



Chemistry I Cycle I Lesson 2

Identify and Describe Chemical and Physical Properties of Matter

LAB THURSDAY! DRESS ACCORDINGLY!

Warmup (5 minutes):

An iron nail rusts. An iron nail is ground into powder. An iron nail is melted in a furnace. An iron nail is dissolved in sulfuric acid, producing a green solution. Which of these are physical changes? Which of these are chemical?



Chapter menu

Resources



Chemistry I Cycle I Lesson 2

Identify and Describe Chemical and Physical Properties of Matter

LAB THURSDAY! DRESS ACCORDINGLY!

Vocabulary:

“Chemical Property”, “Physical Property”, “Density”

Activity:

Physical & Chemical Properties of a Mystery Metal
Identification of metal by density

Classwork:

Problems p19, #1,5,6 (everyone) and 12 (Honors only)



Properties of Matter

Physical Properties

- A **physical property** of a substance is a characteristic that does not involve a chemical change.
- Physical properties of a substance can be determined without changing the nature of a substance.
- Physical properties include texture, state, melting point, and boiling point.



Chapter menu

Resources





Properties of Matter, *continued* Chemical Properties

- A **chemical property** a property of matter that describes a substance's ability to participate in chemical reactions.
- A chemical property of many substances is that they react with oxygen.
 - **example:** rusting
- Some substances break down into new substances when heated.







Chapter menu

Resources





Comparing Physical and Chemical Properties

	Iron	Red food color
Physical property	Malleability 	Red color 
Chemical property	Reactivity with oxygen 	Reactivity with bleach 

Replay

End
Of
Slide

Chapter menu

Resources

Properties of Mystery Metal – Physical or Chemical?

Let's come up with properties and sort them into physical and chemical! Take notes in binder as we work.

Don't forget 2 important physical properties that all matter has – mass and volume!



Chapter menu

Resources





Properties of Matter, *continued*

Density is the Ratio of Mass to Volume

- The **density** of an object is the mass of the object divided by volume of the object.
- Densities are expressed in derived units such as g/cm³ or g/mL.
- Density is calculated as follows:

$$\text{density} = \frac{\text{mass}}{\text{volume}} \text{ or } D = \frac{m}{v}$$

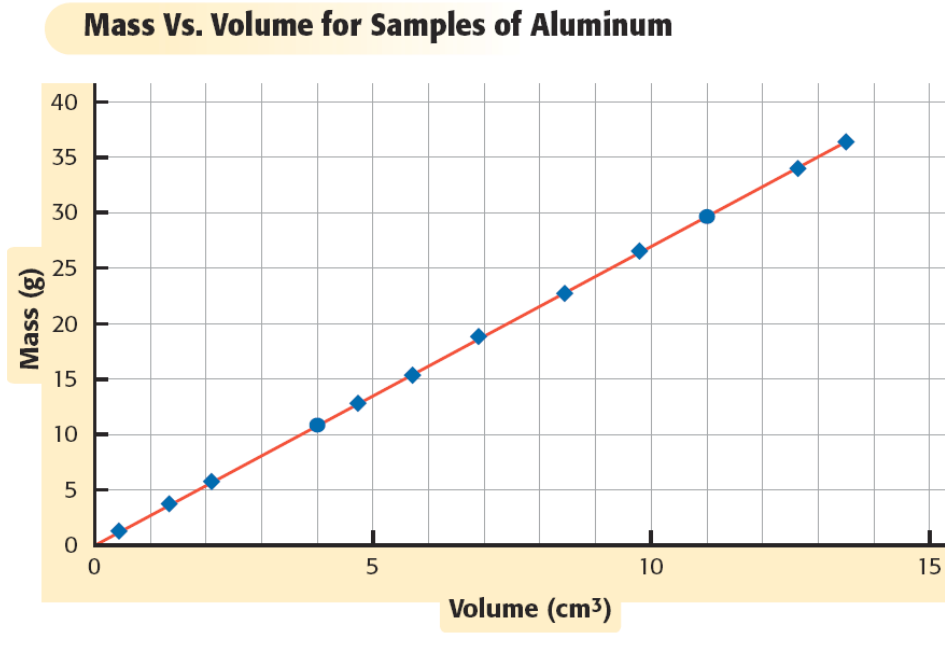




Properties of Matter, *continued* Density of an Object

- The density of a substance is the same no matter what the size of the sample is.

Block number	Mass (g)	Volume (cm ³)
1	1.20	0.44
2	3.69	1.39
3	5.72	2.10
4	12.80	4.68
5	15.30	5.71
6	18.80	6.90
7	22.70	8.45
8	26.50	9.64
9	34.00	12.8
10	36.40	13.5



Chapter menu

Resources





Equation for Density

$$D = \frac{m}{V}$$

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Replay



Chapter menu

Resources

What IS Mystery Metal?

Don't forget 2 important physical properties that all matter has – mass and volume!

Mass in grams \div Volume in mL = Density

Look up in Appendix A-5 to identify our metal.



Chapter menu

Resources





Properties of Matter, *continued*

Density Can Be Used to Identify Substances

Substance	Density (g/cm ³) at 25°C
Hydrogen gas, H ₂ *	0.000 082 4
Carbon dioxide gas, CO ₂ *	0.001 80
Ethanol (ethyl alcohol), C ₂ H ₅ OH	0.789
Water, H ₂ O	0.997
Sucrose (table sugar), C ₁₂ H ₂₂ O ₁₁	1.587
Sodium chloride, NaCl	2.164
Aluminum, Al	2.699
Iron, Fe	7.86
Copper, Cu	8.94
Silver, Ag	10.5
Gold, Au	19.3
Osmium, Os	22.6

*at 1 atm

- Because the density of a substance is the same for all samples, you can use this property to help identify substances.

