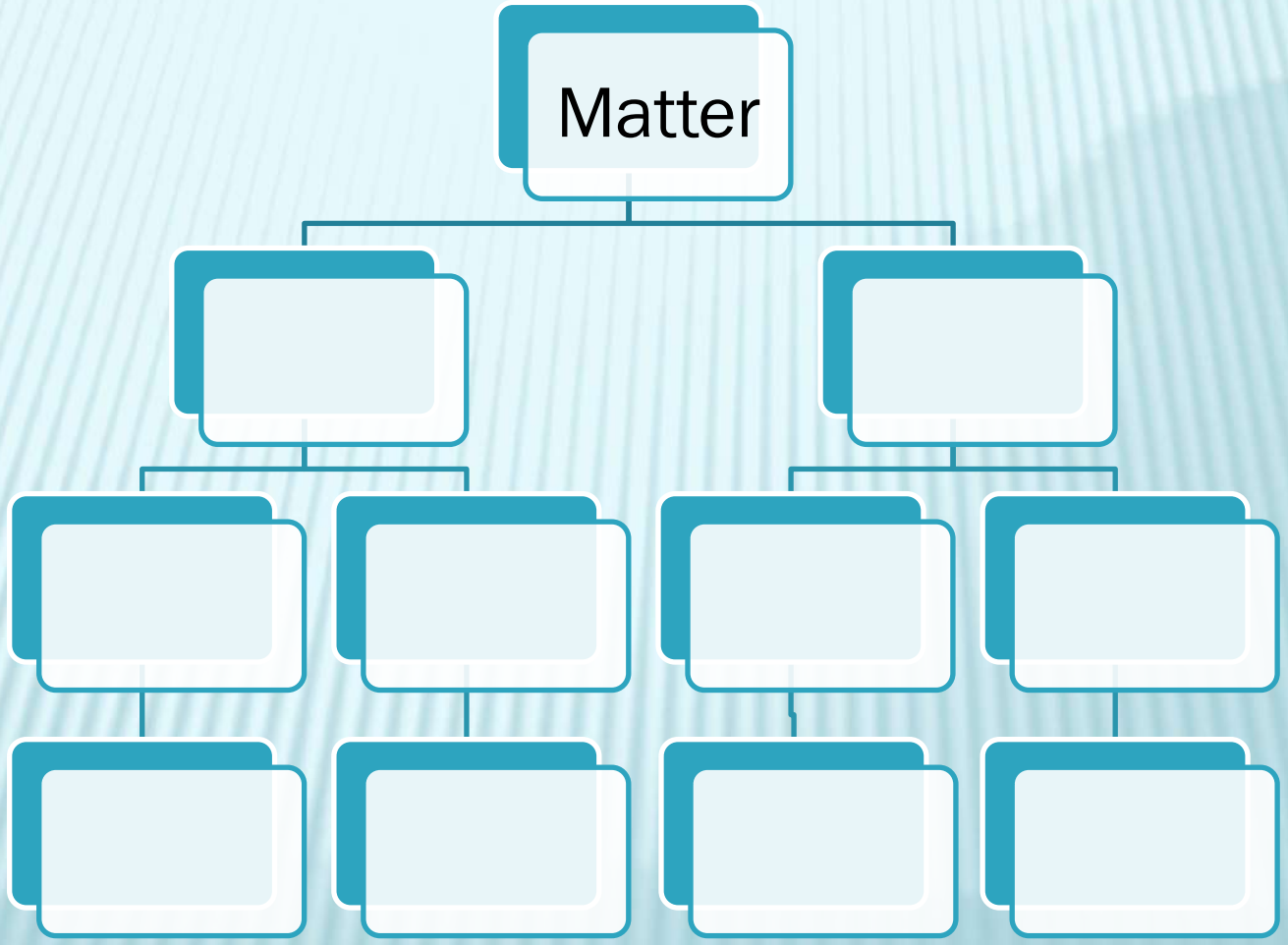
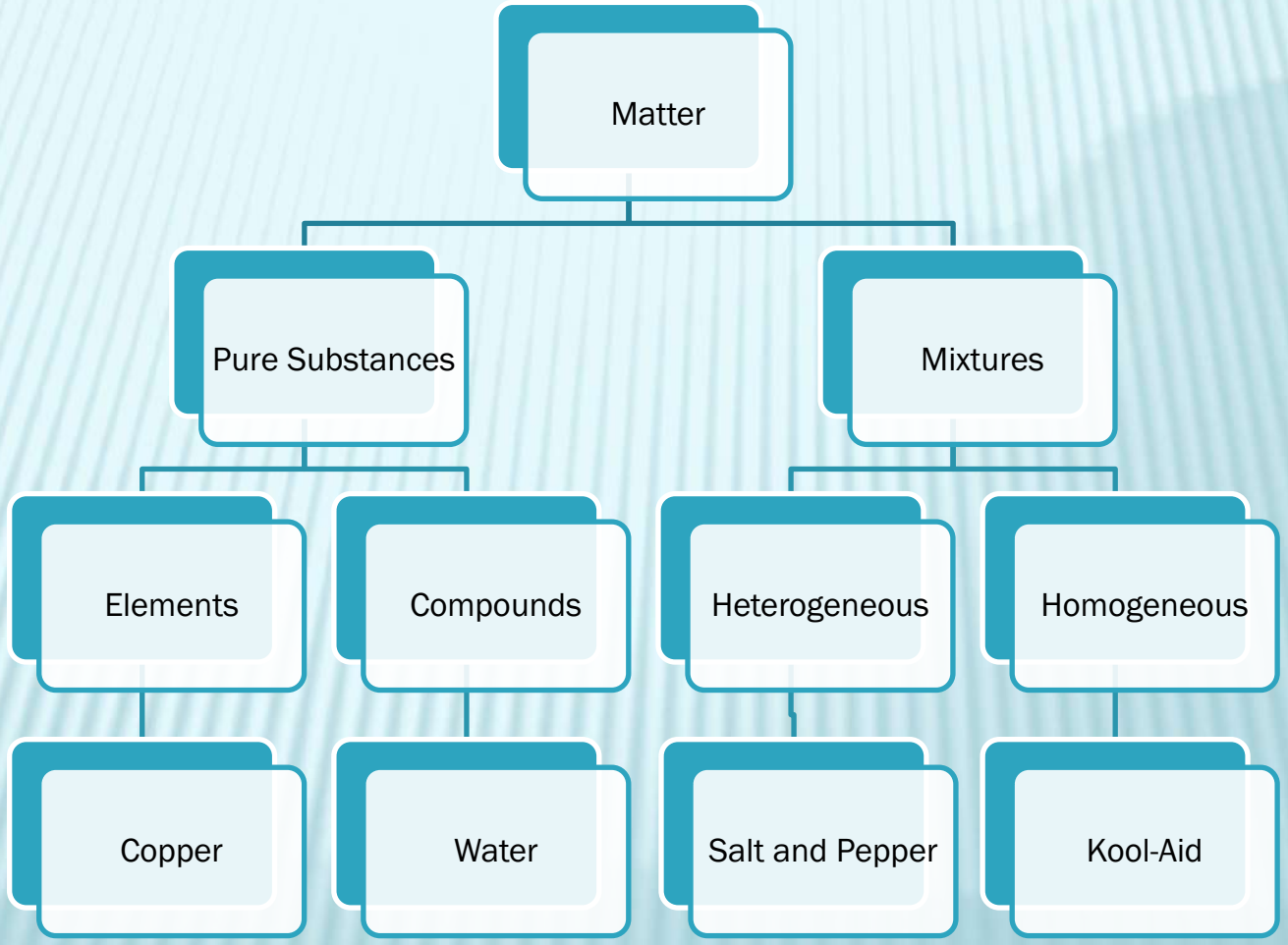
ELEMENTS, COMPOUNDS, AND MIXTURES


Matter


Matter
Pure Substances
Mixtures
Elements
Compounds
Heterogeneous
Homogeneous
Copper
Water
Salt and Pepper
Kool-Aid

PURE SUBSTANCES

- A single type of matter with a specific composition and a specific set of properties
- Includes elements and compounds

ELEMENTS

- Pure substance
- Simplest substances
- Cannot be broken down into simpler substances by physical or chemical means
- Made up of only one type of atom
- Have unique physical and chemical properties
- Examples: gold, silver, carbon, helium, calcium, etc. (over 100)

COMPOUNDS

- Pure substance
- Made up of two or more elements that are chemically combined
- Can be broken down chemically but not physically
- Have own set of physical properties that may be very different from their original parts.
- Combine in definite ratios
- Examples: H_2O, NaCl, CO_2, $C_6H_{12}O_6$

CHEMICAL FORMULAS

- H_2O = water
- NaCl = table salt
- CO_2 = carbon dioxide
- $C_6H_{12}O_6$ = sugar (glucose)

- ****the number of atoms for each element is determined by the number beside it. For example, water has 2 hydrogens and one oxygen.

MIXTURES

- Combination of two or more substances that are not chemically combined
- Substances in a mixture keep their own identities
- Can be physically separated
- Examples: Salt and pepper, chocolate chip cookies, Kool-Aid, salt water, air

SEPARATION TECHNIQUES

- Melting
- Distillation
- Magnets
- Centrifuge
- Filtration
- Crystallization/Evaporation
- Chromatography

TYPES OF MIXTURES

- 1. Heterogeneous
- 2. Homogeneous

HETEROGENEOUS MIXTURES

- Mixtures that are “different” throughout
- Not evenly mixed
- The different parts are easy to tell apart
- Examples: chocolate chip cookie, watermelon, salt and pepper, salad, damp soil

HOMOGENEOUS

- Mixtures that are the “same” throughout
- Evenly mixed
- Different substances are hard to tell apart
- Also called solutions
- Examples: salt water, Kool-aid, air, brass

SOLUTIONS

- Mixtures of two or more substances in which one or more of them seem to disappear in the other
- Another name for a homogeneous mixture
- Can be made up of solids, liquids, or gases.

TYPES OF SOLUTIONS

- **Liquid:** Kool-aid, salt water
- **Gas:** Atmosphere
- **Solid**: Brass, stainless steel (alloys)

HOW DO SOLUTIONS FORM?

- By **dissolution**: a process in which a substance breaks up into atoms, ions, and molecules.
- Have two parts:
  1. **Solute**: disappears or dissolves
  2. **Solvent**: dissolves the solute

EXAMPLE

- Kool-Aid
- Solute: powder mix
- Solvent: water

**usually more solvent

** because the solvent is usually water it is called the **universal solvent**

solutions in which water is the solvent are called **aqueous solutions

PRECIPITATE

- New solute that falls out of a solution by chemical means.
- Examples: soap scum, stalactites/stalagmites

DETERMINING SOLUBILITY

- **Solubility:** how much of a solute dissolves in a given solvent at a specific temperature
- If a solute can be dissolved it is said to be **soluble**
- If a solute cannot be dissolved it is said to be **insoluble**
- **Saturated**: solution that contains all of the solute it can
- **Unsaturated**: solution that *does not* hold all of the solute it can

FACTORS THAT AFFECT SOLUBILITY

- 1. Temperature: an increase in temperature causes an increase in solubility.
- 2. Pressure: an increase in pressure causes an increase in solubililty

DETERMINING CONCENTRATION

- **Concentration** is how much solute there is compared to the amount of solvent
- **Concentrated**: large amount of solute
- **Dilute**: small amount of solute