Edu Science

SMART SLIDES™ ACTIVITY KIT
TROUSSE DE LAMES INTELLIGENTES
JUEGO DE ACTIVIDADES PORTAOBJETOS INTELIGENTE

8+

⚠ WARNING:
Contains functional sharp points and edges.
Keep magnifying glass away from direct sunlight and windows.

⚠ MISE EN GARDE:
Contient des pointes aigües et des bords coupants.
Garder la loupe à l'abri de la lumière et des fenêtres.

⚠ ADVERTENCIA:
Contiene puntas y bordes funcionales afilados.
Lupa del mantiene lejos de la luz del sol y de windows directos.

TOTAL NET WT. OF ACCESSORIES/POIDS NET TOTAL DU ACCESSOIRES/PESO NETO TOTAL DEL ACCESORIOS: 7.05 OZ (200 g)

Instruction manual
Manuel détaillé
Manual de instrucciones

Contents

- 21 Prepared slides
- 7 Blank slides with labels & covers
- Slide carrying case
- Magnifying glass
- Needle rod
- Pipette
- Tweezers
- Scalpel
- Petri dish
- Red dye
- Blue dye
- 7 Vials of specimens
- Instruction manual

Experiment Instructions

WARNING!

- Keep chemicals and corrosive liquids out of the reach of children.
- Do not ingest any chemicals.
- Wash your hands thoroughly with soap under running water after use.
- Not suitable for children under 3 years of age.
- Contains functional sharp points and edges.

Accessories in this experimental kit may have sharp edges and tips. Please store the device and all of its accessories and aids out of the reach of young children when not being used due to a risk of injury.

DISPOSAL

Keep packaging materials, like plastic bags and rubber bands, away from children, as they pose a risk of suffocation.

Dispose of packaging materials as legally required. Consult the local authority on the matter if necessary.

Introduction

Here are a few tips about how to take a better look at the wonderful world of microorganisms and crystals. You will learn how to prepare your object so that you can look at it under a microscope. The numerous experiments described should make you curious and want to use your microscope more.

QR Codes

The 21 slides come with a QR (quick response) code printed on them. These QR codes can be used to access our website which is handy for gathering more information regarding the slide you're working with. After downloading your QR code reader from your app store, simply point your mobile device at the QR code and you will be automatically taken to a web page with more information for that slide.

Objects to Observe

With a magnifying glass, you can look at non-transparent (i.e. opaque) objects like small animals, parts of plants and tissues. When you use a magnifying glass, light falls onto the object and is reflected back through the magnifying lens and into your eye. With your microscope, however, you can observe transparent objects. The light from the lamp goes through the opening on the stage and through your prepared specimen. Then, it passes through the objective, the body of the microscope, the eyepiece, and travels into your eye. In this way, the microscope is only meant for observing transparent objects. Many microorganisms in water, parts of plants, and the tiniest animal parts are naturally transparent. To observe opaque objects under the microscope, we must make them transparent. We may make them transparent through a treatment or penetration with the right materials (media), or by taking the thinnest slices from them (using a specimen slicer), and then examine them. Below you'll find out how to do this.

How to Produce Thin Specimen Slices

WARNING:
Only do this with an adult's supervision. Ask your parents to help you. As already mentioned, you need to get the thinnest slices possible from an object so that they are transparent and can be looked at under the microscope. First, get a candle and place it in an old pot, then heat it on the stovetop until the wax becomes liquid. Now, use tweezers to dip the object in the liquid wax a few times. Be careful, the wax is very hot! After each dip, allow the wax to harden before you dip the object into the wax again. When the wax around the object has hardened completely, you can use the specimen slicer (not included) to cut it into thin slices. Place these slices on a slide and cover them with a cover slip.

The Production of Specimens

There are two basic types of specimens: permanent specimens and short-term specimens.

Short-term Specimens

Short-term specimens are produced from objects that you want to look at, but don't want to keep in your specimen collection. These specimens are only meant to be observed for a short period of time, after which they are disposed of. For short-term specimens, place the object on the slide and place a cover slip on top of it. After looking at the object, clean the slide and cover slip, disposing of the specimens. One of the secrets of successful observation with a microscope is the use of clean slides and cover slips. Spots or stains will distract you when looking at an object.

Permanent Prepared Specimens

Permanent prepared specimens are produced from objects that you would like to look at again and again. The preparation of dry objects (e. g. pollen or the wings of a fly) can only be done with special glue (gum media). You'll find such glue at a local hobby store or online, identified as "gum media." Objects that contain liquid

must first have the liquid taken out of them before they can be prepared as permanent specimens.

How to Prepare a Dry Object

First, place the object in the middle of a clean slide and cover it with a drop of glue (gum media). Then place a cover slip on top of the object and glue. Lightly press the cover slip, so that the glue spreads to the edges. Let the specimen harden for 2-3 days before observing it.

How to Prepare a Smear Specimen

For a smear specimen, place a drop of the liquid to be observed (e.g. water from a puddle in the forest) on the end of the slide using a pipette. Then smear the liquid across the slide with the help of a second slide. Before observing, let the slides dry together for a few minutes.

Experiments

Experiment No. 1:
Black and White Print
Objects:
1. A small piece of paper from a newspaper with a black and white picture and some text,
2. A similar piece of paper from a magazine.

In order to observe the letters and the pictures, produce a short-term slide from each object. Now, set your microscope to the lowest magnification and use the specimen from the newspaper. The letters on the newspaper look frayed and broken, since they are printed on raw, low-quality paper. The letters on the magazine look smoother and more complete. The pictures in the newspaper are made up of many tiny dots, which appear slightly smudgy. The pixels (half-tone dots) of the magazine picture are clearly defined.

Experiment No. 2:
Color Print
Objects:
1. A small piece of color printed newspaper,
2. A similar piece of paper from a magazine.

Make short-term specimens from the objects and observe them with the lowest magnification. The colored halftone dots of the newspaper often overlap. Sometimes, you'll even notice two colors in one dot. In the magazine, the dots appear clear and rich in contrast. Look at the different sizes of the dots.

Experiment No. 3:
Textile Fibers
Objects and accessories:
1. Threads from various fabrics (e.g. cotton, linen, wool, silk, rayon, nylon, etc.),
2. Two needles.

Each thread is placed on a slide and frayed with the help of the two needles. Next, wet the threads and cover them with a cover slip. Set the microscope to one of the lower magnifications. Cotton fibers come from a plant, and look like a flat, twisted ribbon under the microscope. The fibers are thicker and rounder at the edges than in the middle. Cotton fibers are basically long, collapsed tubes.
Linen fibers also come from a plant, and they are round and run in one direction. The fibers shine like silk and exhibit count-

less bulges on the thread. Silk comes from an animal and is made up of solid fibers that are small in diameter, in contrast to the hollow plant-based fibers. Each fiber is smooth and even and looks like a tiny glass tube. The fibers of the wool also come from an animal. The surface is made of overlapping sleeves that look broken and wavy. If possible, compare wool from different weaving mills. In doing so, take a look at the different appearance of the fibers. Experts can determine which country the wool came from by doing this. Rayon is a synthetic material that is produced by a long chemical process. All the fibers have solid, dark lines on the smooth, shiny surface. After drying, the fibers curl into the same position. Observe the differences and the similarities.

Experiment No. 4:
Table Salt
Object: normal table salt.

First, place a few grains of salt on a slide and observe the salt crystals with the lowest setting of your microscope. The crystals are tiny cubes and are all the same shape.

Experiment No. 5:
Production of Salt Crystals
Objects and accessories:
1. Table salt
2. Test tube filled halfway with warm water to dissolve salt,
3. Cotton thread,
4. Paper clips,
5. Matchstick or pencil.

Add salt to the water until it no longer dissolves. We now have a saturated salt solution. Wait until the water has cooled. Fix a paper clip to the end of the cotton thread. The paper clip serves as a weight. Tie the other end of the cotton thread into a knot, stick the match through and dip the end with the paper clip in the salt solution. Place the match horizontally on top of the test tube. It prevents the cotton thread from slipping all the way down into the test tube. Now, place the tube in a warm place for 3-4 days. If you take a look at the glass after a few days under the microscope, you can see that a little colony of salt crystals has formed on the cotton thread.

Experiment No. 6:
How do You Raise Brine Shrimp?
Accessories (from your microscope set):
1. Shrimp eggs
2. Sea salt,
3. Hatchery,
4. Yeast. (not included)

Brine shrimp, or “Artemia Salina”, as they are called by scientists, have an unusual and interesting life cycle. The eggs produced by the female are hatched without ever being fertilized by a male shrimp. The shrimp that hatch from these eggs are all females. In unusual circumstances, e.g. when the marsh dries up, the male shrimp can hatch. These males fertilize the eggs of the females and from this mating, special eggs come about. These eggs, so-called “winter eggs,” have a thick shell, which protects them. The winter eggs are very resistant and capable of survival if the marsh or lake dries out, killing off the entire shrimp population. They can exist for 5-10 years in a “sleep” status. The eggs hatch

when the proper environmental conditions are reproduced. These are the type of eggs you have in your microscope set.

The Incubation of the Brine Shrimp

In order to incubate the shrimp, you first need to create a salt solution that corresponds to the living conditions of the shrimp. For this, put a half liter of rain or tap water in a container. Let the water sit for approx. 30 hours. Since the water evaporates over time, it is advisable to fill a second container with water and let it sit for 36 hours. After the water has sat stagnant for this period of time, add half of the included sea salt to the container and stir it until all of the salt is dissolved. Now, put a few eggs in the container and cover it with a dish. Place the glass container in a bright location, but don‘t put it in direct sunlight. Since you have a hatchery, you can also add the salt solution along with a few eggs to each of the four compartments of the tank. The temperature should be around 25º. At this temperature, the shrimps will hatch in about 2-3 days. If the water in the glass evaporates, add some water from the second container.

The Brine Shrimp under the Microscope

The animal that hatches from the egg is known by the name “Nauplius Larva”. With the help of a pipette, you can place a few of these larvae on a glass slide and observe them. The larvae will move around in the salt water by using their hair-like appendages. Take a few larvae from the container each day and observe them under the microscope. In case you’ve hatched the larvae in a hatchery, simply take off the cover of the tank and place the tank on the stage. Depending on the room temperature, the larvae will be mature in 6-10 weeks. Soon, you will have had raised a whole generation of brine shrimp, which will constantly grow in numbers.

Feeding your Brine Shrimp

In order to keep the brine shrimp alive, they must be fed from time to time, of course. This must be done carefully, since overfeeding can make the water become foul and poison our shrimp population. The feeding is done with dry yeast in powdered form. A little bit of this yeast every second day is enough. If the water in the compartments of the hatchery or your container turns dark, that is a sign that it is gone bad. Take the shrimp out of the water right away and place them in a fresh salt solution.

Warning! The shrimp eggs and the shrimp are not meant to be eaten!

Experiment No. 7:

How does bread mold develop?

Object: An old piece of bread.

Put the bread on a slide and lightly moisten it with water. Place the bread into a sealed container, and keep it warm and out of harsh light. Within a short time, the black bread mold forms. When the mold takes on a white, shining appearance, observe it with your microscope. It will look like a complicated mass of thread, forming the fungus body, which is called the mycelium. Each thread is known as a hypha. These threads, or hyphae, grow like long, slim stacks, ending in a small, white ball, called a sporcap. Inside the sporcap is

a spore that will eventually be released to start new colonies of mold. With your microscope you can watch this amazing transformation unfold.

Experiment No. 8:
Observing stem and root sections
Objects:
1. A celery stalk.
2. A carrot.

Cut several very thin slices from the middle of the celery (a stem) and from the middle of the carrot (a root). Make a “wet mount” by placing a drop of water on the slide. Then put the specimen on the water-covered slide, and top with a cover slip. The water will help support the sample. It also fills in the space between the cover slip and the slide. Start by viewing them at the lowest magnification and then increase the magnification for more detailed observation.

Experiment No. 9:
Observing cork cells
Object: A small cork

With an adult’s supervision, cut a very thin slice from the cork, the thinner the better. Prepare a wet mount of this cork slice as you did with the celery and carrot in Experiment 8. When applying the cover slip over the slide, the water and the cork, make sure no air bubbles are trapped beneath it. Begin with the lowest power and increase the magnification as desired. The cells you see, called lenticels, are actually the air pockets that have been left after the plant material inside has died.

Experiment No. 10:
Observing leaf cells
Objects: A fresh leaf, clean and dry, without holes or blemishes

With an adult’s supervision, cut a one-inch cross section out of the center of the leaf, from one side of the leaf to the other. Tightly roll that section up starting from one uncut edge of the leaf. The central vein of the leaf will be in the center of the roll and not be visible. Then make several very thin slices off one end of the roll. The central vein will be in the middle of this almost transparent slice. You’ll be observing the cells around that central vein. Using a droplet of water, make a wet mount (as in Experiments 8 and 9), placing the leaf segment so that the inner part faces up. Start with the lowest power and gradually increase the magnification for more detail.

Product Manual Visit

www.exploreone.com/pages/product-manuals

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