

Chemical Bonding

Ionic and Covalent Compounds

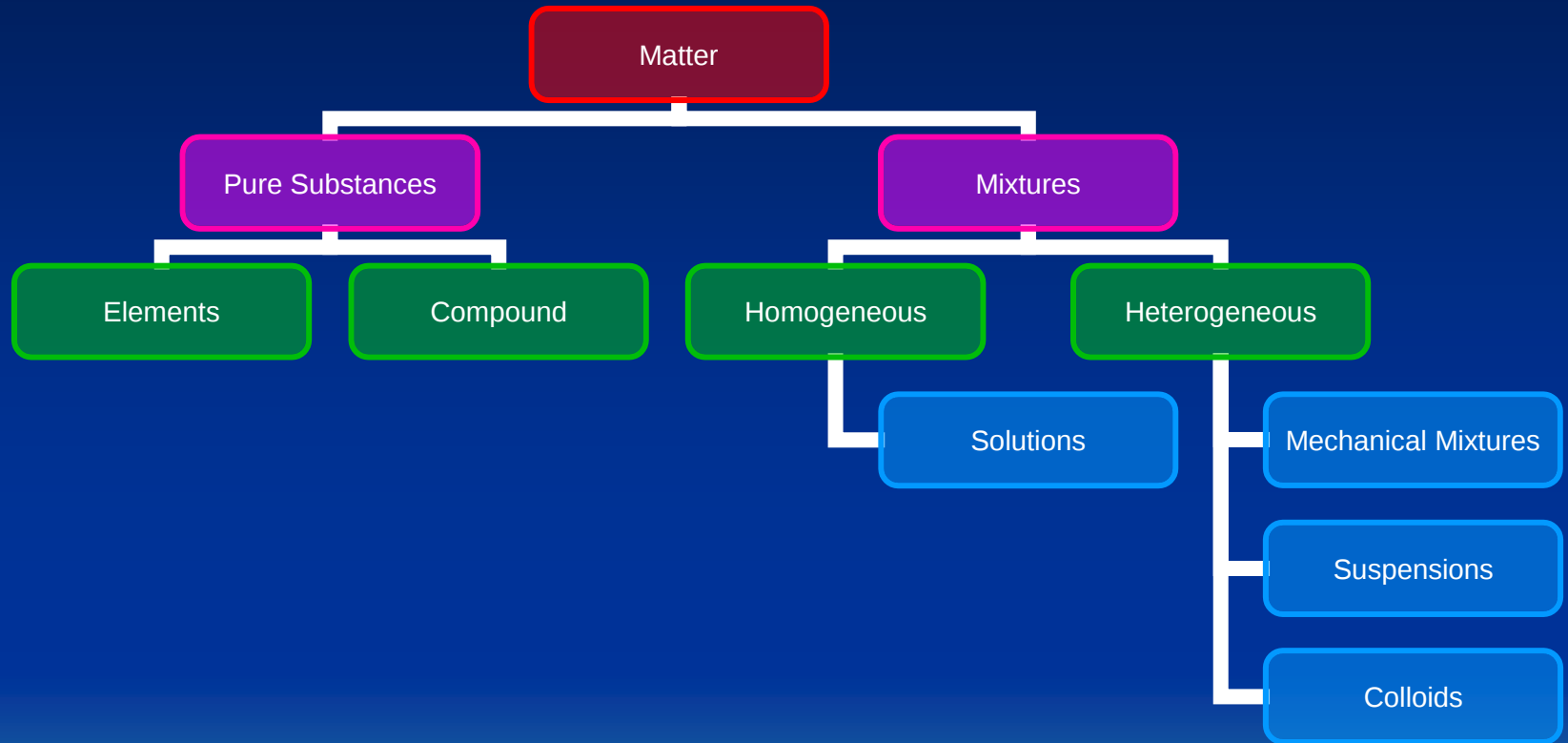


Matter

- Anything that has mass and takes up space.
- Matter is made up of **ATOMS**
- **ATOMS:** are the smallest units of matter
- Matter can be divided into **Pure Substances** and **Mixtures**



Classification of Matter



Pure Substances

- Cannot be separated into two or more substances by physical or mechanical means
- **HOMOGENEOUS:** It has uniform composition throughout the whole sample
- Its properties are constant throughout the whole sample



Pure Substances

- There are two types of pure substances:
- **ELEMENT:** A substance that cannot be broken down by chemical means.
- **COMPOUND:** A substance formed by the reaction of two or more chemical elements. The elements in a compound are present in fixed ratios.

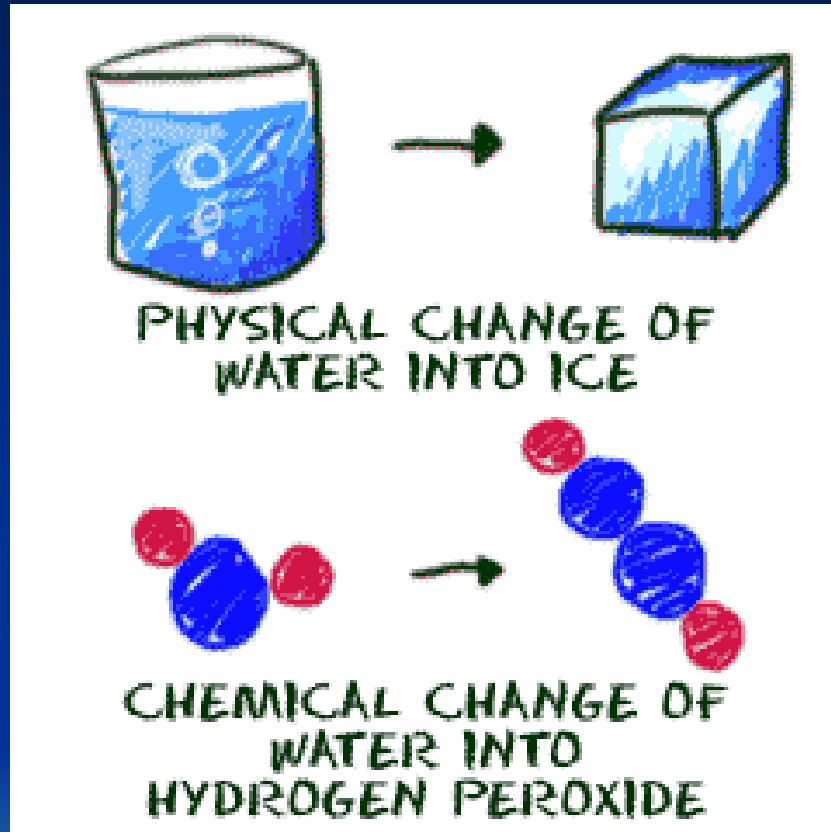


Element vs. Compound

- On the left: Sodium
- On the right: Sodium chloride



Properties of Matter



- There are two properties of matter:
- **PHYSICAL:** Characteristics of a substance that help to identify it
- **CHEMICAL:** How does a substance react when changed into a new substance

Physical Properties

- **STATE:** gas, liquid or solid
- **COLOUR**
- **SOLUBILITY:** ability of a solute to dissolve in a solvent
- **MALLEABILITY:** ability of a solid to be bent
- **VISCOSITY:** how easily a liquid flows



Physical Properties

- **FREEZING POINT**
- **MELTING POINT**
- **ELECTRICAL CONDUCTIVITY**
- **TEXTURE:** rough, smooth or soft
- **HARDNESS**
- **DENSITY:** how compact a substance is



Chemical Properties

- **COMBUSTIBILITY:** will it burn or is it non-flammable
- **REACTION WITH ACID:** will it bubble and disappear or will it do nothing

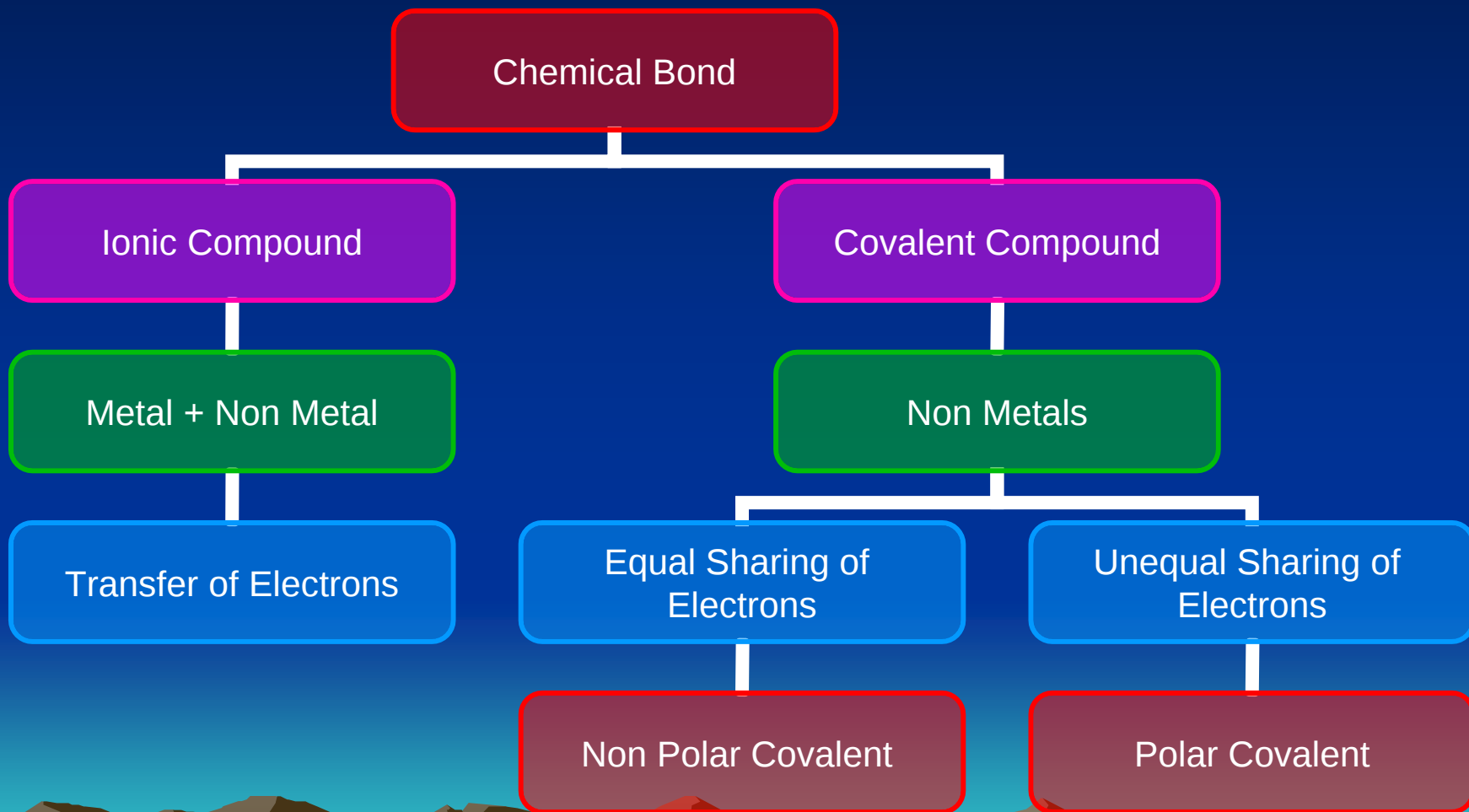


Compounds

- **Compound:** A combination of different elements in different ratios
- **Chemical Bond:** Interaction between elements usually through their single valence electrons



Compound Categories



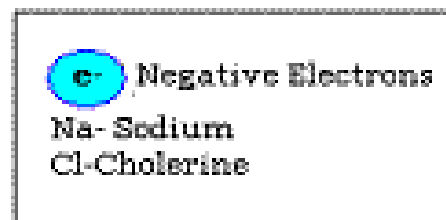
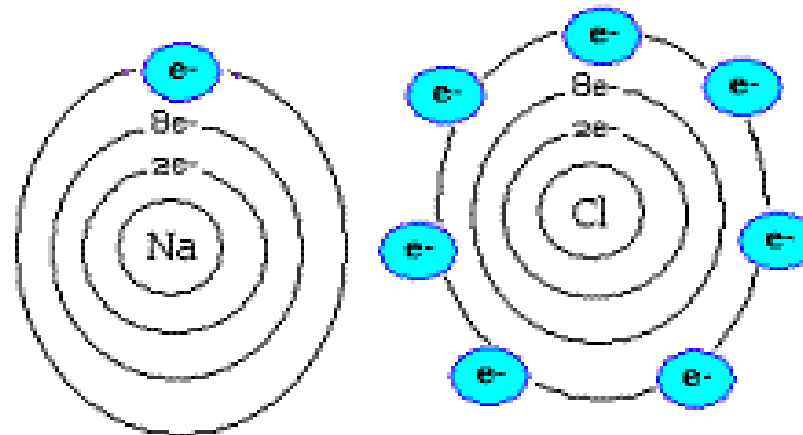
Ionic Compounds

- Ionic bonds form between metals and nonmetals
- Defined as a transfer of electrons from metal to nonmetal
- Since opposites attract, when a positive ion and a negative ion come into contact, they experience a force of attraction
- The chemical bond is known as an **IONIC BOND**



Ionic Compound

Ionic Bond



Properties of Ionic Compounds

- Solids at room temperature
- They form crystals
- High melting points
- Highly soluble in water
- **ELECTROLYTES:** ionic compounds that have high electrical conductivity in melted or liquid state, but not in solid state



Ionic Compounds



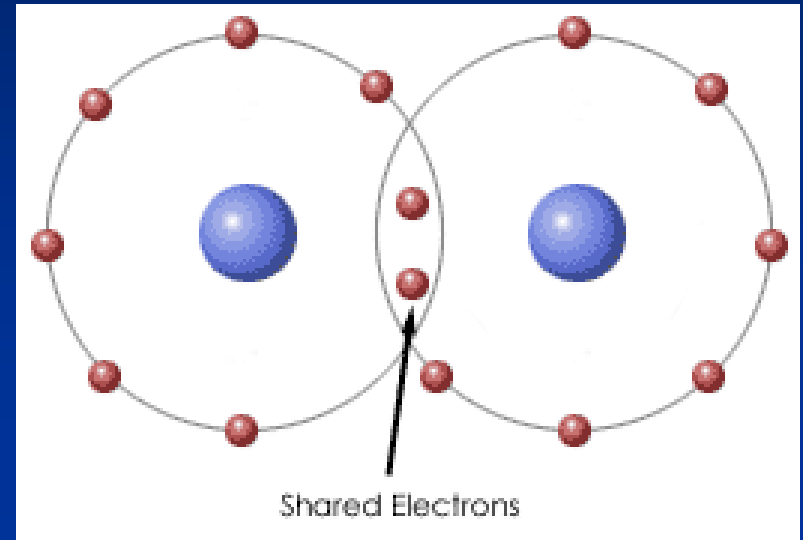
Covalent Compound

- Covalent bond form between non metals
- Defined as the sharing of one or more pair of electrons
- The shared electron pairs are attracted to the nuclei of both atoms
- Two types of covalent compounds:
POLAR covalent and **NON-POLAR** covalent

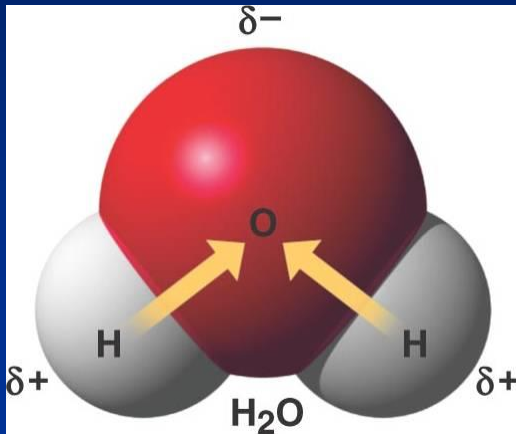


Non-Polar Covalent Com

- A bond in which an electron pair is shared equally
- The nuclei of both atoms attract the electrons with equal force
- **Example:** Oil



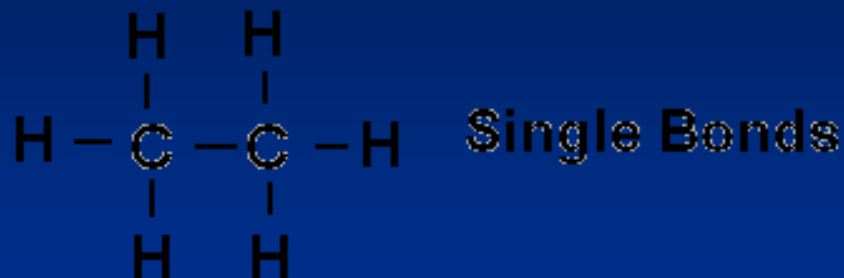
Polar Covalent Compounds



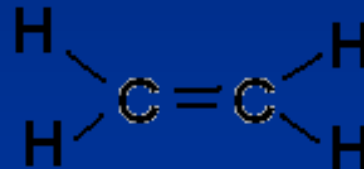
- A bond in which an electron pair is shared unequally
- The shared electron pair will spend more time around one atom than the other
- One atom will have a negative charge while the other atom will have a positive charge
- **Example:** Water

Multiple Covalent Bonds

- **Single Bond:** atoms share one electron pair
- **Double Bond:** atoms share two electron pairs
- **Triple Bond:** atoms share three electron pairs



Single Bonds



Double Bonds



Triple Bonds

Properties of Covalent Compounds

- They can be solid, liquid or gas at room temperature
- Relatively low melting and boiling points with some exceptions
- Some soluble in water (polar) and some are not soluble in water (non-polar)
- Non electrolytes



Covalent Compounds

