



2024 Edition

# SCOUTMASTER BUCKY

## Chemistry Merit Badge

SCOUTS PARTICIPATING IN A SCOUTMASTER BUCKY MERIT BADGE OPPORTUNITY (ONLINE OR IN PERSON), PLEASE CONSIDER ALSO USING THE CHEMISTRY MERIT BADGE CLASS PREPARATION PAGE FOR CLARIFICATIONS, INSIGHTS, AND EXPECTATIONS.

<https://scoutmasterbucky.com/merit-badges/chemistry/chemistry-cpp.pdf>

### CHEMISTRY MERIT BADGE WORKBOOK

**REQUIREMENT 1a:** Describe three examples of safety equipment used in a chemistry laboratory and the reason each one is used.

SAFETY EQUIPMENT EXAMPLE #1

Example #1:

Reason Used:

SAFETY EQUIPMENT EXAMPLE #2

Example #2:

Reason Used:



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### SAFETY EQUIPMENT EXAMPLE #3

Example #3:

Reason Used:

**REQUIREMENT 1b:** Describe what a safety data sheet (SDS) is.

Notes:

**REQUIREMENT 1b:** Tell why a safety data sheet (SDS) is used.

Notes:



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**REQUIREMENT 1c:** Obtain an SDS for both a paint and an insecticide. Compare and discuss the toxicity, disposal, and safe-handling sections for these two common household products.

Don't forget to bring your Safety Data Sheets to share and review with your merit badge counselor.

**This requirement must be reviewed with your merit badge counselor.**

**BE PREPARED!**

**REQUIREMENT 1d:** Discuss the safe storage of chemicals.

**Notes:**

**REQUIREMENT 1d:** How does safe storage apply to your home, your school, your community, and the environment?

**Home:**

**School:**

**Community:**

**Environment:**



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**REQUIREMENT 2a:** Predict what would happen if you placed an iron nail in a copper sulfate solution.

Notes:

**REQUIREMENT 2a:** Put an iron nail in a copper sulfate solution. Describe your observations and make a conclusion based on your observations.

Notes:

**REQUIREMENT 2a:** Compare your prediction and original conclusion with what actually happened.

Notes:

**REQUIREMENT 2a:** Write the formula for the reaction that you described.

Notes:



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**REQUIREMENT 2b:** Demonstrate how you would separate sand (or gravel) from water.

This requirement component will be performed during the class with the merit badge counselor.

**This requirement component must be reviewed with your merit badge counselor.**

**REQUIREMENT 2b:** Describe how you would separate table salt from water.

Notes:

**REQUIREMENT 2b:** Describe how you would separate oil from water.

Notes:

**REQUIREMENT 2b:** Describe how you would separate gasoline from motor oil.

Notes:



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**REQUIREMENT 2b:** Name the practical processes that require these kinds of separations and how the processes may differ.

Sand (or Gravel) from Water:

Salt from Water:

Oil from Water:

Gasoline from Motor Oil:



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**REQUIREMENT 2c:** Describe the difference between a chemical reaction and a physical change.

Notes:

**REQUIREMENT 2c:** Observe a chemical reaction and a physical change and share your observation with your counselor.

Chemical Reaction:

Physical Change:

**REQUIREMENT 3:** Construct a Cartesian diver.

**REQUIREMENT 3:** Describe its function in terms of how gases in general behave under different pressures and different temperatures.

Notes:

**REQUIREMENT 3:** Describe how the behavior of gases affects a backpacker at high altitudes and a scuba diver underwater.

Notes:



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**REQUIREMENT 4a:** 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.

Consider reviewing the Chemistry Merit Badge Pamphlet for preparation for this requirement component.

**This requirement will be done as a part of the class under the guidance of the merit badge counselor.**

**BE PREPARED!**

**REQUIREMENT 4b:** Describe the chemical similarities and differences between toothpaste and an abrasive household cleanser.

**Similarities:**

**Differences:**

**REQUIREMENT 4b:** Explain how the end use or purpose of a product affects its chemical formulation.

**Notes:**





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**REQUIREMENT 4c:** 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.

Consider reviewing the Chemistry Merit Badge Pamphlet for preparation for this requirement component.

**This requirement will be done as a part of the class under the guidance of the merit badge counselor.**

**BE PREPARED!**

**REQUIREMENT 5:** Discuss with your counselor the 5 classical areas of chemistry (organic, inorganic, physical, analytical, and biological), and two others from the following list. Explain what they are, and how they impact your daily life.

- Agricultural chemistry
- Atmospheric chemistry
- Computational chemistry
- Electrochemistry
- Environmental chemistry and green chemistry
- Flavor chemistry, fragrance chemistry, and food chemistry
- Medicinal and natural products chemistry
- Photochemistry
- Polymer chemistry
- Or another area of chemistry of your choosing.

ORGANIC

**Description:**

**Everyday Life Impact:**



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### INORGANIC

**Description:**

**Everyday Life Impact:**

### PHYSICAL

**Description:**

**Everyday Life Impact:**



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## Chemistry Merit Badge

### ANALYTICAL

**Description:**

**Everyday Life Impact:**

### BIOLOGICAL

**Description:**

**Everyday Life Impact:**



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## Chemistry Merit Badge

**CHOICE #1**

**Choice #1:**

**Description:**

**Everyday Life Impact:**

**CHOICE #2**

**Choice #2:**

**Description:**

**Everyday Life Impact:**



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**REQUIREMENT 6a:** 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.

Agency #1:

Agency #2:

Selected Agency:

Responsibilities:

**REQUIREMENT 6b:** Define pollution.

Notes:

**REQUIREMENT 6b:** Explain the chemical impacts on the ozone layer.

Notes:

**REQUIREMENT 6b:** Explain the chemical impacts on the global climate change.

Notes:



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**DO ONE OF THE FOLLOWING (6C1, 6C@, or 6C3) FOR REQUIREMENT COMPONENT 6C**

**REQUIREMENT 6c:** Using reasons from chemistry, describe the effect on the environment of...

**REQUIREMENT 6c1:** the production of aluminum cans.

**REQUIREMENT 6c2:** burning fossil fuels.

**REQUIREMENT 6c3:** single-use items, such as water bottles, bags, straws, or paper.

Notes:

**DO ONE OF THE FOLLOWING (7A, 7B, 7C, or 7D) FOR REQUIREMENT 7**

**REQUIREMENT 7a:** Visit a laboratory and talk to a chemist.

Laboratory Name and Location:

Person's Name and Position that you spoke with:

**REQUIREMENT 7a:** Ask what that chemist does and what training and education are needed to work as a chemist.

What the Chemist does:



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Training Requirements:

Educational Requirements:

**REQUIREMENT 7b:** Using resources found at the library and in periodicals, books, and the internet (with your parent's or guardian's permission), learn about two different kinds of work done by chemists, chemical engineers, chemical technicians, or industrial chemists. For each of the four positions, find out the education and training requirements.

CHEMISTS

Two kinds of work done by:

Educational Requirements:

Training Requirements:



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### CHEMICAL ENGINEERS

Two kinds of work done by:

Educational Requirements:

Training Requirements:

### CHEMICAL TECHNICIANS

Two kinds of work done by:

Educational Requirements:

Training Requirements:





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### INDUSTRIAL CHEMISTS

Two kinds of work done by:

Educational Requirements:

Training Requirements:

**REQUIREMENT 7c:** Visit an industrial plant that makes chemical products or uses chemical processes.

Industrial Plant Name and Location:

Person's Name and Position that you spoke with:

**REQUIREMENT 7c:** Visit an industrial plant and describe the processes used.

Notes:



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**REQUIREMENT 7c:** What, if any, by-products are produced and how are they handled?

Notes:

**REQUIREMENT 7d:** Visit a county farm agency or similar governmental agency.

Agency Name and Location:

Person's Name and Position that you spoke with:

**REQUIREMENT 7d:** Learn how chemistry is used to meet the needs of agriculture in your county.

Notes: