# V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

An Autonomous Institution Affiliated to Madurai Kamaraj University
(Belonging to Virudhunagar Hindu Nadars)
Re-accredited with 'A' Grade (3rd Cycle) by NAAC
VIRUDHUNAGAR - 626 001 (TAMILNADU)

# DEPARTMENT OF ZOOLOGY

## STANDARD OPERATING PROCEDURE

## FOR THE

## EQUIPMENTS

सत्यमेव जयते
DEPARTMENT OF BIOTECHNOLOGY
Ministry of Science & Technology
Government of India

**Under**

## DBT STAR COLLEGE SCHEME

FOR STRENGTHENING UG SCIENCE DEPARTMENTS
No.HRD-11011/163/2020-HRD-DBT DT.24.08.2020

## DEPARTMENT OF BIOTECHNOLOGY

MINISTRY OF SCIENCE AND TECHNOLOGY, MHRD,
NEW DELHI

V.V.Vanniaperumal College for Women, Virudhunagar,Tamilnadu
No HRD-11011/163/2020-HRD-DBT-SCS /2020-2021/Zoology /Standard Operating Procedure/Equipments

# DIGITAL WATER AND SOIL ANALYSIS KIT

It is a unique portable instrument for measurement of various parameters that indicate the quality of water and soil.



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# DIGITAL WATER AND SOIL ANALYSIS KIT

## MEASUREMENT OF WATER pH

1. Connect the pH electrode to the BNC socket and attach the temperature probe if auto temperature compensation is desired.
2. Press the Enter key in the Main Menu when the cursor is below pH parameter.
3. Select the pH menu and read menu, press the Enter key after dipping the electrode in the sample.
4. To change the temperature presss the ▲/▼ keys. After setting the Temperature,the display now shows the pH value together with the Temperature.
5. The displayed value can be stored by pressing the Store key.

## MEASUREMENT OF SOIL pH

1. Take off the protective cap from metal probe.
2. Press OFF/ON button. Tester displays “7.00”.
3. Insert the metal probe vertically into the sample that requires testing, at least 6-8cm deep. Make sure there is close contact (Soil humidity should be 60%-80%). The tester will start testing automatically. After about 1 minute the test is over, Indication light will be on for about 10 seconds. The displayed number is locked, which is the value of pH.
4. After each test, take out the tester, wipe the metal probe clean with towel or tissue paper. Display will be unlocked, and will show “7.00”. It is ready for a new test.
5. After use, wipe the metal probe clean until it displays “7.00”. Switch off the tester.

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# DIGITAL WATER AND SOIL ANALYSIS KIT

## MEASUREMENT OF EC (ELECTRICAL CONDUCTIVITY) IN WATER

1. Connect the EC probe to the instrument.
2. Select EC-TDS from the main menu
3. Press the Enter key.
4. Select EC and press Enter key and move the cursor to SET PARAM and again press Enter key to accept the displayed values.
5. After confirming the parameters selected in EC connect cell to the instrument.
6. Dip the EC cell into the solution and select the Read mode.
7. Now the EC value of the solution is displayed with respect to the temperature coefficient, reference temperature and cell constant values accepted in the instrument.
8. The displayed values can be stored by pressing the Store Key.
9. If the EC value of the solution is above 200 Ms the display shows OVER RANGE.

## MEASUREMENT OF ELECTRICAL CONDUCTIVITY

1. Take off the protective cap from metal probe.
2. Press OFF/ON button Tester display “0″.
3. Water the soil with distilled water before testing. Best humidity is 60%-80%. Insert the metal probe into soil vertically and clockwisely, to about 6-8 cm deep. Make sure the soil has thorough contact with metal probe. After about 6 seconds, the tester will display the measured value. Tightness of soil will affect measuring result. Multiple tests at the same and different points should be performed and take the average as final result.
4. **Accurate testing** : Use a container, mix dried soil with distilled water at the rate of 10:1. Stir and make it into a mud form. Put the metal probe into the mud about 6-8CM deep. About 6 seconds, the tester will display the measured value.
5. Wipe the metal probe with towel or tissue paper after each test. Make it clean and dry. till the display show “0″.

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# DIGITAL WATER AND SOIL ANALYSIS KIT

It is a unique portable instrument for measurement of various parameters that indicate the quality of water and soil.

## MEASUREMENT OF TDS IN WATER

1. Connect the TDS/Cond. Probe to the instrument and dip it in the solution.
2. Select EC/TDS from the Main Menu and press Enter key and press the ▲/▼ keys to set the parameters and again press the Enter key to accept the prameters. (Temperature)
3. After setting the temperature values, the display shows the TDS and Temperature readings.

4.The displayed values can be stored by pressing the Store Key.

## MEASUREMENT OF SALINITY IN WATER

1. Connect Cond/TDS/Sal probe to the instrument.
2. Select the Sal from the main menu and press Enter key. Press ▲/▼keys to modify the cell constant, Sal factor and again press the Enter Key to accept the new parameters.
3. To read the salinity move the cursor below Sal using the ▲/▼keys and press the Enter Key.
4. If the temperature probe is not attached, attach the temperature probe to the temperature input socket and press the Enter Key for ATC operation or press Esc Key for manual temperature compensation.
5. After settting the Temperature, the display shows the salinity and Temperature readings.
6. The displayed values can be stored by pressing the Store Key.

## MEASUREMENT OF DISSOLVED OXYGEN IN WATER

1. Assemble the DO probe and connect it to the instrument.
2. Select Read from the above menu and press Enter Key.
3. Attach the temperature probe to the temperature input socket and insert it into the solution and press the Enter Key for ATC operation or press Esc Key for manual temperature compensation.
4. After accepting the Temperature the display shows the values of DO and Temperature Readings.The displayed values can be stored by pressing the Store Key.

## PRECAUTIONS

1. The instrument operates both on battery as well as on mains.
2. When it is used on battery, the battery should be charged overnight.
3. Switch on the insrument using the battery or the mains.

# DIGITAL SPHYMOMANOMETER


Digital Sphymomanometer is used in measuring blood pressure of man without listening to the sounds of blood flow.





# DIGITAL SPHYMOMANOMETER

Digital Sphymomanometer is used in measuring blood pressure of man without listening to the sounds of blood flow.

## PROCEDURE

1. Sit in a chair in a relaxed position with legs uncrossed, feet on the floor. Now the arm cuff should be placed on the arm at the same level of heart.
2. Remove tight-fitting clothing from arms and do not place the arm cuff over thick clothes.
3. Insert the air plug into the air jack securely.
4. Put the arm through the cuff loop.The bottom edge of the arm cuff should be1 to 2cm above the elbow.
5. Marker is centered on the middle of inner arm and close the fabric fastener firmly.
6. Remain still and do not talk while taking measurement.
7. Press the START/STOP button, the arm cuff will start to inflate automatically and gradually reduce the pressure automatically in the same way as DONE WHEN USING manual sphymomanometer.
8. When OK symbol is displayed the cuff is correctly wrapped tightly enough on the arm and the readings is accurate and reliable.
9. Remove the arm cuff and press the start/stop button to turn the monitor off.
10. The monitor automatically stores the measurements in its memory and automatically turns off after 2 minutes.

## PRECAUTIONS

1. One Should avoid bathing, consuming alcohol, or caffeine, smoking, Exercising and having food 30 minutes before Measuring Blood Pressure.
2. Measurements should be taken in a quiet place.
3. Do not use the monitor to the injured arm or the arm under treatment.
4. Do not forcibly bend the arm cuff or bend the air tube excessively.

# STEREOMICROSCOPE

Stereomicroscope is used to examine the opaque specimens and provide 3D view of the insects or any part of the plant that are normally visible to the naked eye.

In Stereomicroscope, two different paths of light are focussed from objective lens and the eye piece. Both these lights provide a different angle of viewing the object in which the bottom light is used for viewing the object while the top light is used during dissecting the specimen.It consists of the following parts

- Eye pieces
- Magnification Changer
- Observation Body
- Objective
- Coarse Adjustment Knob
- Illumination control
- Transmitted illumination
- On/Off Switch





# STEREOMICROSCOPE

## PROCEDURE

1. Install the eyepieces in the eyepiece ocular one by one
2. Plug in the power cord and insert the power adapter to the AC socket.
3. Gently press the power on switch"A". The green LED (B) will illuminate which indicates the power "ON" indication.
4. Illumination control switch is provided on the base, left side of the column.Gently press this button to power up the transmitted illumination.
5. Press the button once to illuminate all the LED's in the ring, press twice to illuminate the front five LED's and press thrice to illuminate rear five LED's
6. By regulating the Knob "C", the intensity of illumination can be controlled.
7. While looking through the eyepiece, rotate the magnification knob in clockwise or anticlockwise to achieve the desired magnification.
8. Place the specimen on the stage
9. Bring the specimen in focus by using the coarse motion knob(B) to focus the specimen.
10. Adjust the brightness for incident light by adjusting the observation tube, eyepieces, interpupillary distance and the diopter setting.
11. Observe the specimen

## CARE MAINTENANCE

1. Do not hold the microscope by the stage or observation tube while carrying from place to place. Use the "Arm handle "properly
2. While replacing LED, turn the microscope's main switch in "OFF" position abd disconnect power cord to avoid potential electrical hazards
3. Place the eyepiece in eyepiece ocular appropriately.
4. Clean all glass components by wiping gently with cleaning clothprovided
5. To remove fingerprintsor oil smudges, wipe with cleaning cloth slightly moistened with hand-soap liquid initially. If this does not produce a satisfactory result, use a mixture of petroleum (85%) and isopropanol (As these chemicals are highly flammable, they must be handled carefully) Be sure to keep these chemicals away from open flames or potential sources of electrical sparks. The equipment must be switched "OFF" .
6. Never attempt to dismantle the parts of microscope
7. To clean non-glass components, use alint free, soft cloth slightly moistened with adiluted neutral detergent.

# DEEP FREEZER


This equipment is used to store blood samples, food samples or any biological samples, to extend the shelf life period of the stored products





# DEEP FREEZER

## PROCEDURE

1. Connect Deep Freezer to the electrical supply, the red lamp lights up.
2. Switch on the appliance at least 3 hours before operating.
3. Set desired temperature using Thermostat knob which can be found on the front side of the appliance.
4. If the dial is in cooler mode, the temperature inside the cabinet can be adjusted from approximately 5ºC to -6ºC ±2ºC. If the dial is in freezer mode, the temperature inside the cabinet can be adjusted from approximately -14 ºC ±2ºC to -27ºC±2ºC
5. Open the door and keep the samples in appropriate place.
6. Close the door.
7. Samples must be wrapped in polythene or placed in waxed cartons
8. The green lamp light up of which indicates the running of compressor which maintains the constant temperatures using Thermostat knob

## CARE MAINTENANCE

1. The appliance should be connected to a single phase 230V 50Hz AC supply by means of three-pinplug, suitably earthed.
2. Do not touch electrical switches if smell a gas and open the windows immediately
3. Do not keep carbonated or any type of drinks in the appliance
4. Do not use metal or sharp scrappers to remove the frost that formed inside the appliance.
5. Do not open the lid of the appliance unnecessarily or frequently
6. Do not lay the appliance without any space. Some air space is necessary around the packs for efficient temperature maintenance.
7. When defrosting, pullout the plastic covers which is found at the bottom of the appliance and replace it in correct place
8. Store only frozen products.

# HORIZONTAL LAMINAR AIR FLOW CHAMBER

Laminar flow chamber is used provide a filtered airflow across the work area to prevent the airborne contamination in the samples.



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# HORIZONTAL LAMINAR AIR FLOW CHAMBER

## PROCEDURE

1. The cabinet should be checked to ensure that no object susceptible to UV rays is present inside the cabinet before running the laminar flow cabinet.
2. The glass shield of the hood is then closed, and the UV light is switched on. The UV light should be kept on for about 15 minutes to ensure the surface sterilization of the working bench.
3. The UV light is then switched off, and a time period of around 10 minutes is spared before the airflow is switched on.
4. About 5 minutes before the operation begins, the airflow is switched on.
5. The glass shield is then opened, and the fluorescent light is also switched on during the operation.
6. To ensure more protection, the working bench of the cabinet can be sterilized with other disinfectants like 70% alcohol.
7. Once the work is completed, the airflow and florescent lamp both are closed and the glass shield is also closed.

## PRECAUTIONS

1. The laminar flow cabinet should be sterilized with the UV light before and after the operation.
2. The UV light and airflow should not be used at the same time.
3. No operations should be carried out when the UV light is switched on.
4. The person who uses the chamber should be dressed in lab coats and long gloves.
5. The working bench, glass shield, and other components present inside the cabinet should be sterilized before and after the completion of work.
6. decontamination of the cabinet should be done by wiping down with disinfectant prior to commencing work is mandatory.
7. germicidal UV lamp should be run for 15- 20 minutes prior to using the bench
8. Cabinets with UV lights must be turned off during the day when personnel occupy the room.
9. We should allow only essential items should be placed in the working place.
10. Objects should not be placed between the HEPEX and any point where the clean environment must be maintained.
11. We should use proper attire, lab coat, mask, and gloves.

## MAINTENANCE

1. We should inspect condition of unit and electrical cord/plug to ensure safe operation.
2. We should keep unit clean. We should wipe down the chamber with a cloth and Sporicidin (We should not use alcohol or organic solvents inside the).

# TRINOCULAR MICROSCOPE


A trinocular microscope is used to take pictures and also record videos of the specimens to be observed. It has two eyepieces like a binocular microscope and an additional third eye tube for connecting a microscope camera





# TRINOCULAR MICROSCOPE

## PROCEDURE

1. Plug the microscope power cord in to electrical out let.
2. Turn on the microscope by rotating the illumination control knob on the bottom left side of the instrument.
3. Set the intensity of light to the lowest setting using illumination control knob.
4. Open the aperture diaphragm of the condenser fully by rotating the ring to the extreme right.
5. Using the sub stage condenser focusing knob, raise the condenser to the top of its excursion.
6. Place the specimen slide on the stage. Rotate the nosepiece to move the objective (40 X for dry mount and 10 X for wet mount) into working position.
7. Raise the stage by rotating the coarse adjustment knob to its positive stop. Using the fine adjustment knob, bring the specimen into sharp focus.
8. Adjust the eye tubes for inter pupillary distance and eye difference. The left eyepiece tube is focusable to compensate for refractive differences of the eyes.
9. Focus on the specimen through the right eyepiece tube onlyto set the eye tubes correctly, use the fine adjustment knob while covering the left eyepiece or closing the left eye.
10. Focus the specimen through the left eyepiece by turning the eye tube. Cover the right eyepiece while doing this and be sure to focus with the left eye tube only, without using the focusing knob.
11. Remove an eyepiece and view the back aperture of the objective.Then the condenser aperture diaphragm should be closed, to obtain the full resolving power of the microscope, and reopened until the diaphragm leaves just disappear from view. replace the eyepiece. The aperture diaphragm can be adjusted to enhance contrast and/or increase the depth of focus.
12. When changing to higher power objectives, the positions of the aperture diaphragm must be reset. As magnification increases, the aperture diaphragm must be opened as required.

## CARE AND MAINTENANCE

1. We should clean the lower magnification objectives and optical surfaces with a lint free cloth or lens tissue moistened (not wet) with methanol, if there is lack of contrast, cloudiness or poor definition is encountered,
2. We should clean the front lens with a toothpick covered with a cotton tip wetted with methanol.
3. We should avoid excessive use of solvent for cleaning.
4. Covering the microscope always with dust cover is mandatory whenever the microscope is not in use.
5. We should wipe the bottom of Oil immersion lens of a fast absorbing tissue paper before and after using the lens.
6. We should use Xylene to clean the lens surfaces.

# BINOCULAR MICROSCOPE


Binocular microscopes are used to carryout the microscopic analysis of blood cells and to detect abnormal changes in cell or tissues. It reduces the eye strain caused by the monocular microscopes when observe the cells for long periods of time.





# BINOCULAR MICROSCOPE

## PROCEDURE

1. Connect the plug to main power socket and switch ON the Mains to the Instrument, and switch ON the lamp.
2. Adjust the intensity of the light by turning the knob provided at base of Microscope.
3. Adjust the condenser by raising or lowering it.
4. Fix the slide in position on the stage.
5. Turn the low power (10x) objective into position. Make sure it has clicked into position.
6. Lower the condenser as low as possible. Open the iris diaphragm wide.
7. Gradually raise the mechanical stage till the objective is almost touching the slide.
8. Then looking through the eyepiece and using the coarse adjustment knob lower the mechanical stage so as to bring the object roughly into focus.
9. By using the fine adjustment knob bring the object sharply into focus.
10. Final adjustment can be made by adjusting the condenser and iris diaphragm.
11. If the high power objective is to be used, we should rotate the eyepiece until the high power objective occupies the position of the low power objective. Then use the coarse and fine adjustment knobs to focus the object. The light should be adjusted by manipulating the condenser (raising it) and the diaphragm.
12. If a cover slip is necessary it should be very thin or else it may not be possible to bring the objective close enough to focus the object.

## USE OF OIL IMMERSION LENS

1. After focusing the object under low power, turn the eyepiece and put the oil immersion objective in place.
2. Place a drop of oil (cedar wood) on the slide.
3. Gradually raise the mechanical stage till the oil drop touches the objective and just flattens it, without touching the object itself.
4. View the objective from the side with the eyes on level with the slide.
5. Then look down the ocular and slowly lower the mechanical stage by meansof the coarse adjustment knob until the object is just in view.
6. Then using the fine adjustment knob bring the object into focus.

**NOTE :** 100 x objective is used only as an oil immersion lens.

## CARE AND MAINTENANCE

1. Before using We should check that the objectives, eyepieces and all external parts of the Microope are clean.
2. Wipe the surfaces of the Microscope with lint free duster.
3. Wipe the underneath portion of the oil immersion lens with a fast absorbing tissue paper or cloth before and after using the lens.
4. Record the Usage and cleaning details in the usage register.

# PHASE CONTRAST MICROSCOPE


Phase contrast microscope is used to observe living cells and their motility. It provide high-contrast, high-resolution images.





# PHASE CONTRAST MICROSCOPE

## PROCEDURE

1. Turn the Lamp ON
2. Place Glass slide on the specimen
3. Adjust the Focus by rotating the coarse adjustment knob and fine adjustment knob for fine detail focusing.
4. Adjust the Interpupillary Distance (IPD)
5. Adjust viewing Height
6. Adjust the Diopter
7. Center the Condenser
8. Adjust the Condenser Position and Aperture Iris Diaphragm

## CARE AND MAINTENANCE

1. Always cover the microscope with the provided dust cover when not in use.
2. To remove an objective, rotate it counter clockwise while gripping it with a rubber sheet, etc. to avoid any slippage.
3. To clean the lens surfaces, remove dust using a soft brush or compressed air (cans available at your local electronics store).
4. The microscope should not be placed in direct sunlight, high temperature humidity dust and vibrations.
5. Arm handle is provided for carrying the microscope. To prevent damage, do not hold the microscope by the stage or observation tube. Be sure to remove the specimen from the stage clip while transporting unit to avoid damage to the specimen slide.
6. Clean all glass components by wiping gently with cleaning cloth provided. To remove finger prints or oil smudges, wipe with cleaning cloth slightly moistened with a mixture of petroleum (85%) and isopropanol (15%).
7. Do not attempt to use organic solvents to clean the microscope components other than the glass components. To clean non-glass components, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.

# INCUBATOR


The incubator helps to maintain constant temperature. It helps in the development of embryos in fertilized eggs.



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# INCUBATOR

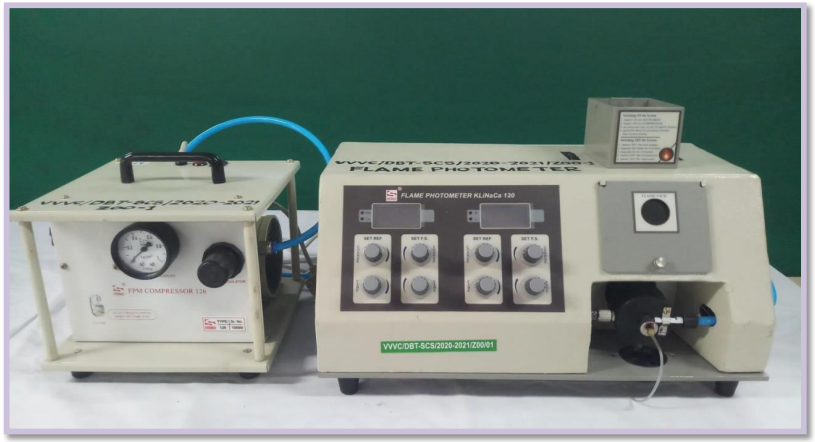
## PROCEDURE

1. Switch on the instrument and check for the glowing of indicator light.
2. Place the eggs in the egg tray of the incubator, with the larger end facing up and the narrow end facing down in the incubator.
3. Set the temperature to 100.5 degrees Fahrenheit
4. The temperature should not drop below 99 degrees Fahrenheit or raise to 102 degrees Fahrenheit.
5. The incubator's thermometer should be Double-checked with a medical thermometer placed nearby to ensure the proper working of gauge.
6. Eggs must be turned at least 2-3 times daily during the incubation period. The eggs should not be turned during the last three days before hatching since the embryos move into hatching position and need no turning.
7. The incubator should be opened only when necessary to prevent the escape of heat and humidity as it can affect the success of the hatch.

## CARE AND MAINTENANCE

1. Wash it with 10 percent bleach solution, following by warm soapy water and a thorough rinse for sanitizing.
2. Once the incubator is clean and dry, turn it on and check to be sure a constant temperature and humidity level will maintained.
3. Then, place the incubator in an area where ambient temperatures are steady, with no risk of draft.

# FLAME PHOTOMETER




Flame Photometer is used to estimate the concentration of calcium, sodium and potassium in the sample.

## PROCEDURE

### PNEUMATICS SETTING

1. Ensure that the Air-Tube, Gas-Tube, and Drain-Tube are properly connected.
2. Switch on the Compressor, Ensure that the output pressure is close to 0.50 Kg/cm$^2$ and is stable (No fluctuations or drift is seen in output pressure gauge).
3. Dip the Atomizer capillary tube (plastic) in distilled water. Ensure that regular droplets fall in Drain-Cup and drains out.
4. Open the fuel gas fine ADJ (Fine Adjustment Valves) valve by approximately half turn.
5. Switch on the fuel supply from the fuel source/LPG cylinder and immediately ignite the flame through the IGNITION window.
6. Watch the flame through the Flame view Window. Do fine adjustment with the help of the Gas Control Valve to get a stable flame having well defined cones.

### ELECTRONIC SETTING

1. Connect the Unit to the mains through its Main Cord.
2. Turn on mains POWER switch. Digital Display should turn on.
3. Turn the SET F.S (Full scale) both COARSE & FINE; Set REF both COARSE & FINE controls in maximum clockwise position.
4. Select appropriate filter(s) with the help of filter selector of the burner unit.





5. Feed distilled water to atomizer(in burner unit). Wait at least for 30 seconds.
6. Adjust SET REF FINE to achieve precise zero setting.

### ESTIMATION OF ELEMENTS

1. Select Sodium (Na) and Potassium (K) filters.
2. Feed distilled water to atomizer and aspirate distilled water for 30 seconds. Set ZERO on K DPM (Diesel particulate matter (DPM)) using SET REF COARSE & FINE controls. No setting is required for Na.
3. Feed standard solution, 1mEq per liter for Na or 1.0/0.01 mEq per liter for Na/K to the atomizer and aspirate standard(S) for 30 seconds. Set 100 on Na DPM using SET REF COARSE & FINE controls. No setting is required for K.
4. Feed another standard 1.70/0/080 mEq per liter for Na/K solution to the atomizer and aspirate standard(S) for 30 seconds. Set 170 on Na DPM and 80 on K DPM using SET F.S. COARSE & FINE controls.
5. Again, feed distilled water to atomizer and aspirate distilled water for 30 seconds. Set/re-set ZERO on K DPM using SET REF COARSE & FINE controls. No setting is required for NA.
6. Repeat steps 3,4 and 5 till satisfactory repeatability is achieved.
7. Now the instrument is ready for estimation of the sample.
8. Feed sample to the atomizer and aspirate the sample for 30 seconds and result will be displayed on respective DPMs in mEq per liter. After the estimation(s) of the sample, feed distilled water to the atomizer and aspirate it for 30 seconds.
9. Repeat steps 2 to 6 for re-calibration after every 10 to 12 samples or 15 minutes.
10. After the completions of all the estimations, feed distilled water to the atomizer and aspirate it fir about 1 minute to wash out remaining from the mixing chamber, atomizer etc.

### CARE AND MAINTENANCE

1. First Switch ON compressor then gas supply. Ignite flame with gas control.
2. First Switch OFF gas supply and the compressor.
3. Switch OFF the fuel supply immediately if the compressor/ main supply goes off .
4. Switch on/off the fuel supply from the fuel regular switch. Do not use the fuel gas control for switching on/off the fuel supply. Do not drain out Air-Filter of the Compressor when the flame is on. Never keep gas supply on when the flame is not ignited.
5. Before feeding next sample, feed distilled water to the atomizer, say for 5 sec, to avoid interference of the previous sample.
6. Do not leave the flame photometer unattended if the flame is on.
7. Replace the gas cylinder well before it gets empty. Otherwise reproducibility will significantly deteriorate. Do not disturb output regulator setting unless it is required.
8. Observe the compressor output pressure daily. Only when significantly deviated, readjust it.

# UV TRANSILLUMINATOR


This instrument is used in molecular biology to visualize the proteins, DNA or RNA bands separated using Gel Electrophoresis



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# UV TRANSILLUMINATOR

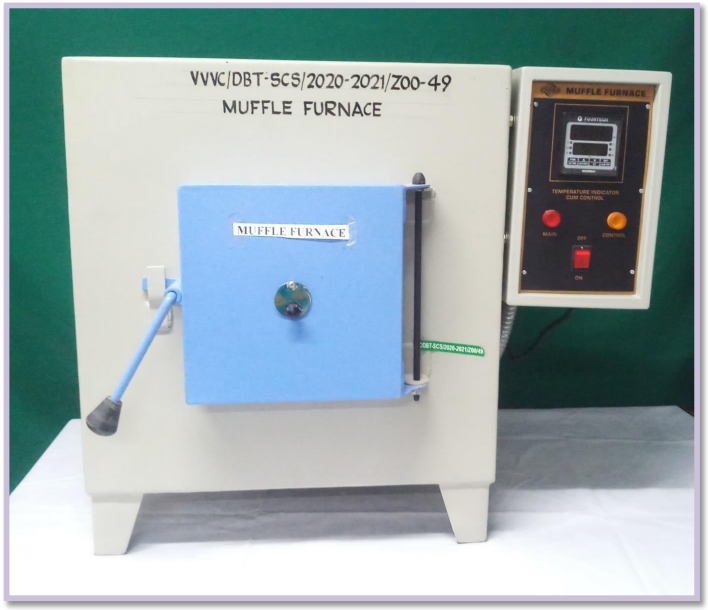
## PROCEDURE

1. The power of the unit should be turned off.
2. Open the UV-blocking cover to desired angle.
3. Place the sample on the filter surface.
4. Close the UV-blocking cover or make sure people nearby are properly protected.
5. Press the switch “power ON/OFF” to turn on the unit. The tubes should become energized and emit a steady glow of light. The light may initially flicker, especially if the lamp is cold, but should stabilize after a few seconds.
6. Press “high/low switch” for preferred intensity to visualize. If you need high intensity of UV radiation, then press the switch to “high” for high intensity. (Note: Do not press the switch up and down.)
7. Visualize or capture image by imaging system or any camera available. (Note: Do not keep the UV transilluminator on for a long period of time, it may reduce filter and UV tube’s lifetime. Long time UV exposure may also cause damaged to sample.)
8. Turn off the unit before remove the sample.
9. Clean the sample touched surface with soft tissue.

## CARE AND MAINTENANCE

1. Sample touched surface of UV transilluminator should be cleaned by moisten soft tissues after every usage to avoid all possible contaminations and damages of instruments.
2. Do not use abrasive detergent, it could damage the filter and decrease its life.

# MUFFLE FURNACE




Muffle furnace helps in combustion to eliminate contamination of the samples



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# MUFFLE FURNACE

## PROCEDURE

1. Turn on Fume Hood fans to exhaust out any harmful fumes during furnace operation.
2. Warm-up the furnace before15 minutes of use to reach the desired temperature of 550 degrees Celsius.
3. Items to be placed in the Muffle Furnace should be first placed in the ceramic crucibles,
4. Use the metal tongs located along side the furnace to pick up and gently place the crucibles with the items inside the furnace after switching off the furnace
5. Once the tests/Muffle Furnace operation is complete, turn the switch OFF and UNPLUG the furnace.

# STETHOSCOPE

Stethoscope is a medical instrument used in listening to sounds produced within the in the heart or lungs. A stethoscope is used in combination with sphygmomanometer to measure blood pressure.





# STETHOSCOPE

## MEASUREMENT OF BLOOD PRESSURE

1. Sit in a relaxed position with the arm at rest on a table.
2. Secure the cuff around the bicep so that it cannot move but is not tight.
3. Squeeze the balloon to increase the pressure.
4. Watch the aneroid monitor and increase the pressure to 20–30 mm Hg.
5. After inflating the cuff, place the stethoscope just inside the elbow crease under the cuff
6. Slowly deflate the balloon and listen to the sounds, known as Korotkoff sounds, through the stethoscope
7. Note the number on the aneroid monitor when the first sound occurs, as this is systolic pressure
8. Continue listening until the steady heartbeat sound stops
9. At this point, record the number from the aneroid monitor, which is the diastolic pressure

## MAINTAINENCE

1. Wipe with a 70% isopropyl alcohol solution for disinfection.
2. Do not use hand sanitizer as a cleaning agent as there are additives that may damage parts of the stethoscope.
3. Do not immerse your stethoscope in any liquid, or subject it to any sterilization process.
4. Keep your stethoscope away from extreme heat, cold, solvents and oils.
5. Tunable diaphragms can be removed from the chestpiece and their surfaces wiped with alcohol or soapy water. Dry all parts thoroughly before reassembly.
6. Eartips can be removed from the eartubes for thorough cleaning. For safety, snap eartips firmly back onto the ribbed ends of the eartubes.

# AUTOCLAVE


## COMPONENTS

- Pressure Chamber
- Lid/ Door
- Pressure gauge
- Pressure releasing unit
- Electrical heater





# AUTOCLAVE

An autoclave is used to kill harmful bacteria, viruses, fungi, and spores in the samples by using steam under pressure.

## PROCEDURE

1. Before running an autoclave check to see that no item is left inside the autoclave from the previous batch.
2. Then check the water level in the autoclave. If the coil is visible then add sufficient water to it and make the coil invisible.
3. Now place the sample within the autoclave which is needed to sterilize.
4. Then close the lid and make it airtight by tightening the screws. After that switched on the autoclave.
5. Adjust the safety valves to maintain the required pressure.
6. Then close the drainage pipe and allow the steam to reach the desired levels (15 lbs).
7. After reaching the desired level of pressure the whistle will blow to remove excess pressure from the autoclave chamber.
8. After the whistle holds the autoclave for 15 minutes, this is known as the holding period.
9. Switch off the autoclave and allow it to cool down until the pressure gauge shows that the inside pressure of the autoclave has lowered down to that of the atmospheric pressure.

## CARE AND MAINTENANCE

1. Autoclaves should not be used to sterilize water-proof or water-resistant substances like oil or powders.
2. The autoclave should not be over crowded, and the materials should be loaded in a way that ensures sufficient penetration of articles by the steam.
3. The items to be autoclaved should always be placed in a secondary container.
4. Only autoclavable bags are to be used to autoclave packaged waste.
5. To ensure sufficient penetration, articles should be wrapped in something that allows penetration by steam, and materials like aluminum foils should not be used.
6. The items placed inside the chamber should not touch the sides or top of the chamber.
7. The wastes and cleaned items should be autoclaved separately.
8. Attempts to open the lid when the autoclave is working should never be made.
9. Liquid components should never be autoclaved in sealed containers.

# ELECTRONIC BALANCE






# ELECTRONIC BALANCE

Electronic balance is an instrument used in the accurate digital measurement of weight of chemicals and materials.

## PROCEDURE

1. Place the electronic balance on a flat, stable surface indoors.
2. Press the "ON" button and wait for the balance to show zeroes on the digital screen.
3. Use tongs or gloves to place the empty container in which the sample is to be to be measured.
4. Press the "Tare" or "Zero" button to automatically deduct the weight of the container. The digital display will show zero again, indicating that the container's mass is stored in the balance's memory.
5. Carefully add the substance to the container. Note down the reading.

## CARE AND MAINTENANCE

1. Carefully remove the balance pan, clean and replace it.
2. Mop up any spilt liquids and brush any spilt chemicals from the weighing chamber. Clean the glass doors (inside and out), using a soft cloth and 80% v/v ethanol.
3. Remove dust from the exterior of the cabinet and clean up any spilt chemicals from the balance bench area.

# COLONY COUNTER


Colony counter is used to count the number of colonies of bacteris in sample of food (CFU/mg) or water (CFU/ml)





# COLONY COUNTER

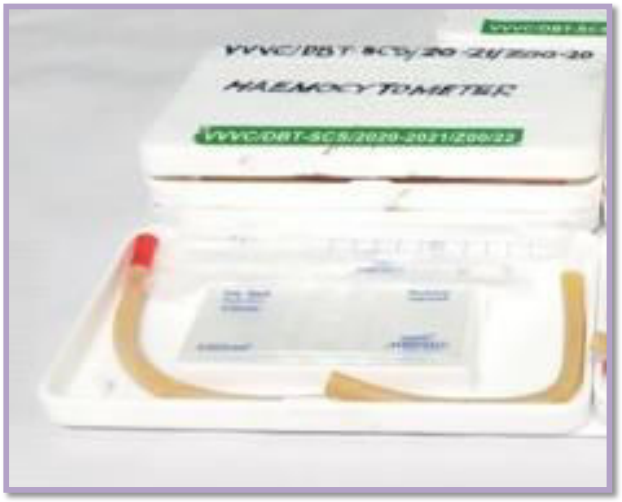
## PROCEDURE

- Clean the instrument with Isopropyl alcohol before usage.
- Place the instrument in a clean and dry place. Switch ON the power.
- Ensure that the marker is connected to the instrument.
- Read the digital screen display, it should be “0000” if not then do it by pressing the reset button manually.
- Now place the Petri dish in an inverted position on the instrument platform to count the colonies by marking on each colony.
- The number of colonies will be displayed on the screen.

## CARE AND MAINTENANCE

- De-dust the external surface of colony counter and magnifier with a lint-free duster.
- Clean the external surface of colony counter with wet duster soaked with 70% Iso propyl alcohol.

# HAEMOCYTOMETER




A haemocytometer is a specialized slide which is used for counting red and white blood cells





# HAEMOCYTOMETER

## PROCEDURE

1. Clean Haemocytometer and coverslip with 70% ethanol, followed by distilled water.
2. Collect the blood by pricking the finger using a lancet needle. The blood is sucked into the RBC pipette by the capillary action. Blood is diluted with known volume of diluting fluid, the Haeme's fluid.
3. Transfer a small volume of blood to each counting chamber using a Pasteur pipette. Carefully touch the tip of the Pasteur pipette to the edge of the coverslip and allow each chamber to fill by capillary action. Avoid overfilling or under-filling the chambers.
4. Let the cells settle onto the counting chamber grid by keeping it undisturbed for about 5 to 10 minutes. Place the Haemocytometer onto the microscope stage and focus on low power (40x total magnification) before changing to 100x total magnification and focus again.
5. If there is a high cell count (eg>100 per square), count just the centre large square (the one divided into 25 squares in the improved Neubauer). Of these smaller central squares count the four corners and the middle one when using the improved Neubauer; then multiply the total by five to give a total for the whole large square.
6. When counting cells that fall on the grid lines, only count the cells on the top and right-hand lines of each square. Do not count the ones on the bottom or left-hand lines. This prevents cells from being counted twice.
7. If there are too many (e.g. over 300), too few (e.g. less than 100), or if more than 10% of the cells are in clumps, then dilute, concentrate, or vigorously mix the specimen respectively and repeat the counting procedure.

## CARE AND MAINTENANCE

1. Do not discard the heavy coverslips. These are reusable.
2. Do not let the Haemocytometer dry out. Immediately after use, wash the counting chamber and coverslip in 70% ethanol.
3. Rinse with distilled water, wipe dry with a soft tissue and store in the special container.

# MICROWAVE OVEN


Microwave ovens can be used in laboratories for the rapid heating of samples



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# MICROWAVE OVEN

Microwave ovens can be used in laboratories for the rapid heating of samples.

## PROCEDURE

1. Plug in the microwave.
2. Put the sample in a microwave-safe utensil.
3. Use a thick, domed lid made of durable plastic that is designed for use in the microwave to cover the sample.
4. Set the temperature and time.
5. Switch off the oven, open the door and use the tongs to take out the sample.
6. During processing, if press the STOP/CANCEL pad once or open the door, the program will be paused, then press START/EXPRESS to resume, but if press STOP/CANCEL pad twice, the program will be cancelled. After ending, the system will sound beeps to remind the user every two minute until the user press STOP/CANCEL pad or opens the door.

## CARE AND MAINTENANCE

1. The microwave oven must be placed on a flat, stable surface to hold its weight.
2. Do not place the oven where heat, moisture, or high humidity are generated, or near combustible materials.
3. For correct operation, the oven must have sufficient airflow. Allow 20cm of space above the oven, 10cm at back and 5cm at both sides. Do not cover or block any openings on the appliance. Do not remove feet.
4. Do not operate the oven without a glass tray, roller support, and shaft in their proper positions.
5. Make sure that the power supply cord is undamaged.
6. The socket must be readily accessible so that it can be easily unplugged in an emergency.

# THERMOSTATIC WATER BATH


Thermostatic water bath is used for incubation of test samples underwater at constant temperature over a longer period of time.

## CARE AND MAINTENANCE

- Keep Changing water daily and keep clean from the inside to prevent the encrustation of important components in a water bath.
- When using the water bath, keep the lid closed so that the water does not evaporate.
- Measure inside and outside temperature of the water bath once a week.
- Make sure, the thermometer does not stick to the wall of the water bath.



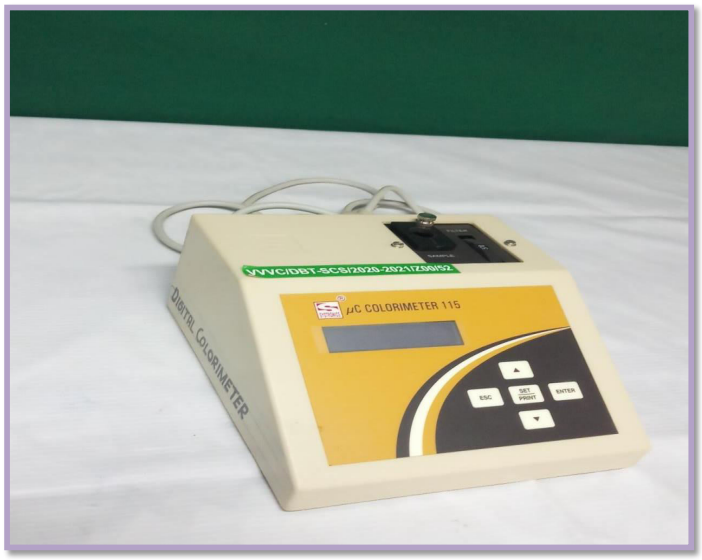


# THERMOSTATIC WATER BATH

## PROCEDURE

1. Before filling water in the thermostatic water bath, check the power switch and make sure that it is in the “OFF” position.
2. Fill the bath with distilled water, making allowance for displacement by the samples being immersed and for expansion of the media upon reaching operating temperature
3. The maximum liquid level should be “1 1/2” from the top surface of the bath after samples are immersed.
4. The thermometer is attached to the bath via a metal clip on the top of the bath. It should be inserted until the immersion depth indicator line is at or below the water surface. The thermometer bulb should always be located above the diffuser shelf.
5. Insert the line cord into the proper receptacle and turn the power switch to the “ON” position. This action will energize the heater and cause the amber pilot lamp to light. The pilot lamp will stay lit as long as the heater is energized. (NOTE: Do not leave the bath unattended during the setting procedure).
6. Turn both the temperature control and high temperature limit thermostat knobs fully clockwise. The temperature control pilot lamp should light.
7. When the bath temperature reaches the desired temperature, slowly turn the high temperature limit thermostat counter clockwise and stop when the high temperature limit pilot lamp just lights.
8. Turn the high temperature limit thermostat knob clockwise to the next highest reference number. The high temperature limit light should go off. The high temperature limit thermostat is now set approximately 5° above the desired bath temperature.
9. Turn the Temperature Control Thermostat counter clockwise until both pilot lamps are off.
10. Turn the Temperature Control Thermostat clockwise until the Temperature Control Pilot Lamp just lights. Allow the unit to stabilize, read just/fine tune the Temperature Control thermostat as necessary.

# DIGITAL COLORIMETER








# DIGITAL COLORIMETER

Digital colorimeter is an instrument used to measure the absorbance of wavelengths of light at a particular frequency (color) by a sample.

## PROCEDURE

### Measuring Transmittance

1. Turn unit on.
2. Select correct filter.
3. Set function switch to %T.
4. Put blank (distilled or deionized water) in a test cuvette and place in the holder.
5. Adjust 100% T for a reading of 100.0%. 5.2.4 Place sample to be measured in holder, readout will display transmittance of sample in direct %

### Measuring Absorbance

1. Set function switch to ABS.
2. Put blank (distilled or deionized water) in a test cuvette and place in universal holder.
3. Adjust ZERO ABS (100% T) for a reading of 00.0 absorbance (same as setting transmittance to 100%).

### Measuring Concentration

1. Set function switch to % T.
2. Put blank (distilled or deionized water) in a test cuvette and place in universal holder. Adjust %T for a reading of 100.0. 5.4.4 Set function switch to either C1 or C2 (depending on intensity of concentration or resolution desired).
3. Place a standard solution of known concentration in the holder and adjust concentration to correct reading. Colorimeter is now calibrated to the concentration units desired.
4. Replace standard solution with sample to be tested and read concentration in direct units.

### Calculation of concentration via Transmittance or Absorbance

1. Concentration can be determined from either transmittance or absorbance readings by constructing a calibration curve. Make a series of standard dilutions for test sample.
2. Take readings of all the dilutions following steps given in transmittance and absorbance and record the results.
3. Prepare a calibration curve of absorbance Vs concentration or transmittance Vs concentration.
4. To determine the concentration of an unknown sample, several solutions of known concentration are tested and prepared. The concentration is plotted on a graph and generating a calibration curve. In this, the unknown sample is compared to the known sample on a curve and then measuring the whole concentration.

# COMPOUND LIGHT MICROSCOPE


## CARE AND MAINTENANCE

1. The objective lenses and eyepiece should be cleaned with the help of silk cloth and cleaning liquid before using.
2. The microscope should not be tilted when working, using it.
3. When an object needs to be studied, focus on low power objective first and then move to high power.
4. The lower power needs to be left in place after all observations are completed.
5. When focusing, care needs to be taken to ensure that the objective lens never strikes the stage or the slide.
6. Only the fine adjustment knob should be used when the high power objective is employed.
7. Cover slip should always be used to cover well-mount preparations before observation under the microscope is made.
8. Do not dismantle the microscope.
9. When carrying the microscope, always use both hands.
10. Try to place it in a box after using the microscope.





# COMPOUND LIGHT MICROSCOPE

The compound microscope enables us to view things that are too small to be seen with the naked eye. It uses a system of two or more lenses to collect and focus the transmitted visible light through a specimen to the eye. Animal cells, plant cells, protozoa and bacteria can be easily seen with a light microscope

## PROCEDURE

1. Rearrange the mirror so that adequate light passes into the microscope.
2. The mirror, lenses, stage, and slides should be cleared of dust and be clean.
3. Place the slide in the middle of the stage.
4. Firmly secure the slide with clips at two edges of the slide to ensure that the slide cannot move.
5. The nose piece is adjusted in such a way that the low power objective is aligned with the object of focus placed on the slide.
6. The coarse adjustment knob can be shifted upwards or downwards such that the slide is well under focus.
7. Turn the fine adjustment knob by moving upwards or downwards to get a clear and sharp image of the object under focus.
8. All minute details of the object are observed under low power objective. Necessary diagrams are sketched.
9. The nose piece is now turned to bring the high power objective aligning with the object. The fine adjustment knob is tuned as much as possible to get a bright and precise view of the object.
10. In high power, the details of the object are observed. The coarse adjustment knob should not be used when the object is being examined in high power as it can crush the slide.

# ROTARY SHAKER


## CARE AND MAINTENANCE

1. Place the unit on the laboratory bench in such a way that the power supply (on/off switch) is easy to reach, so it is not necessary to reach across the apparatus, and the power-indicator light is easily seen.
2. Select a location where it will not be easily knocked over or tripped on. Avoid unintentional grounding points and conductors such as sinks, metal plates, jewellery, other metal objects or surfaces.
3. Inspect the apparatus to be used. Examine the insulation on the high voltage leads for signs of deterioration (e.g., exposed wires, cracks or breaks, etc.) Check the buffer tanks for cracks or leaks, and missing covers.
4. Ensure that all switches, lights and all safety interlock features are in proper working condition and that “Danger-High Voltage” warning signs are in place on the power supply and buffer tanks.
5. Use only apparatuses in proper working condition



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# ROTARY SHAKER

Rotary Shakers is used to grow culture of micro organisms and tissue cells. It improves the mixing & helps to dissolve the substance in the flask or speed up the reaction.A shaker is a used to mix, blend, or agitate substances in a tube or flask by shaking them.

## PROCEDURE

1. Place the sample in an acceptable container with a lid.
2. Gently press the container in one of the spring housings until it is securely placed**.**
3. Close the lid of the incubator and turn on the machine using the power switch to the right hand side.
4. Once the machine is powered on, the shaker starts running.
5. Press the select button until the RPM indicator is illuminated on the left hand side of the control panel.
6. Use the arrow keys to set the RPM of the shaker.
7. The number will set when no buttons are pressed.
8. Press the select key until the ºC INDICATOR illuminates.
9. Set the temperature using the arrow keys. Temperature range is from 4º to 60ºC
10. Press the select key until the HRS INDICATOR is illuminated.
11. Use the arrow keys to set the TIME of the shaker. This can be a value from .1 to 99.9.
12. If a continuous run time is desired, simply press the start button.
13. Press the START/STOP key. The shaker will start in untimed mode.
14. Press the START/STOP key again. The shaker will stop and the display will read OFF.
15. Press the START/STOP key a third time; the time indicator will light and the shaker will now start the timed run.
16. The machine will come to a stop once the timed run has ended.
17. If running in untimed mode, the START/STOP key can be pressed at any desired time.
18. Make sure the machine has come to a complete stop and open the lid.
19. Use a hot glove if high temperatures were set.
20. Turn off the power by flipping the switch on the right side of the machine.

## AGAROSE GEL ELECTROPHORESIS


Agarose gel electrophoresis is a general term thatis used for the separation of charged particles (ions), the DNA under the influence of an electric field.

### PROCEDURE

1. Prepare a 50x stock solution of TAE buffer in 1000m of distilled $H_2O$. Weigh 242 g of Tris base in a chemical balance. Transfer this to a 1000ml beaker. Prepare EDTA solution (pH 8.0, 0.5M) by weighing 9.31g of EDTA and dissolve it in 40ml distilled water. EDTA is insoluble and it can be made soluble by adding sodium hydroxide pellets. Check the pH using pH meter.
2. Prepare the electrophoresis buffer (usually 1x TAE ) to fill the electrophoresis tank and to cast the gel.
3. Prepare a solution of agarose in electrophoresis buffer at an appropriate concentration.
4. Loosely plug the neck of the Erlenmeyer flask. Heat the slurry in a boiling-water bath or a microwave oven until the agarose dissolves. The agarose solution can boil over very easily so keep checking it. It is good to stop it after 45 seconds and give it a swirl. It can become superheated and NOT boil until take it out whereupon it boils out. So wear gloves and hold it at arm's length.
5. Use insulated gloves or tongs to transfer the flask/bottle into a water bath at 55°C. When the molten gel has cooled, add 0.5µg/ml of Ethidium bromide. Mix the gel solution thoroughly by gentle swirling.
6. (For the preparation of Ethidium bromide adds 1g of Ethidium bromide to 100 ml of $H_2O$. Stir on a magnetic stirrer for several hours to ensure that the dye has dissolved.





Wrap the container in aluminum foil or transfer the 10 mg/ml solution to a dark bottle and store at room temperature.)

7. While the agarose solution is cooling, choose an appropriate comb for forming the sample slots in the gel. Pour the warm agarose solution into the mould.
8. Allow the gel to set completely (30-45 minutes at room temperature), then pour a small amount of electrophoresis buffer on the top of the gel, and carefully remove the comb. Pour off the electrophoresis buffer. Mount the gel in the electrophoresis tank.
9. Add just enough electrophoresis buffers to cover the gel to a depth of approx. 1mm.
10. Mix the samples of DNA with 0.20 volumes of the desired 6x gel-loading buffer.
11. Slowly load the sample mixture into the slots of the submerged gel using a disposable micropipette or an automatic micropipettor or a drawn-out Pasteur pipette or a glass capillary tube. Load size standards into slots on both the right and left sides of the gel.
12. Close the lid of the gel tank and attach the electrical leads so that the DNA will migrate toward the positive anode (red lead). Apply a voltage of 1-5 V/cm (measured as the distance between the positive and negative electrodes). If the electrodes are 10cm apart then run the gel at 50V. It is fine to run the gel slower than this but do not run it any faster. Above 5V/cm the agarose may heat up and begin to melt with disastrous effects on gel's resolution. If the leads have been attached correctly, bubbles should be generated at the anode and cathode.
13. Run the gel until the bromophenol blue and xylenecyanol FF have migrated an appropriate distance through the gel.
14. The gel tray may be removed and placed directly on a transilluminator. When the UV is switched on we can see orange bands of DNA.

### CARE AND MAINTENANCE

1. Do not touch any cooling apparatus connected to a gel.
2. The current can be conducted through the tubing. Do not run electrophoresis equipment while unattended.
3. If electrophoresis buffer is spilled or leaks from the gel box, stop the run and clean up the bench top immediately.
4. Wear a long-sleeved lab coat, safety goggles, gloves (latex is not effective), long pants, and closed-toe shoes.
5. Wear appropriate skin and eye protection when working with UV radiation.

## SPINWIN MICRO CENTRIFUGE


Spinwin micro centrifuge helps to accommodate PCR tubes and micro centrifuges for continuous separations of components in a sample with safety lid lock and lid drop protection.





## SPINWIN MICRO CENTRIFUGE

### PROCEDURE

1. Turn on the apparatus.
2. Open the door of the equipment.
3. Place the tubes in face to face pattern for maintaining the balance of the centrifuge.
4. Adjust the time and centrifuging speed.
5. Close the equipment using the safety lid lock.
6. Allow the centrifuge to run.
7. Turn off the equipment when the centrifuge has stopped running for the required time.
8. Take out the samples by opening the door of the equipment

### MAINTENANCE

1. Centrifuge should be installed on a good stable base.
2. Before using the centrifuge check the rotor for firm placement.
3. Centrifuge must not be knocked or moved during operation.
4. In case of fault or emergency release, never touch the rotor before it has stopped turning.
5. Only the rotors and accessories approved by the manufacturer for this device may be used.
6. The centrifuge must not be operated with highly corrosive substances which could impair the mechanical integrity of rotors, hangers and accessories. The door of the apparatus should be always closed.

## HAEMOGLOBINOMETER


It is an instrument used to determine the quantity of haemoglobin in the blood. It is based on comparision of the colour of the tested blood, which is treated with hydrochloric acid, with the colour of standards





## HAEMOGLOBINOMETER

It is an instrument that is used to determine the quantity of hemoglobin in the blood. It is based on comparison of the color of the tested blood, which is treated with hydrochloric acid, with the color of standards.

### PROCEDURE

1. N/10 Hydrochloric acid is taken in Hemoglobin tube that has two graduations, gm/dl on one side, and the Hb percentage on the other side with graduations upto the mark 20, the lowest marking in yellow colour.
2. Venous or Capillary blood is drawn up to 20µl mark of hemoglobin pipette exactly.
3. For capillary blood draw, boldly prick the tip of the middle or ring finger with the help of Blood lancet or pricking needle. Wipe out the first drop of blood and suck the blood from the second drop in Hb pipette up to the mark of 20 µl. Fill the Hb pipette by capillary action. Wipe out the surface of the pipette with the help of tissue paper/ cotton so that excess blood may not be added to the Hb tube.
4. Dispense the blood into N/10 hydrochloric acid taken in the hemoglobin tube, rinse the pipette with the same solution and mix properly with the help of stirrer.
5. Place the tube at room temperature for 10 minutes for complete conversion of hemoglobin into acid hematin.
6. After the reaction completes, place the Hb tube in the column in Sahli's Comparator box and start diluting the dark brown coloured compound (Acid Hematin) formed in the Hb tube using the N/10 HCl or distilled water by adding drop by drop of it into the solution and mix with the help of stirrer after each addition.
7. This process is done until the endpoint comes matching the color of standard with the color of the test.
8. Once the color is matched with the standard brown glass, lift the stirrer up and note down the reading in Sahli's Hb tube by taking the lower meniscus in consideration.
9. Now add one more drop of distilled water and mix it properly with the help of stirrer. If color is still matching with the standard add another drop till it matches with the standard and note down the reading and, if it gets lighter after adding the first extra drop, it shows reading taken before dilution was correct. Note down that reading as the final result.
10. Reading of this method is expressed in Hemoglobin gm/dl (gram/100 ml) of blood.

## DIGITAL HAEMOGLOBINOMETER


The Digital Hemoglobinometer is a portable device used to measure the concentration of haemoglobin in blood.The measurement of haemoglobin is important to diagnose anaemia or high haemoglobin levels in the assessment of changes before and after operations or blood transfusion.

CARE AND MAINTENANCE

1. Graduated tubes must be cleaned before use.
2. It is easy to add too much dilute hydrochloric acid during the color comparison process.
3. Acid haematin is not a stable compound and readings must be taken within the recommended time interval.
4. Samples can only be measured one at a time.
5. After prolonged use, the numbers on the graduated cylinder fade and are difficult to read.





## DIGITAL HAEMOGLOBINOMETER

### PROCEDURE

1. Fill the Sahli graduated cylinder to the 2g mark with dilute 0.1 M hydrochloric acid (approximately 0.15 ml). Clean the fingertip with cotton wool soaked with 70% alcohol.
2. Allow alcohol to dry. Obtain a drop of blood by puncturing the fingertip with a sterile lancet. Wipe away the first drop of blood.
3. Draw the blood to the 0.02 ml mark using the Sahli blood pipette. Do not pipette by mouth
4. Wipe any residual blood from the exterior of the pipette. Recheck that the blood still reaches the 0.02 ml mark.
5. Add the blood to the dilute acid. Mix the blood and acid thoroughly by flushing the pipette several times
6. Allow the acid/blood mixture to stand for five minutes.
7. Place the tube into the tube holder of the colored scale.
8. Hold the scale up to the light.
9. If the color of the solution is the same or lighter than that of the colored standard, the hemoglobin level is 4 g/dl or less.
10. If the color of the solution is darker than the colored standard, continue to add dilute acid drop by drop.
11. Stir the solution with the glass rod after each drop is added, and compare the solution to the colored glass standard.
12. Keep adding the acid until the color of the solution matches the color of the glass standard.
13. Hold the scale up to a window when assessing the color match.
14. Once the colors match, hold the instrument at eye level and record the value of percent hemoglobin indicated on the side of the tube by the level of fluid.

## MAGNETIC STIRRER


A hot plate magnetic stirrer is used for mixing and heating aqueous solutions simultaneously to speed up the reaction and dissolve the solute in the solvent.





## MAGNETIC STIRRER

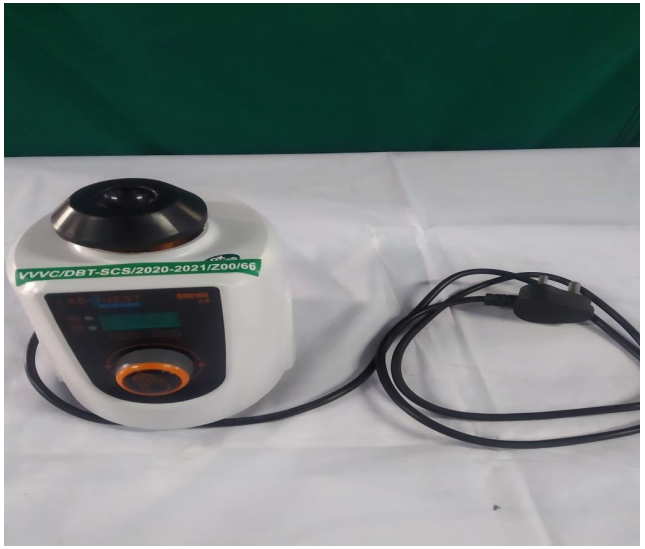
### PROCEDURE

1. Place the beaker with solution (which is to be stirred) on hot plate.
2. Placethe small white Teflon coated magnetic needle in the beaker containing solution.
3. Keep the speed regulator knob at ‘o’ point.
4. Connect the plug wire of the unit to the main supply out. Then Switch ‘ON’ position.
5. Turn the speed regular knob clock wise gradually; the Teflon coated magnet shall start revolving. Increase the speed by further turning the speed knob clock-wise till the desired speed is attained.
6. Rotate the heater knob to the desired temperature (low, medium & high) required for heating the solution.
7. After completion of stirring rotate the speed knob anticlockwise to stop the movement of Teflon coated magnet.
8. Turn the heater knob to ‘0’ position and put the main switch at ‘off’ position, before disconnecting from the mains.
9. Remove the magnet needle from container and clean it properly. Keep the magnet bead to its storage location.
10. Clean the equipment after work is over.

### MAINTENANCE

1. Instrument housing should be properly grounded to avoid accidents.
2. When unused for long periods, should cut off the power, store a dry and ventilated place.
3. The instrument should be kept clean and dry, prohibit the solution flows into the machine, to avoid damage to the machine, cut off the power when not working.
4. During mixing, when find stirrer is beating or non-stirring, reduce speed or disconnect the power to check whether the flat bottom of the beaker, location is positive.
5. Stirring heating time not too long, intermittent use can extend the life, not heated without stirring.
6. The medium-speed operation can continuously work for 8 hours, high-speed operation can continuously work for four hours, to prevent severe vibration during operation.

## VORTEX MIXER




The Vortex Mixer is used to agitate samples and promote homogenization of samples in test tubes



V.V.Vanniaperumal College for Women, Virudhunagar,Tamilnadu
No HRD-11011/163/2020-HRD-DBT-SCS /2020-2021/Zoology /Standard Operating Procedure/Equipments

## VORTEX MIXER

### PROCEDURE

1. Switch “ON” the mains.
2. Switch “ON” the Instrument.
3. Red light will glow.
4. Put the test tube on the rubber pad.
5. Set the speed with the help of the knob.
6. On completion turn the speed knob anticlockwise.
7. Switch “OFF” the Instrument.
8. Switch “OFF” the mains.

### CARE AND MAINTENANCE

1. The work surface should be firm, flat and clean.
2. Keep a good ventilation environment.

## DIGITAL SPECTROPHOTOMETER






## DIGITAL SPECTROPHOTOMETER

The spectrophotometer is an instrument which measures an amount of light that a sample absorbs and thereby calculating the concentration of a solute in a solution.

### PROCEDURE

1. Connect the instrument to the mains supply through the 3 pin plug.
2. Adjust the wavelength disc to the desired wave length by rotating the wave length setting knob & select the required wavelengths 340-400nm or 400-960nm.
3. Keep the sensitivity control in '1' position
4. Set the display to 00.0 % T without inserting the cuvette in the holder using the set zero control
5. Open the lid of the sample holder and insert a cuvette tube with blank solution close the lid.
6. With the help of 'Calibrate Coarse' control, bring the display reading near 100% T. Now using the fine knob adjust 100% T.
7. Keep increasing the sensitivity range till 100% T is set.
8. Insert the cuvette containing test solution in the holder and note the reading.
9. Read the value on the display by keeping the mode selection in OD position.
10. From the graph plotted from the above procedure and the OD obtained in the step II, the concentration of the unknown may be obtained.
11. Repeat the experiment with the other samples of unknown concentration in the cuvette. Record the value shown by the spectrophotometer.