

Matter

1. Matter is defined as **anything that has mass or takes up space**
2. The states of matter are:
 - a. **Solid**
 - b. **liquid**
 - c. **gas**
3. Which state of matter has changeable shape but definite volume? **liquid**
4. Which state of matter has changeable shape and changeable volume? **gas**
5. How would you describe a solid? **Definite shape and volume**

Energy

1. Energy is the **capacity** to do work.
2. What are the 2 types of energy? **Kinetic** and **potential**
3. What type of energy is considered energy in action? **kinetic**
4. What type of energy is stored or inactive? **potential**

5. Can energy be transformed? **Yes because stored energy can be released**
6. What type of energy is stored in bonds of chemical substances? **Chemical energy**
7. What energy results from movement of charged particles? **Electrical energy**
8. How would you describe mechanical energy? **Directly involved in moving matter**
9. What is electromagnetic or radiant energy? **Energy that travels in waves, ex: light**
10. Energy conversion, is it efficient or inefficient? Why? **Inefficient because some is lost as heat**

Atoms and Elements

1. What is an element? **substances that cannot be broken down into simpler substances**
2. There are 4 elements that make up 96% of the body, what are they?
 - a. **oxygen**
 - b. **carbon**
 - c. **hydrogen**
 - d. **Nitrogen**

3. What is an atom?
 - a. A unique **building block** for each element
 - b. The smallest **particle** of a **element**
4. What is a 1 or 2 letter symbol that defines each element? **Atomic symbol**
5. What are the 3 subatomic particles:
 - a. **Proton** - have a positive charge with **1** AMU
 - b. Neutrons- have a **no/neutral** charge with **1** AMU
 - c. **electrons**- have a **negative** charge with no AMU
6. Protons and neutrons are found in the **nucleus**, while electrons orbit around the **nucleus**
7. What is an Atomic Number? **Number of protons**
8. What is the Mass Number? **Protons and neutrons**
9. What exactly is an isotope? **Structural variation of the original element**
 - a. What makes the isotope different? **The number of neutrons**

- b. Are isotopes very stable? **No they are radioactive**

Combining Matter

1. What is the difference between a compound and a molecule? **Molecule- general term for**

2 or more bonded atoms, Compound- specific molecule that 2 or more different bonded atoms

- a. What is a good example of a compound found in our bodies? **Glucose,**

C₆H₁₂O₆

2. What is a mixture? **2 or more components that a physically intermixed**

3. What are the 3 types of mixtures?

- b. **Solution** - homogenous

- i. **solvent**- present in the greater amount

- ii. Solute- **substance dissolved in solvent**

- iii. True solutions are **usually transparent**

- c. **colloid**- heterogenous and does NOT settle out

- i. Also known as **emulsions**

ii. How does this mixture appear? The mixture

has a cloudy or milky look

d. suspension- heterogenous, with large visible solutes that settle out

i. What was a good example of this? Water

and sand, blood and plasma

Chemical Bonds

1. Chemical bonds are “energy relationships” between electrons of reacting atoms.
2. Electrons are the subatomic particles that are involved in all chemical reactions.
3. Electron shells are also referred to as energy levels
 - a. Shell 1 contains 2 electrons.
 - b. Shell 2 and on contains 8 electrons.
4. The outermost shell is known as the valence shell.
5. Which electrons are involved in chemical reactions? Valence electrons
6. What is the Octet Rule? Atoms desire 8 electrons in their outermost shell to be satisfied

7. Valence shells that are filled are known as **inert** or chemically unreactive. A good example of this is noble gases.
8. Many atoms do not have full valence shells, what do they do to try to achieve stability
- a. **Gain electrons**
 - b. **Lose electrons** or
 - c. **share electrons**

Bonds

1. What type of bond has ions that have gained or lost an electron and become charged?

Ionic bond

- a. Which ion has gained an electron, so it has become more negative? **anion**
 - b. Which ion lost an electron, so it becomes more positive? **cation**
 - c. Why are these ions attracted to each other? **They are opposite charges, so they are attracted to one another**
 - i. Is this a weak or strong bond? **Relatively weak bond**
2. What type of bond is formed by sharing 2 or more valence shell electrons between atoms? **Covalent bond**

a. What are the 2 different types of this bond? **Polar covalent** and **nonpolar covalent**

i. A **polar** covalent bond is the unequal share of electrons, where some electrons spend more time orbiting one atom compared to the other, giving the molecule poles.

ii. What is it referred to as when a molecule has 2 different charges? **The molecule is called "dipole"**

iii. What gives water its major properties? **It has a polar covalent bond**

iv. Which end of a water molecule would you assume has the electronegative end? **The oxygen, because it is a larger atom than hydrogen**

v. Why does water "clump together?" *remember the penny example from class* **the negative end of the water molecule is attracted to the positive end of other water molecules**

vi. In a **nonpolar** covalent bond, sharing is equal, so you do not have poles.
A good example of this is **carbon dioxide**

vii. Do these 2 types of bonds want to interact? **No**

3. What type of bond is formed between an electropositive hydrogen of one molecule and an electronegative atom of another molecule? **A hydrogen bond**
- a. Is this even truly a bond? **No it is more of a weak attraction**
 - b. It also acts as **intramolecular** bonds, meaning it helps fold proteins into specific shapes
4. In order, what bond is strongest to weakest? **Covalent, ionic, hydrogen**