

Chapter 1

INTRODUCTION

Fig. 1.3, p. 9



Fig. 1.4, p. 11

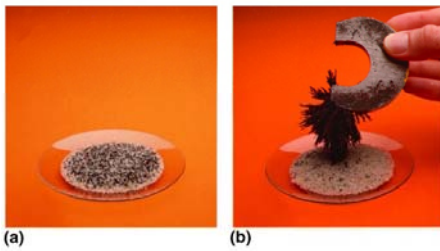


Fig. 1.7, p. 14

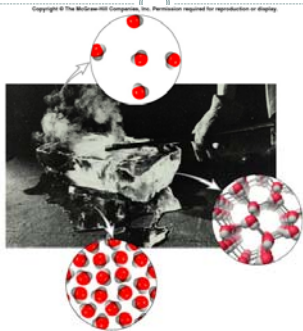


Fig. 1.5, p. 13

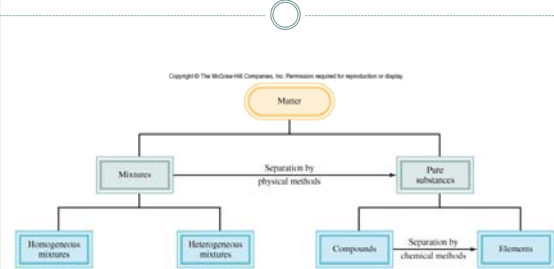
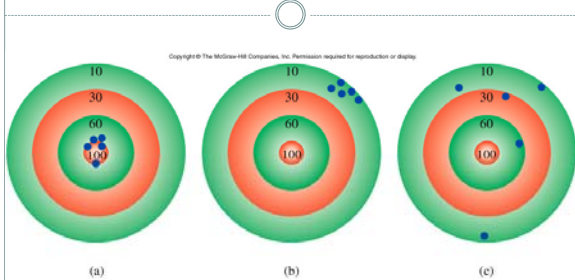


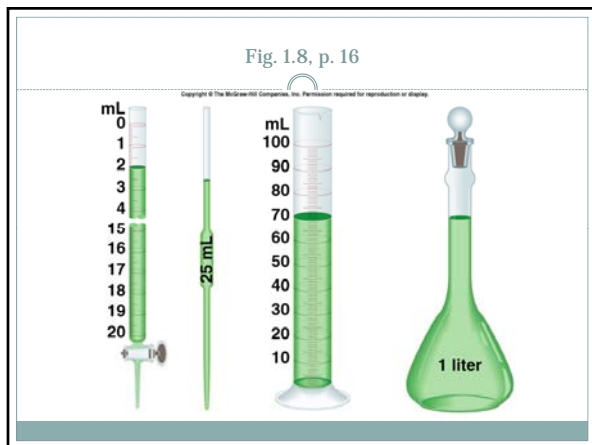
Fig. 1.13, p. 26



Accuracy and Precision

- **Accuracy** tells us how close a measurement is to the true value of the quantity that was measured.
- **Precision** refers to how closely two or more measurements of the same quantity agree with one another.

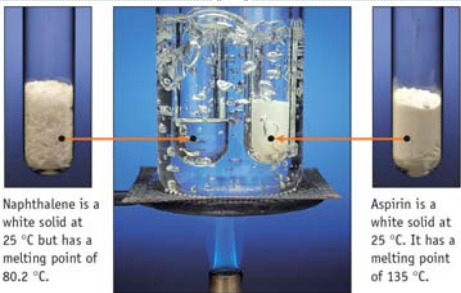
Fig. 1.8, p. 16



Physical and Chemical Changes

- In a **physical change**, the identity of a substance is preserved even though it may have changed its physical state or the gross size or shape of its pieces.
- In a **chemical change**, one or more substances (the reactants) are transformed into one or more different substances (the products).

A physical change

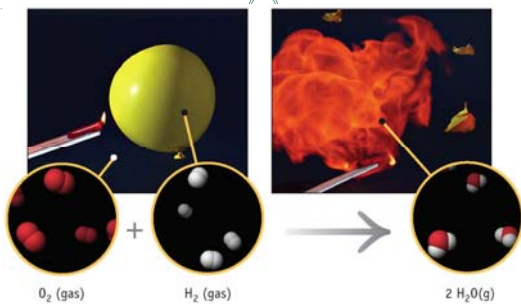


Naphthalene is a white solid at 25 °C but has a melting point of 80.2 °C.

Aspirin is a white solid at 25 °C. It has a melting point of 135 °C.

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A chemical change



O_2 (gas)

H_2 (gas)

$2 H_2O$ (g)

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SI Base Units

- Length — ???
- Mass — ???
- Time — ???
- Temperature — ???
- Amount of substance — ???

Metric System

- Kilo-, (k), ???
- Milli-, (m), ???
- Micro-, (μ), ???
- Nano-, (n), ???
- Pico-, (p), ???

Chemistry In Action

On 9/23/99, \$125,000,000 Mars Climate Orbiter entered Mar's atmosphere 100 km (62 miles) lower than planned and was destroyed by heat.



1 lb thrust ~~X~~ 1 N

1 lb = 4.45 N

"This is going to be the cautionary tale that will be embedded into introduction to the metric system in elementary school, high school, and college science courses till the end of time."

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Figure 1.11, p. 19

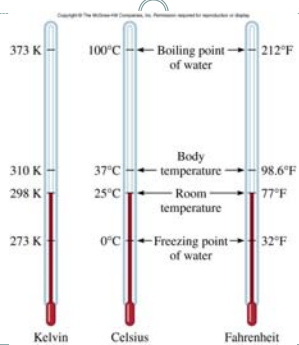
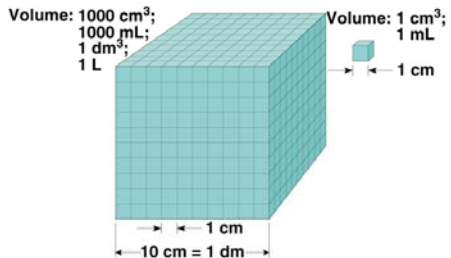


Fig. 1.9, p. 1.10

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Significant Figures

- Any digit that is not zero is significant
- Captive zeros (those between nonzero digits) are significant
- Leading zeros (those to the left of the first nonzero digit) are **not** significant

Significant Figures

- Trailing zeros (zeros after the last nonzero digit) are significant if there is a decimal point. If there is no decimal point, then they may or may not be significant.
- Use scientific notation

Multiplication and Division

- The number of significant figures in the final product or quotient is determined by the original number that has the smallest number of significant figures.

Addition and Subtraction

- The number of significant figures to the right of the decimal point is determined by the lowest number of significant figures to the right of the decimal point in any of the original numbers.

Problem-solving by Dimensional Analysis

- This is a general problem-solving approach that uses the dimensions or units of each value to guide one through calculations.
