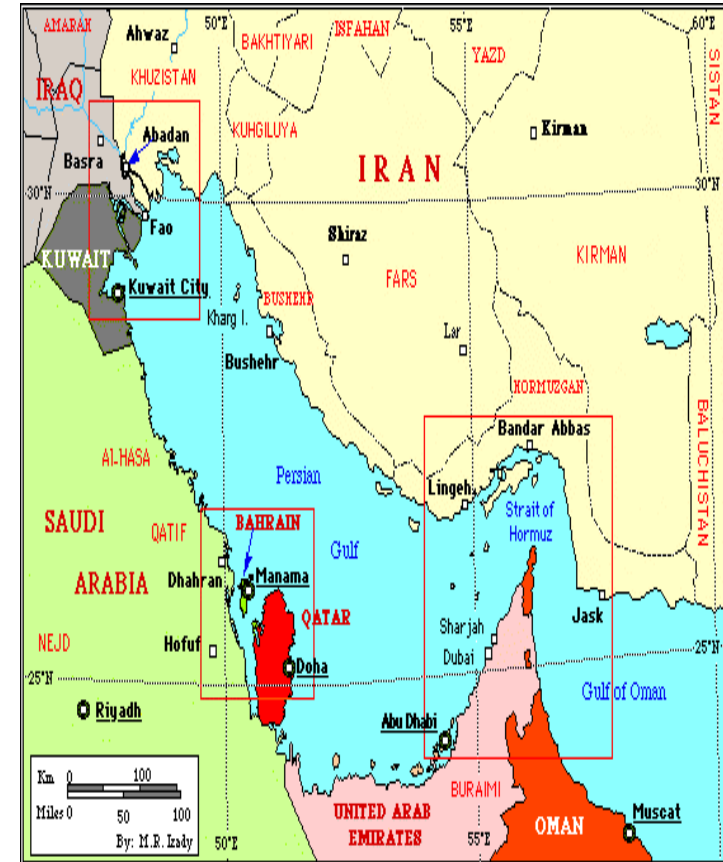


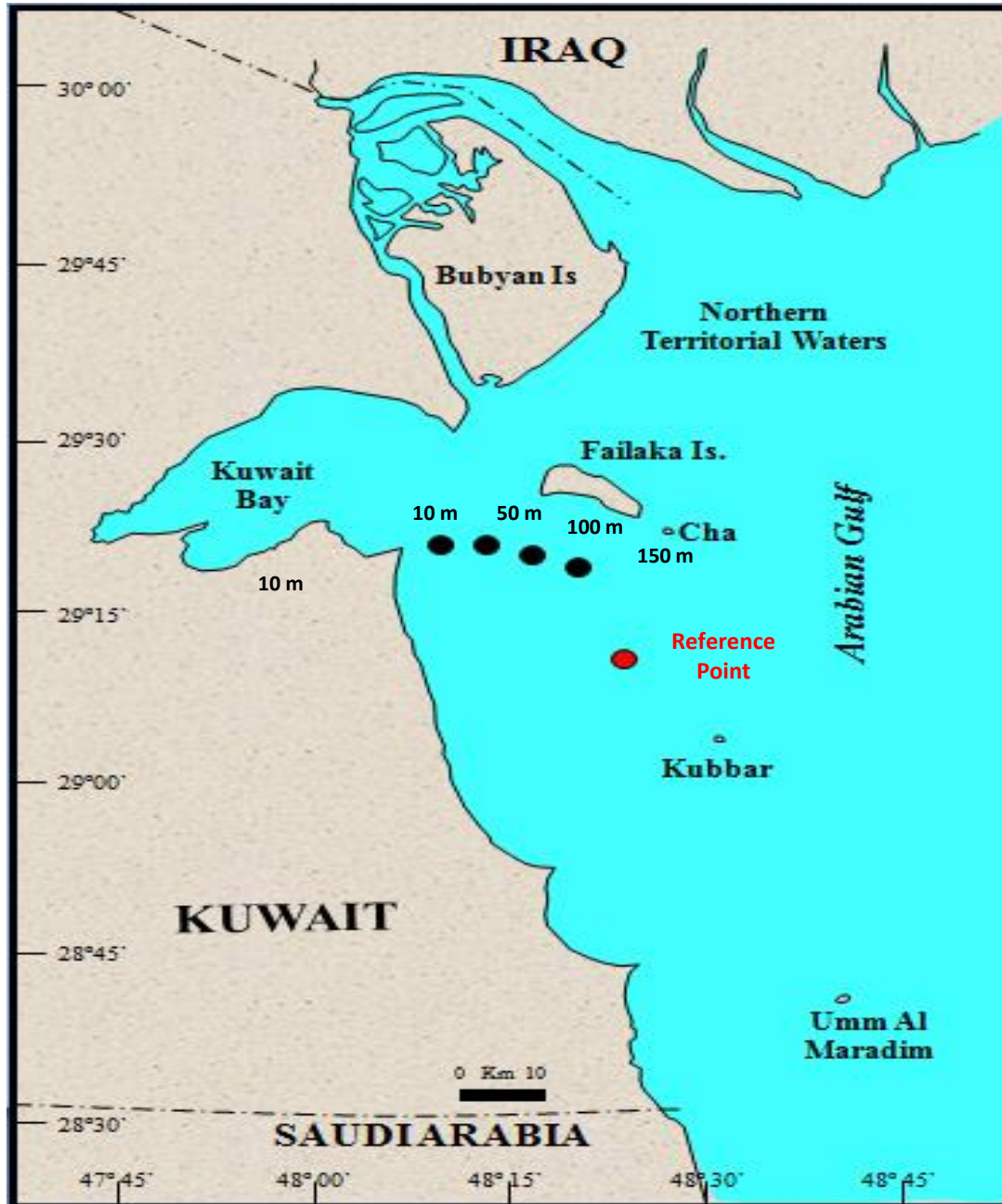
- **Salinity**
- Very high, can range **33-42 ppt** (parts per thousand).
- Increases in the summer.
- Temperature increases, salinity increases.



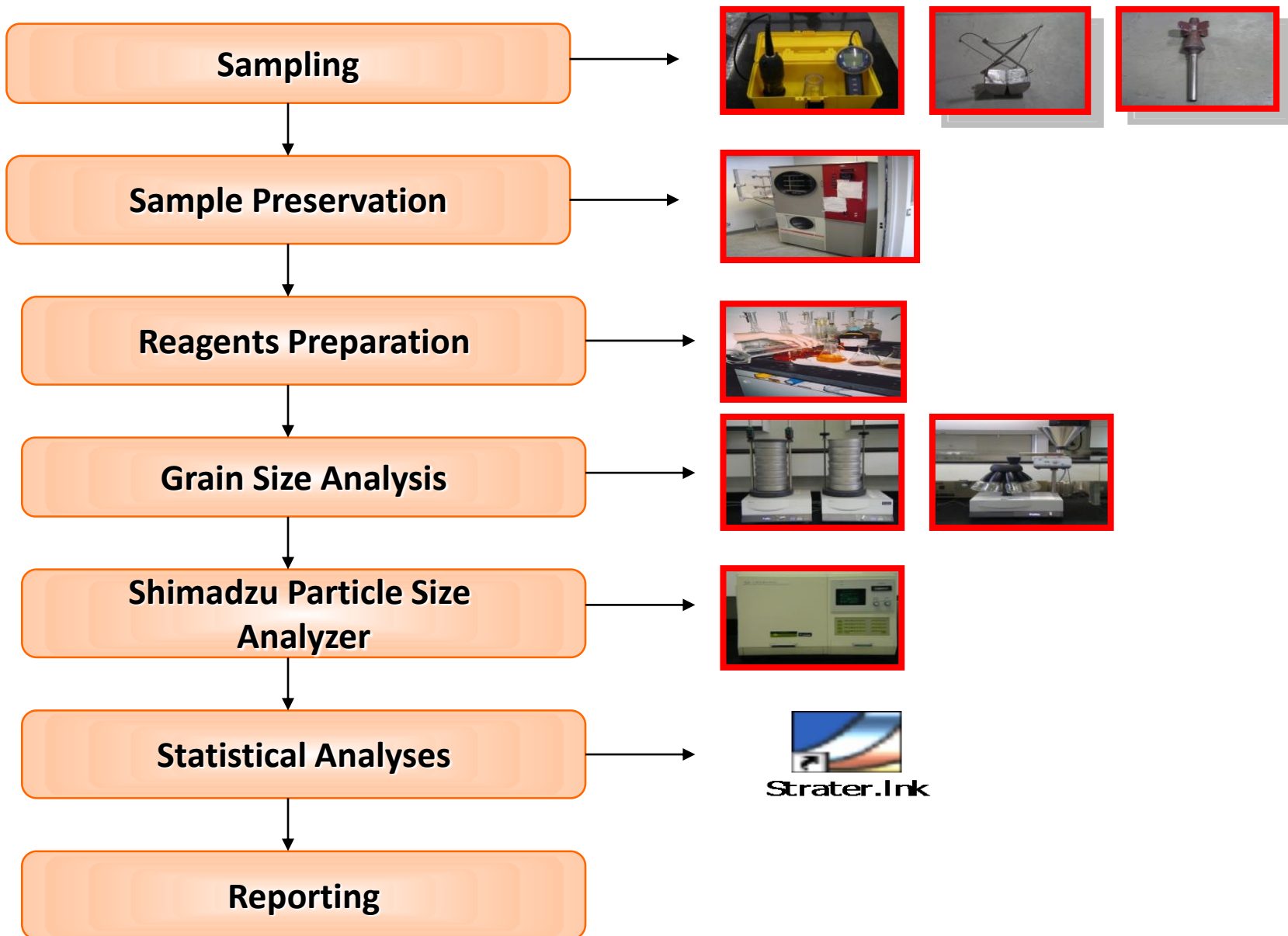
General Characteristics of Kuwait's Marine Environment

- **Temperature**
- **Kuwait's Territorial Waters is characterized by elevated water temperatures.**
- **July to August: 30.5 °C.**
- **January to February: 14.0 °C.**
- **Average: 23.8 °C.**





Sedimentological Analysis



Water Quality Measurements

- **Water Quality Probe**

For Field determination of water quality parameters such as: temperature, pH, DO, Conductivity, ORP, Turbidity, salinity and depth.

It has a 8.9 cm display screen with 100 data frame memory and water proof case.



Sedimentological Analysis



- **VAN VEEN GRAB SAMPLER**

lightweight model easily used from a small boat with nylon cable used for collecting surficial sediment samples from the sea floor.



- **CORE SAMPLER**

Used to obtain an undisturbed sediment samples and its suitable for sand, silt and clay bottoms.

Sections of the core can be retained in a plastic tubes.

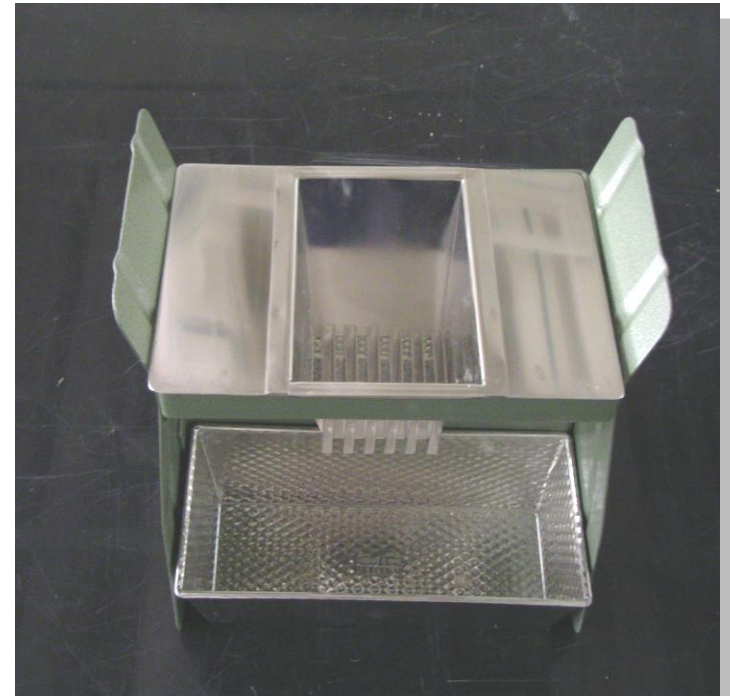
Sedimentological Analysis

- **Retsch Sample Splitter RT**

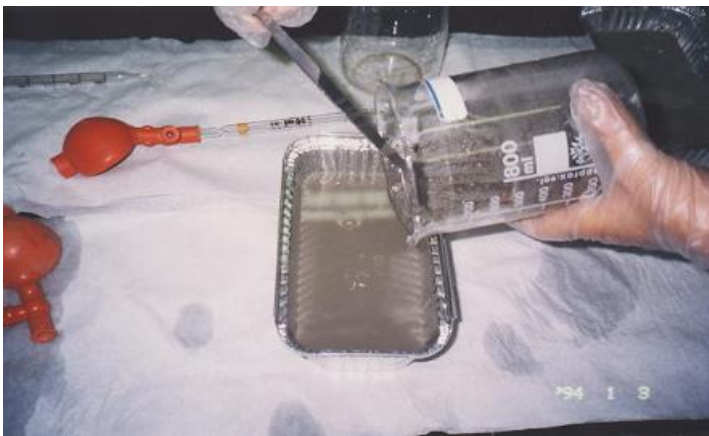
Is used for the simple dividing and reduction of bulk sediment samples and other materials.

Sample Splitters are the most proper tool for on-site sampling and laboratory usage.

Also, it has a high-precision manual dividing process.



Sample Preparation



Sample Preparation



Sample Preparation

- **MAXO -185-D OVEN**

It has a maximum temperature of 300°C and its used for drying various types of material such as: sediments, filter papers, glassware and etc.



- **Model U - Memmert Universal Ovens**

With Temperature range +30°C to +220°C (86°F to 428°F) for drying of sediment samples and laboratory glassware.



Sample Preparation

- **VITIRIS GENESIS 12SL
FREEZE DRYER**

The unit has several parameters in it such as: condenser temperature and vacuum, etc.

And it is used for the freeze-drying process of different materials such as: sediments like sand and mud and food like dough and bread.



Sample Preparation

- **GIBERTINI EUROPE 3000 BALANCE**

This balance has a maximum weighing value of 3300 g for weighing the desired amount of sediment samples.



- **METTLER AM50 Sensitive Balance**

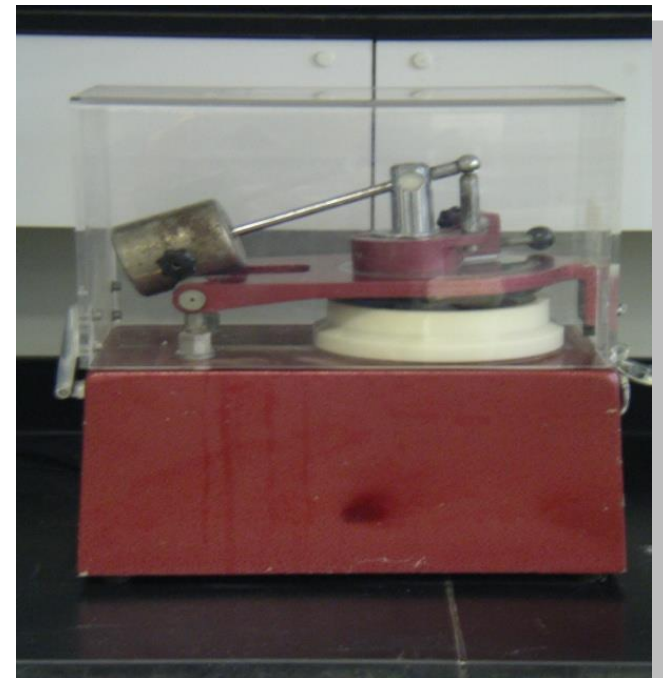
This sensitive balance is for weighing the micro fractions of materials such as sediment samples and chemicals. Its range is 900 mg-50 g.



Sample Preparation

- **Fritsch Pulverisette**

Is used for grinding solid sediments into powdered forms for analysis and storage purposes.



Grain Size Analysis

- **Determine the characteristic of marine sediment whether it's composed of sand or mud (type of grains).**
- **Measure the grain size and relate the level of pollution to the sediment grains.**
- **Two main parts:**
 - **1) Dry sieving**
 - **2) Wet sieving**

Grain Size Analysis Instruments

- **Retsch PT 100
Sample Divider**

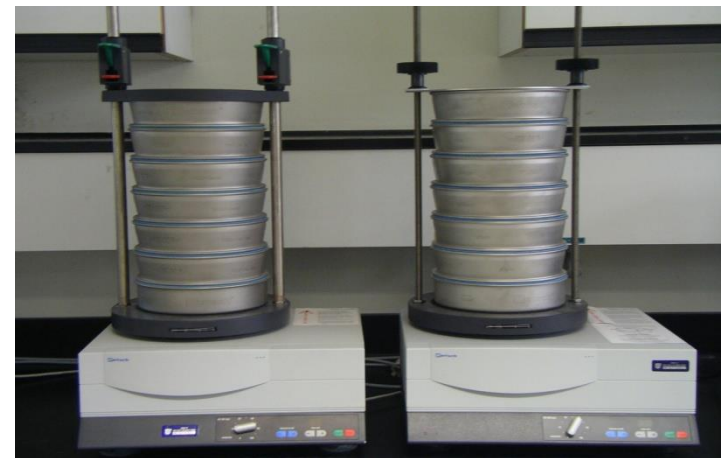
To obtain a representative divisions of non-homogeneous materials such as sediment samples into representative sub-samples.

It has an Automatic material feed via feeder unit with extremely high dividing accuracy.

- **Sieve Shakers AS 200 digit**

For wet and dry sieving operations of sediment samples. It has a measuring range form 0,020 - 25 mm.

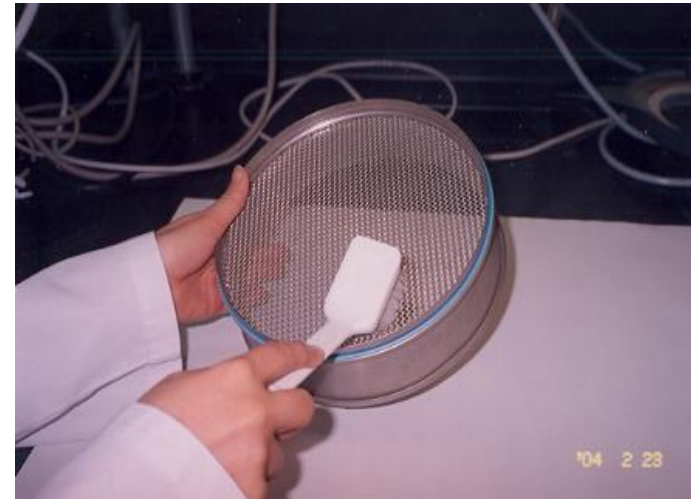
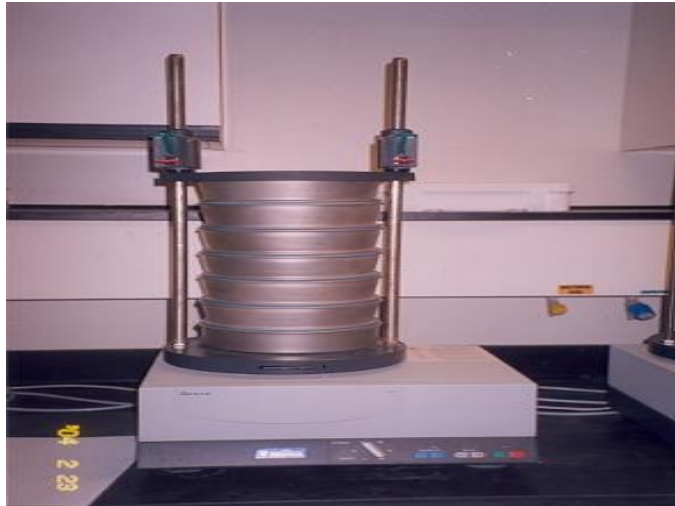
With a low-noise and maintenance-free advantages.



Grain Size Analysis



Dry Sieving



Grain Size Analysis

- **SA-CP3 SHIMADZU Centrifugal Particle Size Analyzer**

Operates with gravitational and/or centrifugal sedimentation and photometric detection method determine the particle sizes of samples such as: suspended solids in waste water, sediment, foods, ceramic material and synthetic resins, etc.

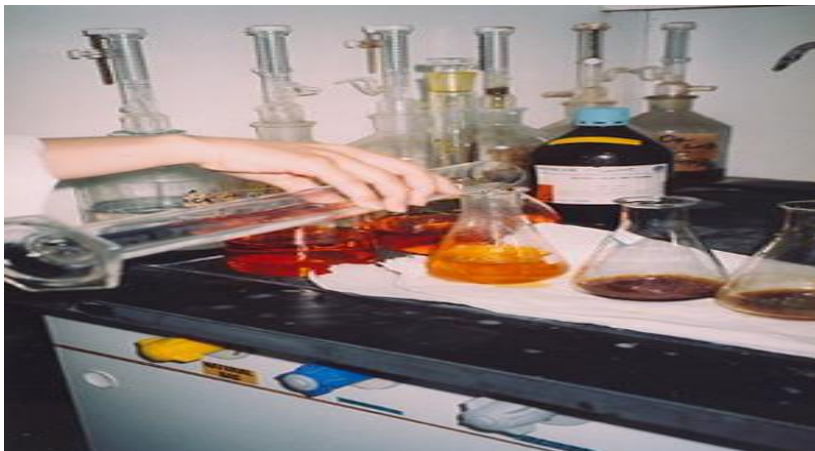
It has a measuring range of 0.02-500 μ m.



Total Organic Carbon (TOC)

- To determine the percentage of organic carbon present in the collected sediment samples.
- To identify the origin of the organic carbon in the sediment samples.
- To relate the percentage of organic carbon to marine pollution.

Total Organic Carbon (TOC)



Fecal Coliforms Bacteria In Sea Water

using IDEXX technique

Enterolert®

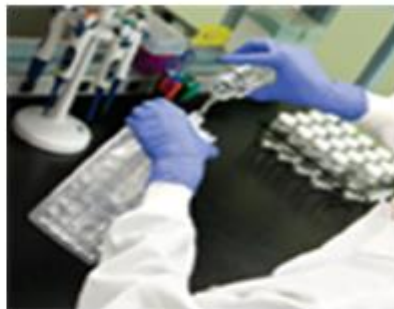
Detects and quantifies enterococci in 24 hours

Definition:

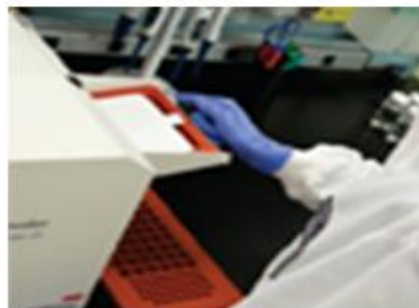
- Fecal coliforms are aerobic and facultatively anaerobic. Gram- negative, non-sporeforming rods that ferment lactose while producing acid and gas at 35 C and 44.5 C, in less than 24hours. They produce indole in tryptone water containing tryptophane at 44.5 C.
- Fecal coliforms exhibit a highly specific positive correlation with fecal contamination from warm-blooded animals and, therefore, are good indicators for the sanitary quality of coastal waters. Since fecal coliforms die within hours when exposed to sunlight in seawater at temperatures about +4 C, their presence in seawater indicates only recent contamination by fecal material.
- Die-away rates (T-90) depend on salinity temperature, solar radiation, etc. and must be taken into consideration when interpreting the results.



A



B



C



D



E

Analysis of micro-nutrients in sediments (Phosphate and Nitrogen Forms)

- Loosely bound phosphate is analyzed by HACH method 8048; Phosver3 (ascorbic acid) method. The detection range for this method is 0.02 to 2.5 mg/L PO₄⁻³
- Nitrite is analyzed by HACH method 8507; Deionization method. The detection range for this method is 0.002 to 0.3 mg/L.
- Nitrate is analyzed by HACH method 8192; Cadmium Reduction method. The detection range for this method is 0.01 to 0.5 mg/L.
- Ammonia-nitrogen is analyzed by HACH method 8155; Salicylate method. The detection range for this method is 0.01 to 0.5 mg/l.



Analysis of micro-nutrients in sediments (Phosphate and Nitrogen Forms)

- **HACH DR / 4000U
Spectrophotometer**

To measure the concentration of organic phosphorous in marine sediment samples.

Photometric Range: - 3.0 to 3.0 ABS.

To determine the intensity of various wavelengths in a spectrum of light
Wavelength Range: 190 to 1100 nm.



- **WIFUG-Lab. Centrifuge**

Is used for the separation of liquid materials from solid materials such as sediment from interstitial water for later geochemical laboratory analysis.



- **SPECTROPHOTOMETER VIS-7220G**

The VIS single beam Spectrophotometer can be used to determine the concentration of organic phosphorous in marine sediment samples as well as other nutrient salts in water and sediment.

It has a fixed wavelength of 330-800 nm.



Thank You