

CH 221 Fall 2026:

“Eight Bottles” Lab

Instructions

Step One:

Get a printed copy of this lab! You will need a printed (hard copy) version of pages I-1-2 through I-1-5 to complete this lab. If you do not turn in a printed copy of the lab, there will be a 2-point deduction.

Step Two:

Watch the video introduction for this lab **here:** <http://mhchem.org/w/1.htm>

The video introduction will help prepare you for the lab and assist you in completing the work before turning it in to the instructor.

Also **complete the PreLab questions** before starting the lab.

Step Three:

Bring the printed copy of the lab with you on Monday, Sept. 21 (section L1), Tuesday, September 22 (section L2), Wednesday, Sept. 23 (section L3) or Friday, Sept. 25 (section L4). During lab in room AC 2507, you will use these sheets (with the valuable instructions!) to gather data, all of which will be recorded in the printed pages below.

Step Four:

Complete the lab work and calculations on your own, then **turn it in** (pages I-1-3 through I-1-5 *only* to avoid a point penalty) **at the beginning of recitation to the instructor on Monday, Sept. 28 (section L1), Tuesday, Sept. 29 (section L2), Wednesday, Sept. 30 (section L3) or Friday, Oct. 2 (section L4).** The graded lab will be returned to you the following week during recitation.

If you have any questions regarding this assignment, please email (mike.russell@mhcc.edu) the instructor. Good luck on this assignment!

Eight Bottles

Problem solving is not restricted to scientific investigations. Indeed, it is a life long process that involves every aspect of human endeavor. The way one solves a problem is related to one's individual learning style. There are, however, some common factors which seem to be part of most scientific investigations. Although, every investigator, being human, approaches each problem with some preconceived ideas, facts are gathered by accurate observation of behavior of the system of interest. Conclusions are based solely on the observed data.

Only by using experimental observations to study the behavior of matter, arranging the results of such studies in an orderly fashion, correlating the observed data and testing these correlations (theories or hypothesis) by further systematic observations can one hope to increase our ability to deal with the physical world around us. This approach is usually referred to as the Scientific Method. There is nothing unique about the order of activity to this method other than it provides a logical way to deduce order and causality for natural phenomena. An inherent part of the scientific method is the element of creativity. This is what makes possible the development of completely new concepts. This experiment is designed to allow you to use some of the elements of scientific investigation mentioned here.

Eight bottles, labeled A through H, containing eight different solutions have been prepared for your examination. When mixed together, in pairs, several of these solutions will undergo a chemical reaction. A reaction can be observed by one of the following changes:

1. A color change will occur.
2. A gas will be evolved (bubbles will be observed)
3. A precipitate (a cloudy mixture) will form.
4. The evolution of heat.

Be carefully observing any changes that occur it should be possible for you obtain enough data to characterize each of these solutions. In this experiment we will use only a color change or a precipitate to detect a chemical reaction. From the results of your study, you should then be able to prepare a concise description of how to identify the contents of an unlabeled bottle assuming the others are available for mixing.

PROCEDURE

Obtain a tray with dropper bottles containing solutions labeled A-H. In each dimple of a spot plate, combine 3 drops each of various combinations of two solutions. Mix with a clean stirring rod, and record your observations (**color change or precipitate formation along with the color of the precipitate**) in the data table provided. When the spot plate is full, simply rinse it off with distilled water into the waste container and continue experimenting.

Obtain two unknown solutions from your instructor and record their ID #s on your data sheet. Experiment with these unknown by mixing with the contents of each of the bottles labeled A-H. Remember to mix only two solutions at a time. Record your observations on the data sheet.

From the data recorded in your data table, determine the identity of your unknowns (one of the solutions A-H)

Eight Bottles

NAME:

Lab Partner(s):

*Include **all first and last** names for full credit!*

Solutions	A	B	C	D	E	F	G	H
A								
B								
C								
D								
E								
F								
G								
H								
Unknown Number:								
Unknown Number:								

Conclusion:

Unknown number _____ Identity (letter) _____

Unknown number _____ Identity (letter) _____

Based upon your observations, describe briefly how you identified the unknown numbered solutions (above) containing one of the eight known solutions (A-H).

Postlab Questions:

1. Why do you obtain the maximum useful information about the solutions by mixing only two solutions at a time?
2. How would you detect the evolution of a gas upon mixing the solutions? (and remember, not all gases have a smell.)
3. Which of the A-H "solution(s)" could be distilled water? How do you know?

Please note: The instructor will send you email throughout the term, so *please check your email several times each week!* The instructor will use your @saints.mhcc.edu address by default, but if you wish to use an alternate email address, send an email to mike.russell@mhcc.edu from your alternate email account and it will be changed promptly.

Eight Bottles PreLab Questions

Ideally you will complete these before performing the lab.

Include the completed PreLab Questions when you turn in your lab report.

1. What is the instructor's office room number on the Mt. Hood Community College campus?
2. If glassware breaks in the lab, will you be charged? Explain briefly.
3. If glassware breaks in the lab, should you put the broken glass pieces in a regular garbage can? Explain briefly.
4. It is ok to wear open toed shoes, shorts and clothes showing your midriff (stomach) during lab? Explain briefly.
5. What is the specific MHCC website (URL) for the AVID / Learning Success Center? Where is it located on campus?
6. For you in this lab section, when will almost all assignments be due? Include day, time and room location.
7. When this lab is due, should you include the first page of the lab? What page(s) should you include? Explain briefly.
8. If you ever have any questions, ask the instructor in person or over email. Speaking of which, what is the instructor's email address?

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