Internal Laboratory Security

Report File Number: 001A - Addendum A

Confidential Report:

Prepared for Dr. Biology

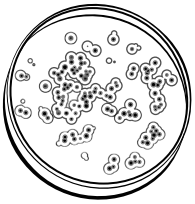
Overview:

Document contains instrument key and reference materials for outside experts to consult while reconstructing image files from corrupted data disk.

Summary:

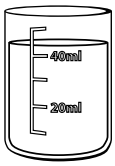
Images and descriptions of instruments recovered from corrupted disk. Also includes reference materials for outside consultants. Information should remain classified until filed through offical channels.

End Report

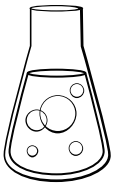


Petri (pronounced – "pE – tree") **dish** are thin round dishes with covers made of glass or plastic. Petri dishes are often used by biologists to grow (culture) cells for experimental research. The type of cells that are often cultured are bacteria, animal, plant, or fungus. Microbiologists use partially filled Petri dishes filled with warm liquid agar mixed with nutrients to culture different microbes. Cell biologists often use cell media instead of agar to culture cells.

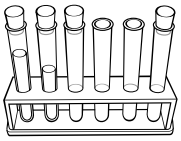
Wire loop used to prepare microbial Petri dishes. After sterilizing the wire hoop by heating it in red hot flame and then allowing it to cool a microbiologist will pick up a loop full of liquid or bacterial growth from the surface of an agar plate, and then lightly streak the loop back and forth across a newly prepared Petri dish with agar medium.



Beaker (pronounced – "beek –r) is a common container for liquids used in most laboratories. Beakers are usually labeled for measuring quantities in metric values and range in size from a few milliliters (mL) up to several liters (L).

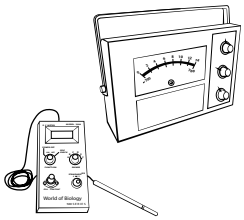


Flask (pronounced – "fl – ask") is a common container for liquids found in most laboratories. Flasks vary in shapes and sizes, but mostly have a wide base that tapers up toward a narrower cylindrical top called the neck. Flasks are designed to measure metric units from a few milliliters (mL) up to larger volumes, liters (L) and are usually made from glass, but some are plastic.

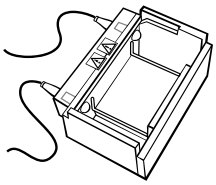


Test tubes or **culture tubes** are commonly found in a biology laboratory. Most are made of glass, but some are made from plastic.

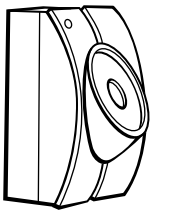
Magnetic stirrer (stir plate) – Magnetic stir plates use rotating magnets, or a stationary electromagnet to spin a bar magnet usually coated with a special plastic material that can withstand being submerged in solutions without dissolving or interacting with the solutions. When the bar magnet, also called a flea, is placed in a beaker containing liquid on top of a stir plate the bar will rotate as the magnetic field is increased, or the rotating magnet in the base is rotated. Many stir plates include a heating element to help speed up the process of mixing solution.



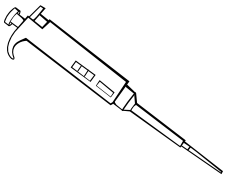
pH (pronounced "pE – H") **meter** measures the pH or acidity or alkalinity of a liquid and semi-solid materials. pH meters are also called acid meter. pH measurements range from 0 – 14 with a value of 7 being neutral. Values higher than 7 are alkaline and values less than 7 are acidic.



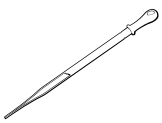
Electrophoresis (pronounced"E-lec-tro-fuh-REE-siss") also called **gel electrophoresis** is a method used by biologists to separate macromolecules such as DNA (nucleic acids) or proteins based on size, electric charge, and other properties. Electrophoresis describes how charged particle under the influence of an electric field migrate across a gel. Electro refers to the energy of electricity. Phoresis, from the Greek verb phoros, means "to carry across." Electrophoresis technology is used by genetic biologists, molecular biologists, and forensic scientists.



Iris scanner – Instrument used when requiring the highest level of security for access to restricted areas or devices. Iris scanners take advantage of the highly unique features of the human eye, the iris that cannot be reproduced. Specifically applicable for very high security server rooms, safety deposit boxes and other top security areas.



Micropipette –Tool used by scientists to measure and dispense precise quantities of small amounts of liquids (10 ul – 10ml). Most micropipetters use removable plastic tips.

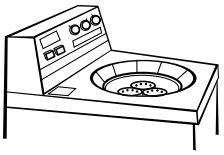


Pasture Pipette – Glass or plastic tube used to transfer and measure small amounts of liquids.

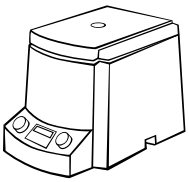
Micropipette tips – Special disposable tips that are used with micropipette devices to dispense small amounts of liquids in repeatable and very accurate amounts (10 microliters ul – 10 milliliter ml).

Centrifuge:

A centrifuge is a piece of equipment, generally driven by a motor, that puts an object in rotation around a fixed axis, applying force perpendicular to the axis. The centrifuge works using the sedimentation principle, where the centrifugal force is used to separate lighter and heavier substances. There are many different kinds of centrifuges, including those for very specialized purposes.



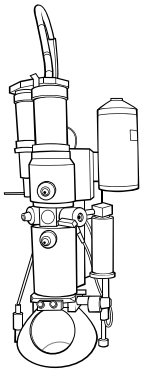
Ultracentrifuge – The ultracentrifuge is a centrifuge optimized for spinning a rotor at very high speeds, capable of generating acceleration as high as 1,000,000 G (9,800 km/s^2) There are two kinds of ultracentrifuges, the preparative and the analytical ultracentrifuge. Both classes of instruments find important uses in molecular biology and polymer science. Theodor Svedberg invented the analytical ultracentrifuge in 1923, and won the Nobel Prize in Chemistry in 1926 for his research on colloids and proteins using the ultracentrifuge.



Microcentrifuge – Simple centrifuges are used in biology and biochemistry for isolating and separating biomolecules, cell organelles, or whole cells. They vary widely in speed and capacity. Molecular biology laboratories use "microcentrifuges" extensively. These benchtop centrifuges typically accommodate microcentrifuge tubes with capacities from 250 µL to 2.0 mL.

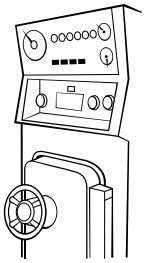
Microscope:

A microscope (Greek: μικρόν micron = small and σκοπός scopos = aim) is an instrument for viewing objects that are too small to be seen by the naked or unaided eye. The science of investigating small objects using such an instrument is called microscopy, and the term microscopic means minute or very small, not easily visible with the unaided eye. In other words, requiring a microscope to examine

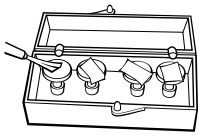


Electron microscopes – which use beams of electrons instead of light, are designed for very high magnification usage. Electrons, which have a much smaller wavelength than visible light, allow a much higher resolution. The main limitation of the electron beam is that it must pass through a vacuum as air molecules would otherwise scatter the beam.

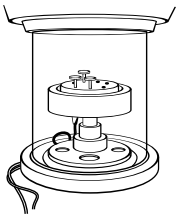
Autoclave (pronounced – "auto –clay-v") an instrument used in biological research to sterilize equipment and objects using high pressure and steam. The combination of pressure and high steam kills bacteria, viruses, fungi, and spores. The use of autoclaves was thought to kill all living organisms, but in 2003 scientists found that a single-celled organism, known as Strain 121, can survive traditional autoclave temperatures of 121 degrees C.



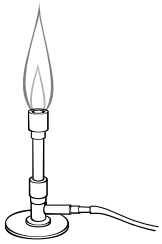
Planchet (pronounced – "plan – Chet") is metal or carbon holder used for specimens that will be viewed in a Scanning Electron Microscope (S.E.M). Usually a specimen is glued to the planchet with a special carbon glue and then coated with a thin layer of gold in a special instrument called a Sputter Coater.



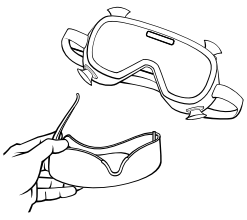
Sputter Coater (pronounced – "sputter coat r") This device is used to prepare specimens that are going to be viewed in a scanning electron microscope (S.E.M.). The thin layer of gold improves the image quality by conducting the extra electrical charge away from the sample. Gold coated images are easier to see because they do not have with white streaks and or areas where the specimen cannot be seen.



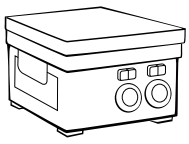
Bunsen burner (pronounced – "bun sen" burner) – Most laboratories have this piece of equipment that produces a gas flame used to heat liquids and solid materials. It is also used to sterilize objects. The interesting note about most devices called Bunsen burners is they are actually Tirrel Burners which include a gas control valve that was not part of the original Bunsen burner.

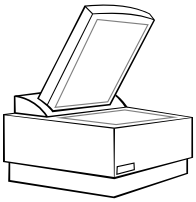


Safety goggles (pronounced – "gog ells") – These clear protective eye glasses are worn by researchers in laboratories to protect against fluid and other materials entering their eyes. Safety goggles come in several sizes and styles.

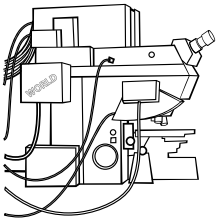


Heating plate – Instrument used to heat materials either to help aid in the mixing of materials. Many times heating plates are combined with magnetic stir plates.

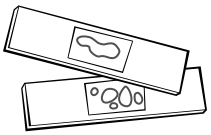




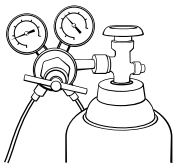
Phosphor-imaging scanner (pronounced - "fos for") – This instrument replaces the need for X-ray film when working with radio active isotopes in molecular biology, genetics, and medical radiography. Instead of using X-ray film developed in chemicals, the exposed imaging plate (phosphor screen) is read using a scanning red-laser system. This instrument looks like a really big flatbed scanner.



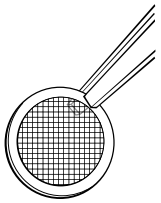
Scanning-laser confocal microscope – This light microscope is best used to produce sharp three-dimensional images and allows viewer to see not just surface features, but often all the way through the sample. The microscope scans successively deeper layers of a specimen and then uses a computer to assemble the various images into a single composition. This technique eliminates blurring and scatter common in most light microscopes.



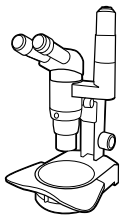
Microscope (pronounced – "Mic row scope") **slide** – Clear glass slides used to view samples under a microscope. Usually microscope slides are used in combination with smaller and thinner glass "cover slips" that protect the sample from damage, or drying out.



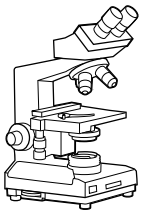
Pressure Regulator – These devices are attached to gas tanks such as oxygen and nitrogen gas tanks and are used to control the amount of pressure and rate of flow of the gas from gas tanks.



Electron Microscope (E.M) grid – These small (less than ¼ inch in diameter) grids are made of copper and nickel and are used to hold specimens that are inserted into a transmission electron microscope (T.E.M). Specimens are placed on top of the grid that has a thin membrane coating on top to keep the specimen from falling through the open areas in the grid.

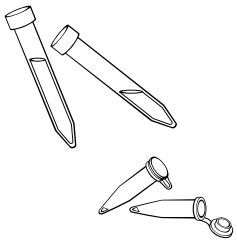


Dissection (pronounced – "die section") **microscope** – Microscopes that are used to look at objects in the range of 1X (twice normal size) to 60X (sixty times normal size). Dissection microscopes have two eye pieces so that the users can judge depth and distance while working with materials and samples.

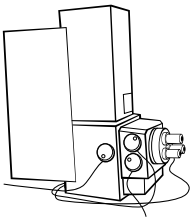


Stereo microscope – Microscopes that have two eye pieces and therefore the ability to view a sample from two different angles. This permits the viewer to judge surface depth of a specimen since both eyes are involved in viewing the sample.

Magnification and biological objects – It is useful to know what magnification and therefore what type of microscope a person would need to view different biological objects. Below are a few basic biological objects and how much magnification would be required to see them.

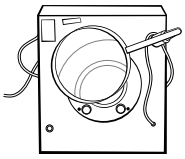


Ultra and micro centrifuge tubes – These tubes that look somewhat like test tubes are specially designed to be used in centrifuges where extreme forces are placed on the tubes when spinning at high speeds. The tops of centrifuge tube either screw on or are capped. The tips are pointed rather than round like test tubes so that biological material will collect at the tip in an easier to obtain "pellet."

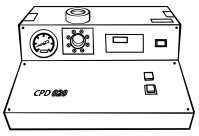


Scanning electron microscope – Unlike the transmission electron microscope (T.E.M.), the scanning electron microscope (S.E.M.) is used to view the surface of objects where the T.E.M. is used to view very thin sections of biological material such as cells and cell organelles. S.E.M. images are most commonly seen of very small insects such as bed bugs and other tiny insects not visible to the unaided human eye.

Biohazard symbol – This symbol is placed on in the area where toxic and or other harmful materials are being used or stored. Other bio hazard materials include radioactive isotopes, acids, and sometimes strong electromagnetic fields.



Cell culture counter – Device used to count individual cell culture colonies. The magnifying lens makes it easier to see colonies and a background grid pattern makes it easier to count the individual colonies.



Critical Point Dryer – This instrument is used to remove water and fluids from biological samples without damage. Under normal conditions when cells lose large amounts of water the result is cell damage and or drastic change in cell shape, such as when a grape is dried and becomes a raisin. Critical point dryers are able to remove the water from cells, without causing damage or change in cell shape.

Some basic terms used in biology

Resolution – the ability to magnify and view two items as separate and distinct objects. This can be experienced when using a simple magnifying glass. As you move the magnifying glass further away from an object(s) the image grows larger and more details are able to be seen. Magnification increases and more details become visible up to point where the objects grow larger, but are blurry. This is the point where the resolution power of the magnifying glass has been exceeded.

Empty magnification – when an object is magnified beyond the range and limits of the microscope being used. Objects appear larger but are fuzzy and individual objects are hard to see because the resolution of the instrument has been exceeded.