October 9, 2018

6th Grade Properties of Matter Review

***Vocab***

* **Matter**: anything that takes up space and has mass
	+ Everything in the universe is composed of matter!
* **Element**: a type of matter that cannot be broken down into another substance by chemical reactions
	+ These elements combine in different ways to form *all* of the matter in the universe
	+ Elements are made up of atoms
* **Atom**: the smallest particle that an element can be broken down into and *still have all the characteristics and properties of that element*
	+ Atoms combine to form very different molecules and compounds
	+ The *type* of atom in a substance and the *amount* of atoms in a substance determine the substance’s properties
		- Different atoms 🡪 NaCl (table salt) is different from C6H8O6 (vitamin C)
		- Different amounts of atoms 🡪 C6H8O6 (vitamin C) is different from C12H22O11 (sugar)
* **Subatomic Particles:**  the tiny particles that are in an atom and determine its properties
	+ **Proton**: a subatomic particle with a positive charge
		- The proton determines the identity of an atom
			* Ex. any atom with 1 proton will always be hydrogen, any atom with 5 protons will always be boron, etc.
	+ **Neutron**: a subatomic particle with no charge
	+ **Electron**: a subatomic particle with a negative charge that orbits the nucleus
* **Periodic Table of Elements**: a table that organizes the elements according to their physical and chemical properties
	+ There are 118 elements on the Periodic Table
* **Atomic Number**: the number of protons and the number of electrons found in an element’s atom
	+ Atomic number = # protons = # electrons
* **Atomic Mass**: the mass of an atom’s protons and neutrons
	+ Atomic mass – # protons = # neutrons
* **Molecule**: a type of matter that is made up of two or more atoms
* **Compound**: a type of matter that is made up of two or more *different* atoms
* **Chemical formula**: tells how many of each element is in a molecule or compound
	+ Ex. H2O, C6H8O6, NaCl, H2SO4

 

* **Density**: a property of matter that defines how much matter exists in a particular space
* **Solubility:**the ability of a solid to dissolve in a liquid
	+ Solute: the substance that is present in smaller amounts and *dissolves*
	+ Solvent: the substance that is present in larger amounts and *causes the solute to dissolve*
* **Miscibility**: the ability of a liquid to mix with another liquid

 

* **Physical Property**: a property of a substance that can be observed without changing the

substance’s identity

* + Ex. color, texture, smell, taste, density, freezing point, melting point
	+ Solubility and miscibility are physical properties
* **Chemical Property**: a characteristic that can be observed by changing the identity of the

substance in a chemical reaction

* + Ex. reactivity to acids, combustion
	+ Evidence of a chemical reaction: temperature change, gas formation, color change
* **pH:**a property used to describe whether a compound is an acid, base, or neutral substance
	+ A pH less than 7 is acidic, 7 is neutral, and a pH greater than 7 is basic



***Focus Questions – review your LabLearner Investigations for help with these questions!***

**Can you tell the difference between an element and a compound by measuring mass and volume?**

* No, because properties such as color, texture, visual appearance, mass, and volume are similar for many elements and compounds.

**Can you determine the identity of an unknown substance by observing its mass and volume?**

* A definite identification using just mass and volume is not possible because mass and volume are similar for many elements and compounds.

**Can you tell the difference between an element and a compound by calculating density and observing chemical reactions?**

* No, because elements and compounds can have similar densities or react in similar ways during chemical reactions.

**Can you determine the identity of an unknown substance by calculating its density and observing chemical reactions?**

* No, because different substances can have similar densities or react in similar ways during chemical reactions.

**Do compounds composed of the same elements have identical properties?**

* Not necessarily
* Remember from Lab #4, Vitamin C, sugar, vinegar, rubbing alcohol and vegetable oil are all composed of the same elements (C, H, and O, or **C**arbon, **H**ydrogen, and **O**xygen). However, vitamin C and sugar are solids and rubbing alcohol, vegetable oil and vinegar are liquids.

**Can compounds composed of different elements have similar properties?**

* Yes, compounds composed of different elements can have similar properties.
* Salt (NaCl), sugar (C12H22O11), and calcium carbonate (CaCO3) are composed of different elements but they are all white solids.
* Salt, sugar, and vitamin C are composed of different elements, but are all soluble in water.

**Do compounds composed of the same elements have a similar or dissimilar pH?**

* Compounds made of the same elements may have a pH that is either similar or dissimilar to each other.
* For example, vinegar and vitamin C are composed of the same elements and have a similar pH in that they are both acidic.
* However, vinegar and vitamin C had very different pH’s compared to vegetable oil and sugar, which are also composed of the same elements.