Properties of Matter

Matter

* Matter is composed of
* Pure substances may be or

Elements

* Simplest pure substances
* Some elemental substances are made of multiple atoms
  + “diatomic” molecule
  + allotropes

Compounds

* Made of several elements in specific proportions
* Systematic naming tells you what types of atoms are in a compound, and in some cases the proportions
  + - Examples:

Carbon dioxide Dinitrogen monoxide Carbon tetrachloride

* + Not always the case! Ionic compounds follow other rules.

Sodium chloride Magnesium chloride

Common Chemicals

* Common chemicals have both a name and a name
  + In many cases, the common name is accepted
    - Examples: *Water Ammonia*

Ex. Are the following elements, compounds, or both? Write the make-up of each.

a) S­8 b) H2CO3 c) CH3COOH d) Mg(OH)2 e) Ca3(C6H5O7)2

Classification of Matter

Pure Substances

*Elemental*

*Compound*

States of Matter (three main)

|  |  |  |
| --- | --- | --- |
|  | Properties | Examples |
| Solid |  |  |
| Liquid |  |  |
| Gas |  |  |

Other States of Matter

*Amorphous*

*Plasma*

*Glasses*

Classifying States of Matter

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| State | Shape | Volume | Compressible? | Flow? |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Properties of Matter

* **physical properties**:
  + characteristics that are directly
* **chemical properties**:
  + characteristics that describe the behavior of matter

Mixtures

* **Homogeneous**:
  + every piece of a sample has identical characteristics, though another sample with the same components may have different characteristics
  + atoms or molecules mixed uniformly
* **Heterogeneous**:
  + contains regions within the sample with different characteristics
  + atoms or molecules not mixed uniformly

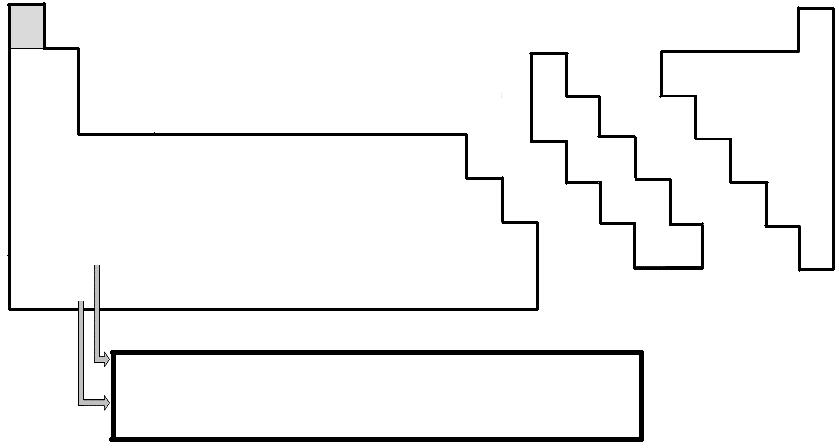
Ex Classify as a type of mixture.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rubbing Alcohol | Soda | Italian Dressing | Sand | Blood |
|  |  |  |  |  |

Separating mixtures

* separate mixtures based on different physical properties of the components (Physical change)
* Methods
  + Distillation
  + Filtration
  + Chromatography
  + Evaporation
  + Decanting

Periodic Table



Types of Elements

Metals

Nonmetals

Metalloids

Changes in Matter

* **Physical changes:** *changes that alter the*  *or*  *of the matter without altering*

*the composition*

* **Chemical changes**: *changes that alter the*  *of matter are called* 
  + the atoms that are present rearrange into new molecules, but all of the original atoms are still present

*Physical Changes*

*Chemical Changes*

Temperature

* Conversion formulas:
* We use the Kelvin in Chemistry:

Ex Find the Fahrenheit and Kelvin temperatures on Venus, which has a constant temperature 462°C.

Heat**:**

* Three modes of heat transfer
  + ***Conduction***
  + ***Convection***
  + ***Radiation***
* Specific heat:
* We can find the amount of energy transferred by the equation:

Ex How much energy is needed to raise 250mL of water from 12°C (out of the faucet) to 95°C?

States of Matter and Energy

Energy and Phase Diagrams

***Latent Heat:***

Ex How does ice melt in ice water?