

# Classification of Matter — Student Guide

## OVERVIEW

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A starting point for the scientific investigation of anything is to observe and find similarities and differences among the things. Scientific work must be able to be understood and repeated by others studying the same thing in order to be useful. One way that scientists accomplish these goals is to classify things according to their traits. To help others to use their method of classification, they often construct a dichotomous key. A dichotomy is a division into two parts. In a dichotomous key there are a series of paired statements, if one is true about the thing you wish to classify you go on to another pair of statements. The alternate answer leads you to a different pair of statements. In this way, by choosing one or the other of paired statements, you are led to a final category for the thing you are observing.

## PROCEDURE

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This exercise uses a dichotomous key to help you classify the contents of 12 small vials into the proper type of matter. The classification of matter is a fundamental step in physical science. You cannot directly observe all of the traits you will be looking for, you must use your own knowledge of things and any other information your teacher has given you. As you make each choice for the contents of a vial, write the number and letter of each statement you choose in the column labeled justification on the line for that vial. Once you reach your final category, the statements you chose will be the justification for your choice.

### A Dichotomous Key to the Classification of Matter

1. a. The contents of the vial have mass and take up space.....go to **Q2**.  
b. The contents of the vial do not have mass or take up space.....therefore it is **ENERGY**.
2. a. The contents of the vial have a variable composition; a sample of this material is not uniform or different samples could differ in the proportions of the things that make it up.....  
.....therefore it is a **MIXTURE**; go to **Q3**.  
b. The contents of the vial have a definite composition. Every sample of this material will have the same composition.....therefore it is a **PURE SUBSTANCE**; go to **Q6**.
3. a. The contents of the vial are uniform throughout, although their proportions could differ form one sample to another.....  
.....therefore it is a **HOMOGENEOUS MIXTURE**; go to **Q5**.  
b. The contents of the vial vary in composition or traits from one part of the sample to another. They do not appear uniform or are known to vary from one part of a sample to another or to settle out over time.....  
.....therefore it is a **HETEROGENEOUS MIXTURE**; go to **Q4**.
4. a. The contents of the vial may appear uniformly distributed, but solid particles will settle out of the liquid portion of the mixture.....therefore it is a **SUPSPENSION**.  
b. The contents of the vial visibly vary in composition.....  
.....therefore it is a **HETEROGENEOUS MIXTURE**.
5. a. The particles of the homogeneous mixture are atoms, ions or molecules; in a transparent mixture they will not scatter a beam of light.....therefore it is a **SOLUTION**.  
b. The particles of the homogeneous mixture are larger than molecules, they make the mixture appear cloudy or milky or they scatter light in a transparent mixture.....  
.....therefore it is a **COLLOID**.
6. a. The substance in the vial is made up of a single type of atom that has a symbol and appears on the periodic table of the elements.....therefore it is an **ELEMENT**.  
b. The substance in the vial is made up of two or more atoms chemically combined in a fixed ratio.....therefore it is a **COMPOUND**.

# Classification of Matter — Student Answer Sheet

## ANSWER KEY TO CLASSIFICATION OF MATTER LAB

After looking closely at each of the twelve samples of substances and using the dichotomous key of classification, decide what each substance is and justify your answer by using the number and letter of each statement that led you to the correct classification for the substance.

TEST TUBE NUMBER	WHAT IS IT?	JUSTIFICATION
1. gravel		
2. sugar		
3. salt in water		
4. sulfur		
5. lead		
6. beads		
7. milk of magnesia		
8. sand		
9. copper		
10. water		
11. bromothymol blue in water		
12. glue		

# CLASSIFICATION OF MATTER

