Matter

Chapter 2

Elements to memorize

- Elements between atomic numbers 1 and 30 AND
  - Hg, Ag, Au, Pt, Pb, Sn, Rn
- You will be responsible for knowing their names (spelt correctly) and their symbols
- You WILL have access to a periodic table

Classifying Matter

2.1

Key Ideas

- How can matter be classified?
- What are carbon and copper classified as elements?
- How are elements related to cmpds?
- What is the difference between a pure substance and a mixture?

What is Matter

- **Matter** is _____

_____

- Chemistry IS the study of matter and how it changes

What is Matter

- All matter is either a pure substance (_____ or _____) or a mixture
  - For Example
  - Silver is a _____
  - Salt (NaCl) is a _____
  - Gravel is a _____

Elements

- *Why are carbon and copper classified as elements?*
- **Elements** are _____

_____

_____

- An **Atom** is the _____

_____

Elements

- All matter is built from atoms. If all the atoms in a substance have the same identity, that substance is an _____.
- The graphite in your pencil point and the copper coating of most pennies are examples of elements.

Elements

- There are around 90 elements naturally found on earth
  - 1-90 except Pm and Tc
- The rest (93-118) are _____
  - These are all unstable and decay over time
  - Some decay very quickly while some last for years
  - Some of these have been found in very small quantities on Earth but for this class, they are man made

Elements

- Elements can be represented by symbols
  - These symbols are on the Periodic Table
    - Mercury = Hg, Carbon = C, Hydrogen = H
- The first letter is ALWAYS _____
- The second letter(s), if needed, are ALWAYS _____

Which of the following are correct?

1. H
2. sR
3. Li
4. b
5. C
6. M_N

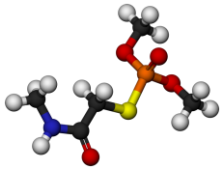
- Why are ____ wrong?

Molecules

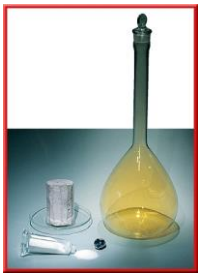
- A **molecule** is a _____

_____

; a molecule is the smallest unit of matter that can exist by itself and retain all of a substance's chemical properties.



Compounds (cmpds)



Cmpds

- But you do, probably every day, just not by themselves
- From the previous slide, the metal was sodium and the gas wash chlorine
- When these chemically combine, they form a cmpd called _____

Cmpds

- A **Cmpd** is a substance _____
_____
_____
- A compound forms when 2 or more elements combine to form a _____substance
- Also, a compound _____have the same properties as the elements in the compound
- Just like mixing a poisonous gas and a metal to make salt

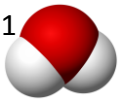
Cmpds

- A cmpd can be represented by a chemical formula

  Examples
  - Water =
  - Sugar =
  - Salt =
  - The _____number tells you how many of each element are present in the cmpd
    - How many are present in the examples?

- What is the chemical formula for the following?

1



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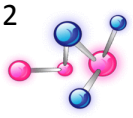

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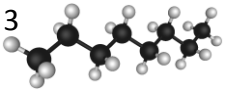

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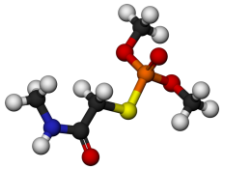


ID the following as elements or Cmpds

1. AgCl
2. Fe
3. Cu
4. Cu_2O
5. CO

- You many have to look around the Periodic Table a little….

Quick Activity

- 2.1 wkst (In class)
  - Get into a group of 2
  - You have 8 minutes…..GO

Pure Substances and Mixtures

- *What's the difference between a pure substance and a mixture?*
- A _____ is a sample of matter, either a single element or a single compound, that has definite chemical and physical properties
- A _____ is a combination of two or more substances that are _____ chemically combined

Pure Substances and Mixtures

- A pure substance, or simply a substance, is a type of matter with a _____.
- A substance can be either an _____ or a _____.
- Some common substances are:

- Which of the above are elements? Cmpds?

Mixtures

- A mixture is a material made up of two or more substances that can be easily _____ _____
  - Examples:
- What are some examples of physical means?
  - Examples:

Heterogeneous Mixture

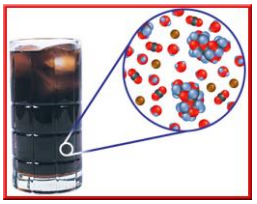
- Unlike compounds, mixtures do not always contain the same _____ of the substances that make them up.
  - Every
- A mixture in which different materials can be distinguished easily is called a _____ _____.

Heterogeneous Mixture

- Most of the substances you come in contact with every day are heterogeneous mixtures. Some components are easy to see, like the ingredients in pizza, but others are not.
- For example, the cheese in pizza is also a mixture, but you cannot see the individual components.

Homogeneous Mixture

- Soft drinks contain water, sugar, flavoring, coloring, and carbon dioxide gas.
- Soft drinks in sealed bottles are examples of _____ mixtures.



Homogeneous Mixture

- A _____ contains two or more gaseous, liquid, or solid substances blended evenly throughout.

Will it mix?

- Liquids and gases (fluids) can mix, or not
- When fluids mix, they are _____.
- When they do not mix, the are _____.
- Which are which…
  - Water and vinegar
  - Oil and water

Quick Activity

- Get a test tube
  - It should measure 14 cm tall and 2 cm wide
- Fill ½ of the test tube with tap water
- Slowly add (drop by drop) the oil to the test tube
  - Oil is in the pipettes
- Record your observations in your notebook
- Place your thumb over the top and shake for 10 seconds
- Record your observations

Assignment

- EOSQ - Page 50 (4,5,7,8)
- 2.1 Concept Review wkst
- TON 2.2

Properties of Matter

2.2

Key Ideas

- Why are color, volume, and density classified as physical properties?
- Why are flammability and reactivity classified as chemical properties?

Physical Properties

- *Why are color, volume, and density classified as physical properties?*
- Physical properties are characteristics that can be observed _____ changing the identity of the substance.

Physical Properties

- Any characteristic of a material that you can observe _____the identity of the substances that make up the material is a **physical property**
- Examples of physical properties are :

Physical Properties

- Physical properties can be observed or measured.
  - Like the properties on the previous slide
- _____: the temperature and pressure at which a solid becomes a liquid
- _____: the temperature and pressure at which a liquid becomes a gas
- _____: the ratio of the mass of a substance to the volume of the substance

Appearance

- How would you describe a tennis ball?

Behavior

- Some physical properties describe the behavior of a material or a substance.

- For example….
- Every substance has a specific combination of physical properties that make it useful for certain tasks.

???

- What are some physical properties of ….
  - Your friend
  - The desk
  - The school
  - Hawley
  - The Earth

Physical Properties

- Density is mass divided by volume
- Density and weight ARE NOT THE SAME
  - What is weight?
  - What is a label for weight?
- A common unit for density is g/cm^3
  - So, are density and weight the same?

Physical Properties

- What does it mean when you say something is "light" or "heavy"?

Practice

1. Find the density of a 15 g block that is 20 cm^3?
2. What is the mass of a block that has a density of 2.4 g/cm^3 and a volume of 1.4 cm^3?
3. What is the volume of a block with a density of 4.8 g/cm^3 and a mass of 5.3 g?

Changing density

- How can you change density?

In class

- Complete page 54, 1-3 in your notebook.
- You have 8 minutes… GO

Quick Lab

- Complete the Quick Lab on page 55 of your book
- Do this in groups of 4 (you choose)
- You have 20 minutes
- You will have to write a LAB REPORT for this lab
- It is due at the end of the chapter

Chemical Properties

- *Why are flammability and reactivity classified as chemical properties?*
- A _____ describes how a substance changes into a new substance, either by combining with other elements or by breaking apart into new substances.

Chemical Properties

- The tendency of a substance to burn, or its _____, is an example of a chemical property because burning produces new substances during a chemical change.
- A _____ is a characteristic of a substance that indicates whether it can undergo a certain chemical change.
- These properties are not as easy as physical properties to identify

Chemical Properties

- Examples:
- _____is the ability to burn
- _____is the capacity of a substance to combine chemically with another substance
- _____
- _____
- The key is.. The remaining cmpds/mix/element is now _____

Chemical Properties

- Are chemical properties always there?
- If a piece of wood is NOT burning, is it flammable?
- If a piece of iron is not rusting, does it have the ability to rust?

Quick Recap

- Physical Properties can be observed withOUT changing the identity of the substance while chemical properties MUST change the identity of the substance (to be observed)

Quick Lab

- Complete the Quick Lab on page 58
- Do this in groups of 4
- You have 15 minutes… GO
- Assignment
  - Observations of Cmpd A and B
  - Data Table
  - Question 4 (with an explanation)

Assignment

- EOSQ (1,2,4-7)
- 1.2 Concept Review wkst
- TON 2.3

Changes in Matter

2.3

Key Ideas

- Why is getting a haircut an example of a physical change?
- Why is baking bread an example of a chemical change?
- How can mixtures and compounds be broken down?

Physical Changes

- *Why is getting a haircut an example of a physical change?*
- A physical change affects one or more properties of a substance _____

_____

- **Physical Change:** _____

_____

_____

Physical Change

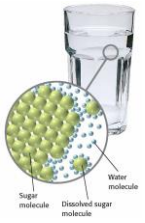
The Identity _____

- A change in _____is called a **physical change**.
- These changes might involve energy changes, but the kind of substance (the identity of the element or compound) _____change.

Explain…

- You find a nugget of gold and want to turn it into a ring.
- Do you still have the same gold as before?

Physical Change

- Which of the following are examples of a physical change?
  - Crushing a can
  - Cutting your hair
  - Bending a wire
  - Tearing a poster
  - Dissolving sugar in water ---------> 

A physical change is a change in…

1. Shape
2. State of matter
3. Size
4. Composition
5. More than 1
6. None of the above

Chemical Change

- Why is baking bread an example of a chemical change?
- A chemical change happens when one or more substances are changed into entirely _____
- **Chemical Change:** a change that occurs when one or more substances _____

_____

Detecting Chemical Change

The Identity _____

- A change of one substance to another is a _____.
- The foaming of an antacid tablet in a glass of water and the smell in the air after a thunderstorm are other signs of new substances being produced.

Detecting Chemical Change

- Clues such as _____ _____are helpful indicators that a reaction is taking place.
- However, the only sure proof is that _____ _____.
- The only clue that iron has changed into a ___ _____.
- Burning and rusting are chemical changes because _____.

Chemical Change

- Which of the following are examples of chemical changes

1. Rotting fruit
2. Rusting car
3. Melting ice
4. Leaves changing color
5. Antacid tablet in water (plop, plop, fizz, fizz)
6. Backing soda volcano

Chemical Change

- Signs of chemical changes

1. Color change
2. Change if odor
3. Production of heat
4. Production of sound
5. Production of light
6. Fizzing

Breaking Down Mixtures and Cmpds

- *How can mixtures and compounds be broken down?*

- Mixtures can be separated by _____ _____, but compounds must be broken down by chemical changes.

Breaking Down Mixtures and Cmpds

- Mixture examples
  1. Separating saltwater into its parts by heating it: When the water evaporates, the salt remains.
  2. Using a distillation device to heat a mixture whose components have different boiling points: The component that boils and evaporates first separates from the mixture.
  3. Using a centrifuge: The mixture spins rapidly until the components separate

Breaking Down Mixtures and Cmpds

- Examples of Cmpds
  1. When mercury(II) oxide is heated, it breaks down into the elements mercury and oxygen.
  2. When a current is passed through melted table salt, the elements sodium and chlorine are produced.
  3. When you open a bottle of soda, carbonic acid in the soda breaks down into carbon dioxide and water.

Assignment

- CR
- EOSQ (1-3, 5-7)