



# Scoutmaster Bucky

## CHEMISTRY

### Merit Badge Workbook

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SCOUT'S INFORMATION	MERIT BADGE COUNSELOR INFORMATION
Name _____ Phone _____ Organization _____	Name _____ Address _____ City State Zip _____ Phone _____ Mobile _____ Email _____
<b>WORKBOOK INFORMATION</b>	
Scoutmaster Bucky Workbook based off of <i>Boy Scout Requirements</i> – 2018 Edition Visit <a href="http://www.ScoutmasterBucky.com">www.ScoutmasterBucky.com</a> for more information.	
<b>REQUIREMENT 1A:</b> DESCRIBE THREE EXAMPLES OF SAFETY EQUIPMENT USED IN A CHEMISTRY LABORATORY AND THE REASON EACH ONE IS USED.	
Safety Equipment Item #1:          Reason Used:	
Safety Equipment Item #2:          Reason Used:	



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Safety Equipment Item #3:

Reason Used:

**REQUIREMENT 1B:** DESCRIBE WHAT A SAFETY DATA SHEET (SDS) IS AND TELL WHY IT IS USED

Safety Data Sheet (MSDS):

Reason Used:

**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



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#### REQUIREMENT 1D:

DISCUSS THE SAFE STORAGE OF CHEMICALS. HOW DOES THE SAFE STORAGE OF CHEMICALS APPLY TO YOUR HOME, YOUR SCHOOL, YOUR COMMUNITY, AND THE ENVIRONMENT?

Notes:

Safe Storage of Chemicals ...

at Home:

at School:

at Community:

at Environment:



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**REQUIREMENT 2A:**

PREDICT WHAT WOULD HAPPEN IF YOU PLACED AN IRON NAIL IN A COPPER SULFATE SOLUTION.

**REQUIREMENT 2A:**

THEN, PUT AN IRON NAIL IN A COPPER SULFATE SOLUTION. DESCRIBE YOUR OBSERVATIONS AND MAKE A CONCLUSION BASED ON YOUR OBSERVATIONS.

**REQUIREMENT 2A:**

COMPARE YOUR PREDICTION AND ORIGINAL CONCLUSION WITH WHAT ACTUALLY HAPPENED. WRITE THE FORMULA FOR THE REACTION THAT YOU DESCRIBED



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**REQUIREMENT 2B:** DESCRIBE HOW YOU WOULD SEPARATE SAND FROM WATER

**REQUIREMENT 2B:** DESCRIBE HOW YOU WOULD SEPARATE TABLE SALT FROM WATER

**REQUIREMENT 2B:** DESCRIBE HOW YOU WOULD SEPARATE OIL FROM WATER



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**REQUIREMENT 2B:** DESCRIBE HOW YOU WOULD SEPARATE GASOLINE FROM MOTOR OIL,

**REQUIREMENT 2B:** NAME THE PRACTICAL PROCESSES THAT REQUIRE THESE KINDS OF SEPARATIONS

Sand 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

**REQUIREMENT 3:**

CONSTRUCT A CARTESIAN DIVER. DESCRIBE ITS FUNCTION IN TERMS OF HOW GASES IN GENERAL BEHAVE UNDER DIFFERENT PRESSURES AND DIFFERENT TEMPERATURES.

**REQUIREMENT 3:**

DESCRIBE HOW THE BEHAVIOR OF GASES AFFECTS A BACKPACKER AT HIGH ALTITUDES AND A SCUBA DIVER UNDERWATER



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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.

Taste of Raw Onion:

Taste of Partially Cooked Onion:

Taste of Caramelized Onion:

#### REQUIREMENT 4B:

DESCRIBE THE CHEMICAL SIMILARITIES AND DIFFERENCES BETWEEN TOOTHPASTE AND AN ABRASIVE HOUSEHOLD CLEANSER.

Similarities:





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Differences:

**REQUIREMENT 4B:** EXPLAIN HOW THE END USE OR PURPOSE OF A PRODUCT AFFECTS ITS CHEMICAL FORMULATION

**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.



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**REQUIREMENT 4C:**

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

**REQUIREMENT 5:**

LIST THE FOUR CLASSICAL DIVISIONS OF CHEMISTRY. BRIEFLY DESCRIBE EACH ONE, AND TELL HOW IT APPLIES TO YOUR EVERYDAY LIFE

DIVISION #1:

DIVISION #2:



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DIVISION #3:

DIVISION #4:

DIVISION #5:



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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 TO THE PUBLIC AND THE ENVIRONMENT

AGENCY 1:

AGENCY 2:

Responsibilities:

#### REQUIREMENT 6B:

DEFINE POLLUTION.

Pollution:



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**REQUIREMENT 6B:** EXPLAIN THE CHEMICAL EFFECTS OF OZONE, GLOBAL WARMING, AND ACID RAIN.

Ozone:

Global Warming:

Acid Rain:



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**REQUIREMENT 6B:** PICK A CURRENT ENVIRONMENTAL PROBLEM AS AN EXAMPLE.

**REQUIREMENT 6B:** BRIEFLY DESCRIBE WHAT PEOPLE ARE DOING TO RESOLVE THIS HAZARD...

**REQUIREMENT 6B:** BRIEFLY DESCRIBE WHAT PEOPLE ARE DOING TO INCREASE UNDERSTANDING OF THE PROBLEM



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**DO ONE OF THE FOLLOWING (6C1, 6C2, 6C3, OR 6C4) IN REQUIREMENT 6C**

- REQUIREMENT 6C:** USING REASONS FROM CHEMISTRY, DESCRIBE THE EFFECT ON THE ENVIRONMENT OF ONE OF THE FOLLOWING:
- REQUIREMENT 6C1:** THE PRODUCTION OF ALUMINUM CANS OR PLASTIC MILK CARTONS
- REQUIREMENT 6C2:** BURNING FOSSIL FUELS
- REQUIREMENT 6C3:** USED MOTOR OIL
- REQUIREMENT 6C4:** NEWSPAPER



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**REQUIREMENT 6D:**

BRIEFLY DESCRIBE THE PURPOSE OF PHOSPHATES IN FERTILIZER.

**REQUIREMENT 6D:**

BRIEFLY DESCRIBE THE PURPOSE OF PHOSPHATES IN LAUNDRY DETERGENT.





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**REQUIREMENT 6D:** EXPLAIN HOW THE USE OF PHOSPHATES IN FERTILIZERS AFFECTS THE ENVIRONMENT.

**REQUIREMENT 6D:** EXPLAIN WHY PHOSPHATES HAVE BEEN REMOVED FROM LAUNDRY DETERGENTS



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**DO ONE OF THE FOLLOWING (7A, 7B, 7C, OR 7D) IN REQUIREMENT 7**

**REQUIREMENT 7A:** VISIT A LABORATORY AND TALK TO A PRACTICING CHEMIST.

Laboratory Name and Location:

Person's Name and Position that you spoke with:

**REQUIREMENT 7A:** ASK WHAT THE CHEMIST DOES, AND WHAT TRAINING AND EDUCATION ARE NEEDED TO WORK AS A CHEMIST.

What the Chemist does:

Training Requirements:

Education Requirements:



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#### REQUIREMENT 7B:

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 POSITIONS, FIND OUT THE EDUCATION AND TRAINING REQUIREMENTS.

#### CHEMISTS:

Two kinds of work done by Chemists:

Education Requirements:

Training Requirements:



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#### CHEMICAL ENGINEERS:

Two kinds of work done by Chemical Engineers:

Education Requirements:

Training Requirements:



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#### CHEMICAL TECHNICIANS:

Two kinds of work done by Chemical Technicians:

Education Requirements:

Training Requirements:



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#### INDUSTRIAL CHEMISTS:

Two kinds of work done by Industrial Chemists:

Education Requirements:

Training Requirements:



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**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.

**REQUIREMENT 7C:** WHAT, IF ANY, POLLUTANTS ARE PRODUCED AND HOW THEY ARE HANDLED.



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**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.