DOWNLOAD PDF ELEMENTS COMPOUNDS (BUILDING BLOCK OF MATTER)

Chapter 1 : Using Lego Bricks: Elements, Compounds, and Mixtures Activity â€“ Middle School Science Bl

Elements and Atoms: The Building Blocks of Matter By the end of this section, you will be able to: Discuss the relationships between matter, mass, elements, compounds, atoms, and subatomic particles.

What do you think makes up all the items in the classroom? Some students may answer more concrete things, such as: All living and non-living things around us are made up of stuff called matter. In fact, any item that has mass and takes up space can be considered matter. Do you know what the basic building blocks of matter are called? Well, the basic building blocks that make up matter are called atoms. Sometimes two or more atoms bond, or stick together, and form a molecule. A molecule is the smallest part of a substance that still has all the properties of that substance. For example, a water molecule is made up of two hydrogen atoms and one oxygen atom. Sometimes, a molecule is made up of two or more of the same atoms, such as a helium gas molecule. The matter and molecules that make up the world around us are formed mostly by many different atoms bonding together â€” each having their own properties or attributes. Atoms are little, but they pack a wallop when their energy is released. Atoms consist of three particles: It is easy to remember the types of charges on each of these particles when you use a simple association. For example, protons are positive, and both of those words start with p. Also, neutrons are neutral, which start with n. Then we only have to remember one particle: Where are all these particles located in an atom? The electrons exist in orbits or shells that spin around the nucleus of the atom, which contains the protons and neutrons. In reality, these shells looks like fuzzy clouds that the electrons move about in. Engineers use their knowledge of the structure of atoms to do everything from developing new materials non-stick coatings for frying pans, safer football helmets, carbon fiber for faster cars and lighter prosthetics and bicycles, etc. They also create machines, such as lasers, to artificially create elements. Lasers are used in the medical and dental fields, as well as in various types of industry. During this lesson, we are going to learn more about matter, and the basic building block of matter â€” the atom. Democritus was the first to theorize that matter was made of small pieces. Leucippus was the first to use the term atom atomon , which meant "indivisible" in Greek. We now know that the atom is divisible and is made of even smaller pieces â€” the puzzling subatomic particles. Because the Greeks had no way to test and verify their theories, we had to wait almost years to confirm that atoms do exist, though not quite the way the Greeks imagined. In the 16th century, Robert Boyle came up with the notion that there were elements that could not be broken down any further, but it was not until the 18th century that John Dalton reasoned that elements might be made of atoms. The Atom and Atomic Structure The basic facts to know about the atom are that it is made up of three basic subatomic particles: Generally, the number of protons and electrons balance out to make the atom have an electrically neutral charge. Electrons that are farthest away from the nucleus of an atom valence electrons are the ones that are most easily shared with or transferred to other atoms. The atoms that are missing an electron or share an additional electron are called ions and combine easily with other ions to make molecules. The number of protons in an atom is called the atomic number. This number determines the element of the atom. Within an element, the number of neutrons may vary, creating the different isotopes or nuclides. For the most part, this does not affect the electrical and chemical behavior of the atom. There is some exception with the mass of the isotope, as heavier isotopes tend to react more slowly than lighter ones. There are some things that affect the number of protons and neutrons in the nucleus of an atom, including nuclear fission, nuclear fusion and radioactive decay. Normally, though, the number of electrons is the particle that is most easily changed, because of its lower bonding energy. Traditionally, the atom was represented as a kind of miniature solar system. Now, scientists understand that if we could see an atom, it would look more like a fuzzy little cloud. In fact, scientists can only predict where an electron might be in its shell using the probability theory: How small are we talking? The three main ones are protons and neutrons, which are found in the nucleus or core of the atom, and electrons, which exist outside of the nucleus. Physicists have recently divided atoms into even smaller subatomic particles such as fermions quarks, leptons,

neutrinos, electrons and bosons gluons, photons, gravitrons. It is difficult if not impossible to determine the physical properties of something based on the number or quarks and leptons it contains. The things we see in our world water, wood, metal, skin, teeth are better understood and organized by using the number of protons, neutrons and electrons their atoms and molecules contain. The basic unit of matter; the smallest unit of an element, having all the characteristics of that element; consists of negatively-charged electrons and a positively-charged center called a nucleus. The theory that all matter is made up of fundamental particles called atoms; the concept of an atom as being composed of subatomic particles. Particle orbiting the nucleus of an atom with a negative charge. The smallest unit of a substance that retains the chemical and physical properties of the substance; two or more atoms held together by chemical bonds. Particle in the nucleus of an atom with no charge. Dense, central core of an atom made of protons and neutrons. Particle in the nucleus of an atom with a positive charge. Associated Activities Gumdrop Atoms - Using gumdrops and toothpicks to make atom models, students learn the basic components of the atom, their charges and basic configuration. They also learn that the atom is made up mostly of space and that electrons move about the nucleus in an electron cloud. Matter Matter is anything that has mass and takes up space. The basic building blocks that make up matter are called atoms. What are the different particles found in atoms? Protons and neutrons are found in the nucleus, and electrons are found in shells around the outside of the nucleus. Who remembers what a molecule is? A molecule is the smallest part of a substance that still has all the properties of that substance; when two or more atoms bond, or stick together, they form a molecule. The atom still has many mysteries to discover. In the last years, we have learned new things about how an atom behaves, but there is still so much more to learn. When your parents were growing up, they did not have some of the technology we have today. Advancements made in particle technologies, such as the use of lasers, have occurred because engineers have used the atomic discoveries of scientists to create devices that make our lives better and advance human society. Lasers are used in industry, medicine, military and even many consumer products, such as computers and DVD players. Solicit, integrate and summarize student responses. Ask students to look around at the items in the classroom, and then ask them what they think the "stuff" is that makes up the items in the classroom. Include technology items, such as computers, telephones and intercoms. Atoms, matter, solid stuff, etc. Count the votes and write the totals on the board. Give the right answer. An atom is the smallest building block of matter Answer: True True or False: Molecules are made up of two or more atoms. True; a molecule is also the smallest part of a substance that still has all the properties of that substance. Electrons are found in the nucleus of an atom. False; electrons are found in shells around the outside of the nucleus. Engineers use their knowledge of atoms and molecules to develop new technologies. Lasers are only used in science laboratories. False; lasers are used in many things, including industry, dental and medicine, military and consumer products, such as computers and DVD players. Lesson Summary Assessment Flashcards: Each student on a team creates a flashcard with a question on one side and the answer on the other. If the team cannot agree on the answers, they should consult the teacher. Pass the flashcards to the next team. Each member of the team reads a flashcard, and everyone attempts to answer it. If they are right, they can pass on the card to the next team. If they feel they have another correct answer, they should write their answer on the back of the flashcard as an alternative. Once all teams have done all the flashcards, clarify any questions. Is the charge of a proton positive, negative or neutral? Positive What atomic particles exist in the nucleus? People who develop curriculum and training programs frequently rely on a subject matter expert or SME pronounced "smee" â€” frequently engineers or other professionals â€” to give them the latest scoop on the material. For this activity, each student could become a SME on a subject area and give a poster presentation at a "Puzzling Particles" class science fair. Students could individually pick a subatomic particle and become a specialist on that subject. Or, several students could work together to explain atomic structure, for example, demonstrating how electrons move in shells. Students should be encouraged to act out the properties of the particles. Individually, have students may investigate atoms via the Internet or other sources.

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Chapter 2 : Elements and Atoms: The Building Blocks of Matter - Medicine LibreTexts

Elements and Compounds All matter in the natural world is composed of one or more of the 92 fundamental substances called elements. An element is a pure substance that is distinguished from all other matter by the fact that it cannot be created or broken down by ordinary chemical means.

Molecules Clusters of atoms held together by covalent bonds are called molecules. Compounds that exist as molecules are often called molecular compounds. Notice that the formula of ethane is given as C2H6, not CH3 its empirical formula. C2H6 is the molecular formula of ethane. It shows the actual number of atoms present in the molecule. But a molecular formula does not show what bonds are present in a molecule. This is done using a structural formula. A simple example to illustrate the idea: Carbon dioxide is a molecular compound with: Molecular formula C2H6O which shows that one molecule consists of two carbon, six hydrogen and one oxygen atom Structural formula which shows that two electrons are shared between the two carbon atoms, two are shared between the carbon and oxygen atoms, two are shared in each carbon-hydrogen bond and in the oxygen-hydrogen bond. Ethanol - click on image to open Molecules have three-dimensional shapes. Two atoms held by single covalent bonds are free to rotate relative to one another. This means that molecules can twist, flex and bend. The properties of a molecular compound are determined by: The structure of DNA was derived from a combination of experimental work and model-building. The models used by Crick and Watson were homemade. Nowadays commercial molecular model kits can be bought. But these are being surpassed by software packages that enable 3-D images to be manipulated on screen. You will use molecular modelling throughout much of this guide. The shape of a methane molecule A reminder about chemical formulae: The simplest ratio in which atoms combine to form a chemical is shown by its empirical formula. The number of atoms in a molecule is shown by its molecular formula. The arrangement of its atoms is shown by its structural formula. The arrangement of its atoms in space is shown by its displayed formula. Some groupings of atoms in a molecule have characteristic reactions no matter what the rest of the molecule looks like. These groupings are called functional groups. Here are some important ones that you will find in biological molecules:

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Chapter 3 : PPT â€“ Atoms,Elements, and Compounds PowerPoint presentation | free to download - id: a-Z

In nature, elements rarely occur alone. Instead, they combine to form compounds. A compound is a substance composed of two or more elements joined by chemical www.nxgvision.com example, the compound glucose is an important body fuel.

By the end of this section, you will be able to: Scientists define matter as anything that occupies space and has mass. An object of a certain mass weighs less on the moon, for example, than it does on Earth because the gravity of the moon is less than that of Earth. In other words, weight is variable, and is influenced by gravity. A piece of cheese that weighs a pound on Earth weighs only a few ounces on the moon. Elements and Compounds All matter in the natural world is composed of one or more of the 92 fundamental substances called elements. While your body can assemble many of the chemical compounds needed for life from their constituent elements, it cannot make elements. They must come from the environment. Calcium is essential to the human body; it is absorbed and used for a number of processes, including strengthening bones. When you consume dairy products your digestive system breaks down the food into components small enough to cross into the bloodstream. Among these is calcium, which, because it is an element, cannot be broken down further. The elemental calcium in cheese, therefore, is the same as the calcium that forms your bones. Some other elements you might be familiar with are oxygen, sodium, and iron. All the elements in your body are derived from the foods you eat and the air you breathe. Elements of the Human Body. The main elements that compose the human body are shown from most abundant to least abundant. In nature, elements rarely occur alone. Instead, they combine to form compounds. For example, the compound glucose is an important body fuel. It is always composed of the same three elements: Moreover, the elements that make up any given compound always occur in the same relative amounts. In glucose, there are always six carbon and six oxygen units for every twelve hydrogen units. In other words, an atom of hydrogen is a unit of hydrogenâ€”the smallest amount of hydrogen that can exist. As you might guess, atoms are almost unfathomably small. The period at the end of this sentence is millions of atoms wide. Atomic Structure and Energy Atoms are made up of even smaller subatomic particles, three types of which are important: Although this model is helpful in visualizing atomic structure, in reality, electrons do not travel in fixed orbits, but whiz around the nucleus erratically in a so-called electron cloud.

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Chapter 4 : Building Compounds

Elements built from Protons, Neutrons, and Electrons In the previous section we learned we could make these three building blocks protons, neutrons, and electrons out of energy. Now these three will be used to build the elements, or more specifically, the atoms of each element. All light or colors that you see are the result of movement by electrons. When electrons slow down or stop, they give off light including visible light. You taste protons when you sense a food has a tart, sharp, or vinegar taste. Protons are being released by acids in the food. You feel the weight of neutrons because they roughly double the weight of everything you lift. They also either mention or imply that all protons, electrons, and neutrons are identical to every other proton, electron, or neutron. That is true, but think how amazing that is. Every proton in the universe is exactly like every other proton in the universe. The same is true with electrons and neutrons. How do you make things exactly alike? Yes, nature has produced countless quantities of these particles protons, electrons, neutrons that are always exact copies. The only thing that I know that also has exact copies are numbers. For example, a "3" used here is exactly the same "3" others may use. So the only explanation I have for protons, electrons, and neutrons having exact copies is that they must be mathematically engineered. In other words, some kind of mathematical formula must be directing their assembly. We have all heard that everything is unique. Even "identical" twins have differences, but the protons, electrons, and neutrons in these twins could easily be exchanged with ones from the atoms that make up the dirt or grass. Yes, the protons, electrons, and neutrons in the atoms of your body, could be exchanged with any protons, electrons, or neutrons from anything in the universe and you would never know the difference because they are identical. I find that odd and amazing at the same time. What makes good building blocks? Blocks must allow for ways to connect to one part to another. Tinkertoys had circular wood blocks with eight holes around the perimeter and one through its center. Sticks acted as connectors. With sticks of different lengths and a few kinds of blocks with holes in them, a wide variety of things could be assembled. How do the proton, neutron, and electron compare as building blocks? Electrons by themselves would be poor building blocks because like charges repel, and they would just repel each other. Protons have the same problem. They repel each other and would build nothing. But electrons are attracted to protons. Roll cursor over image to see animation. The electron takes up an orbit around the electron. Part of the reason is that electrons are not just particles, they also behave as a wave. So the wave nature of electrons keeps them from colliding with the proton. To see animation move cursor over the image. The oscillation of the electron creates a spherical electron "cloud. What would a second electron do? Notice the approaching electron is repelled by the orbiting electron, but at the same time it is attracted to the proton. Its movement is governed by these opposing forces. Also notice that when the second electron joins the first, they stay as far as possible away from each other. Spinning is not shown in this animation Here are two hydrogen atoms. Likewise, the electron in the right hydrogen is attracted to both protons. So even though protons repel each other, the fact that they pull on electrons in the other atoms, causes them to pull together. Two hydrogen atoms will stay together because the electrons have room to stay away from each other as they orbit both hydrogen atoms. So even though there is repulsion between the electrons and between the protons, this arrangement minimizes the repulsions allowing for the opposite charge attractions to keep them together. When two atoms share electrons, we say they are bonded together. We see that the proton and electron come together to make an hydrogen atom. We also see that two hydrogen atoms will come together and share electrons. However, one proton has a limited attraction force. Two or more protons together would have a greater attraction force on electrons and give us more building block varieties. This is where the neutron comes in. This is the helium atom. It has two protons, two neutrons, and two electrons. Being neutral, neutrons normally have no effect on protons, but when they are very close, they attract them strongly with the

same "Strong Nuclear Force. To the left are two fluorine atoms. The nucleus of the fluorine atom has nine protons. This is possible because the neutrons help hold them together. The nine protons have a tremendous pull attraction to electrons in the vicinity. Fluorine has nine electrons surrounding it. Two orbit close to the nucleus. The outer seven spread out to maximize space between them. However there is still space for one more electron. Notice how the two electrons are being attracted by protons from both atoms. This pulls the atoms together, and because there is room, the atoms bond. Here the fluorine atoms have pulled together and are sharing one electron each. They are now bonded. This is called a single bond even though two electrons are involved Atoms naturally pull on each other because the protons in them pull on the electrons of the other atoms. However, there has to be room for the electrons to merge and be shared by both atoms, otherwise electron repulsion keeps them apart. Many atoms have room for eight outer electrons. It has six protons, six neutrons, and six electrons. You can see that there are four outer electrons and spaces for four more electrons. This is similar to Tinkertoys, which had blocks that had eight holes around their perimeter. From this picture you can see that carbon could accommodate four electrons and share four of its electrons. Can carbon connect to fluorine? Fluorine "wants" one electron to fill up its outer shell of electrons. Carbon will provide that electron as long as fluorine shares one of its electrons with carbon. You can see how four fluorine atoms can connect to one carbon atom. This is exactly what happens. They come together to form carbon tetrafluoride, which is a gas used in refrigeration systems and also fire extinguishing systems. More importantly, you see how protons, electrons, and neutrons make elements, which are the building blocks for what we call "compounds. Protons, electrons, and neutrons build elements in a rather straight forward manner. For each additional proton, a new element is created. For each proton, an additional electron is attracted. The number of neutrons also increase but not necessarily one neutron per proton. Below are the first six elements. These four are important building blocks for living organisms. Atoms are usually drawn as spheres to help show the space that the electrons occupy. The number next to the element name is how many protons it has. See movie below a better understanding of what electrons can do. In the movie above, you see the normal electrons "orbiting" the nucleus. However, the electron forms an oscillating cloud around the nucleus. The electron can also change shape in order to maximize space between it and other electrons. Electrons are always moving and their exact position is not set but based on probability. But there is a chance that electrons can be elsewhere at least for a moment. Again, electrons are amazing little "particles. Again, this is a simplistic view of the electrons. The next two electrons also occupy a spherical shell. The next two electrons, however, form the shape of four lobes with each electron being two lobes.

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Chapter 5 : Matter, elements, and atoms | Chemistry of life (article) | Khan Academy

What are the basic building blocks of matter? A elements B compounds C mixtures D solutions.

The Building Blocks of Matter All matter, from a rock to an animal to the magma at the center of the Earth, is made from different combinations of 92 naturally occurring substances known as elements. The smallest quantity of an element that still exhibits the characteristics of that element is known as an atom. One atom of carbon, for example, is the smallest piece of matter that still retains the chemical and physical characteristics of carbon. Atoms are made up of even smaller particles called electrons, protons, and neutrons. Each of these particles has a different electrical charge. Protons are positively charged, neutrons have no charge, and electrons are negatively charged. The protons and neutrons of an atom reside in a central body called a nucleus. Electrons appear around the nucleus within orbitals of varying energy. Overall, the atom is neutrally charged with equal numbers of positively charged protons and negatively charged electrons. Elements are distinguished by the number of protons in their nuclei. All atoms containing six protons are called carbon. Any element with one proton is called hydrogen. Only the number of protonsâ€”and not the number of neutrons or electronsâ€”distinguishes elements from each other. An atom that contains a larger or smaller number of neutrons than usual is called an isotope. Carbon usually has six protons and six neutrons and can be called carbon because the number of its protons and neutrons add up to But some carbon atoms have seven or even eight neutrons. These two isotopes are called carbon and carbon Isotopes do not have charge, because the numbers of positive and negative particles remain balanced. Even though they have different masses, isotopes of the same element all have similar chemical properties, because the number of electrons not the number of neutrons or protons determines the way an atom will interact with other atoms. Ions are atoms that either lack or have extra electrons. Because these atoms have unequal numbers of electrons and protons, they are charged particles and are often quite chemically interactive with other atoms. Though the SAT II Biology Test rarely asks direct questions about ions, ions do play an important role in many biological processes and phenomena, so understanding the basics of ions can help you understand the processes that the test covers. Molecules and Compounds Atoms combine with each other in chemical reactions to create molecules, unique substances with physical and chemical properties distinct from those of their constituent elements. Combining two hydrogen atoms with one oxygen atom creates water, which has very different characteristics than hydrogen or oxygen do alone. Molecules such as water containing more than one type of element can also be called compounds. A water molecule made up of oxygen and hydrogen can be called a compound; a hydrogen molecule, which contains only two hydrogen atoms, cannot be called a compound. You may have heard water referred to as H2O. This notation is the standard way of representing molecules and compounds by shorthand. You can create the formula for any compound by writing down the letter symbol of each of its constituent elements and using subscripted numbers to indicate how many atoms of each element are present.

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Chapter 6 : Chemistry for Biologists: Some basic chemistry

Elements & Compounds. STUDY. a basic building block of matter. element. Elements Mixtures and compounds. 50 terms. Science Test 10/2. 28 terms.

Compounds Built from the Elements In the last tutorial, you got an introduction of how atoms bond with each other. In the example on the left, we see that carbon has four vacancies for electrons. Fluorine has one vacancy. The shared electrons are in the middle of a tug-a-war. Protons from both the fluorine and the carbon atoms pull on the electrons. This brings the atoms together. The white arrows show the movement of the electrons. The yellow arrows show the pulling force of the protons. So the four fluorine atoms bond to the single carbon. The formula is CF4. To the left is methane, which is natural gas. One carbon and four hydrogen atoms make up methane. This is another example of electrons being shared by atoms. Shown are just 3 electrons, not all 10 that are there. But you can still see how they move around and are shared by different atoms. This kind of bonding is called covalent bonding. Here the valence of carbon is 4, and hydrogen is 1. To the left are atoms of magnesium and oxygen. They are bonded by ionic bonding. An ion is an atom with a charge. Both of these have a charge. Oxygen, however, has gained two extra electrons, so it has 8 protons and 10 electrons, giving it a net minus 2 -2 charge. These atoms now have opposite charges, so they attract each other. That is called ionic bonding. Compounds are often classified as Organic and Inorganic. In the below image, the rocks, water, and soil contain inorganic compounds, and the tiger, grass, and trees contain organic compounds. You can think of organic compouds as those more likely found in organisms. Inorganic compounds, in contrast, are those created by forces within the Earth. Minerals, for example would be inorganic compounds. When we look at what things are made of, we find that elements usually make a small compound that is then used as a building block for larger compounds. These larger compounds are then used as building blocks for even larger compounds. An analogy would be to draw a brick with 2 long lines, 2 short lines, and a red rectangle these are the elements. These elements, bonded together, represent a small compound 1 brick that is used to build a larger compound layer of bricks. The layer of bricks becomes the building block for a wall of bricks. Wall of bricks integrated into final "organism" or structure. The wall of bricks becomes an integral part of the final organism. The building blocks for inorganic compounds are quite different than those of organic compounds.

Chapter 7 : Building Elements

a small partical that is the building block of matter, made up matter that can vary in composition, made from 2 or more subst a substance that allows heat or electricity to pass through it.

Chapter 8 : The Building Blocks of Matter - Lesson - TeachEngineering

Exploring Elements, Compounds, and Mixtures using Legos. I use this activity to help students visualize how atoms are used as the building blocks of matter and how matter can be classified as elements, compounds, or mixtures.

Chapter 9 : SparkNotes: SAT Subject Test: Biology: The Building Blocks of Matter

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