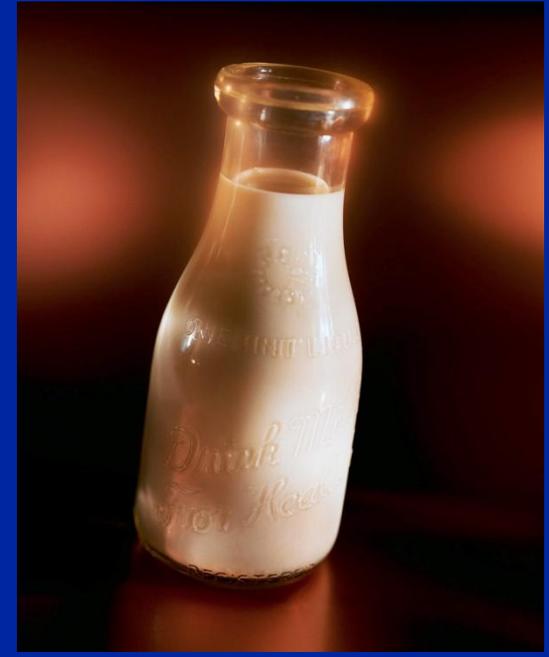


# Classifying Matter

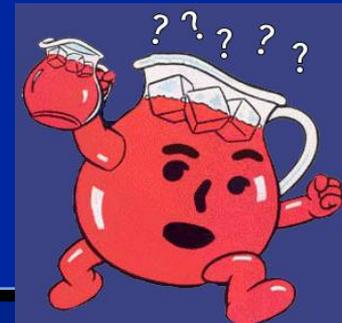
Matter can be described as either a **pure substance** or a **mixture.**

# Mixtures of Matter

- Physical combinations of two or more substances (no chemical reactions occur)



- Mixtures are a physical blend of at least two substances; have variable composition. Every part keeps it's own properties.
- They can be either:
  - 1) Heterogeneous - the mixture is not uniform in composition
    - Chocolate chip cookie, gravel, soil.
  - 2) Homogeneous - same composition throughout
    - Kool-aid, air, salt water



# Heterogeneous Mixtures

- Mixtures that do not blend together. The parts of the mixture remain separate and do not mix well.
- Examples: Italian Dressing, Pizza, cereal, muddy water, OJ with pulp



# Homogeneous Mixtures

- Mixtures that look the same from top to bottom. They have a uniform appearance.
- They are also called solutions
- Solutions can be made of mixtures of solids, liquids and gases
- Examples: Steel (iron and carbon), Hairspray (liquid and gas), Whipped cream (solid and gas)
- Alloys are homogeneous mixtures of metals such as steel and brass.



# Identify the type of Mixture

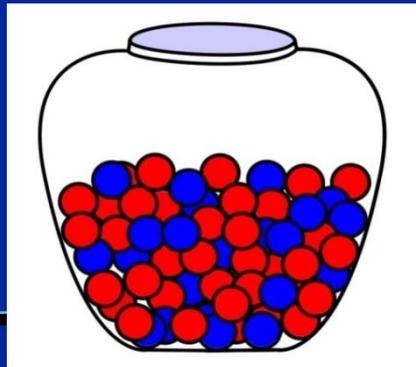
- Flat soda
- Cherry vanilla ice cream
- Salad dressing
- Salt water
- Soil
- Gun Powder
- Black coffee
- Sugar water
- City air
- Paint
- Alcohol
- Brass
- Beach sand
- Pure air
- Spaghetti sauce

# Separating Mixtures

- Because mixtures are not chemically combined they can be separated by
  - Separation by physical properties
  - Filtration
  - Distillation
  - Crystallization
  - Sublimation
  - Chromatography

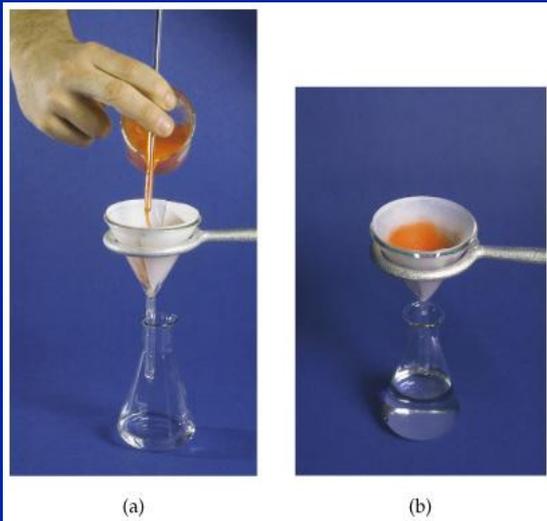
# Separation by properties

- Physical characteristics such as color, size, density, magnetism, etc can be used to separate mixtures.
- Example:
  - \*separating iron from a mixture.
  - \*separating a layer of oil from water
  - \*separating red marbles from blue marbles



# Filtration

- Separates an insoluble solid from the liquid in a heterogeneous mixture
- Uses size of particles



## Separation by filtration

Equipment used during this process includes a **funnel** and **filter paper**.

The liquid which passes through the filter paper is called the **filtrate**.

Example: sand in water



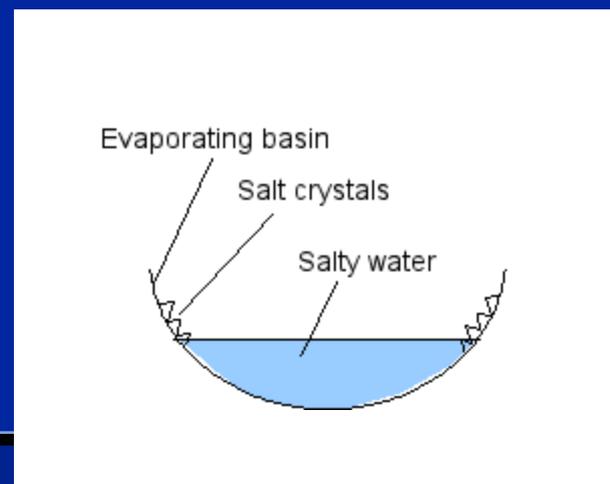
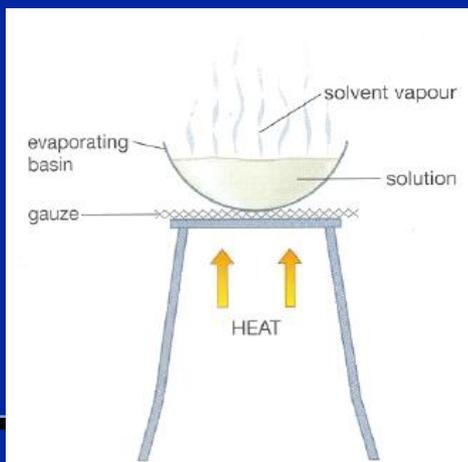
(a)



(b)

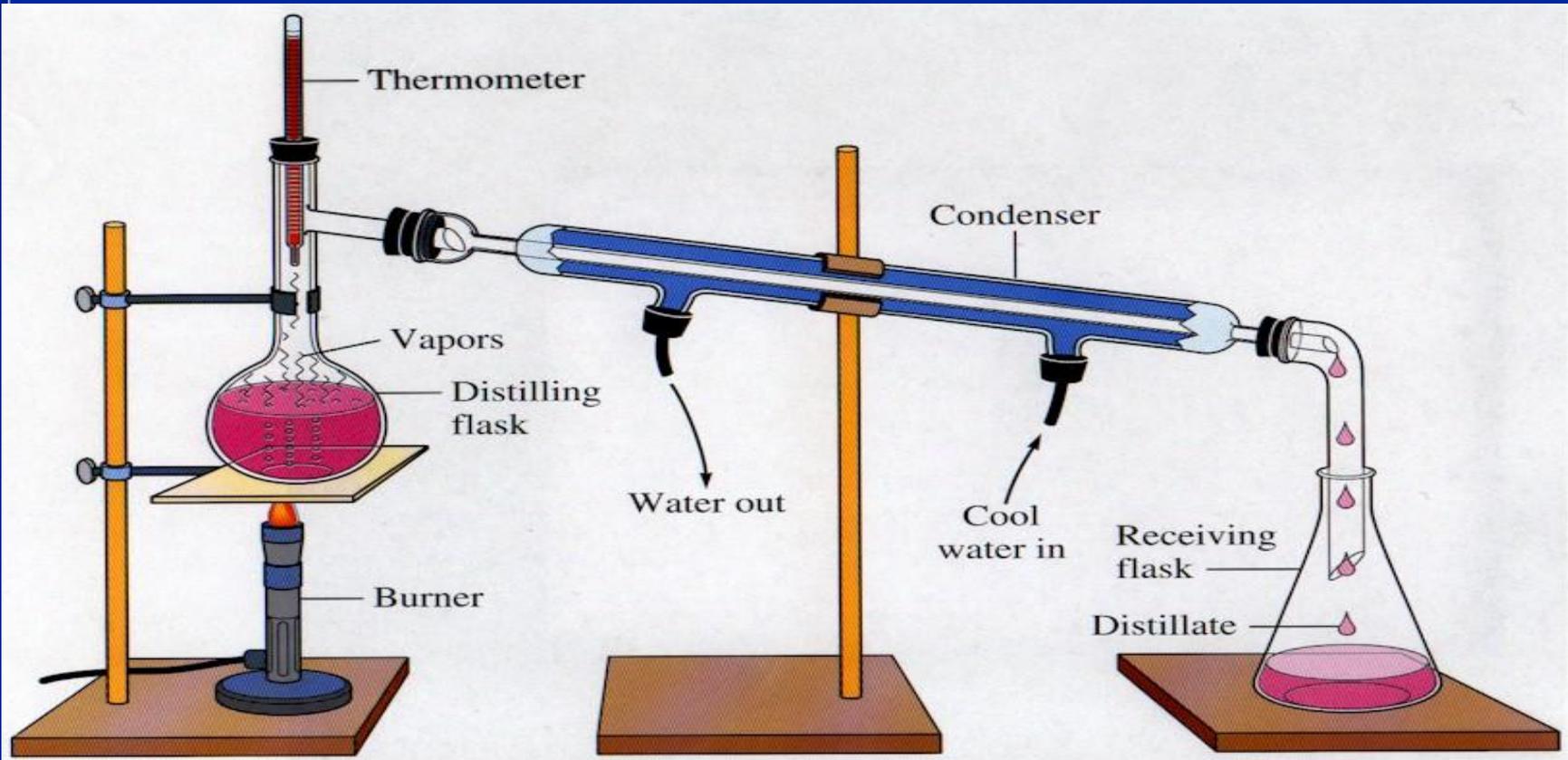
# Evaporation to dryness.

- Homogeneous mixtures composed of **dissolved solids** in a **solvent** can be separated by **boiling** off the liquid. The **solute** remains in the evaporating dish.
- Equipment required involves a hot plate and evaporating dish.
- Example: salt dissolved in water



# Distillation

Separates liquid substances based on their differences in boiling points.



# Distillation

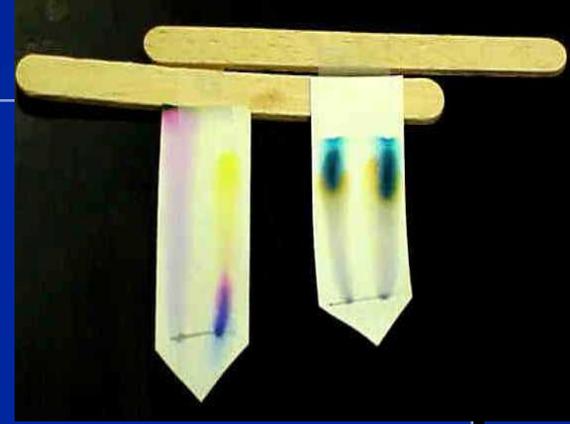
- When the solution is heated, the substance with the **lowest** boiling point boils and changes to a vapor. The vapor **condenses** as it passes through the **condenser** and is collected.
- Example:
  - separating water from the syrup in a coke.
  - separating alcohol from water

# Crystallization

- A solution containing a dissolved solute can also be separated using crystallization.
- When the solution contains as much of the dissolved substance as possible, the addition of even a tiny amount can cause the dissolved substance to come out of solution and collect on any available surface.
- Example:  
the making of rock candy from a sugar solution.



# Chromatography



- Chromatography is a technique that separates **two liquid** components of mixture from each other based on the ability of each substance to **travel up the surface** of another material (called the stationary phase).
- The **stationary phase** is often a solid such as the chromatography paper.

# Chromatography

Components with the **strongest** attraction for the paper travel **slower**.

- Example: separating dyes in food coloring

