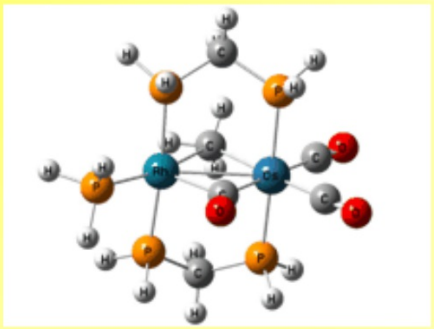
Chemistry 2 Honors

Unit 1



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Objectives

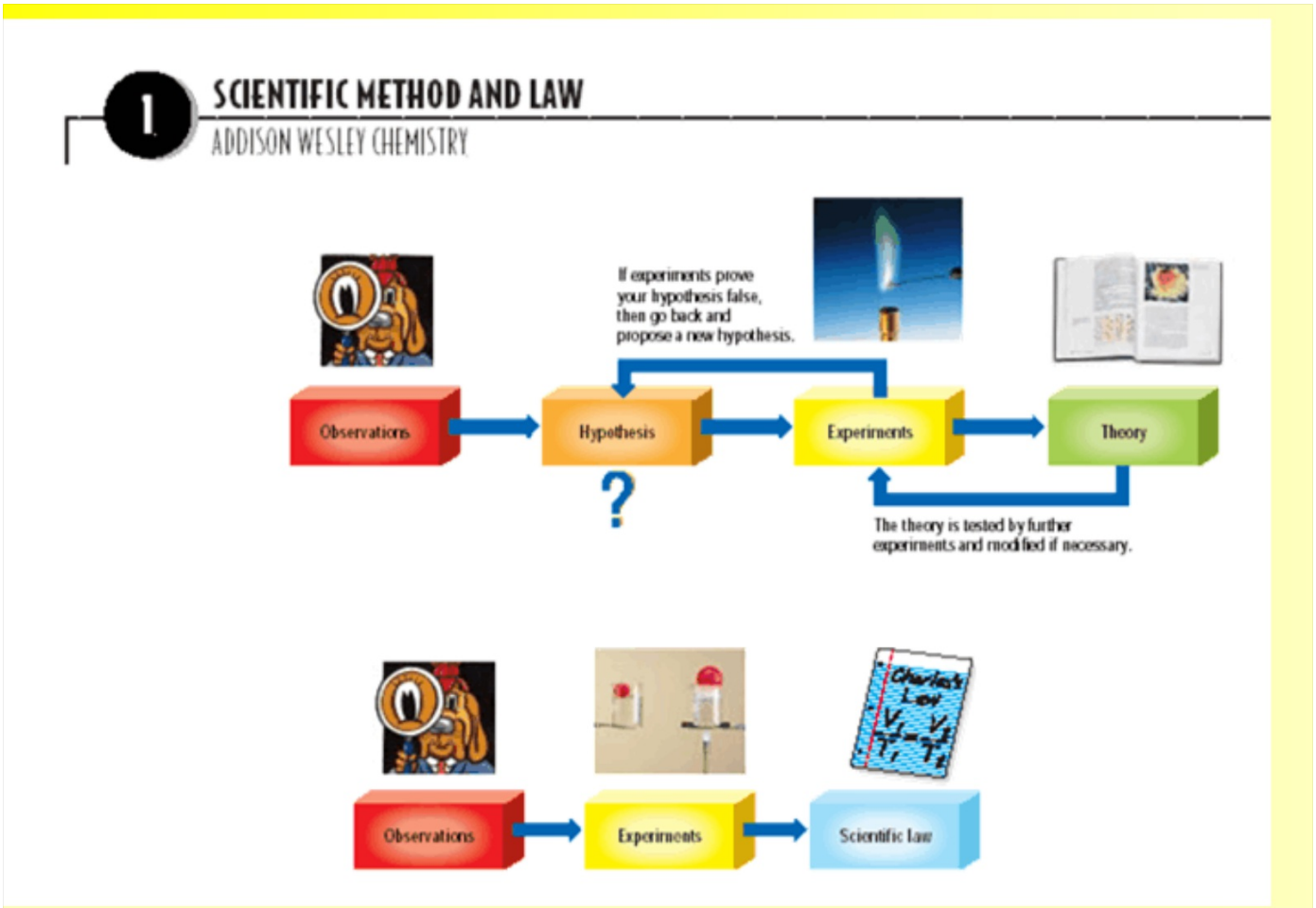
- Classify matter according to the differences between elements, compounds, and mixtures.
- C-1.4 Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.
- C-1.6 Evaluate the results of a scientific investigation in terms of whether they verify or refute the hypothesis and what the possible sources of error are.
- Classify properties and changes as physical or chemical in nature.

Introduction to Chemistry

- Chemistry –
  - The study of matter (composition and changes)
- Matter –
  - Anything that has mass and occupies space
- Why study chemistry?

- Where is chemistry around us?

- Describe the scientific method, and give an example of it being applied. Be prepared to share.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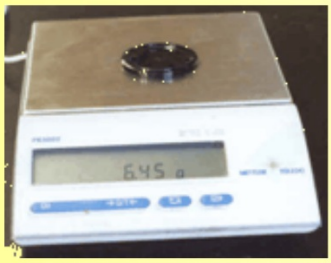
SCIENTIFIC METHOD AND LAW
ADDISON WESLEY CHEMISTRY
If experiments prove your hypothesis false, then go back and propose a new hypothesis.
Observations
Hypothesis
?
Experiments
Theory
The theory is tested by further experiments and modified if necessary.
Observations
Experiments
Scientific Law

Video

Matter and Change



- Mass –
  - The amount of matter a sample contains.
- Substance (or pure substance) –
  - Matter that has a uniform and definite composition.
- Physical Property
  - A quality that can be observed or measured without changing the sample's composition.

- Physical Change -
  - An alteration of matter that occurs without changing its composition.
- Chemical Property -
  - The ability of a substance to undergo a chemical reaction
- Chemical Change (or Reaction) -
  - The changing of one or more substances into new substance(s).

Activity

Physical Change

Melting

Cooking

Dissolving

Burning

Boiling

Rusting

Cutting

Shredding

Freezing

Chemical Change

Milk spoiling

Bomb Exploding

Water evaporating

Tea dissolving

Firefly glowing

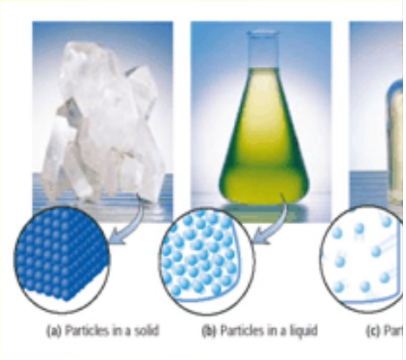
Rain Falling

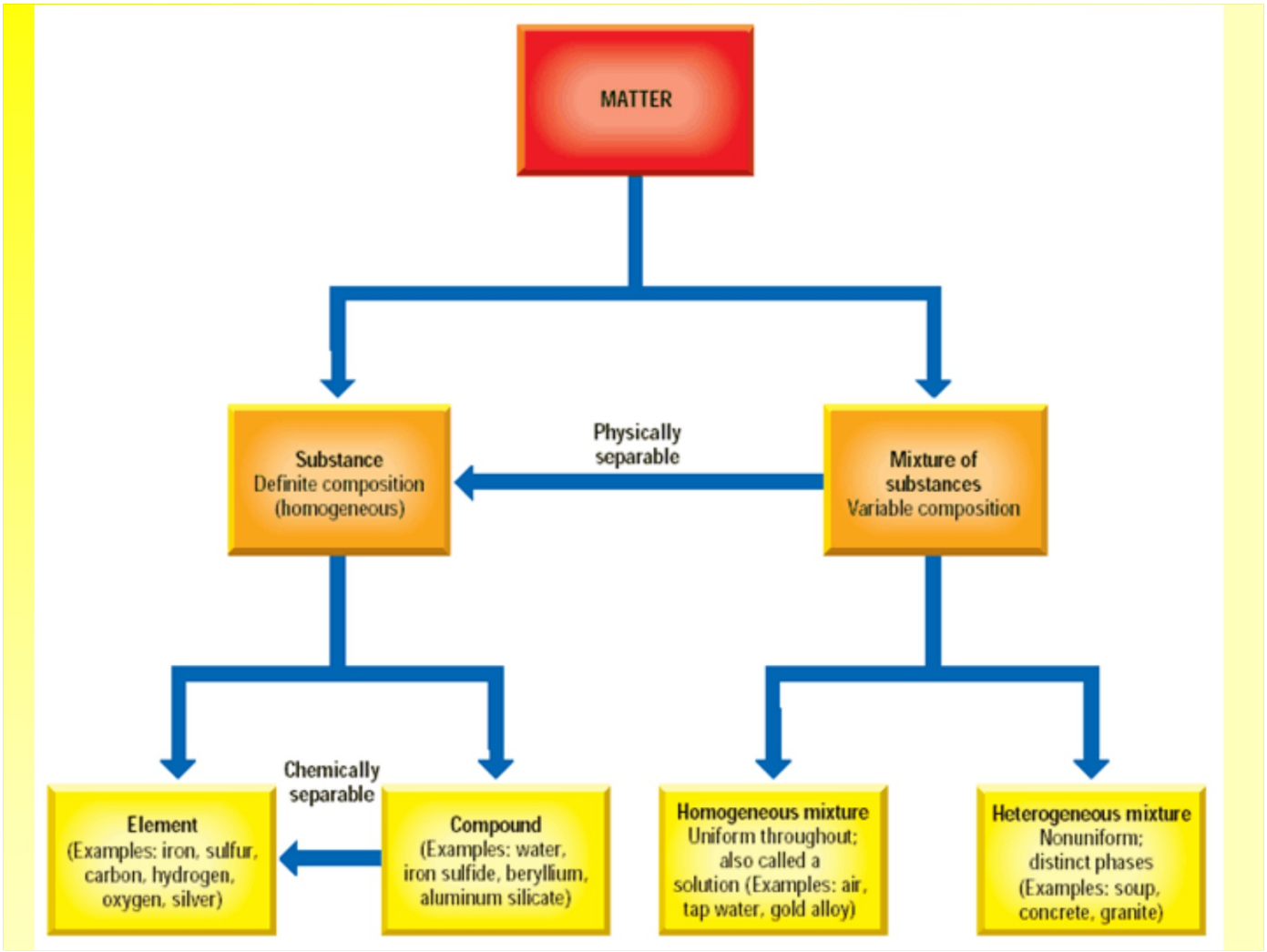
Objectives

- Identify and distinguish the three states of matter.
- Classify matter as element, compound, heterogeneous mixture, or homogeneous mixture.
- Identify the major components of a chemical equation.
- Use scientific notation to express scientific measurements.

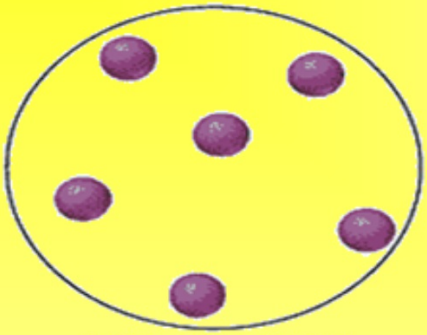
States of Matter

- Solid
  - Definite shape, definite volume, nearly incompressible
- Liquid
  - Indefinite shape, definite volume, nearly incompressible
- Gas (vapor)
  - Indefinite shape, indefinite volume, easily compressible



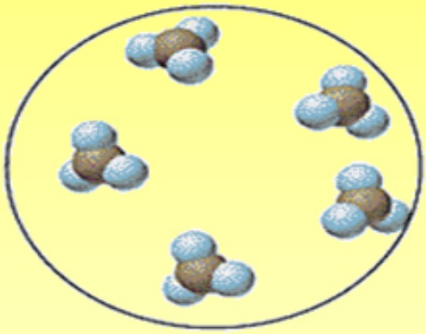

MATTER
Substance
Definite composition
(homogeneous)
Physically
separable
Mixture of
substances
Variable composition
Chemically
separable
Element
(Examples: iron, sulfur,
carbon, hydrogen,
oxygen, silver)
Compound
(Examples: water,
iron sulfide, beryllium,
aluminum silicate)
Homogeneous mixture
Uniform throughout;
also called a
solution (Examples: air,
tap water, gold alloy)
Heterogeneous mixture
Nonuniform;
distinct phases
(Examples: soup,
concrete, granite)

Elements, Compounds, Mixtures

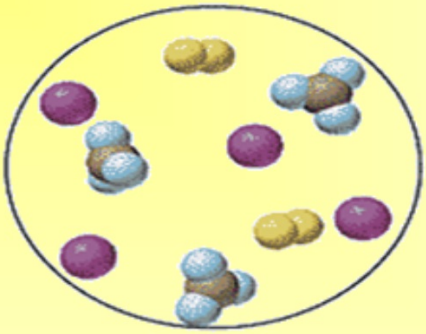


A Atoms of an element

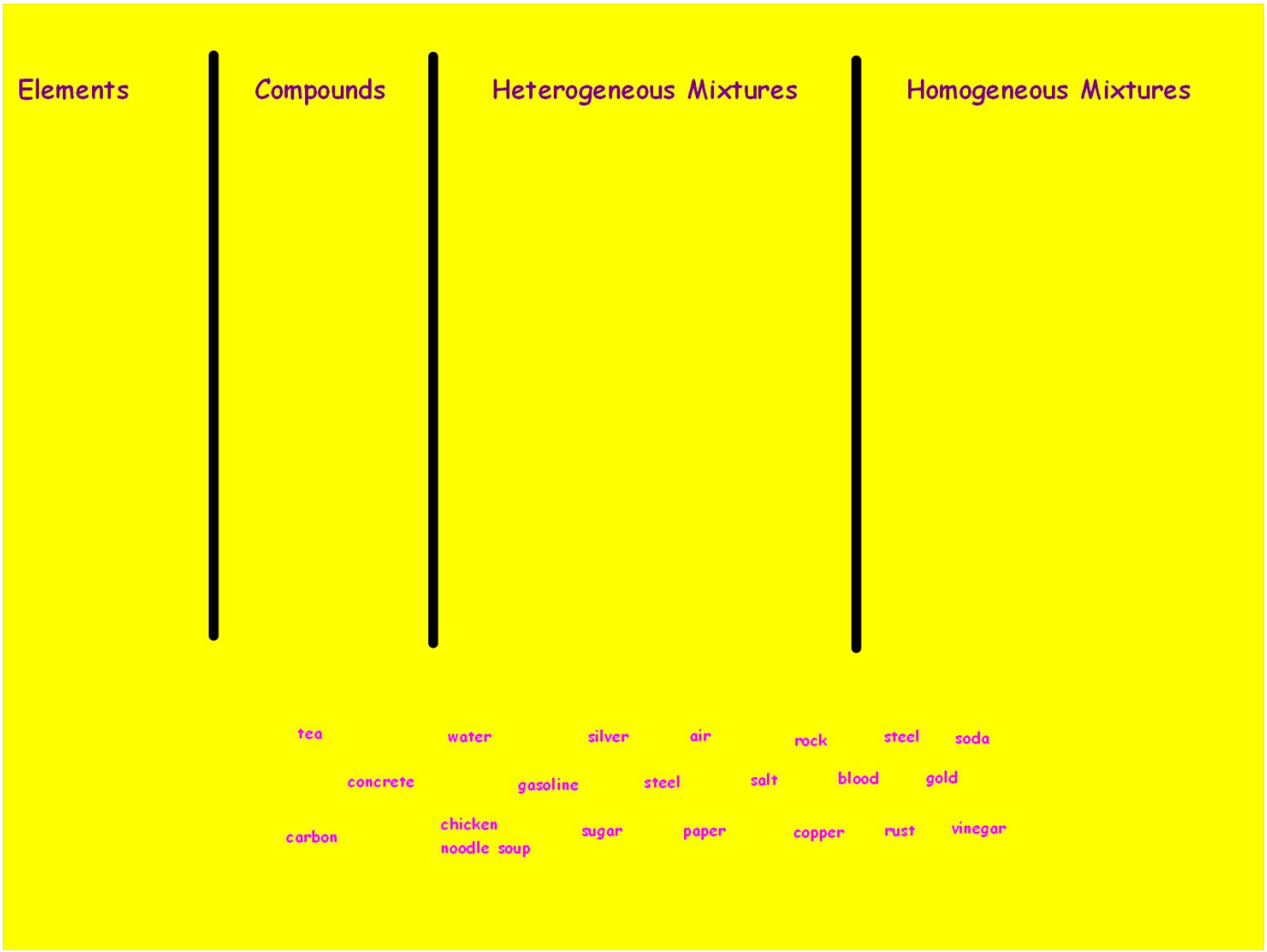
B Molecules of an element



C Molecules of a compound



D Mixture of two elements and a compound


Elements
Compounds
Heterogeneous Mixtures
Homogeneous Mixtures
tea
water
silver
air
rock
steel
soda
concrete
gasoline
steel
salt
blood
gold
carbon
chicken noodle soup
sugar
paper
copper
rust
vinegar

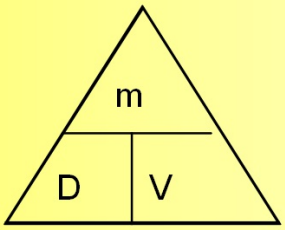
__C_2H_6O (l) + __O_2 (g) __CO_2 (g) + __H_2O (l)

- What are the reactants?
  C_2H_6O and O_2
- What are the products?
  CO_2 and H_2O
- Can you balance the equation?
- Law of Conservation of Mass –
  – Mass is neither created nor destroyed in chemical reactions (it is conserved).

Properties of Matter

- Density –
  - The ratio of mass to volume:

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



  - Examples:

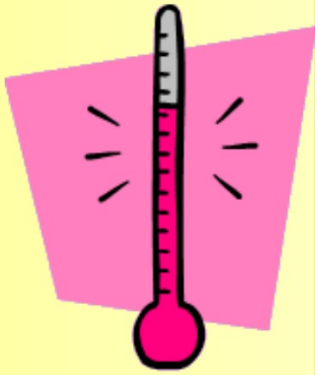
What is the density of a sample with a mass of 24.9 g and a volume of 11.8 cm^3?

What is the mass of a sample with a volume of 35.9 mL and a density of 2.18 g cm^{-3}?

Temperature –

- Measure of the average kinetic energy of the particles in a sample.

- Temperature scales
  - Celcius - 0°C is the freezing/melting point of water and 100°C is the boiling point of water.
  - Kelvin – no negative temperatures.
    - K = °C + 273.15
    - °C = K – 273.15



- Examples –

  Normal body temperature is 98.6°F, which is 37°C. What is that in Kelvin?

  The boiling point of helium is approximately 4 K. What is that in °C?