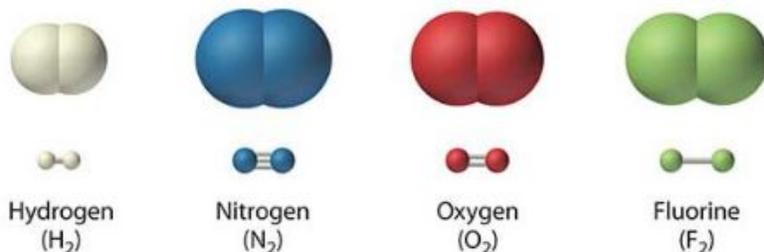


Compounds and Mixtures

“They buried him in his own tomb, which he had made for himself in the City of David; and they laid him in the bed which was filled with spices and various ingredients prepared in a mixture of ointments.” 2Chronicles 16:14

- Molecule: group of two or more of any atoms linked by chemical bonds to form distinct units

Ex: O_2 , H_2 , S_8 , C_{60}



- Molecular mass: sum of atomic masses of all the atoms in a molecule

Ex: $H_2O = 2 \times (1.008 \text{ u}) + 1 \times (16.00 \text{ u}) = 18.016 \text{ u} \rightarrow 18.02 \text{ u}$

- Molecular models: ball-and-stick, space filling [models]
- Compounds: substances composed of different types of atoms bonded together; combinations of two or more elements (H_2O , CO , $C_{12}H_{22}O_{11}$)
- Different compounds can be formed by using the same elements in various combinations:

C, H, O can make

Formaldehyde (CH_2O)

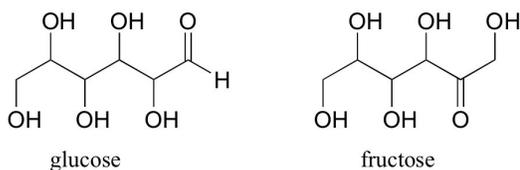
Isopropanol (C_3H_8O)

Aspirin ($C_9H_8O_4$)

Glucose ($C_6H_{12}O_6$)

- Isomers: molecules with the same number and types of atoms but different arrangements of atoms

Ex: $C_6H_{12}O_6 \rightarrow$ glucose and fructose have the same number of C/H/O but in different arrangements



- Pure substance: substance that has the same physical properties throughout and consists of only one type of atom, one type of molecule, or one nonmolecular compound; all pure substances are either elements or compounds

Homogeneous: same physical properties throughout

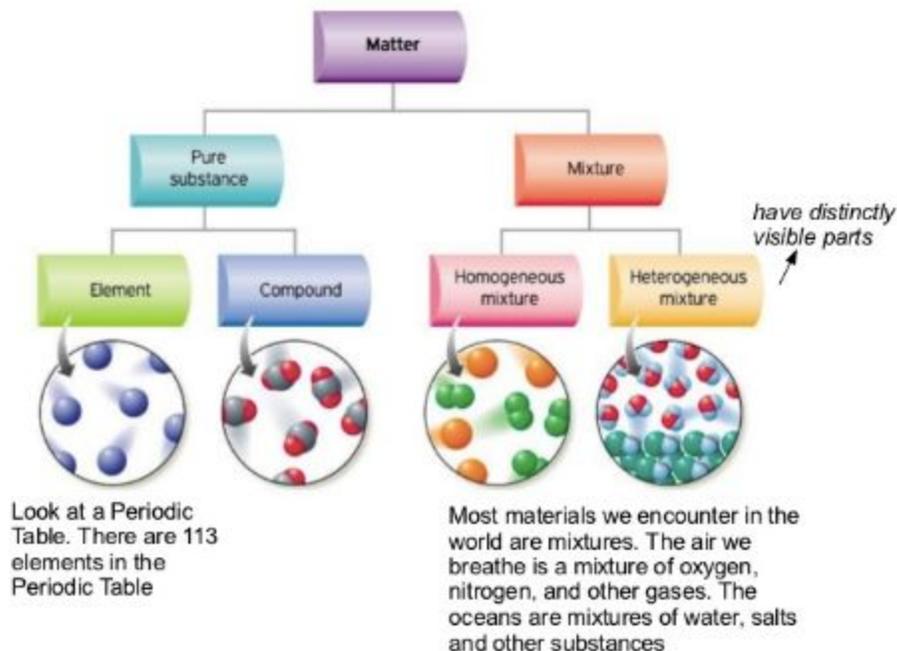
Ex: water, oxygen, aluminum, gold, carbon dioxide, sucrose

- Mixture: composed of several pure substances that are physically mixed but not chemically united

Ex: milk, air, flour, gasoline, sea water

Milk has variable compositions due to different amounts of milk fat

Can be separated by physical methods (sugar + iron filings, sea water)



- Solution: molecules of a substance are uniformly mixed
- Solute: substance that dissolves (salt)
Solvent: substance into which solute dissolves (water); aqueous solutions are where water is the solvent
- Concentration: amount of solute dissolved in given amount of solution; expressed in brackets []
- Solutions are homogenous because physical properties are uniform throughout, but are not pure
- Solubility: ability of one substance to dissolve in another substance; different amounts of the same solute will dissolve in different solvents
Insolubility: inability of a substance to dissolve in a given solvent
- Precipitate: solute comes out of solution
- Higher temp → higher solubility/more solute a solvent can hold
Ex: sugar will come out of solution when honey placed in freezer
- Rate of dissolving affected by temperature / stirring / size of solute
- Heterogenous mixtures: molecules of a mixed substance not completely mixed (sugar + sand)
Colloid: mixture containing tiny suspended clumps that are larger than single molecules but small enough to remain suspended in mixture; characterized by cloudy appearance under bright light

(fog, smoke, milk, gelatin)