Atoms and States of Matter/Elements, Compounds, and Mixtures Study Guide

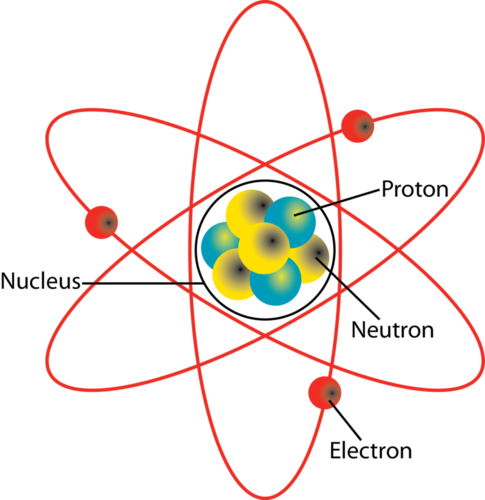
Atoms:

Everything in the universe is made up of tiny particles called \_\_\_\_\_\_\_\_\_\_\_\_\_.

Atoms cannot be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into smaller pieces.

Diagram of an atom:

|  |  |  |  |
| --- | --- | --- | --- |
| Subatomic particle | Location | Charge | Mass |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |



States of Matter

|  |  |  |  |
| --- | --- | --- | --- |
| State of Matter | Energy | Particle movement | Particle arrangement |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Changes of state:

Solidification: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Melting: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Condensation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vaporization: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sublimation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Depositions: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Density:

The equation for density is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Density is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an object has and the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (volume) that same object takes up. Metals such as iron, gold, and lead have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ densities and will feel \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Gases such as oxygen, and nitrogen, which have a mass, have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ densities and are very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

What units can we use to measure mass? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What units can we use to measure volume? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Elements and Compounds:

Elements are always composed of the same type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. All of the elements on the periodic table are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of elements. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form when 2 or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ elements form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds. Compounds of the same elements have very different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the individual elements. For example, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Na) is a highly reactive Alkali Metal and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Cl) is a highly reactive Halogen. Sodium and chlorine chemically combine to form NaCl (sodium chloride) more commonly known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Elements have symbols of 1 or 2 letters and there will only be 1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ letter.
* Compounds will have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2 capital letters, sometimes many more.

Compounds and Mixtures:

Compounds and mixtures are different because of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Compounds can only be separated by breaking the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the elements. Breaking the chemical bonds will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ new substances. Mixtures can be separated by physical means. Some examples of physical separations are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, distillation, breaking, using a magnet, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, density, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and others. When mixtures are separated, no new substances are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

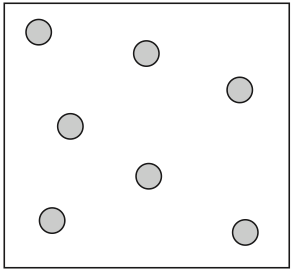
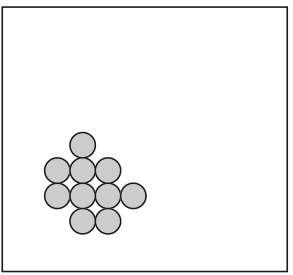
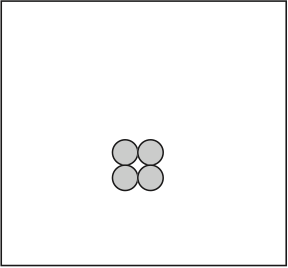
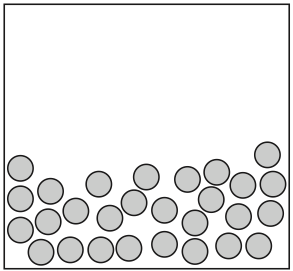
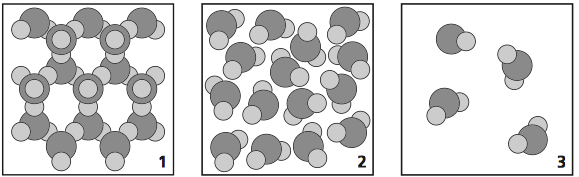
Homogeneous vs. Heterogeneous mixtures

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixture is when a mixture is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout. Each substance is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout the whole mixture. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixture is not uniform throughout and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Some examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixtures are sand, and saltwater. Some examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixtures are oil and water, sand and water,

Chemical makeup of the atmosphere:

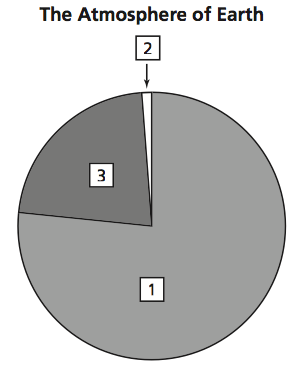
Nitrogen 78%, Oxygen 21%, Argon 0.9%, Carbon Dioxide 0.3%, trace amounts of other gases

Sample TCAP Questions

1. What is the smallest unit of matter that cannot be broken down into smaller substances?
   1. Protons
   2. Neutrons
   3. Electrons
   4. Atoms
2. Which statement is true about the clouds, a chair, and a lake
   1. They are all living things
   2. They are all liquids
   3. They are all made up of atoms
   4. They are made of the same elements
3. Particles in a substance are widely separated and move independently from place to place. The substance could be a
   1. Solid only.
   2. Gas only.
   3. Gas or solid only.
   4. Gas, liquid, or solid.
4. Which diagram best shows the type of particle arrangement of a gas?
   1. 
   2. 
   3. 
   4. 
5. Diagrams of molecular arrangements are shown below. A solid is best shown in diagram
   1. 3
   2. 3 and 1
   3. 1
   4. 2 and 3
6. Each particle in a sample of matter vibrates but does not move from its location. In what state of matter is the sample?
   1. Liquid
   2. Solid
   3. Gas
   4. Plasma
7. When liquid water freezes to form ice the molecules are
   1. Losing energy
   2. Gaining energy
   3. Energy is staying the same
   4. Unable to tell
8. Given the following chart, what is the order of elements from the most dense to the least dense

|  |  |
| --- | --- |
| Element | Density |
| Aluminum | 2.7 g/cm3 |
| Iron | 7.9 g/cm3 |
| Gold | 19.3 g/cm3 |
| Mercury | 13.5 g/cm3 |

* 1. Aliminum, Gold, Mercury, Iron
  2. Gold, Iron, Mercury, Aluminum
  3. Iron, Gold, Aluminum, Mercury
  4. Gold, Mercury, Iron, Aluminum

1. Given the formula D=M/V, what is the density of a rock measuring 64 grams and 16 cm3
   1. 0.25 g/cm3
   2. 4 g/cm3
   3. 8 g/cm3
   4. 1 g/cm3
2. Which of the following is a compound
   1. He
   2. N2
   3. HCl
   4. O
3. Which of the following is an element
   1. NaCl
   2. H2O
   3. O2
   4. CO­2
4. Tess has an unknown substance and after a chemical reaction she has 2 new substances with different properties. She can conclude that the original substance was an
   1. Element
   2. Compound
   3. Mixture
   4. Oxygen
5. Jayden separates substances by sorting them into groups. After separating them, each group has different properties. Jayden can conclude that the original substance was an
   1. Element
   2. Compound
   3. Mixture
   4. Carbon Dioxide
6. Which of the following is a heterogeneous mixture
   1. A layered cake
   2. Oil and water
   3. A cup of tea
   4. Salt
7. The process of a solid turning into a gas is called
   1. Condensation
   2. Vaporization
   3. Solidification
   4. Sublimation
8. When Cole separates iron from salt why is it considered a physical separation
   1. Because he broke the chemical bonds between salt and iron
   2. Because he used physical means and did not change either substance
   3. Because there was a chemical reaction
   4. Because it took energy to remove the iron
9. Which gas is represented by the number 1 in the graph?
   1. Argon
   2. Hydrogen
   3. Nitrogen
   4. Oxygen