

Introduction to Matter and Measurement

Chapter 1

Learning Objectives

1. What are the ways we can describe classify matter and change?
2. How should we communicate uncertainty in measurements?
3. How do I use dimensional analysis to convert units?

Class Outline

Chapter 1: Introduction: Matter and Measurement

1. Classification of Matter and Change
2. Units of Measurements
3. Uncertainty in Measurement
4. Dimensional Analysis

Quick Notes

- Schedule online is a **guideline**. When something is due (like homework) it will be in **bold** and have ****stars**** around it.
- After you register for Mastering Chemistry it will say “**Taught by Whitney King.**” **That is OK!** Everyone is in the same “class” on Mastering Chemistry.
- Thank you for such thoughtful answers on the index cards! It was **delightful** to read about your interests! You guys have some great study strategies!

Classifications of Matter

- **Matter**: Physical material that has mass and volume.
- **Property**: Characteristic of a sample of matter that we can use to recognize it and to distinguish it from other types of matter.
- **Physical Properties**: observed without changing the identity and composition of the substance.
- **Chemical Properties**: ways substances change or react to form other substances

Classification of Matter

- **Molecules**: a chemical unit composed of two or more atoms, arranged and connected in a specific way.
- **Atoms**: The smallest unit of an element, the building blocks of matter.
- **Elements**: Substances that cannot be broken down into simpler substances

Classification of Matter

- **Compound**: substances composed of two or more elements
- **Law of Constant Composition**: Elemental composition of a compound is always the same
- **Mixture**: substances composed of two or more compounds
- **Heterogeneous Mixture**: different samples vary in texture or appearance
- **Homogeneous Mixture**: uniform throughout

Classification of Matter

- Solid
- Liquid
- Gas

Classification of Matter

- **Solid**: definite volume and shape, regardless of its container
- **Liquid**: a definite volume, but takes the shape of its container
- **Gas**: takes on the volume and shape of its container

Classification of Matter

- **Physical Change:** changes physical appearance, not composition
- **Sublimation:** State change from solid to gas
- **Chemical Change or Chemical Reaction:** transformation into a chemically different substance.

Classification of Matter

- **Intensive Properties:** Do NOT depend on the quantity being examined.
- **Extensive Properties:** DO depend on the quantity being measured.

Practice Problem: In groups, classify each property as **Intensive/Extensive**, and **Chemical/Physical**.

In the process of attempting to characterize a substance, a chemist makes the following observations:

1. It is a silvery white, lustrous metal.
2. It melts at 649 °C and boils at 1105 °C.
3. The sample of the substance that she is examining has a mass of 100 g.
4. It reacts with chlorine to give a brittle white solid.

Practice Problem: In groups, classify each property as **Intensive/Extensive**, and **Chemical/Physical**.

In the process of attempting to characterize a substance, a chemist makes the following observations:

1. It is a silvery white, lustrous metal. **Intensive Physical**
2. It melts at 649 °C and boils at 1105 °C. **Intensive Physical**
3. The sample of the substance that she is examining has a mass of 100 g. **Extensive Physical**
4. It reacts with chlorine to give a brittle white solid.
Intensive Chemical