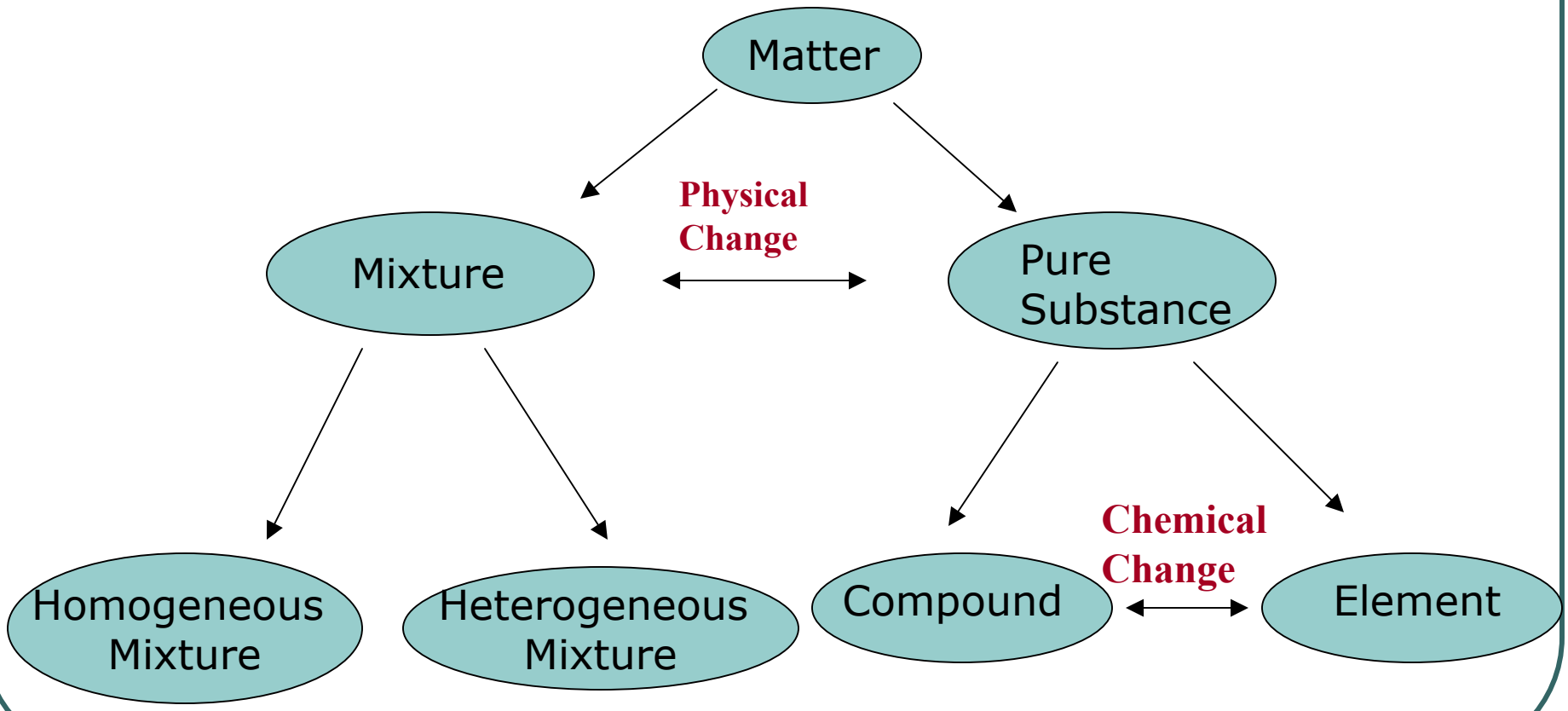
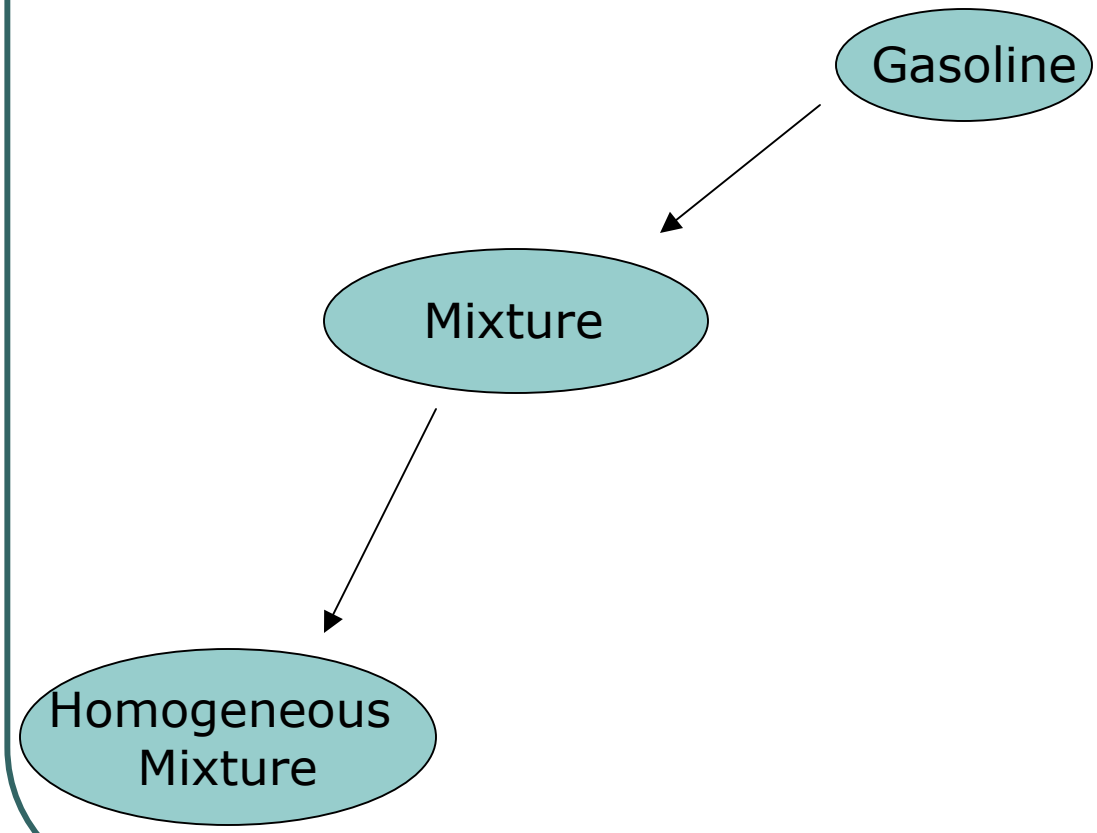
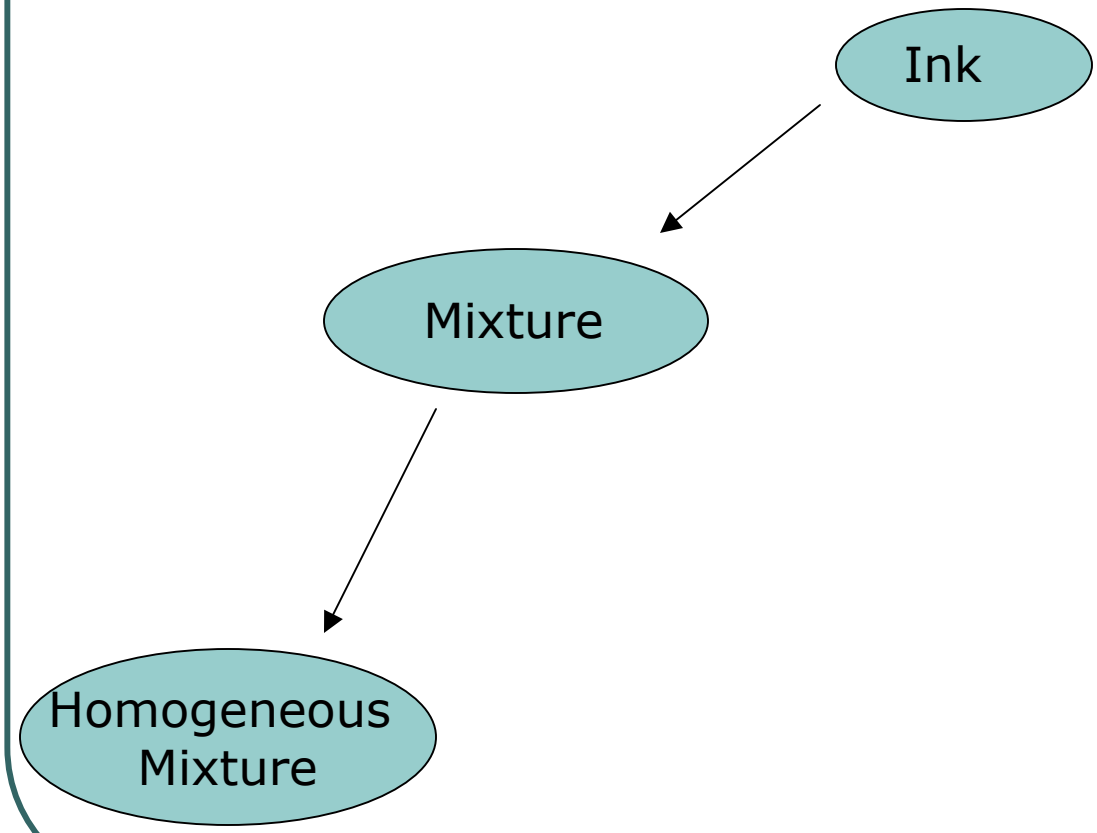
GENERAL CHEMISTRY 101



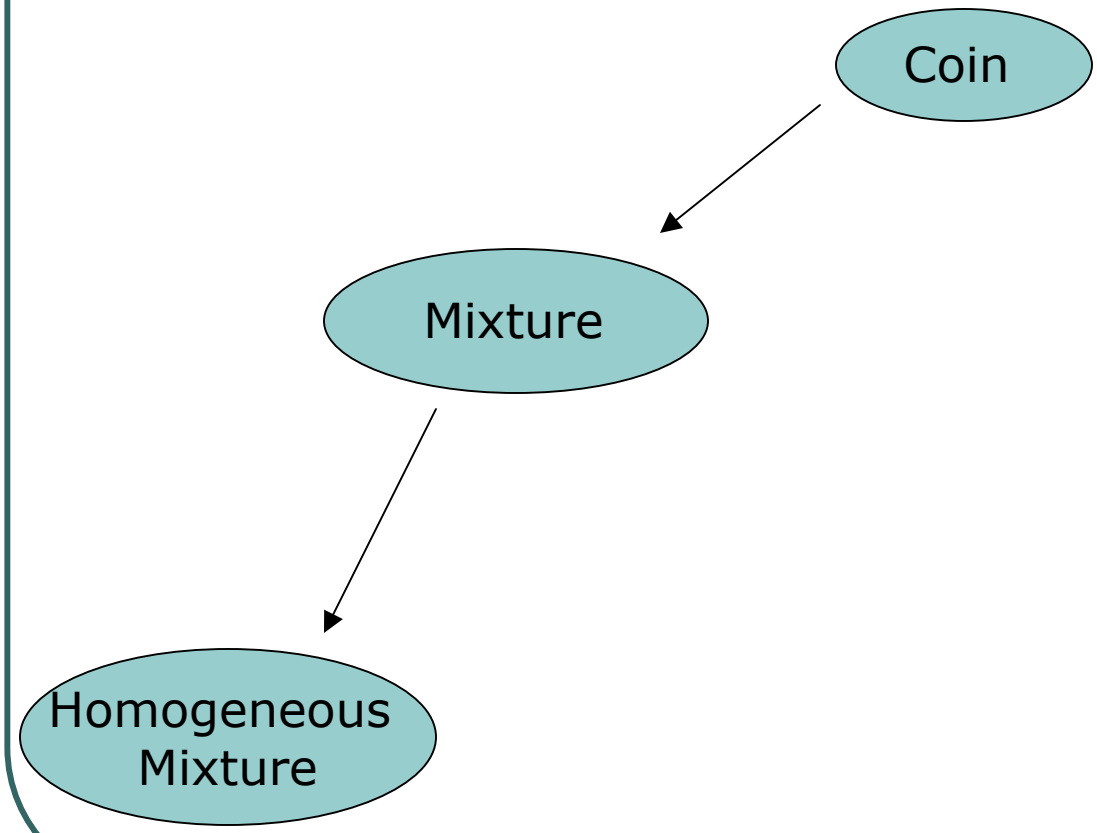
Flow-Chart for Gasoline



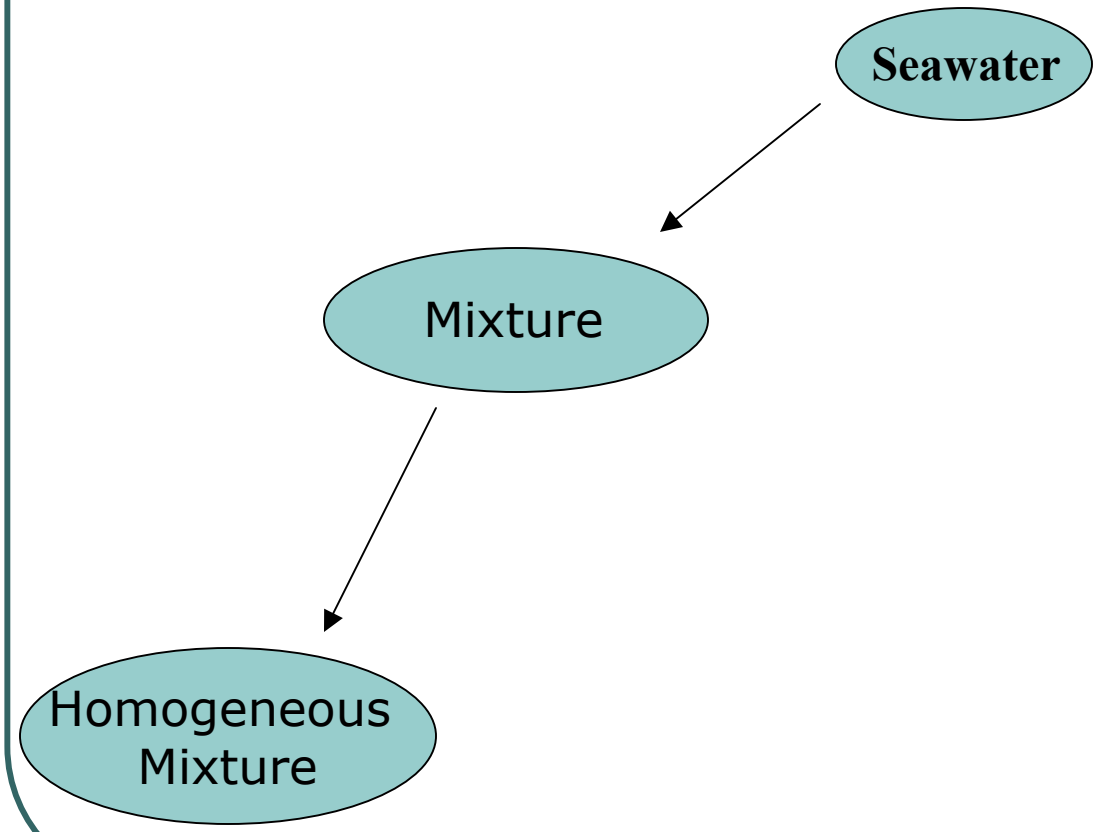
Flow-Chart for Ink



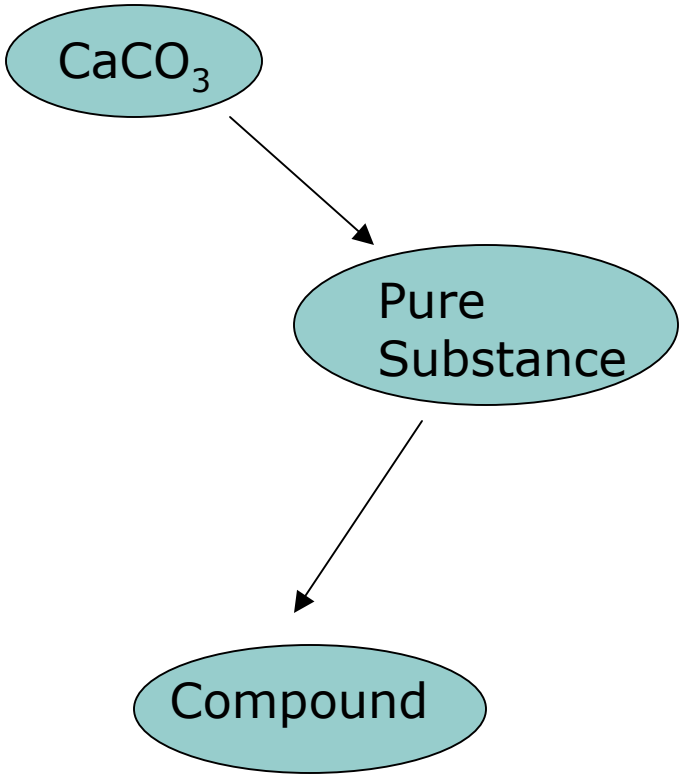
Flow-Chart for a Coin



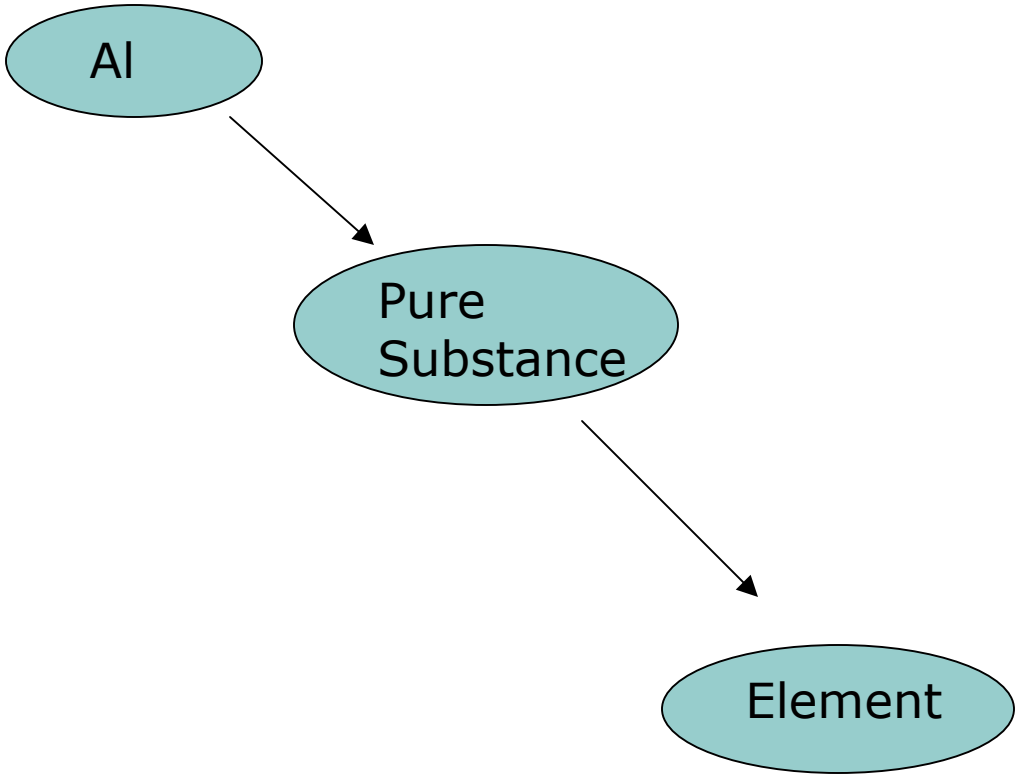
Flow-Chart for Seawater



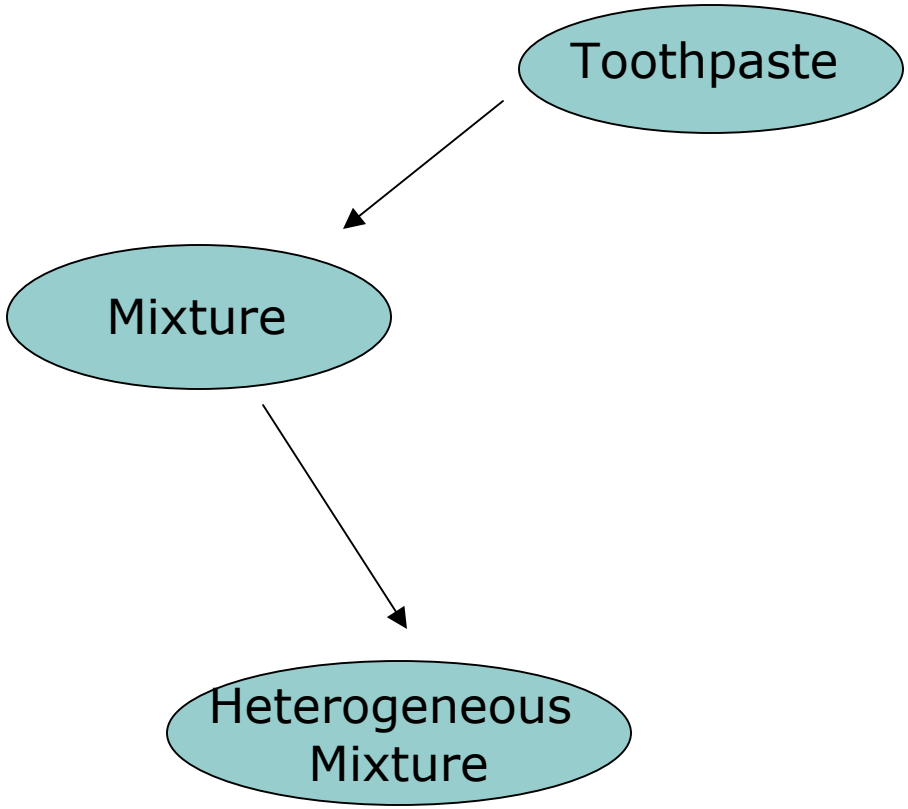
Flow-Chart for $CaCO_3$



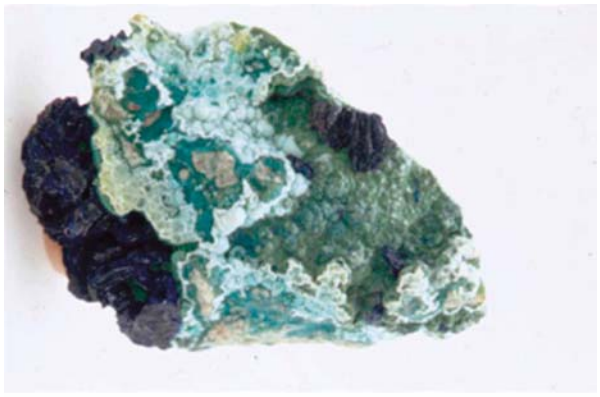
Flow-Chart for Aluminum Foil



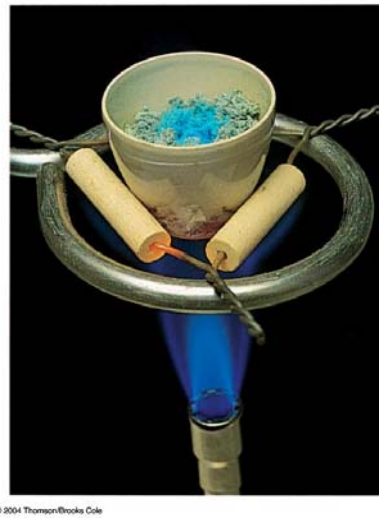
Flow-Chart for Toothpaste

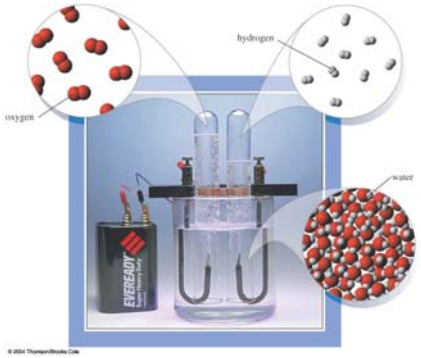


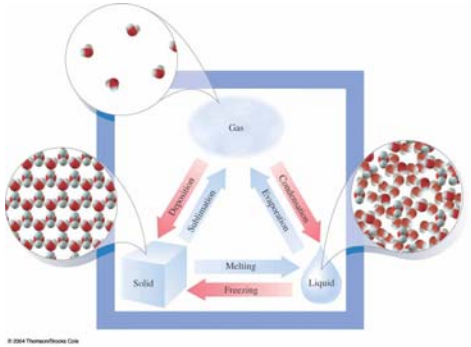
Classify each of the following as a homogeneous or a heterogeneous mixture?



Label each of the following as either a physical process or a chemical process?







Label each of the following as either a physical process or a chemical process?

3 Li Lithium	4 Be Beryllium
11 Na Sodium	12 Mg Magnesium
19 K Potassium	20 Ca Calcium
37 Rb Rubidium	38 Sr Strontium
55 Cs Cesium	56 Ba Barium
87 Fr Francium	88 Ra Radium

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Classify each of the following as a homogeneous or a heterogeneous mixture?

You do it !

- **Muddy river water**

- **Sugar dissolved in water**

Reading….

Please read section 1-12:

HEAT AND TEMPERATURE

END OF CHAPTER 1

CHAPTER 2

Chemical Formulas and Composition Stoichiometry

Chapter Goals

1. Atoms and Molecules
2. Chemical Formulas
3. Ions and Ionic Compounds
4. Names and Formulas of Some Ionic Compounds
5. Atomic Weights
6. The Mole

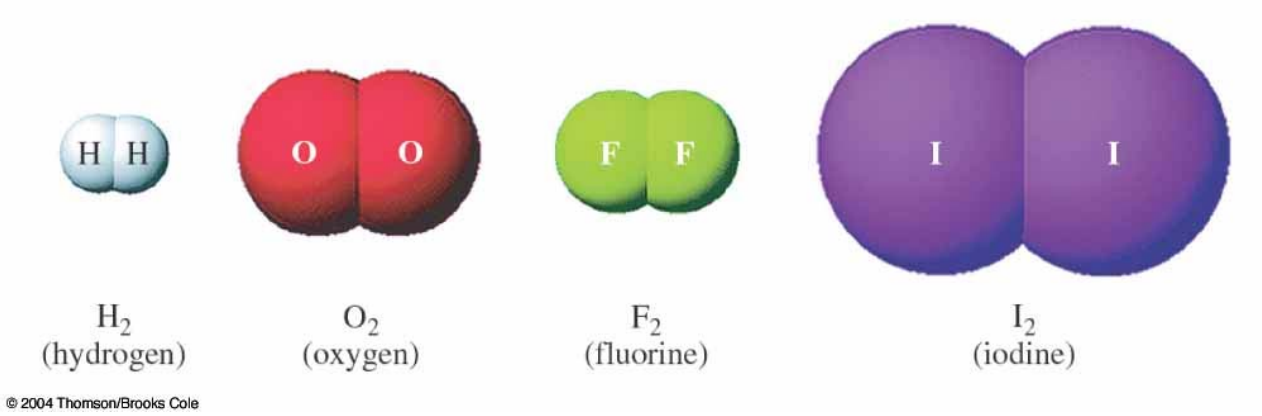
Cont…

7. Formula Weights, Molecular Weights, and Moles
8. Percent Composition and Formulas of Compounds
9. Derivation of Formulas from Elemental Composition
10. Determination of Molecular Formulas
11. Some Other Interpretations of Chemical Formulas
12. Purity of Samples

Atoms and Molecules

A molecule is the smallest particle of an element that can have a stable independent existence.

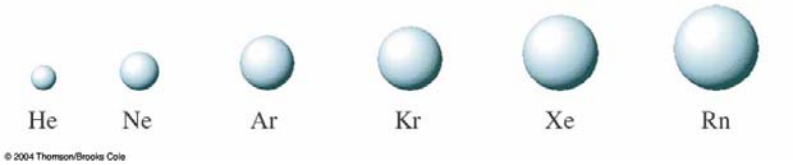
- Examples of molecules



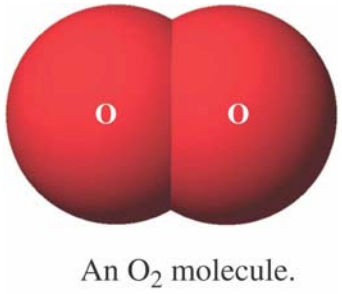
Chemical Formulas

Chemical formula shows the chemical composition of the substance.

- Monoatomic elements: He, Au, Na



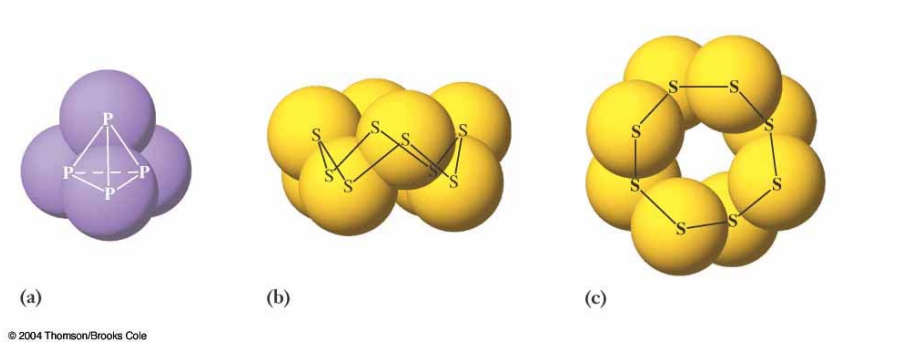
- Diatomic elements: O_2, H_2, Cl_2

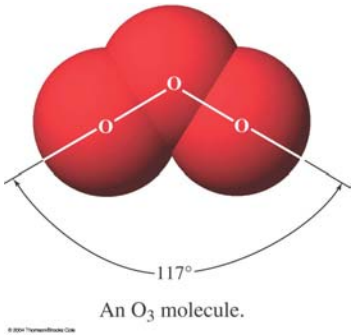


An O_2 molecule.

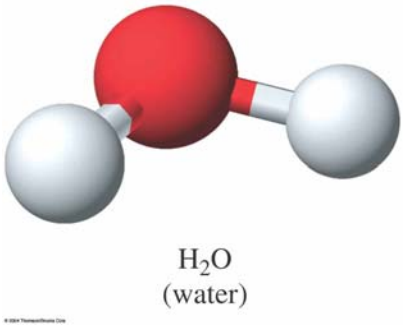
Chemical Formulas

- More complex elements: O_3, S_8, P_4





- Compounds: H_2O, C_2H_5OH



Chemical Formulas

Compound	1 Molecule Contains
HCl	1 H atom & 1 Cl atom
H_2O	2 H atoms & 1 O atom
NH_3	1 N atom & 3 H atoms
C_3H_8	3 C atoms & 8 H atoms

Ions and Ionic Compounds

Ions are atoms or groups of atoms that possess an electric charge.

- Positive ions or cations
  - one or more electrons less than neutral
  - Na^{+}, Ca^{2+}, Al^{3+}
  - NH_4^{+} - polyatomic cation
- Negative ions or anions
  - one or more electrons more than neutral
  - F^{-}, O^{2-}
  - SO_4^{2-}, PO_4^{3-} - polyatomic anions

Formulas, Ionic Charges, and Names of Some Common Ions

Common Cations (positive ions)			Common Anions (negative ions)		
Formula	*Charge*	*Name*	*Formula*	*Charge*	*Name*
Na^+	1+	sodium	F^-	1−	fluoride
K^+	1+	potassium	Cl^-	1−	chloride
NH_4^+	1+	ammonium	Br^-	1−	bromide
Ag^+	1+	silver	OH^-	1−	hydroxide
			CH_3COO^-	1−	acetate
Mg^{2+}	2+	magnesium	NO_3^-	1−	nitrate
Ca^{2+}	2+	calcium			
Zn^{2+}	2+	zinc	O^{2-}	2−	oxide
Cu^+	1+	copper(I)	S^{2-}	2−	sulfide
Cu^{2+}	2+	copper(II)	SO_4^{2-}	2−	sulfate
Fe^{2+}	2+	iron(II)	SO_3^{2-}	2−	sulfite
			CO_3^{2-}	2−	carbonate
Fe^{3+}	3+	iron(III)			
Al^{3+}	3+	aluminum	PO_4^{3-}	3−	phosphate

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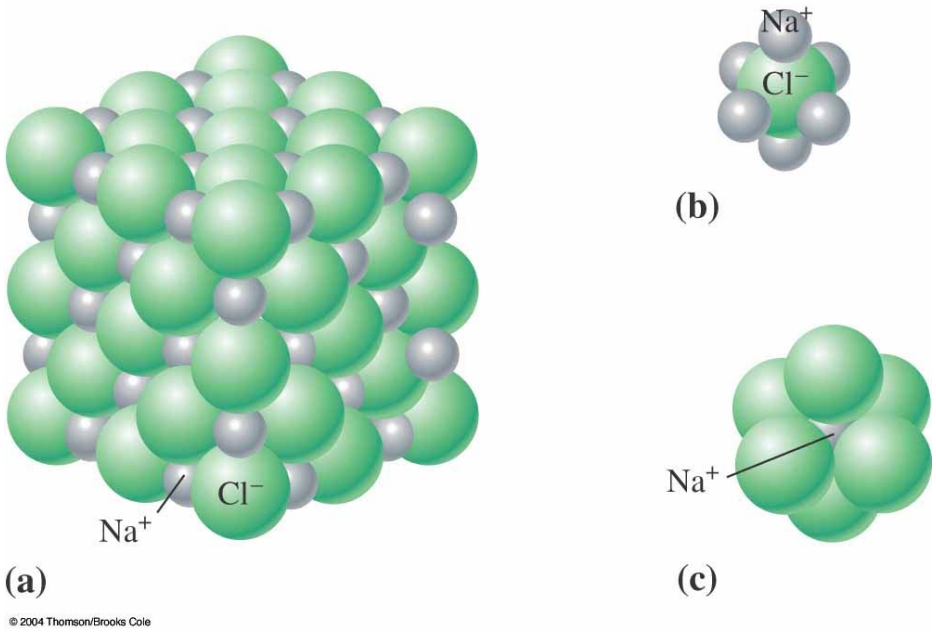
Ions and Ionic Compounds

- Sodium chloride
  - table salt is an ionic compound



Names and Formulas of Some Ionic Compounds

Formulas of ionic compounds are determined by the charges of the ions.

- Charge on the cations must equal the charge on the anions.
- The compound must be neutral.

- $NaCl$ sodium chloride (Na^{1+} & Cl^{1-})
- KOH potassium hydroxide (K^{1+} & OH^{1-})
- $CaSO_4$ calcium sulfate (Ca^{2+} & SO_4^{2-})
- $Al(OH)_3$ aluminum hydroxide (Al^{3+} & 3 OH^{1-})

Names and Formulas of Some Ionic Compounds

- What is the formula of nitric acid?
- HNO_3

- What is the name of $FeBr_3$?
- iron(III) bromide

Names and Formulas of Some Ionic Compounds

- What is the name of K_2SO_3?
- potassium sulfite
- What is the charge on sulfite ion?
- SO_3^{2-} is sulfite ion
- What is the formula of ammonium sulfide?
- $(NH_4)_2S$

Names and Formulas of Some Ionic Compounds

- What is the charge on ammonium ion?
- NH_4^{1+}
- What is the formula of aluminum sulfate?
- $Al_2(SO_4)_3$
- What is the charge on both ions?
- Al^{3+} and SO_4^{2-}