Activity: Herbal Remedies

FOR THE TEACHER

Summary
In this activity, students further their understanding of empirical and molecular formulas through research and a presentation of an herbal remedy. This motivation for creating this lesson is explained in the May 2015 issue of Chemistry Solutions.

Grade Level
High school

Objectives
By the end of this lesson, students should be able to
- Understand molecular and empirical formulas.
- Engage in discussions about herbal remedies and the compounds that may cause the results of the drug.
- Compare and contrast the ideas and knowledge that they bring to class regarding use of food products, herbs, and plants as natural remedies without the use of items purchased at the local pharmacy.

Chemistry Topics
This lesson supports students’ understanding of
- Molecular formula
- Empirical formula

Time
Teacher Preparation: 30 minutes
Lesson: Introduction: one class period; Project research: two class periods; Presentations: depends on class size (I use two class periods)

Materials
- Computer with Internet access

Safety
If food is being consumed, make sure this lesson takes place outside a lab setting.

Teacher Notes
- After students complete the guided outline, a class discussion about the evolution of atomic theory can take place so the teacher can check for understanding.
- Once the atomic theory discussion is complete, the teacher can segue into a conversation about herbal remedies and use green tea as an example. Share samples of green tea with students, if you’d like.
- Students are then given the opportunity to choose an herbal remedy that their project will focus on. Questioning techniques, such as Socratic questioning, can be used to gain an understanding of students’ interest level and experience with plants and food items as medicines. Some examples to consider: ginger ale for an upset stomach, tea with lemon for a sore throat, or mint leaves for bad breath. You can have reference materials for...
students to flip through or have them do a Web search. Books I like to use include *Herbal Remedies Handbook* by Andrew Chevalier or *Heinerman’s Encyclopedia of Fruits, Vegetables & Herbs* by John Heinerman.

**FOR THE STUDENT**

**Lesson**

**Green Tea Guided Notes**

Answer the following questions while paying attention to the presentation about green tea:

- What do you currently use to cure a headache?
- What chemical is in aspirin? Tylenol? Motrin?
- What do you use in your household for an upset stomach?
- What is your favorite pharmacy to go to?
- Where would you turn for medical help if there was no doctor, hospital or pharmacy?
- What did the pioneers, Native Americans, or early civilizations use for those same ailments?
- Herbal remedies are made from
- Who makes the pills or syrups you buy?
- How was it decided what should be included in the medicine that may be over-the-counter or prescription drugs?
- List three positive results of drinking green tea

Now take some time to look at the books around the room or do some online research.

- What herbal remedy would you like to research?

**Empirical Formula Research Project**

Many of the chemicals that are produced by plants do not have any role in the plant’s biochemistry. The chemical is present to protect the plant from insects that could eat it or other prey that could destroy the plant. The milkweed plant is one such example, but this plant’s chemical defenses only work some of the time. Most insects and birds will not eat the milkweed plant because the sap contains a chemical that is poisonous to them. This sap does not harm the monarch butterfly, though. In fact, the monarch butterfly uses the sap’s chemical as part of its defense from predators. Most birds become violently ill if they eat a monarch butterfly. The bird, therefore, learns to avoid these orange and black butterflies.

A major area of pharmaceutical research searches for medically effective natural products. Flowering plants, fungi, and bacteria have all been found to produce medically useful products. For example, the potent painkiller morphine is found in a species of poppy and the heart stimulant digitalis is found in foxglove, a flowering plant. Because substances like these are usually present only in minute amounts, the cost of extracting them from their natural source is
often prohibitive. Consequently, chemists are challenged to discover synthetic pathways for the production of these useful products. The first step for a chemist is to determine the formula of the compound. Using percent composition data obtained in lab analysis, the molecular formula can be determined. Once the formula is known, a chemist can investigate the molecule’s structure and find a likely method to synthesize it.

The pioneers and the Native Americans had to rely on “folk” medicines derived from plants. Check with your family to discover some folk remedies that they may use. What do your family members do to “cure” the hiccups? What did you use when the flu or a fever strikes?

During class time, you will have access to computers and you will research a plant or herb that has been used to create modern medicine using biotechnology—manipulating biological components to develop products that may be beneficial to humans.

The directions for all sections of this 100 point project follow on this sheet. **Five points will be deducted** for each day that the project (any part) is turned in late.

### Research Paper (50 pts)
- Title page
- Intro paragraph
- Fact paragraph
- The culture you have chosen to include
- The EF & MF for this compound
- Comparison to OTC product
- Conclusion
- Works Cited page

### Poster (30 pts)
- Can see all info from three meters
- Title
- Pictures
- Drawing
- Colorful
- Creative
- On a full sheet of poster board

### Presentation (20 pts)
- In-class presentation of interesting facts
- You may use PowerPoint, overhead sheet, or handouts
- Samples or hands-on objects to pass around **Please check with me if you are planning to bring something in to be shared with classmates and eaten in class**
  - /5 pts interesting facts
  - /5 presentation mode
  - /5 loud & clear
  - /5 planned

Student signature _____________________________  Date_______

Parent/Guardian signature _____________________  Date ______

**PROJECT DUE ________________**