Chp4: Part 1:Elements & Compounds / Mixtures & Solutions 1pt ec printing

It's all elemental!

An element is about as simple as it gets. It cannot be broken down into anything else. We know a substance is an element if we keep making it smaller and smaller, but each piece is still made up of _____ type of atom. An element is a _____substance, or a substance that has only one type of particle or atom.

Gold = Element

For example, gold (Au), is a pure substance, an element. If you take a nugget of gold and keep breaking it down, each particle (atom) looks exactly the same. It is made up of ONLY gold atoms.

Names of Elements

Each element has a special name and some are very ancient. The element copper is derived from Cyprus, where it was once mined. Vanadium, which forms beautiful compounds, is named after the Scandinavian goddess Vanadis. The International Union of Pure and Applied Chemistry (IUPAC) decides on the element names.

Element Symbols

An element also has a _____, made up of either one or two letters. If the symbol has two letters, the first is capitalized and the second is _____ case. Many of the symbols are the first letter or two of the element: hydrogen (H), oxygen (O), nickel (Ni), helium (He). Other symbols are of the first letter and the 3rd letter, while others are derived from the Latin, Greek or German name: chlorine (Cl), iron (Fe).

Guessing Game:

Can you guess the right symbol for each element?

1. **Lithium:** _____
2. **Beryllium:** _____
3. **Boron:** _____
4. **Nitrogen:** _____
5. **Sodium:** _____
6. **Chromium:** _____
7. **Uranium:** _____
8. **Californium:** _____
9. **Plutonium:** _____
10. **Mercury:** _____

Element Properties

Every element is unique, with its own special properties that make it different from every other element. We call these _____ properties. Of course, some elements are pretty similar to one another, but there's always something that makes it different from the rest. These small differences, both physical & chemical, separate the elements into 3 main categories. **Element Categories:** There are 3 categories for elements:

1. _____ 2. _____ 3. _____

Each element falls into one of these categories and shares common properties, though keep in mind - there are always exceptions.

Metals

- _____ conductors of electricity and heat
- _____ (metallic luster)
- _____ (hammered into sheets)
- _____ (drawn into thin wires)

Example: **Aluminum (Al)**

Think of aluminum foil, it is a classic metal. Why?

- it's shiny
- It's malleable - flattened into very thin sheets
- it conducts electricity

Nonmetals

- _____ conductors of electricity and heat
- _____(not shiny)
- _____- not malleable •_____ ductile
- Examples: gases (Hydrogen, Helium, Oxygen, etc) & odd non-gases (Sulfur, Carbon, Phosphorous).

Metalloids or _____

- possess properties of both metals and nonmetals - some metalloids are ductile but not shiny, etc.
- Usually, they look like a _____, but behave chemically like a _____
- The 7 metalloids are: Boron, Silicon, Germanium, Arsenic, Antimony, Tellurium, Polonium.

Compounds

While some elements are found in their pure form in nature, most are bonded to other elements. A compound is a _____ substance made up of two or more elements that are _____ _____. In order to combine two elements to make a compound, the elements have to chemically react with one another. The elements in a compound are not simply mixed together, they are actually joined or _____ to one another in a specific way. Complicated?

Basically, ***a compound is one or more elements stuck together!***

Definite Ratios: What's more, a compound is made up of a _____of these elements. Salt (sodium chloride) is made up of 1 sodium atom and 1 chloride atom. The ratio is always 1:1 (1 to 1, or 1/1). It doesn't matter if you were looking at salt in California, Siberia, or Mars - it's always the same. Similarly, in water, there are always 2 hydrogen atoms to 1 oxygen atom. In fact, we call this the law of _____

Classified Compounds: We really have only two types of compounds:

1. _____are compounds that contain carbon (and usually hydrogen. They are called organic because it was ONCE believed that they could only be formed by living organisms.

2. _____are all other compounds

Compound Properties: Just like elements, each compound has unique properties that help identify and distinguish the compound. Usually, a compound's properties are _____from its constituent elements. For example, look at salt, sodium chloride. Sodium: reacts violently with water Chlorine: a poisonous deadly gas However, when we put the two together - we get salt, which is definitely safe to eat and dissolves in water.

Breakin' it down: Since compounds are made up of several elements, it makes sense that we can separate the elements. In other words, a compound can be broken down into similar elements through chemical change (heat, reactions). For example, carbonic acid is a gas that gives soda its carbonation or fizz. This compound can be broken down into simpler carbon dioxide and water. What happens when you open up a soda and leave it out? The released pressure lets the carbonic acid separate into its simpler elements - and goes flat.

IT'S NOT PHYSICAL: The only way to break down a compound is through CHEMICAL change, not physical change. Think about it - compounds are made up of elements that are BONDED to one another. The only way to rip apart the bonds is by providing some serious energy to the whole thing. _____is one way to separate a compound. _____ is another method, where an electric current is used to break down the compounds.

Review

1. What do you know about elements?

_____substances
_____ be broken down
Each element has _____properties
Classified into _____ _____ _____
Examples: Argon gas, Nitrogen gas

2. What do you know about compounds?

_____ substances
Made of 2 or more_____
Each compound has _____ properties that may differ from its individual elements
Always form in _____
_____ be broken down into simple substances
Example: water (H_2O, NaCl, CO_2)

3. What are the 3 categories of major elements? _____

4. Describe the differences between the three:

_____	_____	_____
good conductors, shiny, malleable, ductile	opposites of metals	act like both of them

5. How are elements and compounds alike? And different?

_____

_____

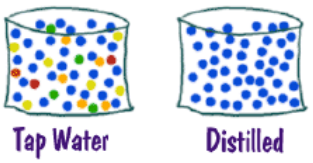
6. What are 2 ways to break down a compound? _____

Part 2: Mixtures & Solutions

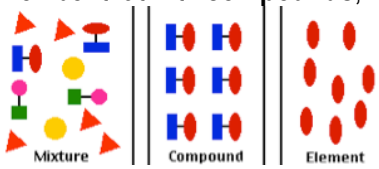
Pizza Pizza: What does it take to make the perfect pizza? A perfectly round and rolled out pizza dough, covered with an even layer of mouth-watering red sauce, buried beneath freshly grated mozzarella, and topped with your favorite toppings (pineapple!) What does this make? _____**!!** A pizza is a perfect example of a mixture. A mixture is a combination of two or more substances - that are _____ combined. If they react and combine chemically, it will become a _____ instead. The ingredients in a pizza are all mixed together, but you still have separate ingredients. The cheese and sauce haven't combined to make a brand new substance.

Example of a Mixture: Water

When you see distilled water, it's a _____
That fact means that there are just water molecules in the liquid.
Your tap water is a mixture of water with other things dissolved inside, maybe salt.



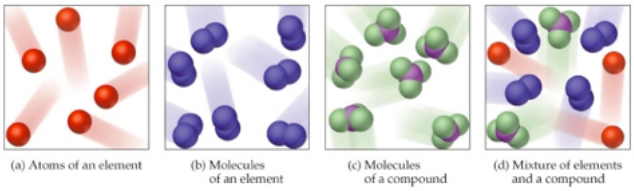
More & More Mixtures: Air consists of nitrogen, oxygen and other small amounts of various gases. Seawater is a mixture of water with dissolved chemicals such as sodium chloride. Gasoline is a mixture of hydrocarbons and other additives. People are highly complex mixtures made of mostly organic compounds. Medicine, perfume, the list goes on and on. Don't Change me! Mixtures don't like change & _____ In other words, because no chemical reactions took place, substances are the same before and after you mix them together. Because of this, it is still possible to _____ the substances from one another. Remember that with **compounds**, we can only separate them using chemical means (heating and electrolysis).



Yes I am different & special What else makes a compound different from a mixture? In a mixture, the components do not have a definite ratio. In your pizza, you can add as much cheese or as little sauce as your heart desires.

This is where it gets complicated - being able to tell the difference between a mixture and a compound. Think of water, a _____, made up of the elements hydrogen and oxygen. Not only is water totally different from its elements, but you can't easily separate the elements from the water. On the other hand, if you mixed sugar and sand in water, the mixture is both sweet (from the sugar) and gritty (from the sand). This sugar dissolves, but the sand doesn't - which lets you separate them easily. Isn't that genius?

Mixtures	Compounds
Made of	Made of
Components _____ their original properties	Components _____ their original properties
Separated by _____ means	Separated by _____ means
_____ ratio	_____ ratio



BrainPop: Compounds & Mixtures

1. How are mixtures created? A. Through physical changes B. Through chemical reactions C. Through anti-matter changes

2. How are compounds created? A. Through physical changes B. Through chemical reactions C. Through anti-matter changes

3. What is a true mixture?
A. It is always thicker than the 2 chemicals that go into it.
B. It retains the properties of the substances that make it up
C. It can never be separated into it's original substances.

4. What is a true compound? A. It does not retain the properties of the substances that make it up B. It must have water as one of its components C. It requires heat energy to make

5. Which of these is a compound? A.Soda B.Fruit juice C.Salt

6. Which of these is a mixture?
A. A chocolate chip cookie B. Salt C. Gold

7. What is the compound water made of?
A. 2 hydrogen atoms & 1 oxygen atom B. 3 hydrogen atoms
C. 2 oxygen atoms &1 hydrogen atom

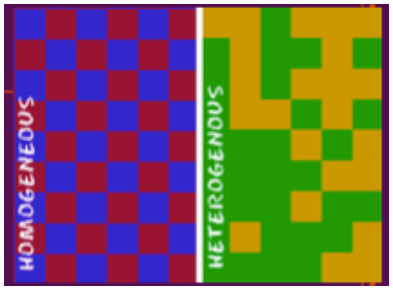
8. How many elements can bond together to form a compound?
A. Just 1 B. No more than 3 C. 2 or more

9. What can be separated into its elements fairly easily?
A. A compound B. A mixture C. A pure substance

10. What can we mix together?
A. Solids, liquids, & gases B. Only liquids C. Only solids & gases

Part 3: Solubility / Heterogeneous / Homogenous / Mixtures & Solutions

Solutions: A _____is a mixture that appears to be a single substance, but is made of particles of 2 or more substances that are evenly distributed among each other. They are also referred to as _____ In short, a **solution** is a **mixture**, where the particles are so well mixed that the composition is the same throughout and we can't see distinct molecules, even with a microscope.



Special Solutions: Not all solutions are _____. **Alloys** are solid solutions of metals and nonmetals that have dissolved in _____. Brass is an example of an alloy - it is zinc dissolved in copper. Steel is carbon and other elements dissolved in iron. Gases can be solutions too.

Homogenous Mixtures: A homogeneous mixture is a uniform mixture where you can't otherwise tell that there are multiple phases. If it's gases it's homogeneous. If it's solids you have to look at it. Steel is a mixture of iron and carbon, but you wouldn't know. A box of copper and steel nuts you can tell apart. **Homogenous Liquids**: If it's a liquid mixture and you can see through it it's homogeneous. Tea is a homogeneous mixture. Milk is not.

Heterogeneous Mixtures: If you can clearly tell that there is more than one thing in a container it's heterogeneous If there is a liquid that you can't see through it's heterogeneous. If you can tell there is an easy way to separate things then it's a heterogeneous mixture.

Summary: Two Types of Mixtures

1) Homogenous Mixtures

_____

_____

Elements or compounds which **CAN'T** be physically separated
- Looks like **a single** substance
- Particles are really really small
- Particles are thoroughly & evenly mixed

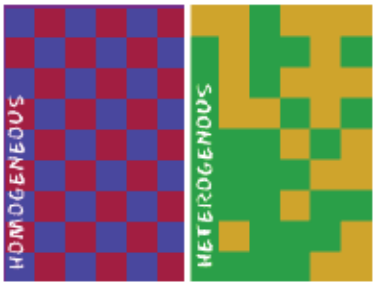
Examples: Oxygen/Carbon Dioxide

2) Heterogeneous Mixtures

_____

These **CAN** be physically separated
- Can see the different parts
- Particles range in size, but definitely visible

Examples: Salad, Pizza, soil, sugar water



Suspensions: A suspension is a _____where the particles are mixed in a solvent, but do not dissolve because they are large. Think of a snow globe. The snow particles are mixed in with the fluid, but do not dissolve. Dirty air is a suspension. Think about dust that floats around in the air, and you can see it when a beam of light falls on it. The dust particles are too big to fully mix and combine with the air/gas particles. Salad dressing is another example.

Solutes & Solvents: _____is when substances separate and spread evenly throughout the mixture.
_____ = the dissolved substance. _____ = the substance the solute dissolves in
If something is _____, that means it can dissolve in the solvent.
If it is _____, that means it cannot dissolve in the solvent (rocks in water).

Example: Salt Water: Salt is highly soluble in water - that means it dissolves in water.
_____ = the solute _____ = the solvent
In fact, water dissolves so many substances, that it is called the _____. The chemical that is the majority of the mass and is _____ another compound is the _____.
The compound making up the smaller share of the mass and is _____ is the _____

How much are you dissolving?
_____is the amount of solute dissolved in the solvent.
A lot of times, it is in grams per milliliter of solvent, or g/mL
_____ = less solute _____ = more solute
If the solute is colored, then a dilute solution is usually pale, whereas a concentrated solution is dark

Speed it Up! There are 3 methods to make a particle dissolve faster:
_____ - stirring or shaking causes the particles to separate and spread more quickly
_____ - causes particles to more more quickly and separate
_____- increases the amount of contact between the solute and solvent and causes better mixing
Video Notes: _____