

**Laser Microscope**

*Amy Ordaz, Biology Major*

**Materials:**

1 laser

1 plastic dropper/syringe

Pond water

Surface to project image on

Apparatus to suspend beaker (optional)

**Procedure:**

1. Fill plastic dropper with some of the water collected from a pond
2. Hold dropper pointed down with apparatus or with hand while suspending a single drop from the end of it
3. Orient laser a few inches away (best to stabilize with a level surface)
4. Shine the laser through the suspended droplet
5. Observe the image projected on the wall/screen

**Tips:**

* The more stable the dropper and the laser are, the easier the image will be able see
* Ensure that water is collected as fresh as possible, so that any microorganisms will still be alive

**Explanation:**

Water collected from a pond or similar ecosystem will contain a myriad of different microorganisms, from bacteria to protozoans and even invertebrate animals such as rotifers. These organisms are much too small to see with the naked eye. However, the laser can magnify these small creatures when employing the curve of the water as a type of magnifying lens. The concentrated light from the laser is refracted, and what is projected are shadows of the microscopic animals contained in the single drop of water.

**Safety:**

Laser should not be pointed at anyone’s eyes.



**ATP Energy Jar**

*Amy Ordaz, Biology Major*

**Materials**:

1 gallon jar

3 Construction paper strips, each with a “P” written on it

Novelty springing snake with the word “energy” attached to it

**Procedure:**

1. Attach the strips of paper to the jar horizontally, with the 3rd strip attached to the lid of the jar
2. Load the springing energy snake into the jar
3. When the lid is taken off, the snake leaps out of the jar

**Explanation**:

This demonstration shows how the molecule ATP works. The high energy phosphate bonds will release energy when the third bond is broken (as symbolized by the snake). Conversely, for ADP (*di*phoshate) to add on a third phosphate again, energy must be used (illustrated by the snake being put back into the jar before the P is secured again.

**Safety:**

Ensure that the springing snake won’t injure anyone’s face.



**Balloon Skewer**

*Amy Ordaz, Biology Major*

**Materials:**

1 Balloon

1 Kebab skewer

Oil

**Procedure:**

Blow air into the balloon so that it is full but not completely inflated. Soak the kebab skewer in oil and slide through the balloon from the top region to near the bottom where it is tied off.

**Tips:**

Practice a few times to ensure the correct amount of air and the correct placement of the skewer. After putting the skewer through the ends, the demonstrator could also illustrate the tightness of the latex in the center and pop the balloon by sticking it through the middle.

**Explanation:**

The latex in the balloon is made of polymers that work to stretch out as the balloon inflates. Because the most stretch occurs in the center of the balloon, the long chains of polymers are under much more stress than the chains at either end of the balloon. But if the skewer is put through the middle region, the balloon will pop.

**Safety:**

Know that it is still possible for the balloon to pop while doing this experiment, just not as probable in the location specified.



**Of Musical Proportions**

*Amy Ordaz, Biology Major*

**Materials:**

8 metal pipes, cut in proportions of 1, then ½, 1/3, ¼, etc.

String to suspend the pipes

Spoon

A few volunteers to hold the pipes

Written out music for the pipes (optional)

**Procedure**

Suspend the pipes and proceed to play a melody with them using the spoon. Each pipe is labeled with a number, that serves as the code to read the music provided.

**Explanation**

Sound is created from each pipe when it is struck by the spoon because of the change in air pressure. Each pipe has a specific natural frequency that it vibrates at depending on the length of the pipe. These pitches, struck in the correct rhythm and order, create music.

**Tips:**

Be sure that the measurements for the pipes are exact.

**Safety:**

The pipes are heavy, so ensure that they are secured before striking with a spoon.



**Carbon Dioxide Bubble**

*Amy Ordaz, Biology Major*

**Materials:**

Block of dry ice

Bowl of water

Liquid dish soap

Rag

**Procedure:**

1. Soak the rag with some dish soap and water
2. Place the block of dry ice into the bowl of water
3. When the ice begins sublimate, take the rag and slide it across the lip of the bowl
4. This should create a large bubble of carbon dioxide, from the dry ice

**Tips:**

Place apparatus on a towel to avoid a mess

**Explanation:**

Dry ice is frozen carbon dioxide that will change directly from solid to a gas, a process known as sublimation. The dish soap and water will create a thin layer over the top of the sublimating dry ice, and this will consequently create a bubble. When the bubble is popped, all that is released is simply the carbon dioxide gas that has built up inside the bubble.

**Safety:**

Dry ice should be handled carefully, as it is very cold.