**Matter Notes:**

**Unit 1: Materials and Processes that Shape a Planet**

**Mini-Unit:** Chemistry of the Earth

**Goal 2**: The student will demonstrate the ability to describe and classify materials that make up Earth

**Objectives – The student will be able to:**

* Illustrate the chemical structure of the atom and describe characteristics of protons, neutrons, electrons, and the nucleus
* Distinguish among compounds, mixtures, molecules, and isotopes

**Textbook:** Chapter 4, Page 80

Matter:

Matter –

Mass –

Properties of Matter:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – characteristics that can be observed without changing the compositions of the substance

Ex: density, color, hardness, freezing point, boiling point, and the ability to conduct an electrical current

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – characteristics that describe how a substance reacts with other substances to produce different substances

Ex: ability to form rust, ability to form/not form certain compounds

Density –

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the smallest unit of an element that maintains the chemical properties of that element; cannot be broken down into smaller units that still have the same chemical and physical properties of that atom

Atomic Structure:

Atoms are made up of subatomic particles

1. Nucleus –
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – positively charged subatomic particles found in the nucleus, the number of protons determines the atomic number and the identity of the element
3. Neutrons –
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – subatomic particle with a negative charge found in a certain region of space around the nucleus called the electron cloud; kept close to the atom due to the attraction between the opposite charges of the electron and proton

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – a substance consisting of only one type of atom, cannot be broken down or separated into simpler substances by chemical means; all elements have the same atomic number

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the number of protons in a nucleus; all atoms of any given elements have the same atomic number; because an uncharged atom has the same number of protons and electrons, typically the number of electrons is the same as the atomic number

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– the sum of the number of protons and neutrons in an atom; expressed in atomic mass units (amu) where a proton and a neutron both have a mass of 1 amu; electrons (1/1840 amu) are ignored when determining atomic mass

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– a chart that classifies the elements into columns, where elements in the same columns have similar electron arrangements thus they have similar chemical properties

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – an atom that has the same number of protons (or the same atomic number) as the other atoms of the same element do but that has a different number of neutrons (and thus a different atomic mass)

Combinations of Atoms:

Compound –

Molecule –

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 Elements 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_🡪 Compounds

A chemical formula is a combination of letters and numbers which show what elements and how many atoms of each element make up a compound.

Ex: H2O – chemical formula for water; H2 tells you have two hydrogen atoms while the O tells you have one atom of oxygen

A chemical equation is a series of letters and numbers which show you the reactants and products of a chemical reaction

Ex: CH4 + 2O2 🡪 CO2 + 2H2O, One molecule of methane reacts with two atoms of oxygen to create/yield one molecule of carbon dioxide and two atoms of water

Chemical Bonds:

Chemical Bonds –

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – once two atoms exchange an electron, one is positively charged (lost the electron) and the other is negatively charged (gained the electron), the opposite charges attract forming an ionic bond

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – an atom or molecule that has gained or lost one or more electrons and has a negative or positive charge

Ex: if an atom gains an electron it becomes a negative ion, if it loses an electron it becomes a positive ion

Covalent Bond –

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – unequal sharing of electrons leads a molecule to have a slightly positive end and a slightly negative end