



University of Technology



**Petroleum Technology
Department**

Drilling fluid Laboratory

For 3rd year

**Petroleum engineering
laboratory equipment**

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Department of Petroleum Technology -

University of Technology

INDEX

4-Scale Mud Balance.....	1
Microprocessor-based PH\mV\°C Bench Meters.....	2
Plastic Marsh Funnel Viscometer.....	3
2 -Speed, Hand-crank Rheometer.....	4
Model 900 digital viscometer complete with thermo cup, soft ware, calibration fluid and rolling carrying case.....	5
Filter press with Dead Weight Assembly.....	6
Analog Resistivity Meters.....	7
20-mL Retort Kit with Electronic Temperature controller and 20-mL Retort Kit with thermostat.....	8
Atmospheric Consisto meter (model 60).....	9
Hamilton Beach® Three Spindle Mixer with Containers.....	10
Constant Speed Blender (Model 20)	11
Methylene Blue Test Kit.....	12
Electrical Stability Meter.....	13
SandContent Kit with Case.....	14

Introduction.....

Drilling Fluid Laboratory is the laboratory in which it presents the test procedures used to determine whether the drilling fluid has suitable properties for performing its functions.

Also the student in this laboratory will recognize:-

1- The types of drilling fluid and the fundamental properties in which must be tested.

2-How to deal with the common additives used to obtain the desirable properties under various well conditions

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1- 4-scale Mud Balance

One of the most important properties monitored throughout the drilling operation is mud density . this equipment used to determine density of the drilling fluid. The instrument consists of a constant volume cup with a lever arm and rider calibrated to read directly the density of the fluid in ppg,gmp.



Purpose:
measurement mud
density.

2-Microprocessor-based PH\mV\°C Bench Meters

The most commonly chemical parameter in aqueous solution is acidity and alkalinity.

Measuring parameters by this equipment:

ph ,mV , ° C, Ion concentration, relative mV

The pH meter is an electric device utilizing glass electrodes to measure a potential difference and indicate directly by dial reading the pH of the sample. The pH meter is the most accurate method of measuring PH.



Purpose:

Measurement acidity and the alkalinity of the drilling fluid

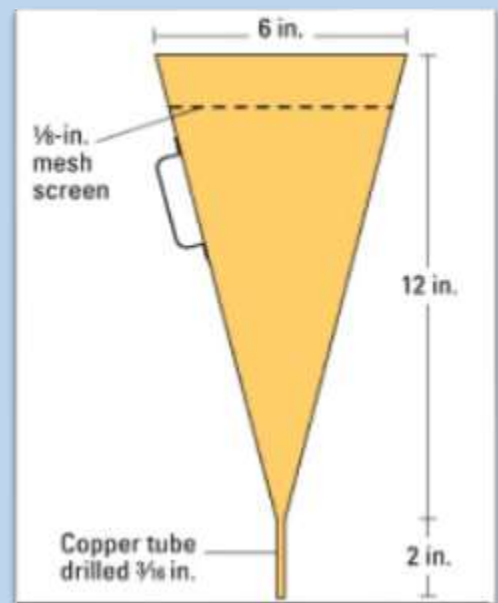
Company: HANNA

Serial Number: 08487758

3_ plastic marsh funnel

The Marsh Funnel is a device that is common to every drilling rig. The Marsh Funnel is oldest and simplest device used to determine viscosity on a routine basis which is useful only for relative comparisons. measure the time rate of flow in sec. for one quart of mud to flow through a marsh funnel which has capacity of 946 cm³. A quart of water exits the funnel in

26
sec



Purpose:

Measure the time rate of flow in sec. for one quart of mud

4 -2-Speed ,Hand-crank Rheometer

Rheometer is a direct-indicating, manually operated, rotational viscometer. the instrument is powered by a hand crank , which drives the spindle through a precision gear train. The shift cam selects between fixed speeds of 300 and 600 RPM. A knob on the hub of the shift cam determines gel strength.

Rheometer is a coaxial cylindrical rotational viscometer, used to determine single or multi-point viscosities. It has fixed speeds of 2 : 300 and 600 RPM ,also used to read Gel strength.



Purpose:

Determine Mud Reology(Apparent Viscosity (Ma), Apparent Viscosity (Ma), Yield Point (Yp))

-Mud Reology(GEL STRENGTH)

Company: OFITE(OFI testing equipment)

Serial Number: 12-2294

5-Model 900 digital viscometer complete with thermo cup, soft ware, calibration fluid and rolling carrying case

A high tech testing instrument doesn't have to be difficult to use or maintain. Take look at model 900, one word comes to mind -simple :simple to operate, simple to calibrate ,simple to maintain.

This viscometer is extremely versatile. Its simplicity makes it ideally suited for the field, yet with the addition of a computer , it can perform as well as any lab machine available today .Mud engineers will appreciate the push button calibration ,not to mention getting standard API tests with one command.



Purpose: measurement Shear stress, shear rate ,viscosity at: $\varnothing 1, \varnothing 2, \varnothing 3, \varnothing 6, \varnothing 10, \varnothing 20, \varnothing 30, \varnothing 60, \varnothing 100, \varnothing 200, \varnothing 300,$

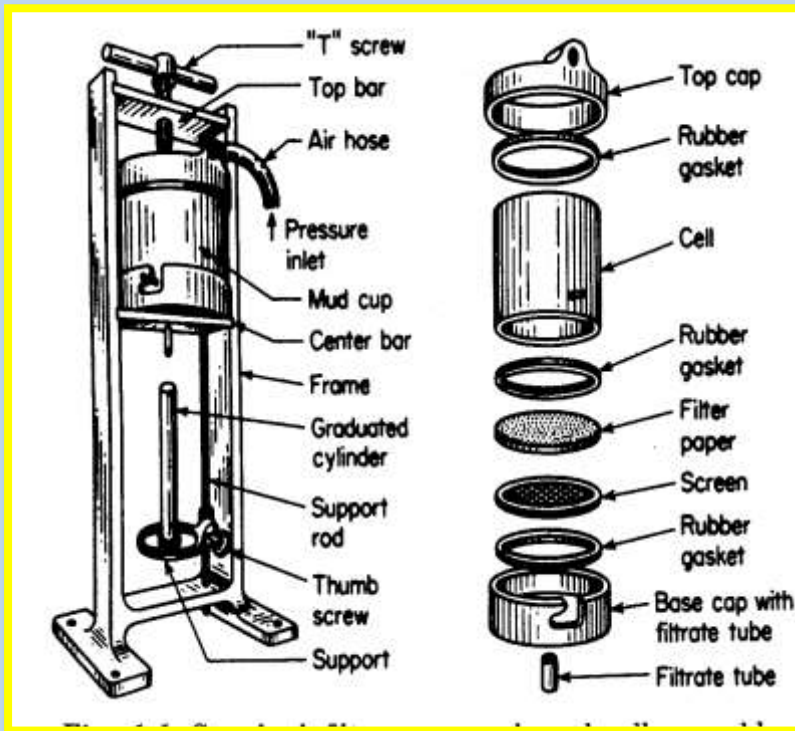
Company: OFITE(OFI testing equipment)

Serial Number: 004-12-1754

6-Filter press with Dead Weight Assembly

The Dead Weight Hydraulic Assembly provides the operator of the standard API Filter press with a convenient source of the hydraulic pressure

this alleviates the need for a regulator ,separate pressure source , outside connection .the hydraulic system has sufficient volume to run the complete 30- minute filtration test without further attention from the operator , and the assembly requires a minimum amount of maintenance



OFITE(OFI testing
Company: equipment)
Serial Number: 140-75

Filtration of
to determine the
and wall cake-
properties of
(solid).

7- Analog Resistivity Meters

Resistivity Meter is a portable measuring instrument designed to give a quick ,reliable measurement of the resistivity from a small sample ,expressed in ohm-meters.

This transistorized meter accurately measure the resistivity of fluids ,slurries ,and semi-solids with resistivity from 0.01 to 10 ohm-meter²/meter.



Purpose: Measurement Resistivity of mud or another fluid, slurries, and semi-solids with resistivity from 0.01to 10ohm-meter²\meter

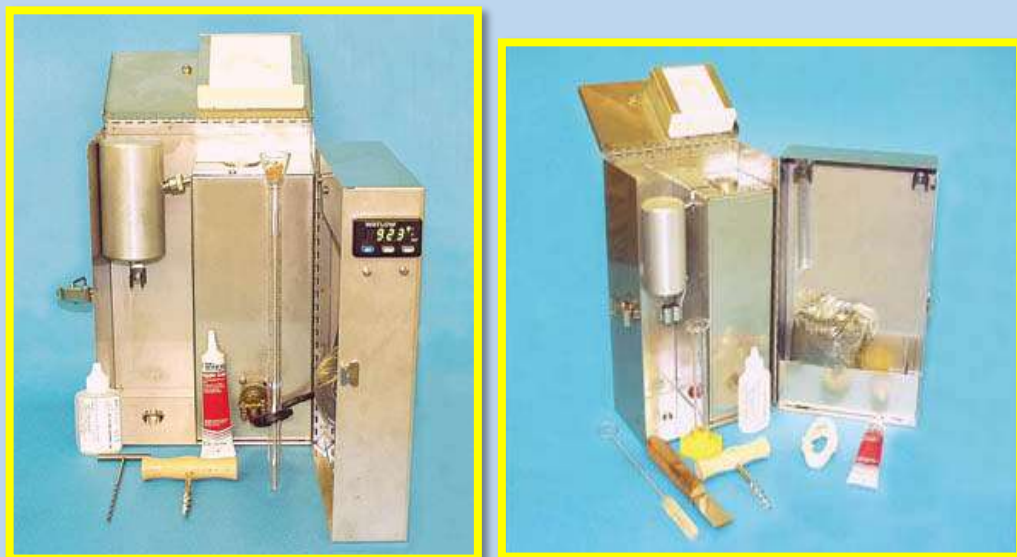
Company: OFITE(OFI testing equipment)

Serial Number:04-05-02

8- 20-mL Retort Kit with Electronic Temperature controller and 20-mL Retort Kit with thermostat

The retort provides a method for measuring the percentage (%) of oil and water , and for estimating both suspended and dissolved solids contained in a sample of water-based or oil based mud's and cutting.

Knowledge of oil, water, and solid content is fundamental to proper control of mud properties when considering oil/ water ratios ,rheology, density, filtration , and salinity.



**Purpose: Determination of
water, oil & solid content in
drilling mud**

Company: OFITE(OFI testing equipment)

Serial Number: 12-96

9-*Atmospheric Consistometer (model 60)*

Atmospheric consistometer is used for conditioning cement slurries as specific within API Specification 10.



Purpose:

For conditioning cement slurries as specified within API Specification 10. determination of rheological properties, examination of free water content

Company: OFITE(OFI testing equipment)

Serial Number: 12-31

10- *Three Spindle Mixer with Containers*

Special attention to mixing procedures and reagent preparation is essential in any qualitative fluid analysis. Factors such as low or high shear, initial mix concentrations, and an ability to change mixing speeds are important considerations when choosing a laboratory or field mixer.



Purpose:

Mix the mud

Company: Hamilton Beach

Serial Number: E1221L0040

11- Methylene Blue Test Kit

The methylene blue capacity of a drilling fluid is an indication of the amount of reactive clays (bentonite or drilled solids) present as determined by the methylene blue test (MBT). The methylene blue capacity gives an estimate of the total cation exchange capacity (CEC) of the solids in the drilling fluid. The methylene blue capacity and the cation exchange capacity are not necessarily equivalent, with the methylene blue capacity normally being somewhat less than the actual cation exchange capacity. Methylene blue solution is added to a sample of drilling fluid which has been treated with hydrogen peroxide and acidified until saturation is noted by the formation of a “dye halo” around a drop of solids placed on filter paper. Drilling fluids frequently contain substances in addition to reactive clays that also absorb methylene blue dye. Pretreatment with hydrogen peroxide removes these effects from organic materials such as lignosulfonates, lignites, cellulosic Polymers and polyacrylates, etc.



Purpose: The methylene blue capacity of a drilling fluid is an indication of the amount of reactive clays (bentonite or drilled solids) present as determined by the methylene blue test (MBT)

12- Electrical Stability Meter

The OFITE Electrical Stability Meter (ES) is a sine wave instrument. It is manufactured in accordance with the American Petroleum Institute (API) “Recommended Practice Standard Procedure for Field Testing Oil-Based Drilling Fluids”, 13B-2. It is accurate, compact, and portable and is intended for routine field and laboratory use to measure the relative electrical strength of drilling fluids having a continuous oil phase.

The ES Meter is self contained and consists of a meter and probe, and it operates on four 9 volt alkaline batteries which are readily obtainable. Two calibration standards (high and low) are included with each unit to ensure accuracy.



Purpose:

use to measure the relative electrical
Strength of drilling fluids having a continuous oil

Company: OFITE(OFI testing equipment)

Serial Number: 7763

13-SandContent Kit with Case.

It is desirable to know the sand content of drilling mud's because excessive sand may result in the deposition of a thick filter cake on the wall of the hole, or may settle in the hole about the tool when circulation is stopped, thus interfering with successful operation of drilling tools or setting of casings. High sand content also may cause excessive abrasion of pump parts and pipe connections.

The OFITE Sand Content Kit determines the volume percent of sand-sized particles in the drilling fluid. API defines sand-sized particles as any material larger than 74 microns (200 mesh) in size.

The test can be performed on low solids fluids as well as on weighted fluids



Purpose:

Use to know the sand content of drilling mud's because

Excessive sand may result in the deposition of a thick filter cake on the wall of the

Company: OFITE (OFI testing equipment)

Serial Number: 43768

14-Constant Speed Blender (Model 20)

Constant Speed Blender was designed to prepare well cement for testing according to the guidelines stated within API Specification 10.

Research has demonstrated that the properties of well cement are highly dependent upon mixing procedure. In addition, studies have indicated that when constant speed blenders / mixers are used, data obtained from thickening time tests has greater reproducibility and generally correlates better with data obtain from other laboratories.



Company: OFITE(OFI testing equipment)

Serial Number: 120904

