

Name: \_\_\_\_\_

Date: \_\_\_\_\_



## Characteristic vs. Non-Characteristic Properties



**Physical Properties** of matter are characteristics of a substance that can be observed or measured without changing the makeup of the matter of the substance (NO chemical change needs to occur-meaning their particles stay the same). Characteristics such as mass, volume, color and temperatures are physical properties.

**Chemical Properties** of matter are the ability of substances to react with or change into other types of matter. (Chemical change needs to occur-these chemical changes actually change the nature of the particles). Characteristics such as flammability, reactivity, endothermic reactions (absorbs heat), exothermic reactions (gives off heat), oxidation reactions (such as iron rusting), and formation of a precipitate (solid) are all chemical changes.

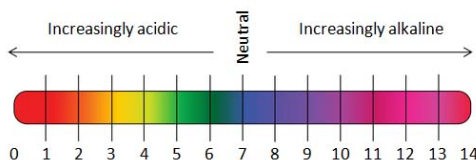
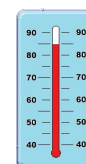
Some characteristics can describe a substance but do not, by themselves, identify the substance. Many substances can be described as brown, for example. However, other characteristics of matter are unique to each different substance. Just like DNA and fingerprints are unique to each individual human, the temperature at which a substance freezes (freezing point) is unique for each different pure substance. For example, only water freezes at 0°C.

To determine which of these properties allow us to identify a substance, we divide physical and chemical properties into two other categories:

1. **Non-characteristic properties:** Properties that can be used to **describe** but NOT identify a substance.

These properties are not unique to one particular substance but could be used to describe many different substances.

- Includes things like:
  - Mass
  - Shape
  - Volume
  - Temperature
  - Color
  - pH (acidity and alkalinity)



2. **Characteristic properties:** Properties that can be used to **describe AND identify** a substance.

These properties are unique for each substance.

- Includes things like:
  - Solubility (a measure of how well one substance dissolves into another)
  - Melting Point (same as Freezing Point)
  - Density (mass divided by volume)
  - Boiling Point (same as Condensation Point)

**Questions:** Based on the information that you read, answer the following questions.

1. What is the difference between a physical property and a chemical property?
  
2. What is the difference between a characteristic property and a non-characteristic property?
  
3. You are given a box and told there is something inside with a mass of 50.0 g.
  - a. Does knowing the mass allow you to identify what is in the box?
  
  - b. What kind of property must mass be: characteristic or non-characteristic? Explain.
  
4. Can a physical property also be a characteristic property? If yes, give one example (LOOK IT UP, if you are not sure).

5. In the lab, you are given an unknown liquid and asked to determine if it is water.
  - a. Would you test characteristic properties or non-characteristic properties to make this determination?
  
  
  
  
  
  
  
  
  
  
  - b. What are some of the properties you would be able to test?

In the space below, draw a data table to record your observations as you hypothetically test the water (we will not actually be testing it.) Use a pencil and ruler.

1. In the table, make 2 columns and 4 rows.
  
2. Label the column headings as:
  - i. Name of property
  - ii. Value of this property for water (ex. 0°C is value for the freezing point of water)
  
3. List the three specific properties you would use to identify the water in Column 1 (Other than freezing point).
  
4. In Column 2, state the known values of each property for water.

# PHYSICAL VS. CHEMICAL PROPERTIES

Name \_\_\_\_\_

A physical property is observed with the senses and can be determined without destroying the object. For example, color, shape, mass, length and odor are all examples of physical properties.

A chemical property indicates how a substance reacts with something else. The original substance is fundamentally changed in observing a chemical property. For example, the ability of iron to rust is a chemical property. The iron has reacted with oxygen, and the original iron metal is changed. It now exists as iron oxide, a different substance.

Classify the following properties as either chemical or physical by putting a check in the appropriate column.

	Physical Property	Chemical Property
1. blue color		
2. density		
3. flammability		
4. solubility		
5. reacts with acid to form H <sub>2</sub>		
6. supports combustion		
7. sour taste		
8. melting point		
9. reacts with water to form a gas		
10. reacts with a base to form water		
11. hardness		
12. boiling point		
13. can neutralize a base		
14. luster		
15. odor		

<b>Property Name</b>	<b>Characteristic (C) or Non-characteristic (NC)</b>
Temperature	
Density	
Solubility	
Mass	
Color	
Melting Point	
Electrical conductivity	
Magnetism	
Hardness	
Boiling Point	
Volume	