

Chemistry Merit Badge Program at Huntley Meadows Park

Important information about how to prepare for a merit badge program at Huntley Meadows Park.

Merit badges are also supposed to be done with the buddy system. *We highly recommend that you attend the program with your scout especially if he does not have a buddy*; the chances of your scout completing all the work for the badge, during the allotted time, increases dramatically when he is properly motivated. There is never a fee for adults and you are sure to learn something. Also our policy is that the program will not proceed if there are not 2 or more adults present for the program especially those containing hikes. We will attempt to enlist adult volunteers from our center but this is not always possible so *prepare for the possibility that you may have to stay for the program and not just drop off your scout*. This will allow the instructor to concentrate more fully on the difficult task of imparting all the required information and assisting the boys individually if necessary, while other adults keep the atmosphere calm and productive.

These programs are 3-5 hours long be sure to pack a snack and water for your scout and that he is dressed appropriately for being outdoors for some or all of the program time. Merit Badges are in general not designed to be completed in an afternoon therefore in order to complete the badge there is some work the scouts need to do outside of the workshop. We call this prework. We suggest this is done prior to the badge program date but we realize this is not always practical or possible, in these cases we will if requested sign partial cards and accept the assignments after the program or ask that you bring/ send back all the work and the card in order to sign off on the blue card all at once.

Please bring to class:

- Worksheet <http://meritbadge.org/wiki/index.php/Chemistry>
- Prework
- Blue card, pencil and clipboard
- Snack/drink
- Appropriate clothing to go outside to observe the weather

The following is what we will be doing during the chemistry badge if it is in **RED** it is prework!

1. Do EACH of the following activities:
 - a. Describe three examples of safety equipment used in a chemistry laboratory and the reason each one is used.
 - b. Describe what a material safety data sheet (MSDS) is and tell why it is used.
 - c. **Obtain an MSDS for both a paint and an insecticide.** Compare and discuss the toxicity, disposal, and safe-handling sections for these two common household products.
 - d. Discuss the safe storage of chemicals. How does the safe storage of chemicals apply to your home, your school, your community, and the environment?
2. Do EACH of the following activities:
 - a. Predict what would happen if you placed an iron nail in a copper sulfate solution. Then, put an iron nail in a copper sulfate solution. Describe your observations and make a conclusion based on

your observations. Compare your prediction and original conclusion with what actually happened. Write the formula for the reaction that you described.

b. Describe how you would separate sand from water, table salt from water, oil from water, and gasoline from motor oil. Name the practical processes that require these kinds of separations.

c. Describe the difference between a chemical reaction and a physical change.

3. Construct a Cartesian diver. Describe its function in terms of how gases in general behave under different pressures and different temperatures. Describe how the behavior of gases affects a backpacker at high altitudes and a scuba diver underwater.

4. Do EACH of the following activities:

a. Cut a round onion into small chunks. Separate the onion chunks into three equal portions.

Leave the first portion raw. Cook the second portion of onion chunks until the pieces are translucent. Cook the third portion until the onions are caramelized, or brown in color. Taste each type of onion. Describe the taste of raw onion versus partially cooked onion versus caramelized onion. Explain what happens to molecules in the onion during the cooking process.

b. Describe the chemical similarities and differences between toothpaste and an abrasive household cleanser. Explain how the end use or purpose of a product affects its chemical formulation.

c. In a clear container, mix a half-cup of water with a tablespoon of oil. Explain why the oil and water do not mix. Find a substance that will help the two combine, and add it to the mixture. Describe what happened, and explain how that substance worked to combine the oil and water.

5. List the four classical divisions of chemistry. Briefly describe each one, and tell how it applies to your everyday life.

6. Do EACH of the following activities:

a. Name two government agencies that are responsible for tracking the use of chemicals for commercial or industrial use. Pick one agency and briefly describe its responsibilities to the public and the environment.

b. Define pollution. Explain the chemical effects of ozone, global warming, and acid rain. Pick a current environmental problem as an example. Briefly describe what people are doing to resolve this hazard and to increase understanding of the problem.

c. Using reasons from chemistry, describe the effect on the environment of ONE of the following:

1. The production of aluminum cans or plastic milk cartons

2. Sulfur from burning coal

3. Used motor oil

4. Newspaper

d. Briefly describe the purpose of phosphates in fertilizer and in laundry detergent. Explain how the use of phosphates in fertilizers affects the environment. Also, explain why phosphates have been removed from laundry detergents.

7. Do ONE of the following activities:

a. Visit a laboratory and talk to a practicing chemist. Ask what the chemist does, and what training and education are needed to work as a chemist.

b. Using resources found at the library and in periodicals, books, and the Internet (with your parent's permission), learn about two different kinds of work done by chemists, chemical engineers, chemical technicians, or industrial chemists. For each of the four jobs, find out the education and training requirements.

c. Visit an industrial plant that makes chemical products or uses chemical processes and describe the processes used. What, if any, pollutants are produced and how they are handled.

d. Visit a county farm agency or similar governmental agency and learn how chemistry is used to meet the needs of agriculture in your county.