Chemistry

Science, Chemistry

Chemistry Types pf Compounds * Homogeneous mixtures are composed of one or more parts that look as one. * Heterogeneous mixtures consist of two or more substances and do not look as one. * Compounds are two or more elements that are chemically combined. * Matter that contains more than one kind of particle. * Elements are pure substances that cannot be broken down into smaller parts. * Solutions are a mixture of one or more substances and is homogeneous. * Pure substances contains one kind of particle. * Mechanical Mixtures area mix of substances that is heterogeneous. Phsical and Chemical Properties Physical Properties * Physical Property- a characteristic of a substance that can be observed and measures without changing the identity of the substance. * Qualitative Physical Properties: Colour, Smell, State (solid, liquid, gas), texture, lustre (shiny, dull), malleability (soft, pliable, hard). * Quantitative Physical Properties: Viscosity, Melting Point, Boiling Point, Solubility, Hardness, Conductivity, Density. Chemical Properties * Chemical Property- the ability of a substance to change and form new substances. * Chemical Reactivity- With water, oxygen, acids, or another pure substance. * Combustibility- the ability of a substance to burn in air * Stability- the ability of a substance to remain unchanged. * Toxicity- the ability of a substance to cause harmful effects in plants and animals. Signs 1. Heat is produced. 2. Colour changes. 3. Bubbles form. 4. Precipitate forms(white specs at the bottom of the container). In Contrast Physical PropertiesChemical Properties * size, shape, color, temperature, texture, and weight. * Never changes forms. * Can be observed without changing identity. * Two substances reacting on act other. * Things that we cannot sense with our seances. * Changes and forms new

substances. Density Formula Mass Density = Volume Evolution of the Atomic Model Democritus - the Greek philosopher that proposed the atom. Dalton - proposed a theory that atoms cannot be broken/broken down, they can form compounds, and atoms are different for every single element. Thompson - discovered the electron and that all atoms had negatively charged particles. Proposed that the atom was a lump of positively charged material, with electrons inserted throughout. (Raisin Bread Model). Rutherford - proposed that all atoms had a nucleus. Shot alpha particles at gold foil, and some bounced back, therefore, he inferred that there must be a small region of positive particles; the nucleus. Bohr - discovered the energy levels in the atom, stating that only a certain amount of electrons can be on these levels at once, and that they can move from level to level, the electron has to absorb a certain energy level. Chadwick- British physicist that once work with Rutherford, was the first person to experimentally show that neutral particles (neutrons) help make the nuclei of most atoms. He was awarded the Nobel Prize in 1935. Atomic Structure Mass Number- The sum of the number of protons and neutrons in the nucleus of an atom. Atomic Mass Number- The number of Protons in the nucleus of an atom. Valence Electrons- An electron in the outmost occupied energy level of an atom. Periodic Table Developed In the 1860's a Russian chemist named Dimitri Mendeleev organized known elements looking for patterns in their properties. He put them in order of atomic mass. Mendeleev left gaps in his table wherever there seemed to be a break in the pattern of the properties. Classes Metals are located to the left of the zig zag line. Good conductors of electricity and heat. they are malleable and ductile. About 80 elements are metals. Non Metals- located to

the right of the zig zag line. Brittle, dull; not ductile or malleable. Poor conductors of heat and electricity. Only 18 elements are nonmetals Metalloids - are located on the zig zag line. They have shared properties between metals and non metals. Periods/Groups/Families * Group 1 - the alkali metals (soft, solid, silver, very reactive) * Group 2- the alkaline earth metals (soft, very reactive) * Group 17 - halogens (very reactive non metals) * Group 18 - noble gasses (non reactive gasses) * Group - elements with similar chemical properties in a vertical column. * Period - the horizontal row of elements. * Zig Zag line - the line that separated metals (left) from non metals (right). Metalloids are inside the line. Compounds Ionic Bond/Compound * Ionic Compounds form when one atom transfers one or more electrons to another atom. * They do this because they want to fill the valence shell of the atom, which makes the atom more stable. * When a neutral atom transfers the electron both atoms become Ions, which mean the are positively or negatively charged atoms. * Ionic Bonds are the force that pulls the valence electron away from their original atom. * Ionic Compounds are very conductive of electricity. Molecular Compound/ Covalent Bond * A molecular compound is a compound that is formed when atoms of two or more deferent elements share electrons. * A covalent bond is a chemical bond in which one or more pairs of electrons are being shared by two atoms. * Covalent bond are what hold the molecular compound together. Biology Parts of and Ecosystem Biotic Preditation * When one organism consumes another organism for food. * Organism that is consumed is called " prey". * Organism that is consuming is called the " Predator". * Linked to Trophic Levels, and the Food Chain. Symbiosis * The interaction

between members of two different species * Both species are benefiting from the other * No one gets " shafted" in the relationship. * Ex: Mushroom help the trees with absorption, the tree in return, produces glucose for the Mushroom. Competition * Occurs when two or more organisms compete for the same resources such as food in the same location at the same time. * Takes energy. Energy that is taken away from competition is energy that is taken away from other important life process such as, growth and reproduction. * One organism can be outcompeted by another group. * Can influence the population size. Abiotic Water * Needed to survive. * Plants suck the water from their roots. * Animals use to regulate their body temperature. Oxygen * Animals sand plants use for respiratory process. * Aquatic animals can get the oxygen from the water. Light * Plants use for photosynthesis. Nutrients * Needed for all organisms to grow. Soil * Provides nutrients to plants. * Provides a habitat for many micro-organisms. Nutrient Cycles Page 14&15 Photosynthesis Photosynthesis- A process that changes solar energy into chemical energy. Chlorophyll- The pigment that gives leaves their green colour. It is also a key player in Photosynthesis. How? Sugars, including glucose, are in a class of molecules called carbohydrates. Carbohydrates are made from carbon, oxygen and hydrogen. This plant needs to supply these elements to make glucose. They get the hydrogen from water, they get their carbon and oxygen from tiny pores in their leaves called, Stomata. The Chlorophyll in the plant leaves uses solar energy to assemble glucose molecules from water and carbon dioxide. Oxygen is also produced during photosynthesis. See page 22. Purpose The purpose of Photosynthesis is to generate food in the form of glucose to the plant so it

can grow and survive. Cellular Respiration Cellular Respiration- A process that releases energy from organic molecules, especially carbohydrates, in the presence of oxygen. How? The glucose that was originally assembled by the photosynthesis, is broken down to make it available for the body to use for its cells. Its amazing, the energy that you use when you blink, comes from cellular respiration. In contrast to photosynthesis, cellular respiration consumes oxygen and produces carbon dioxide. Purpose The purpose of cellular respiration is to break down food (glucose) to release energy(carbohydrates). Trophic Levels * Since it is impossible for energy to be created, there needs a way for organisms to produce energy. This energy can be transferred through, trophic levels. Trophic Level- A category of organism that is defined by the way they gain their energy. * Primary Producers are organisms that can make their own food, for example, plants. They are in what is called the First Trophic Level. * Consumers are organisms that cannot make their own food. Consumers must consume other organisms to get their own food or energy. Their are three trophic levels for consumers, their levels depends of their place in the food chain. * Biomass-the total mass of living organisms in a defined group or area. * Levels- The first trophic levels is for Primary Producers. The second trophic level is usually small animals such as insects or small mammals. The third trophic level is small birds, medium sized rodents, and small reptiles. The fourth trophic level is made up of large animals such as large birds, large mammals and large reptiles. * All levels of this food chain are linked to decomposers. Decomposers take the nutrients from the waste and decaying bodies, and puts them back into the abiotic parts of the eco-system so they can be used

again. Trophic Efficiency * Biomass- the mass of living cells and tissues that has been assembled by organisms using solar energy. Leaves, stems, wood and flower nectar are all parts of a plant that are packed with chemical energy due to solar energy. So, indirectly animals rely on solar energy for energy. * Trophic Efficiency- the measure of how much of the energy in an organism at one trophic level is transferred to the next trophic level. * This number of efficiency is always smaller than 100% because the organism uses some of that energy for its life functions as well as its waste products. * The energy units drop about 10% each level. * See figure 1. 16 * For example, if a plant has 1000 units of energy, a mouse comes along and eats the plant the mouse will only get about 100 units of energy. A snake eats that mouse , the snake will only get 10 units. Then a hawk comes and consumes the snake the hawk will only get about 1 unit of energy. * Many reasons for the decrease in energy. Herbivores don't eat all parts of the plant. Not everything that an animal eats is digested, such as bones. Also energy is lost from the animals body heat. * Because of the inefficiency there are are fewer carnivores than herbivores, and fewer herbivores than plants. Populations * Population- All the individuals of a species that occupy a particular geographic area at a certain time and can successfully reproduce. * Exponential Growth- accreted growth that produces a " j" shaped curve when population is graphed time. * Can be caused by new habitat or when pressure is removed from the species. * Limiting factors- a factor that limits the growth, distribution, or amount of a population in an ecosystem. * Limiting factors can be cause by exponential growth. If the population gets to large too fast the resources needed can run out. Biodiversity *

Biodiversity- The number and variety of life forms, including species, found within a specific region as well as all the number and variety of ecosystems within and beyond that region. * Scientists predict that there is between 5-100 million species, however they have only found 2 million. * A main goal for scientist is to document the biodiversity of earth. * Includes earths ecosystems. * For biodiversity to remain high diverse ecosystems need to remain sustainable. * Nutrient and energy cycles of one ecosystem can effect those of another. * Preserving and protecting each species and he ecosystems they inhabit are critical to maintaining biodiversity on Earth. Measuring * Canopy Fogging- Used for insects. Scientists spray a large tree with insecticide, when the insects drop, they fall on to a large sheet. Scientist can then keep and observe some insects. * Quadrant Sampling- A quadrant is a large square, that can rage in size from 1 m2 to 20 m2. They are used to count different species inside the quad. The counting can take be repetitive to get a correct representation. * Transect Sampling- When scientist use a roll of string or measuring tape, with intervals to count the amount and type of species. Every interval the type and number of species are recorded. * Netting- Fine mesh nets are set up, in terrestrial ecosystems for bats and birds, in aquatic ecosystems for fish. oct captures the organism is identified, measured, and their blood is taken for genetic analysis. Usually the organism is tagged then released. Communities * Community- all the populations of the different species that interact in a specific area or ecosystem. * Ex. Coral reef is home to many different populations of species. * Important Species. Some species have greater affect on an ecosystem than others. This can be because they have a high population or they preform a critical ecosystem

service. They can also change the environment physically. Three species that effect an ecosystem are…. * Dominant Species- species that are so abundant that they have the biggest biomass of any community member. * Keystone Species- a species that can get greatly affect population numbers and the health of an ecosystem. * Ecosystem Engineer- a species that causes such dramatic changes to landscapes that it creates a new ecosystem. * * Captive Breeding- the breeding of a rare or endangered species in controlled settings to increase settings to increase the population size. * Succession- the series of changes in an ecosystem that occurs over time, following a disturbance. Restoration Ecology * Restoration Ecology- the renewal of degraded or destroyed ecosystems through active human intervention. * Stewardship- the active assumption of responsibility for the welfare of the environment. Restoration Methods * Reforestation- The regrowth of a forest, either through natural process or through the planting of sees or small trees in an area where a forest was cut down. * Wetlands Restoration- Wetland restoration is a process in which a wetland is, to the greatest extent possible, returned to its natural state in terms of soil quality, composition, water coverage, and the type of plants that grow there, and the habitat. * Biocontrol (controlling alien species)- The use of a species to control the population growth of undesirable species. * Chemicals (controlling alien species)- The use of chemicals to drive away unwanted species from an ecosystem. Can be harmful to the other species. * Bioremediation- The use of living organisms to clean up contaminated areas naturally. * Bioaugmentation- The use of organisms to add essential nutrients to deleted soils.