μHandy Mobile Microscope

Your Second Pair of Eyes

Microscope Teaching Resources

Contents

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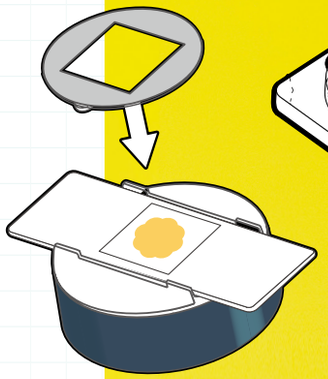
Formal & Informal Science Education

1

Capture micro-worlds with phones or tablets.

Lo-Mag Lens (10-300X)
Best for Grade 1-6
Stereomicroscope-like

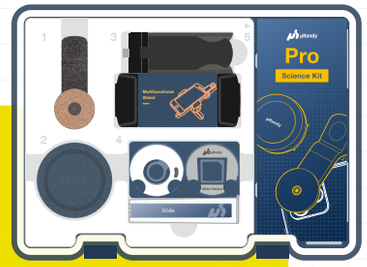


2 Learn from any sample – wet specimens to standard slides.

Hi-Mag Pro Lens (45x-1350x)
Best for Grade 6-12
Compound Microscope-like

3 Minimum maintenance needed for hassle-free teaching.

4 Set up your lab in a snap anywhere.



5 Foster a culture of journaling – Preparing future scientists

Biology

Onion Cell & Oral Mucosa Cell Comparison

Introduction: Life science is a journey of discovery that begins at a microscopic level. Cell observation is the first step on this journey, a fascinating starting point for students. The adventure of uncovering the fundamental differences between plant and animal cells begins under a microscope.

Through simple observation, students can witness the rigid and static nature of plant cells, contrasted with the irregular and flexible nature of animal cells. This lesson is their opportunity to make these discoveries for themselves.

• Objectives

1. Identify differences between plant and animal cells.
2. Enjoy a clear microscopic image with little effort and training, establishing basic familiarity with microscope equipment. Additional time can be utilized in more detailed observations.

Materials for Each Group

- uHandy Science Kit
  - 1 Hi-Mag Pro Lens
  - 2 Circular Slide
  - 3 Light Stage
  - 4 uHandy Stand
  - 5 Sampling Sticker
- 6 Smart Device
- 7 One red onion
- 8 Toothpick
- 9 Methylene blue solution

Extension

1. *Brazilian waterweed (Egeria densa) observation: One of the more notable differences between the two cell types is that plant cells have chloroplast--the cell part that contains the chlorophyll. Students can observe the waterweed cells under the microscope and locate individual chloroplast.*
2. *Alternatively, for interested or more advanced students teachers can discuss the internal structures of cells such as the nucleus, mitochondria….. etc.*

Exploration-Plant Cells vs Animal Cells (Time: 50-65 min)

Plant Cells Observation (Time: 20-25 min)

Step 1 Install the Hi-Mag Pro Lens and uHandy Stand on the smart devices.

Step 2 Tear the skin from the red onion and gently lay it on the Circular Slide.

Step 3 Peel off a Sampling Sticker and place it on the Circular Slide.

Step 4 Attach the Circular Slide to the Light Stage.

Step 5 Place the Light Stage under the Hi-Mag Pro Lens. Now we can begin to scan the samples!

Step 6 After observing the onion cells, the Sampling Sticker can be discarded. However, the Circular Slide can be reused by wiping it with water or alcohol.

Animal Cells Observation (Time: 20-25 min)

Step 7 Place a single drop of Methylene blue solution on the Circular Slide.

Step 8 Using a toothpick, students can gently scrape the inside of their cheeks for a cell sample. Be careful not to hurt yourself!

Step 9 Now that students have collected a cell sample on the toothpick, they should gently swirl the side edge of the toothpick through the Methylene blue solution on the Circular Slide.

Step 10 Use a new Sampling Sticker and paste it on the Circular Slide.

Step 11 Repeat Steps 5-6. **Students can switch the samples for comparison.**

Clean-Up (Time: 10-15 min)

Step 12 At the end of the lesson, make sure to clean the Circular Slide with alcohol, wipe it, and then return the microscope parts to the uHandy Science Kit Case.

Oxidation-Reduction Reaction

Introduction: Oxidation-reduction reaction is an experiment that is sure to catch the attention of students! Students will be able to conduct several experiments and observe, firsthand, the relative reactivity of metals at a microscopic level.
Teachers will be able to explore the topic further as students become more engaged by watching the reactions with their own eyes.

• Objectives

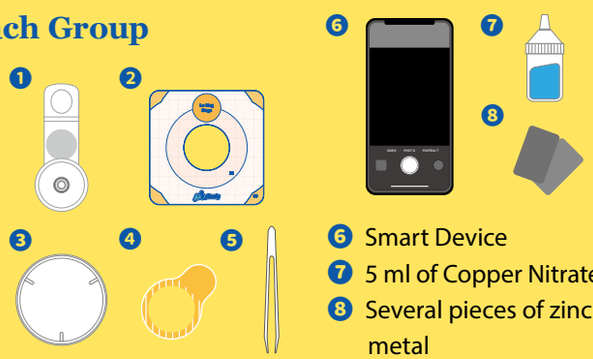
1. Engage students in the oxidation-reduction reaction before delving deeper into the chemical processes involved.
2. Explore the interactions between metals and metal ions. What's the difference?

Safety Precautions

Copper (II) Nitrate Solution is a strong oxidizer, HARMFUL if swallowed, can cause IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

Materials for Each Group

- uHandy Starter Kit
  - 1 Lo-Mag Lens
  - 2 Extension Stage
  - 3 60 mm Petri Dish
  - 4 Sampling Sticker
  - 5 Tweezer



- 6 Smart Device
- 7 5 ml of Copper Nitrate Solution
- 8 Several pieces of zinc sheet metal

Reference

1. *chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/04._Reactions_in_Aqueous_Solution/4.4%3A_Oxidation-Reduction_Reactions*
2. *www.middleschoolchemistry.com/lessonplans/chapter6/lesson5*
3. *chem.libretexts.org/Courses/Saint_Marys_College_Notre_Dame_IN/Chem_122L%3A_Principles_of_Chemistry_II_Laboratory_(Under_Construction__)/09%3A_Oxidation_Reduction_Reactions*
4. *https://www.khanacademy.org/science/ap-chemistry/redox-reactions-and-electrochemistry-ap*

• Discussion (Time: 10 min)

1. Ask students to think about and give examples of oxidation-reduction reactions.
   le. irons turns to rust
2. Ask them how long this reaction typically takes. A month? More than a month?
3. Have you ever observed this reaction? Besides a time-lapse video, how can we see this change in a short period of time?

Exploration (Time: 40-50 min)

Set-up (Time: 5 min)

Step 1 Install the uHandy Stand on smart devices.

Step 2 Take out Lo-Mag Lens, Extension Stage, 60 mm Petri Dish, and the Tweezer.

Step 3 Install the Lo-Mag Lens, clip it over the selfie camera lens, and check to make sure that the field (white circle) is in the center of the screen. Place the Extension Stage over the lens and check to make sure it is centered over the camera.

Experiments (Time: 25 min)

Step 4 Place a piece of the zinc sheet metal into the Petri Dish and place the dish on the Extension Stage. Double check to make sure that the piece of zinc is over the camera.

Step 5 Press record on the camera before moving onto Step 6. This is very important!

Step 6 Place a large drop of copper nitrate solution on the piece of zinc.

Record (Time: 10 min or after school)

Step 7 Be sure to have students write down and record their observations.

Clean-Up (Time: 10 min)

Step 8 Be sure to clean the petri dish by wiping out any remaining solution or metals with tissue paper. Then, clean the petri dish again with water or alcohol to ensure no dried residue remains.

Step 9 Place the equipment and the parts back into the uHandy Starter Kit Case.

Recommendations from K-12 Educators

Dr. Erica Colón

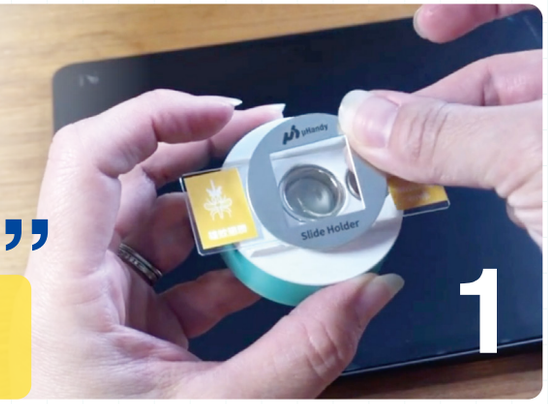
Founder of Nitty Gritty Science

• How they incorporate uHandy Microscope into their classroom

I feel the best way to use this is the teacher using a tablet that is hooked up as a second camera so images can be shared on smartboards or when teaching remotely.

I plan on adding the kit to my Outdoor Explorer pack because I'm able to use this mobile microscope with my iPad. I have not been able to do this with another pocket microscope, so I love the opportunity it gives me to show an entirely different world in nature to students.

Blog:
https://bit.ly/3w1Wk3G



1

Science Lessons That Rock

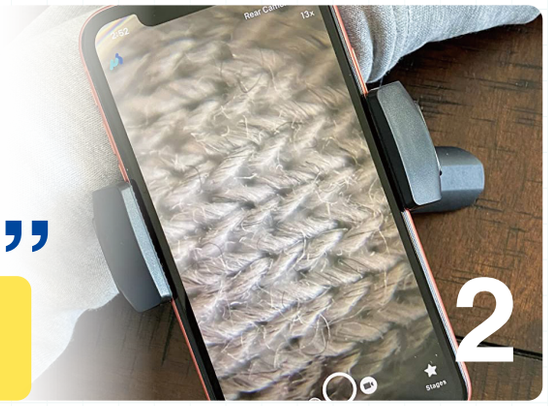
Middle and High School Science Teacher

• How they incorporate uHandy Microscope into their classroom

Students could take it outside for sampling or easily move through stations in the classroom.

I have tried multiple brands and have never been satisfied with the quality.... nothing even came close to what a compound microscope could do. But along came the uHandy pocket microscope and I've been pleasantly surprised at its capabilities!

Blog:
https://bit.ly/3jmtFnd



2

Josie Bensko

Middle School Science Teacher

• How they incorporate uHandy Microscope into their classroom

I turned my phone into a microscope for my 100% remote students at home to feel like they were getting the same experience as the students in my classroom when we were hybrid.

Getting our students excited about science through a computer screen is HARD. This Digital Microscope Kit from uHandy is a GAME CHANGER.

Instagram
https://bit.ly/2UKozqR

3

Isabella Liu

High School Chemistry Teacher

• How they incorporate uHandy Microscope into their classroom

1. Microscale chemistry experiments
2. Building students' confidence in their own lab skills

By attaching the uHandy microscope to their personal devices during an experiment or demonstration for the class, students could see microscopically what's happening with the solutions and what it means when a precipitate is formed.

Blog
https://bit.ly/3gZ5WYQ

4

Contact Us

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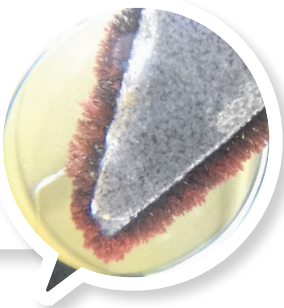

Oxidation-Reduction

Onion Cell

Oral Mucosa