



Hashemite University
Faculty of Engineering
Civil Engineering Department

Environmental Engineering Lab

List of Experiments

- 1 DETERMINATION OF CHLORIDE
- 2 DETERMINATION OF RESIDUAL CHLORINE
- 3 DETERMINATION OF TOTAL and CALCIUM HARDNESS
- 4 DETERMINATION OF ALKALINITY and ACIDITY
- 5 DETERMINATION OF CONDUCTIVITY AND TOTAL SOLID
- 6 DETERMINATION OF TURBIDITY and JAR TEST
- 7 DETERMINATION OF COD
- 8 DETERMINATION OF DO
- 9 DETERMINATION OF BOD



Environmental Engineering Lab

Device Name: FLOCCULATOR
Used for: Treatment of water contains a large amount of fine suspended matter
Experiment associated with it: Jar Test experiment
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

FLOCCULATOR

Manufacturer

VELP SCIENTIFICA, ITALY

Maintenance Record

Not Needed

Model No.

F105A0109 , JLT6

Machine Description

JLT 6 Flocculator are multiple stirrers with reproducible stirring speeds allowing standard conditions to be met during analysis. The stirring shafts are stainless steel. The sample can be backlit for easier reading. The rotation speed can be set from 10 to 300 rpm the time can be set in hours or minutes.

Safety Instruction

- This instrument must be earthed.
- Disconnected from power supply before maintenance and servicing.
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Never move or carry the unit while beakers are in place.
- Clean the instrument using a damp cloth and mild detergent solution.
- Do not use harsh or abrasive cleaning agents.

The experiments conducted on this machine

- Jar test experiment

The experiments summary

The dosage of the chemical coagulant to be adopted for removing suspended solids from waste-water are established based on an evaluation of the results obtained from the Jar Test. Multiple stirrers with reproducible stirring speeds ensure repeatable and reliable results.



Jar Test Procedure:

The jar test procedures involve the following steps:

1. Using the 1000 ml graduated cylinder, add 1000 ml water sample to each beaker and labeled each of beakers with 1 till 6.
2. Add the coagulant (Alum or FeCl_3) to each container.

**Stock solutions are prepared by dissolving 10.0 grams of coagulant into 1000 mL distilled water so each 1 mL of the stock solution will equal 10 mg\L (ppm) when added to 1,000 mL of water to be tested.

3. The 6-Beakers contain the prepared sample is placed in the Jar Testing Machine. The paddles are release and adjusted to be in middle of the beakers then beginning the two stirrers using rapid mixing (coagulation) that is at 100 rpm for 1 minute. The rapid mix stage helps to disperse the coagulant throughout each container.
4. Reduce the stirring speed to 25 to 35 rpm and continue mixing for 15 to 20 minutes. This slower mixing speed helps promote floc formation by enhancing particle collisions which lead to larger flocs.
5. After the flocculation period, turn off the mixers remove the paddles and allow solids to settle for 30 minutes. The floc settling characteristics is being observed.
6. The final turbidity being measured in each container by using the turbidity meter by taking a sample from the center of each one sample, about 5 cm down, and being done carefully for not disturb the flocs that have settled.
7. Graph of Turbidity versus Alum dosage is plotted using the data recorded and optimal conditions are determined.



Environmental Engineering Lab

Device Name: PH METER
Used for: used to measure acidity or alkalinity of a solution
Experiment associated with it: Alkalinity, Acidity, Total hardness and calcium hardness.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

PH meter

Manufacturer

Adwa, Belgium

Maintenance Record

Not Needed

Model No.

AD-1000

Machine Description

AD1000 is a professional bench meter with ranges for pH, 763 ORP (Oxidation Reduction Potential) and temperature measurements range from -20 to 120°C. Relative mV readings are also provided. Up to 5-point calibration with 7 memorized buffers (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01 & 12.45) and two custom buffers.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- After performing any of the cleaning procedures, rinse the electrode thoroughly with deionized water, refill the reference chamber with fresh electrolyte and soak the electrode in AD70300 storage solution for at least 1-hr before taking measurements.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- pH electrode should be kept moist and not allowed to dry out.

The experiments conducted on this machine

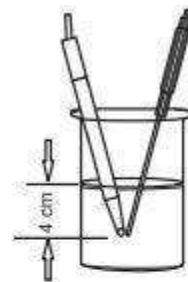
- Alkalinity and Acidity experiments.

The experiments summary

- Preparing a samples for a desired pH value using acid or base.



pH meter Calibration Procedure:



1. Immerse the pH electrode and the temperature probe approximately 4 cm into a buffer solution and stir gently.

The temperature probe should be close to the pH electrode.

2. Press CAL and the instrument will display the measured pH on the primary LCD and the “7.01 pH” buffer on the secondary LCD, together with CAL and “Cal Point 1” tags.

If necessary, press the up and down arrow keys to select a different buffer value.

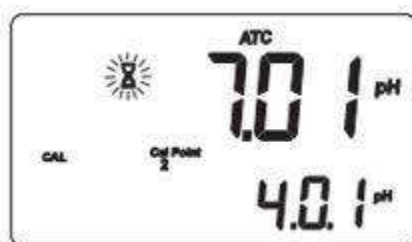


3. When the reading is stable and close to the selected buffer, the CFM tag appears. Press the CFM key to confirm.

4. The calibrated value is then displayed on the primary LCD and the secondary LCD will display the second expected buffer value, together with CAL and “Cal Point 2” tags.



5. After the first calibration point is confirmed, immerse the pH electrode and the temperature probe approximately 4 cm into the second buffer solution and repeat steps from 1 to 4.



Hint:

The instrument should be recalibrated:

- Whenever the pH electrode is replaced
- At least once a week
- After testing aggressive chemicals
- If the CAL DUE message is blinking during measurement

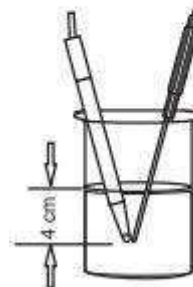
pH Measurement Procedure:



Make sure the instrument has been calibrated before taking pH measurements.



1. Press RANGE to enter pH range.
Press RANGE again to change the pH measurement resolution.
2. Immerse pH electrode tip and temperature probe approximately 4 cm into the solution to be tested. Allow for the electrode to stabilize and put the temperature probe tip as close as possible to the pH electrode.
3. The pH reading is displayed on the primary LCD and the temperature value on the secondary LCD.
4. If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly with deionized or tap water and then with some of the next sample. This will prevent cross contaminations and condition the electrode before immersing it into the solution to be tested.





Environmental Engineering Lab

Device Name: Muffle Furnace
Used for: Determination of Total Organic and Inorganic solids in water
Experiment associated with it: Solid experiment
Courses associated with it: Wastewater and Environmental engineering





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Name

MUFFLE FURNACE

Manufacturer

Nabertherm, Germany

Maintenance Record

Not Needed

Model No.

L40/11

Machine Description

L40/11 Available with folding door (L) which can be used as a clipboard or without additional charge with a lift gate (LT), where the hot side will be averted from the user. Its provide Tmax 1100°C or 1200°C and ceramic heating plates with built-in heating wire, easy to replace.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Don't use the furnace for heating food, wood, grain, etc.
- The furnace mustn't be used as a workplace heater
- Don't use the furnace to melt ice or similar material.
- Don't use the furnace as clothes dryer.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.

The experiments conducted on this machine

- Total organic and inorganic solids experiment.


The experiments summary

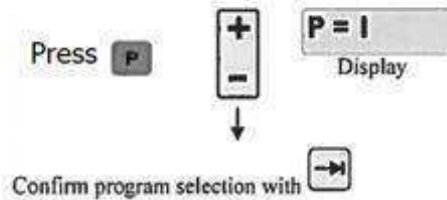
- Evaporating sample at 550°C.




Muffle Furnace Procedure:

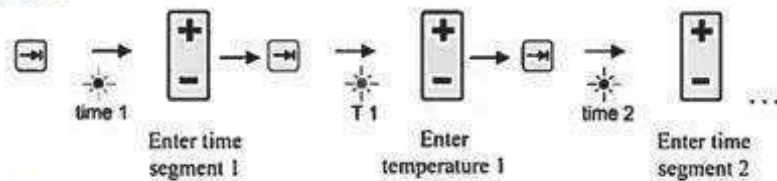
Operating Instructions

- Turning ON the controller  and wait until the furnace chamber temperature is shown in the display.
- Entering the program:

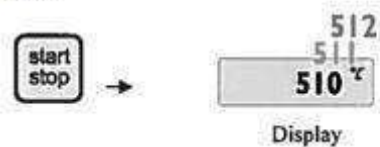


- If the furnace is to be started later:
Press  for the "wait" segment and enter the time in minutes.

- Entering the program:



- Starting the program:





Environmental Engineering Lab

Device Name: Automatic Balance
Used for: weighting samples.
Experiment associated with it: All of experiment
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

AUTOMATIC BALANCE

Manufacturer

BEL Engineering, ITALY

Maintenance Record

Not Needed

Model No.

M214AI

Machine Description

Electronic precision balance M214AI having capacity of 22gm with resolution 0.0001gm. Equipped with Large glass draught shield with 3 sliding doors for easy access to the items being weighed. perfect for use in laboratory, research departments, formulation and quality control applications.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- Don't install the balance in places with air flows.
- Don't disconnect the balance from electrical mains and use ON/OFF button to stand-by the balance when it's finished to use the balance.

The experiments conducted on this machine

- All of the experiments.

The experiments summary

- Weighting chemicals.



Automatic Balance Procedure:

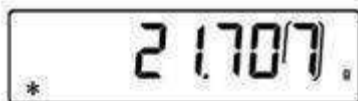
Weighing

From "STAND BY" mode:

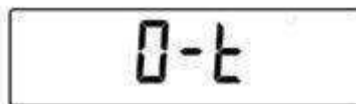
- Press **ON/OFF** button to bring balance to work conditions.
- Press again **ON/OFF** button to return to "STAND BY" condition.



1. Load the container on the pan. The display will show the weight.



2. Press **O/T** button. "O-t" string will be displayed



3. After reaching stability, the value "0.000" will be displayed. If the stability is not reached (due to air flows or vibrations or other disturbs) the dashes will remain displayed.



4. Load the objects to weigh in the container. Read net weight value on display.





Environmental Engineering Lab

Device Name: Drying Oven
Used for: Evaporating samples
Experiment associated with it: Determination of Total solid, Total dissolved solid and suspended solids in water
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

Drying Oven

Manufacturer

BIOBASE , China

Maintenance Record

Not Needed

Model No.

BJPX-JUNEAU

Machine Description

The External material made of excellent cold-rolled steel, coating static. The inner chamber made of stainless steel and it have adjustable shelves. The window is Double-lay glass observation with adjustable buckle lock. The temperature range from 10 to 250°C & capacity 50 Ltr.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Be cautious of hot surfaces when loading and unloading items.
- keep face, body and hands away from escaping heat and steam when opening the door of the machine
- The oven should remain clean and free of chemical spills and residues.
- Disconnected from power supply before maintenance and servicing.
- Don't use plastics that are not made to withstand high temperatures into the machine.
- Do not use materials in the oven that are flammable or can create flammable vapors. This presents a fire or explosion hazard.

The experiments conducted on this machine

- Total Solid experiment.

The experiments summary

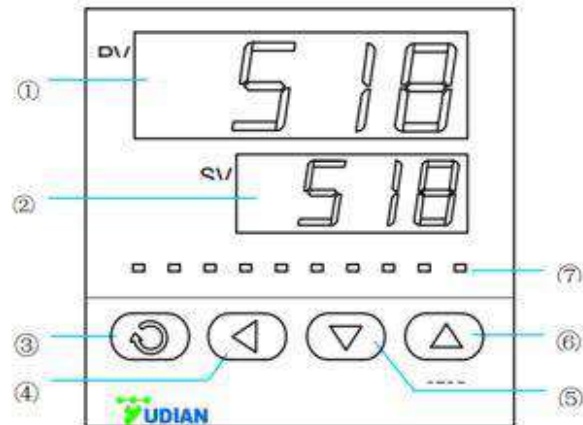
- Drying samples at 103-105°C for 1-2 hour to achieve completely drying.



Drying Oven Procedure:

FRONT PANEL AND OPERATION

- ① Process Value(PV), or parameter code
- ② Set Value(SV), alarming code, or value of a parameter
- ③ Setup key, accessing parameter table, and confirming change.
- ④ Data shift key, also for activating auto turning
- ⑤ Data decrease key
- ⑥ Data increase key
- ⑦ Status display LED,
OP1 – Output
AU1 – Alarm 1
AU2 – Alarm 2
RUN – Controlling process running



Operation Description

Set Value Setting

In basic display status:

- If the parameter lock "Loc" isn't locked, we can set setpoint (SV) by pressing ◀, ▼ or ▲
- Press ▼ key to decrease the value.
- Press ▲ key to increase the value.
- Press ◀ key to move to the digit expected to modify.
- Keep pressing ▼ or ▲ the speed of decreasing or increasing value gets quick.
- The range of setpoint is between the parameter SPL and SPH.
- The default range is 0~400.

Parameter Setting

In basic display status:

- Press ⌚ and hold for about 2 seconds can access Field Parameter Table.
- Pressing ⌚ can go to the next parameter.
- Pressing ◀, ▼ or ▲ can modify a parameter.
- Press and hold ◀ can return to the preceding parameter.
- Press ◀ (don't release) and then press ⌚ key simultaneously can escape from the parameter table. The instrument will escape automatically from the parameter table if no key is pressed within 30 seconds.
- Setting Loc=808 and then press ⌚ can access System Parameter Table.



Environmental Engineering Lab

Device Name: Microbiology safety cabinet

Used for: Enclose specific equipment or procedures that contain volatile & toxic material

Experiment associated with it: Alkalinity, Acidity, Total hardness and calcium hardness.

Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

MICROBIOLOGY SAFETY CABINET

Manufacturer

JINAN BIOBASEBIOTECH CO., CHINA

Maintenance Record

Not Needed

Model No.

BSC-1300IIA2-X

Machine Description

A2 Cabinet is suitable for work with microbiological research in the absence of volatile or toxic chemicals and radionuclide. Its provide protection for operator, sample and environment. The airflow system is 70% air recirculation and 30% air exhaust.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- Don't open the door above the marks.

The experiments conducted on this machine

- Residual chlorine, Acidity ,Alkalinity, COD,DO and BOD experiments.

The experiments summary

- Provide heating with stir to prepare chemicals.



Microbiology safety cabinet Procedure:

Operation Process:

- Connect a suitable power supply.
- Unlock the power lock to power ON the cabinet. LCD display would be lighted, and alarm would occur.
- Press the POWER button to enable all function (Fluorescent lamp, UV lamp, blower, mute, socket, front window, reservation timer, etc.)

UV lamp function could only be selected when front window is fully closed.

- The cabinet should be sterilized by UV lamp for at least 30 minutes with the window fully closed before any experiments.

For safety eyes and skin, people should leave the room during UV sterilization.

- Please move up the front video window 200 mm Height above the worktable and turn on the blower, make sure the experiment should be started after fan working for at least 30 minutes.
- Foot Switch. Within the range of the activity, we could use foot switch to adjust the height of the front panel.

For operating safety, please place the experiment material inside the cabinet before the experiment starts. Maintain the bottom of the front window at 2000 mm height from the worktable during operation.

- After finishing the experiment please fully close the front window and make sure to sterilize the cabinet with a UV lamp for 30 minutes before turning off the cabinet.



Environmental Engineering Lab

Device Name: Water Purification System
Used for: To purification of tap water to distilled water
Experiment associated with it: All of experiments approx.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

WATER PURIFICATION SYSTEM

Manufacturer

JINAN BIOBASEBIOTECH CO., CHINA

Maintenance Record

Running

Model No.

AQUAMAX - BASIC 363

Machine Description

AQUAMAX - BASIC 363 is the water purification system that produces pure water from tap or underground water. This system can reject more than 99% of inorganic and organic contaminants in the feed water.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- Don't close the feed water while it working.

The experiments conducted on this machine

- All of experiments.

The experiments summary

- Purified tap water to prepare chemicals.

Water Purification System Procedure:



Initial Operation

After connection of all tubes described above, please follow instructions as below in order to normally operate the system.

- ① Check if the filters are installed properly. Check if there is any leakage.
(For the ion exchange type, Check the connection of ion exchange filter)
- ② Check the tube connection of the feed water and power supply
- ③ Open the valve of water supply and wait for the prefilter to be filled water.
- ④ Turn on, then the system is on the 「Standby」 mode. After pressing **Operate/Standby** key, the instrument starts flushing for 5 min. for R.O filter. Pressing **Operate/Standby** key once more makes the system stop and get back to 「Standby」 mode. (For the filter, completing the flushing is required.)
- ⑤ On 「Standby」 mode, press **Operate/Standby** key to produce water. Press **Operate/Standby** key again to stop and get back to 「Standby」 mode
- ⑥ After the 「Operate」 mode, the RO pressure is gradually increased. Optimal ratio between the purified water and the rejection water is around 30 : 70 and optimal RO pressure is around 5~6 Kg/cm².

► After Power On.

1. Self Test

BASIC VER 3.00
SELF TEST.....OK

2. Display the model

* aquaMAXB360 *
YoungLin Ins.

Pressing **Operate/Standby** key to flush for 5 minutes.

► **Flush** : Clean the R.O membrane while the pressure valve of R.O opened.

■ OPERATE ■
FLUSH.....05min

Once you press **Operate/Standby** key or 5 min passes, the mode turns to be 「Standby」 mode.

► **Standby** : To protect the RO membrane automatically, it performs flushing every 30 minutes for 1 minute while it does not produce the purified water.

■ STANDBY ■
READY.....



Environmental Engineering Lab

Device Name: DO Meter
Used for: measure the amount of dissolved oxygen in a samples
Experiment associated with it: Dissolved oxygen experiment.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

DISSOLVED OXYGEN METER

Manufacturer

EZDO, Taiwan

Maintenance Record

Not Needed

Model No.

PDO-408

Machine Description

PDO-408 DO/Temp. meter employs leading edge technology with microprocessor-based design with large LCD displays DO and Temp. simultaneously which is suitable for measurement in water solutions for institutes, industrial lab and production field. Rugged design with splash proof housing for handheld or bench top use, Memory function stores and recalls up to 150 points. MAX/MIN and data lock. Degree°C/°F are switchable

Safety Instruction

- Change the electrolyte as it becomes yellow.
- Re-calibrate and re-polarize the meter once the membrane cap has been replaced or reinstalled.
- Moisten the cloth before polishing the cathode.
- Don't over-polish the sensitive gold cathode.
- Clean off the excess electrolyte before use when replacement the member cap.

The experiments conducted on this machine

- DO experiments.

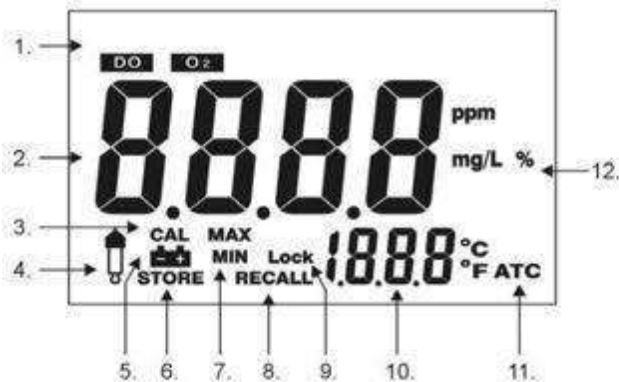
The experiments summary

- Measurement DO of sample in mg/l.



Dissolved Oxygen Meter Procedure:

Display Description:



1. Function mode
2. Measuring value
3. Calibration mode
4. Calibration error indicator
5. Battery power low Indicator
6. Reading stored indicator
7. MAX & MIN value indicator
8. Reading recall indicator
9. Manually lock current reading
10. Temperature value
11. Auto Temperature Compensation
12. Unit

Device Description:



Calibration:

<DO>

1. Remove the probe cap. Press to turn on power and press to choose **O₂** mode. Wait 10 minutes to 30 minutes for the probe to polarize. The reading should be approx. 101.7% (saturation) after the probe has completely polarized.
2. Let the probe in the air. Press and hold for 3 sec. to enter calibration mode. The display will appear **CAL** and flashing 101.7%. When the display stops flashing and indicates "SA", then "End" while calibration ends, and will return to measurement mode.
3. Optional 'zero oxygen' calibration: (improves measurement accuracy for very low or very high DO measurements). Place the probe into a zero oxygen calibration solution, such as 5% sodium sulfite, wait for stability and press and hold to enter calibration. Stability in a zero solution may take many minutes, depending on electrode history.

Note:

1. The icon **O₂** will display automatically during calibration mode. Calibration error indicator icon will appear, and "Err" instead of "SA", if calibration fails.
3. If the reading is not 0% while the probe is not connected, calibrate it in the air without probe to make reading becomes 0%.

Measurement:

<DO>

1. Remove the probe cap. Press to turn on power and press to choose **O₂** mode. Wait 10 minutes to 30 minutes for the probe to polarize. The reading should be approx. 101.7% (saturation) after the probe has completely polarized.
2. Select the desired units of measure by pressing until the proper units are shown in the display.
3. Place the probe in the sample to be measured. Stir the probe in the sample to remove any trapped air bubbles from the membrane surface.
4. Allow the meter time to settle to the final measurement value.

Note:

1. The larger the difference in temperature between the probe and the solution the longer it will take for the reading to stabilize. Stabilization time can vary from ten (10) seconds to five (5) minutes.
2. Cover the probe with the probe cap. The sponge contained in the cap should be moistened (not soaked) with DI (distilled water) or clean tap water.



Environmental Engineering Lab

Device Name: Turbidity meter
Used for: To measure turbidity of samples in NTU
Experiment associated with it: Turbidity measurement experiment.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

TURBIDITY METER

Manufacturer

EZDO, Taiwan

Maintenance Record

Not Needed

Model No.

TUB-430

Machine Description

TUB-430 portable turbidity meter employs leading edge technology with integrated microprocessor, which is suitable for measurement in water solutions for institutes, industrial labs and production fields. It's have Large LCD 45 x 25 mm display for reading convenient, Microprocessor based for fast and accurate measurements, Memory function stores and recalls up to 150 points and Low battery alarm and auto shut off after 10 minutes of non-use.

Safety Instruction

- Clean the glass bottle before placing it into the sample well using a piece of soft cloth
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- Before using this meter for the first time, please verify the meter calibration by reading back the standard solutions. This check is recommended prior to measuring a sample.

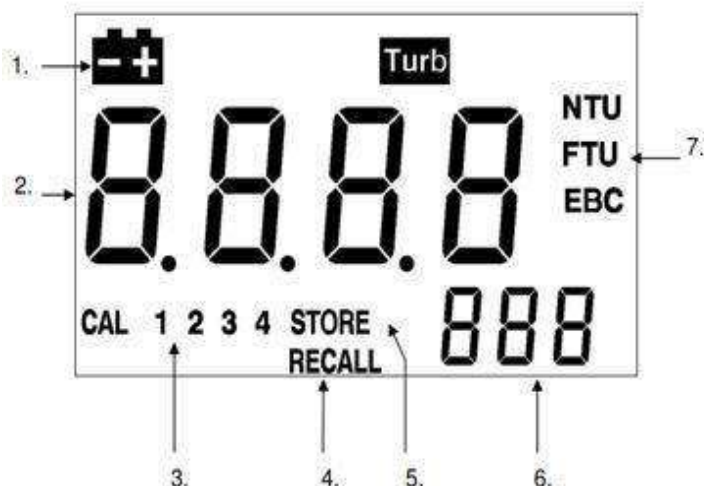
- Turbidity and Jar test experiments.

The experiments summary

- Measure turbidity of sample in NTU

Turbidity meter Procedure:

Display Description:



1. Battery low sign
2. Reading
3. Calibration status indicator
4. Recall mode
5. Data stored sign
6. The ordinal number of the stored reading
7. Unit

Functions of Keyboard:

	Power key. Press 3 sec. to enter Calibration mode
	Press 3 sec. to enter Recall mode. In Recall mode, browse records.
	Store the current reading. In Recall mode, browse records.
	Press to read turbidity. Press 3 sec. to choose units.

Calibration standard solutions:

- CAL 1: 0.00 NTU
- CAL 2: 20.0 NTU
- CAL 3: 100 NTU
- CAL 4: 800 NTU

Calibration:

1. Press "POWER" to turn on the meter, and the display will show "STBY"
2. Gently and slowly invert the calibration solution bottles five times but do not shake the bottles as air bubbles can affect the readings. If there is suspended material in the solution, please shake the bottles for 10 seconds, and wait for 5 minutes before calibration.
3. Press and hold "CAL" to enter calibration mode.
4. After entering calibration mode, the display will show "0.00 NTU" and "CAL 1". Place the CAL 1 standard solution into the sample well, and:
 - 1) press "READ" for calibration, and the "CAL" icon will be flashing, or
 - 2) press "DOWN ARROW/STO" to skip CAL 1 calibration.
 - 3) After The display will then show "20.0 NTU" and "CAL 2".
5. Repeat the above steps to calibrate (or skip) CAL 2 ~ CAL 4.
6. After CAL 4, the display will show "SA" and "END", and then the meter will return to measurement mode.
7. Check corresponding numbers at the lower left of the display (calibration status indicator) to see which calibrations are done correctly.
8. If any of the calibration fails, the corresponding number icons will be flashing. For example, "1" icon will be flashing if CAL 1 is not completed correctly or the standard solution is out of range.

NOTE: Before using this meter for the first time, please verify the meter calibration by reading back the standard solutions. This check is recommended prior to measuring a sample.

Mesurements:

1. Fill the sample solution into the glass bottle.
2. Place the bottle into the sample well.
3. Press "READ" and wait for around 10 seconds to get the reading.



Environmental Engineering Lab

Device Name: Air Pump
Used for: to determine the coefficient of permeability of cohesive soil
Experiment associated with it: BOD and experiment
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

Air Pump

Manufacturer

SCO-TECH, Germany

Maintenance Record

Not Needed

Model No.

PV-15/1

Machine Description

PV-15/1 has a capacity of 15L/min and ultimate pressure vacuum 250mbar with motor power 75W. The body of the pumps is made of aluminum alloy through die casting. It has an advanced design, higher efficiency, longer operating life. It can meet requirements of all kinds of working environments. Wide range of application in laboratories, chemical engineering, biochemical pharmacy, food examination, etc.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Don't heat block flow of cooling air over pump in any way.
- Disconnected from power supply before maintenance and servicing.
- Clean pump using only water- based solvent. Don't use petroleum- based components, acids, caustics, or combustible solvent.

The experiments conducted on this machine

- BOD experiment.

The experiments summary

- Pumping air to the distilled water to provide aerated water.

Air Pump Procedure:



Operating instructions:

- Connect the pump to the components it is to work with (the vacuum pump also can be started when no other components are connected to it).
- Connect the pump's power to the mains supply.
- Start the pump by turning the switch to the "ON" position.
- If necessary, adjust the suction power of the pump using the pressure regulator knob.
- After finishing work, turn off the pump by switching its switch to the "OFF" position.
- If the device will not be used for a long time, disconnect the power cord from the mains supply.



Environmental Engineering Lab

Device Name: Magnetic Stirrer with Heater (Hot Plate)
Used for: to Heating samples with mixing
Experiment associated with it: BOD and Residual chlorine experiments.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

Hot Plate

Manufacturer

VISION Scientific, Korea

Maintenance Record

Not Needed

Model No.

VS-130SH

Machine Description

The VS-130SH stirrer is equipped with a ceramic coated plate which has excellent chemical resistance. Powerful magnets and motor give stirring speeds up to 1500 rpm and heating up to 350°C.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Don't heat or stir volatile or flammable materials.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.
- Keep the hot plate dry and clean.
- Clean up any spills immediately.
- Don't touch the top plate it's too hot.

The experiments conducted on this machine

- Residual chlorine, DO and BOD experiments.

The experiments summary

- Provide heating with stir to prepare chemicals.



Magnetic Stirrer with Heater (Hot Plate) Procedure:

operating procedure

Insert the power plug into the power socket consistent with the label value.

- Prepare a container with the liquid solution already inside of it.
- The container should be placed on the hotplate.
- Connect to the mains to turn on the hotplate.
- By pressing the temperature setting button, adjust the hotplate's temperature.
- After a few minutes, the temperature will reach the set value and stabilizes the set value.
- Place the magnetic stir bar in a vessel filled with solution.
- Next, turn the stirrer magnetic speed adjustment button clockwise to change the speed of the magnetic stirrer.
- Turn the magnetic stirrer adjustment knob counterclockwise if the stirring speed is too high.
- Stir the liquid mixture until uniformity is achieved.
- Remove the magnetic stirrer from the liquid solution container once done.
- After work, please turn off the power supply. The preheating plate will no longer be heated, and its temperature will slowly drop to room temperature.
- Menu Settings hot hands to lift the container.

Warning:

- Do not heat volatile materials outside of a fume hood or safety cabinet.
- To avoid damage to the top plate or heating element, always keep a vessel filled with liquid on the top plate of a stirring hot plate when the unit is heating or cooling.



Environmental Engineering Lab

Device Name: COD Reactor CR 3200
Used for: digest closed samples to a specific time and temperature.
Experiment associated with it: COD experiment
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

COD REACTOR

Manufacturer

Wissenschaftlich Technische
Werkstätten WTW, German

Maintenance Record

Not Needed

Model No.

CR3200

Machine Description

CR 3200 thermo reactor for thermal digestion with programs for the standard parameters COD, quick COD (148°C, 20 min.), total nitrogen, total phosphorus, TOC and heavy metals of galvanizing with automatic heating and switch-off. 8 user-defined digestion programs at temperatures between 25-170°C can be programmed for special degradations and therefore also allow high temperature digestions.

Safety Instruction

- This instrument must be earthed.
- Disconnected from power supply before maintenance and servicing.
- Always use the gloves and handle to prepare the samples and remove it out of the device.
- Close the tubes tightly before operating the device.
- Close the lid before operating the device.
- Periodically clean the instrument using a damp cloth and mild detergent solution. Do not use harsh or abrasive cleaning agents.

The experiments conducted on this machine

- COD Experiment


The experiments summary

digest closed samples to a specific time and temperature.



COD Reactor CR 3200 Procedure:






Starting a temperature program


- 1 Switch on the thermoreactor with .



- 2 Select the thermoblock with  .
An arrow < or > in the display indicates the selected thermoblock.
The control lamp of the thermoblock lights up green.

- 3 Select a temperature program with  .
You can select from 8 predefined temperature programs, up to 8 user-defined temperature programs and a temperature test program (see section 5.6.1).




- 4 Start the displayed temperature program with .
The control lamp for the selected thermoblock flashes red.
The nominal reaction time (in hours and minutes) appears on the display.

automatic timer


If the start of the timer for the reaction time has been set to automatic in the *SETUP* menu (*START TIMER:AUTO*),

The reaction temperature is kept constant during the reaction time.
After the reaction time has expired the control lamps flash red.


manual timer

If the start of the timer for the reaction time has been set to manual in the *SETUP* menu (*START TIMER:MAN*), an *S* is displayed in front of the nominal reaction time. With this setting the thermoreactor controls the temperature until the timer for the reaction time is started by pressing .



- 5 Start the timer for the reaction time with .
The *S* in front of the reaction time disappears.

The reaction temperature is kept constant during the reaction time. The control lamp of the thermoblock lights up red.
After the reaction time has expired the control lamps flash red.
An audio signal sounds in addition.

- 6 Confirm the end of the reaction time for each thermoblock with .

The temperature program is finished.
The audio signal is finished.
The thermoreactor is in the program selection mode.

As soon as the thermoblock has cooled down to under 50 °C, the control lamp switches itself off.



Environmental Engineering Lab

Device Name: COD Reactor VELP
Used for: Digest closed samples to a specific time and temperature
Experiment associated with it: COD experiment
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

COD REACTOR

Manufacturer

VELP SCIENTIFICA, ITALY

Maintenance Record

Not Needed

Model No.

F101A0125, ECO 25

Machine Description

ECO 25 thermoreactor Enables the user to run tests to determine parameters such as COD, nitrogenous and phosphonate compounds. Its contain 25 pos. ($\Phi 16$ mm). There are five working temperatures (70°C , 100°C , 120°C , 150°C and 160°C) and working times of 30min, 60min, 120min or continuous. There is also an acoustic signal and an automatic switch off at the end of each cycle. There is also an acoustic signal and an automatic switch off at the end of each cycle.

Safety Instruction

- This instrument must be earthed.
- Disconnected from power supply before maintenance and servicing.
- Always use the gloves and handle to prepare the samples and remove it out of the device.
- Close the tubes tightly before operating the device.
- Close the lid before operating the device.
- Periodically clean the instrument using a damp cloth and mild detergent solution. Do not use harsh or abrasive cleaning agents.

The experiments conducted on this machine

- COD Experiment

The experiments summary

digest closed samples to a specific time and temperature.

COD Reactor VELP Procedure:



Operation controls:

ON - OFF SWITCH	It turns the unit on and off. If the switch is in the "0" position the unit is off; "-" means it is on.
START-TEMP	<p>When Start-Temperature key is pressed, a work cycle will start with the pre-set values and the corresponding leds will light: Temperature 160 °C and Time 30 min.</p> <p>The next pressing permits to select a different temperature: 160, 70, 100, 120 and 150 °C.</p> <p>It's possible to select different work temperature until the heating block has not reached the set temperature and the count-down is not working. After that the key doesn't work anymore. If the selected temperature is lower than the running temperature of the heating block, (when the Start-Temp key is pressed) the work cycle will not start and all temperature leds will light intermittently, signalling an error. To correct the error, select a temperature that is higher than the running temperature or wait until the heating block cools down to a lower temperature than the temperature to be programmed.</p>
TIME	When the Time key is pressed it's possible to select the following different time: 120, 60, 30 minutes or ∞ (infinite). When a time is selected, the corresponding led will light. After switching on the instrument, the Time key permits to set the time at the set temperature but not to start the reaction cycle. The run time will start when the heating block reaches the set temperature.
TEMP. LED	When a led lights it means that a work cycle is running at the selected temperature. If the leds are off a work cycle is not in progress.
TIME LED	When a pre-set time is selected the corresponding led will light. When the led blinks it means that the selected temperature has been reached and the count-down has started.



Environmental Engineering Lab

Device Name: BOD Incubator
Used for: For incubating BOD samples.
Experiment associated with it: DO and BOD experiments.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

BOD Incubator

Manufacturer

LABCON, United Kingdom

Maintenance Record

Not Needed

Model No.

LBI-205

Machine Description

Labcon BOD Incubator LBI-205 is equipped with an advanced microcomputer control system with a unique air duct design that ensures excellent temperature uniformity and precise temperature control suitable for a wide range of applications. It's provide temperature range from 0-65°C, 6-shelves for samples and have a 500Ltr capacity.

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.

The experiments conducted on this machine

- DO and BOD experiments.

The experiments summary

- For sample preservation at specific temperature and time.

BOD Incubator LBI-205 Procedure:



Operations

- Ensure BOD incubator is connected with mains power supply.
- Turn ON the power switch. The motor will start rotating and controller display will be ON.
- Press **SET** key for 2s to set parameters, set the needed value by pressing **add** or **subtract** key.
- Press **SET** key to set time, temperature, illuminations, and humidity:
- Press **SET** key and chose the needed modifying parameters, then change it to required values by pressing **add** or **subtract** key.
- When finished, press **back** key to get back to the parameter.
- While completer setting, press **set** key for 2s to exit.

Key instruction:

Set key: for parameter setting and save.

Back or query key: In normal state, press this key to inquire the current working state and setting state.

In the setting state, click this button to return the last parameter.

Subtract key:

Press this key for 4s to enter or exit from power failure protection) When power turned on, the screen shows “Memory”)

Add key: while completing running, long press this key for 4s, then the controller runs from the start.

Exit key: In any of command menu, press this key to back to the normal condition.

In normal state, press this key to open/off the back light.

Light key: When its buzzing, press this key to stop it.



Environmental Engineering Lab

Device Name: Cooled incubator
Used for: control samples temperature at or below room temperature.
Experiment associated with it: BOD and DO experiments.
Courses associated with it: Wastewater and Environmental engineering





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Machine Identification Card

Name

COOLED INCUBATOR

Manufacturer

NÜVE, Turkey

Maintenance Record

Not Needed

Model No.

ES 252

Machine Description

ES252 is ideal design for freezing, incubation, drying, different types of tests. Provides temperature range from (-10°C - 60°C), maximum information with highly visible 4,3" colorful LCD display and massive data storage with internal memory that stores the records up to ten years with one hour intervals as digitally and graphically

Safety Instruction

- This instrument must be earthed
- Never move or carry the unit when in use or connected to the mains electricity supply.
- Disconnected from power supply before maintenance and servicing.
- Periodically clean the instrument using a soft cloth and mild detergent solution.

The experiments conducted on this machine

- DO and BOD experiments.

The experiments summary

- For sample preservation at specific temperature and time.

Cooled incubator Procedure:



Follow the steps below to set a program:

1. Push **setting** page key F2 on the working screen
2. **Password query** screen appears. enter password by using increase F1 and decrease F2 keys and push enter key F4. the password is 0000 for the first use.
3. The selection is on **Program Number**. use increase F1 and decrease F2 keys to set the program number which will be set, and push enter key F4.
4. The selection is on **Step Number**. use increase F1 and decrease F2 keys to set the step number which will be set and push in enter key F4.
5. The selection is in is on **Temperature**. use increase F1 and decrease F2 keys to set temperature and push enter key F4.
6. The selection is on **Time Function**. use increase F1 and decrease F2 keys to choose **Time** or **Hold** and push enter key F4.
choose **Time**, if time will be used for this step.
choose **Hold**, the program runs until it is stopped.
7. The selection is on **time**, after time function is set and enter key F4 is pushed. when the **Time Function** is set as **Time** the time can be set from 0 minute to 99 hours 59 minutes by using increase F1 and decrease F2 keys. if the time is set as 00:00 the corresponding step doesn't run, and the program will run the next step.
8. The selection is on **Alarm Range** after time is set and enter key F4 is pushed. the **Alarm Range** can be set between 1 Celsius and 10 Celsius by using increase F1 and decrease F2 keys.
9. The selection is on **Timer On** at set, after **Alarm Range** is set and enter key F4 is pushed. **Timer On** at set can be chosen as **ON** or **OFF** using increase F1 and decrease F2 keys.
 - When it is chosen as **ON**; Time starts to count when the temperature reaches the set temperature.
 - When it is chosen as **OFF**; time starts to count when the corresponding step starts.
10. Push enter key F4 to set the next step and apply the steps from 4. if all steps are set push back key F3.
11. Push tab key F3 to continue sitting of the program whose steps are set.
12. Selection is on **starting step** No. it shows the step number which starts to run when the program starts. choose the step number which starts to run by using increase F1 and decrease F2 keys and push tab key F3.

13. Selection is on the **Repeated Operation** set repetition number by using increase F1 and decrease if two keys and push tab key F3.

14. Selection is on **Stop** at power failure it can be choosing as **ON** or **OFF** by using increase F1 and decrease F2 keys.

If stop at power failure is **ON**:

- The program will be interrupted in case of power failure. when the power failure is over, '**power failure**' error appear on the screen.

If stop at power failure is **OFF**:

- The program will continue to run in case of power failure.
 - If the temperature is in the temperature alarm range, there will be notification regarding power failure. Push question mark Key F3 to set the notification.
 - If the temperature is out of the temperature alarm range, '**Out of Temperature Range**' appear.

15. Push tab F3. the selection is on **Delay**. it can be set from 0 to 99-hour 59 minute by using increase F1 and decrease F2 keys. the program which is started starts to run after the **Delay Time** ends.

16. Push tab key F3. choose **Screen Display** as numerical by using increase of one and decrease F2 keys. push enter key F4.

17. **Working screen appears.** push green start key F4 to start to run the set program.

18. Push read stop Key F4 to stop the running program at any time.