DOWNLOAD PDF ON MATTER : IS IT SUBSTANCE?

Chapter 1 : matter | Definition of matter in English by Oxford Dictionaries

Matter is any substance that has mass and takes up space by having volume. Anything that can be observed is matter; and physicists also hypothesize the existence of "dark matter", which cannot be observed. Material is a broad term for pure chemical substances or mixture of substances. The physical.

Definition[edit] Colors of a single chemical Nile red in different solvents, under visible and UV light, showing how the chemical interacts dynamically with its solvent environment. A chemical substance may well be defined as "any material with a definite chemical composition" in an introductory general chemistry textbook. But, there are exceptions to this definition; a pure substance can also be defined as a form of matter that has both definite composition and distinct properties. Broader definitions of chemicals or chemical substances can be found, for example: Many minerals, however, mutually dissolve into solid solutions , such that a single rock is a uniform substance despite being a mixture in stoichiometric terms. Feldspars are a common example: In law, "chemical substances" may include both pure substances and mixtures with a defined composition or manufacturing process. For example, the EU regulation REACH defines "monoconstituent substances", "multiconstituent substances" and "substances of unknown or variable composition". The latter two consist of multiple chemical substances; however, their identity can be established either by direct chemical analysis or reference to a single manufacturing process. For example, charcoal is an extremely complex, partially polymeric mixture that can be defined by its manufacturing process. Therefore, although the exact chemical identity is unknown, identification can be made to a sufficient accuracy. The CAS index also includes mixtures. Polymers almost always appear as mixtures of molecules of multiple molar masses, each of which could be considered a separate chemical substance. However, the polymer may be defined by a known precursor or reaction s and the molar mass distribution. History[edit] The concept of a "chemical substance" became firmly established in the late eighteenth century after work by the chemist Joseph Proust on the composition of some pure chemical compounds such as basic copper carbonate. However, there are some controversies regarding this definition mainly because the large number of chemical substances reported in chemistry literature need to be indexed. Isomerism caused much consternation to early researchers, since isomers have exactly the same composition, but differ in configuration arrangement of the atoms. Likewise, the idea of stereoisomerism - that atoms have rigid three-dimensional structure and can thus form isomers that differ only in their three-dimensional arrangement - was another crucial step in understanding the concept of distinct chemical substances. For example, tartaric acid has three distinct isomers, a pair of diastereomers with one diastereomer forming two enantiomers. Chemical elements[edit] Native sulfur crystals. Sulfur occurs naturally as elemental sulfur, in sulfide and sulfate minerals and in hydrogen sulfide. List of elements An element is a chemical substance made up of a particular kind of atom and hence cannot be broken down or transformed by a chemical reaction into a different element, though it can be transmuted into another element through a nuclear reaction. This is so, because all of the atoms in a sample of an element have the same number of protons, though they may be different isotopes , with differing numbers of neutrons. As of , there are known elements, about 80 of which are stable â€” that is, they do not change by radioactive decay into other elements. Some elements can occur as more than a single chemical substance allotropes. For instance, oxygen exists as both diatomic oxygen O2 and ozone O3. The majority of elements are classified as metals. These are elements with a characteristic lustre such as iron , copper , and gold. Metals typically conduct electricity and heat well, and they are malleable and ductile. Non-metals lack the metallic properties described above, they also have a high electronegativity and a tendency to form negative ions. Certain elements such as silicon sometimes resemble metals and sometimes resemble non-metals, and are known as metalloids. Chemical compounds[edit] Potassium ferricyanide is a compound of potassium, iron, carbon and nitrogen; although it contains cyanide anions, it does not release them and is nontoxic. List of organic compounds and List of inorganic compounds A pure chemical compound is a chemical substance that is composed of a particular set of molecules or ions. Two or more elements combined into one substance through a chemical reaction form a chemical compound. All

compounds are substances, but not all substances are compounds. A chemical compound can be either atoms bonded together in molecules or crystals in which atoms, molecules or ions form a crystalline lattice. Compounds based primarily on carbon and hydrogen atoms are called organic compounds , and all others are called inorganic compounds. Compounds containing bonds between carbon and a metal are called organometallic compounds. Compounds in which components share electrons are known as covalent compounds. Compounds consisting of oppositely charged ions are known as ionic compounds, or salts. In organic chemistry, there can be more than one chemical compound with the same composition and molecular weight. Generally, these are called isomers. Isomers usually have substantially different chemical properties, and often may be isolated without spontaneously interconverting. A common example is glucose vs. The former is an aldehyde , the latter is a ketone. Their interconversion requires either enzymatic or acid-base catalysis. However, tautomers are an exception: A common example is glucose , which has open-chain and ring forms. One cannot manufacture pure open-chain glucose because glucose spontaneously cyclizes to the hemiacetal form. Substances versus mixtures[edit] Cranberry glass, while it looks homogeneous, is a mixture consisting of glass and gold colloidal particles of ca. Mixture All matter consists of various elements and chemical compounds, but these are often intimately mixed together. Mixtures contain more than one chemical substance, and they do not have a fixed composition. In principle, they can be separated into the component substances by purely mechanical processes. Butter , soil and wood are common examples of mixtures. Grey iron metal and yellow sulfur are both chemical elements, and they can be mixed together in any ratio to form a yellow-grey mixture. No chemical process occurs, and the material can be identified as a mixture by the fact that the sulfur and the iron can be separated by a mechanical process, such as using a magnet to attract the iron away from the sulfur. The resulting compound has all the properties of a chemical substance and is not a mixture. Iron II sulfide has its own distinct properties such as melting point and solubility , and the two elements cannot be separated using normal mechanical processes; a magnet will be unable to recover the iron, since there is no metallic iron present in the compound. Chemicals versus chemical substances[edit] While the term chemical substance is a precise technical term that is synonymous with chemical for chemists, the word chemical is used in general usage in the English speaking world to refer to both pure chemical substances and mixtures often called compounds , [13] and especially when produced or purified in a laboratory or an industrial process. In countries that require a list of ingredients in products, the "chemicals" listed are industrially produced "chemical substances". The word "chemical" is also often used to refer to addictive, narcotic, or mind-altering drugs. Bulk chemicals are produced in very large quantities, usually with highly optimized continuous processes and to a relatively low price. Fine chemicals are produced at a high cost in small quantities for special low-volume applications such as biocides, pharmaceuticals and speciality chemicals for technical applications. Research chemicals are produced individually for research, such as when searching for synthetic routes or screening substances for pharmaceutical activity. In effect, their price per gram is very high, although they are not sold. The cause of the difference in production volume is the complexity of the molecular structure of the chemical. Bulk chemicals are usually much less complex. While fine chemicals may be more complex, many of them are simple enough to be sold as "building blocks" in the synthesis of more complex molecules targeted for single use, as named above. The production of a chemical includes not only its synthesis but also its purification to eliminate by-products and impurities involved in the synthesis. The last step in production should be the analysis of batch lots of chemicals in order to identify and quantify the percentages of impurities for the buyer of the chemicals. The required purity and analysis depends on the application, but higher tolerance of impurities is usually expected in the production of bulk chemicals. Thus, the user of the chemical in the US might choose between the bulk or "technical grade" with higher amounts of impurities or a much purer "pharmaceutical grade" labeled "USP", United States Pharmacopeia. For example, gasoline is not a single chemical compound or even a particular mixture: Naming and indexing[edit] Every chemical substance has one or more systematic names , usually named according to the IUPAC rules for naming. Many compounds are also known by their more common, simpler names, many of which predate the systematic name. For example, the long-known sugar glucose is now systematically named 6-hydroxymethyl oxane-2,3,4,5-tetrol. Chemists frequently refer to chemical compounds using chemical

formulae or molecular structure of the compound. There has been a phenomenal growth in the number of chemical compounds being synthesized or isolated , and then reported in the scientific literature by professional chemists around the world. As of May , about sixty million chemical compounds are known. Also it is difficult to keep the track of them in the literature. CAS provides the abstracting services of the chemical literature, and provides a numerical identifier, known as CAS registry number to each chemical substance that has been reported in the chemical literature such as chemistry journals and patents. This information is compiled as a database and is popularly known as the Chemical substances index. Other computer-friendly systems that have been developed for substance information, are: Identification of a typical chemical substance Common name.

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Chapter 2 : Pure Substances and Mixtures - Chemistry for Kids | Mocomi

For example, the Oxford Advanced Learner's Dictionary states that matter is "a physical substance in general" or "substance, material or things of a specified kind", while substance is a "particular type of matter".

Matter can be defined as any substance that has inertia, occupies space and has mass. How is matter classified? Scientists of the world classify matter as solid, liquid or gas, but there is one more interesting way to classify it. Matter can also be classified as pure substances and mixtures. What is a pure substance? A pure substance is a type of matter which exists in its most basic or purest form and cannot be broken down further. Examples of pure substances include water, gases like carbon dioxide, oxygen and metals like platinum, gold and silver. Each pure substance has its own set of unique chemical and physical properties which helps us in identifying it. It is colourless, tasteless and odourless. Gold is considered pure at 24 karat. It is yellow in color, solid at room temperature and is regarded as a good conductor of electricity. It is also malleable and ductile in nature. Types of pure substances Pure substances can be divided into two categories â€" elements and compounds. Elements are made up of the same types of atoms. The known elements listed in the periodic table can be considered pure substances. Examples of elements include hydrogen, oxygen, gold, silver Compounds are made up of different types of atoms joined together by chemical bonds. Examples of compounds include water, glucose, salt and carbon dioxide. What is a mixture? Mixture is a combination of two or more pure substances where each substance keeps its own identity upon mixing. Mixtures are present almost everywhere on Earth. Look at rocks, the ocean, rivers or even the atmosphere. All of them are mixtures! In other words, anything that you can mix together is a mixture. Even the foods you eat. Why is it called a mixture? It means the fundamental chemical structure of the components in a mixture does not change upon mixing. Examples of mixtures Although water is a pure substance, if you put sand into a glass of water, it would turn into a mixture. Each of the components of a mixture can be separated from one another. You can always separate the sand from water by filtering it. If you take a mixture of salt and water, you can separate it by evaporating the water, to get salt in the container. Air, too, is a mixture of different gases such as carbon dioxide, oxygen, nitrogen and water vapour etc. Blood is a mixture made up of different types of blood cells and plasma. Types of mixtures Homogeneous mixture â€" The components of a homogeneous mixture have a uniform composition, and cannot be seen separately. For example, sugar and water do not chemically react and form another compound although the water does turn sweet! Heterogeneous mixture â€" The components of a heterogeneous mixture do not have a uniform composition and can be viewed separately without losing their identity. For example, if you mix sulfur powder with iron dust, you can easily see the two separately. You can even separate the iron dust by using a magnet. How do we differentiate between pure substances and mixtures? A Pure Substance is matter which cannot be separated into its basic components by using a physical or a chemical process. The physical and chemical properties of pure substances are non-changing, if it is on its own without disturbing. A Mixture is made up of a combination of two or more substances that are not united using a chemical reaction. The physical and chemical properties of mixtures vary.

Chapter 3 : Substance, Matter, and Form

Comparison with mass. Matter should not be confused with mass, as the two are not the same in modern physics. Matter is a general term describing any 'physical substance'.By contrast, mass is not a substance but rather a quantitative property of matter and other substances or systems; various types of mass are defined within physics - including but not limited to rest mass, inertial mass.

These new particles may be high-energy photons gamma rays or other particleâ€"antiparticle pairs. The resulting particles are endowed with an amount of kinetic energy equal to the difference between the rest mass of the products of the annihilation and the rest mass of the original particleâ€"antiparticle pair, which is often quite large. Depending on which definition of "matter" is adopted, antimatter can be said to be a particular subclass of matter, or the opposite of matter. Antimatter is not found naturally on Earth, except very briefly and in vanishingly small quantities as the result of radioactive decay , lightning or cosmic rays. This is because antimatter that came to exist on Earth outside the confines of a suitable physics laboratory would almost instantly meet the ordinary matter that Earth is made of, and be annihilated. Antiparticles and some stable antimatter such as antihydrogen can be made in tiny amounts, but not in enough quantity to do more than test a few of its theoretical properties. There is considerable speculation both in science and science fiction as to why the observable universe is apparently almost entirely matter in the sense of quarks and leptons but not antiquarks or antileptons , and whether other places are almost entirely antimatter antiquarks and antileptons instead. In the early universe, it is thought that matter and antimatter were equally represented, and the disappearance of antimatter requires an asymmetry in physical laws called CP charge-parity symmetry violation , which can be obtained from the Standard Model, [46] but at this time the apparent asymmetry of matter and antimatter in the visible universe is one of the great unsolved problems in physics. Possible processes by which it came about are explored in more detail under baryogenesis. Formally, antimatter particles can be defined by their negative baryon number or lepton number , while "normal" non-antimatter matter particles have positive baryon or lepton number. In October , scientists reported further evidence that matter and antimatter , equally produced at the Big Bang , are identical, should completely annihilate each other and, as a result, the universe should not exist. Conservation of matter Two quantities that can define an amount of matter in the quarkâ€"lepton sense and antimatter in an antiquarkâ€"antilepton sense , baryon number and lepton number , are conserved in the Standard Model. Even in a nuclear bomb, none of the baryons protons and neutrons of which the atomic nuclei are composed are destroyedâ€"there are as many baryons after as before the reaction, so none of these matter particles are actually destroyed and none are even converted to non-matter particles like photons of light or radiation. Instead, nuclear and perhaps chromodynamic binding energy is released, as these baryons become bound into mid-size nuclei having less energy and, equivalently , less mass per nucleon compared to the original small hydrogen and large plutonium etc. Even in electronâ€"positron annihilation , there is no net matter being destroyed, because there was zero net matter zero total lepton number and baryon number to begin with before the annihilationâ€"one lepton minus one antilepton equals zero net lepton numberâ€"and this net amount matter does not change as it simply remains zero after the annihilation. Other types Pie chart showing the fractions of energy in the universe contributed by different sources. Ordinary matter is divided into luminous matter the stars and luminous gases and 0. Ordinary matter is uncommon. Modeled after Ostriker and Steinhardt. Vertical axis is speed of rotation about the galactic center. Horizontal axis is distance from the galactic center. The sun is marked with a yellow ball. The observed curve of speed of rotation is blue. The predicted curve based upon stellar mass and gas in the Milky Way is red. The difference is due to dark matter or perhaps a modification of the law of gravity. Dark matter See also: Galaxy formation and evolution and Dark matter halo In astrophysics and cosmology , dark matter is matter of unknown composition that does not emit or reflect enough electromagnetic radiation to be observed directly, but whose presence can be inferred from gravitational effects on visible matter. The commonly accepted view is that most of the dark matter is non-baryonic in nature. Perhaps they are supersymmetric particles , [61] which are not Standard Model particles, but relics formed at very high energies

in the early phase of the universe and still floating about. Its precise nature is currently a mystery, although its effects can reasonably be modeled by assigning matter-like properties such as energy density and pressure to the vacuum itself. Twenty-six percent is dark matter. So less than 1 part in 20 is made out of matter we have observed experimentally or described in the standard model of particle physics. The Trouble with Physics, p. Exotic matter Exotic matter is a concept of particle physics , which may include dark matter and dark energy but goes further to include any hypothetical material that violates one or more of the properties of known forms of matter. Some such materials might possess hypothetical properties like negative mass. Historical development Antiquity c. Anaximenes flourished BC, d. All of these notions had deep philosophical problems. Rather they, like everything else in the visible world, are composed of the basic principles matter and form. For my definition of matter is just thisâ€”the primary substratum of each thing, from which it comes to be without qualification, and which persists in the result. In other words, in contrast to the early modern conception of matter as simply occupying space, matter for Aristotle is definitionally linked to process or change: For example, a horse eats grass: The matter is not specifically described e. Matter in this understanding does not exist independently i. It can be helpful to conceive of the relationship of matter and form as very similar to that between parts and whole. For Aristotle, matter as such can only receive actuality from form; it has no activity or actuality in itself, similar to the way that parts as such only have their existence in a whole otherwise they would be independent wholes. He was primarily a geometer. Instead of, like Aristotle, deducing the existence of matter from the physical reality of change, Descartes arbitrarily postulated matter to be an abstract, mathematical substance that occupies space: So, extension in length, breadth, and depth, constitutes the nature of bodily substance; and thought constitutes the nature of thinking substance. Descartes makes an absolute distinction between mind, which he defines as unextended, thinking substance, and matter, which he defines as unthinking, extended substance. In short, Aristotle defines matter roughly speaking as what things are actually made of with a potential independent existence , but Descartes elevates matter to an actual independent thing in itself. In both conceptions, matter is passive or inert. In the respective conceptions matter has different relationships to intelligence. For Aristotle, matter and intelligence form exist together in an interdependent relationship, whereas for Descartes, matter and intelligence mind are definitionally opposed, independent substances. In the third of his "Rules of Reasoning in Philosophy", Newton lists the universal qualities of matter as "extension, hardness, impenetrability, mobility, and inertia". Like Descartes, Newton rejected the essential nature of secondary qualities. Carrying the logic forward more consistently, Joseph Priestley â€” argued that corporeal properties transcend contact mechanics:

Chapter 4 : Substance | Definition of Substance by Merriam-Webster

Matter and substance are sometimes used for the same context, but it is completely wrong. Numerous examples have already proved that a matter may or may not be a substance depending on its physical nature, but a substance is always a matter.

Matter and form introduced Aristotle introduces his notions of matter and form in the first book of his Physics, his work on natural science. Natural science is concerned with things that change, and Aristotle divides changes into two main types: For instance, the changes whereby Socrates falls in a vat of dye and turns blue, or puts on a few pounds from excessive feasting during the Panathenaia, count as accidental changes in the categories of quality and quantity, respectively. Socrates, a substance, gains the property of being blue, or the property of weighing twelve stone. The other main kind of change is substantial change, whereby a substance comes into, or passes out of, existence. For example, when Socrates dies, or is born or perhaps conceived, or somewhere in between conception and birth , a substantial change has taken place. In any change, he contends, there must be three things: Thus, for example, in an accidental change, the underlying thing is the substance which acquires a new accidental property. For instance, when Socrates learns to play the flute, he transitions from a state of being unmusical the lack to a state of musicality the form. But for us to be able to say that there is something which has changed, there must be something which remains the same throughout the change, and in this case the obvious candidate is Socrates, who is one and the same person throughout his musical training. In accidental changes there is always a substance to underlie the change, but this is not true for substantial changes, since these involve the coming to be or passing away of a substance see the amusing remark of Irving Copi, quoted at the start of the entry on identity over time. In these cases, the thing that underlies is the matter of the substance. When someone builds a house, it is the bricks which persist through the change. They transition from a state of not being a house to acquire the property of being a house. Aristotle often uses the example of artefacts like houses, even though he does not regard them as substances properly-speaking Metaphysics vii 17, b28â€”30 , because their matter is more straightforward to identify. Nevertheless, the same analysis holds in the case of organisms, which are the substances proper: To say otherwise would be to say that things can come to be out of, or vanish into, nothing, and Aristotle understandably agrees with his predecessor Parmenides that this is impossible Physics i 8, a23â€”b We never experience anything simply appearing or disappearing at random. When we consider organisms, however, it becomes apparent that having the right shape is not sufficient to possess the form. A statue may be human-shaped, but it is not a human, because it cannot perform the functions characteristic of humans: Lastly, we need to know what the thing is for, what its purpose or function isâ€”the final cause. Now Aristotle observes that, although these are all distinct questions, in the case of the last three very often the same thing will serve as the answer to all of them Physics ii 7, a24â€” A house is defined as a shelter of a certain sort De Anima i 1, b3â€”7; Metaphysics viii 3, a29â€” That is what a house is, i. Similarly, a human being is defined as something which lives a certain kind of rationally-directed life. The human function is to live such a life Nicomachean Ethics i 7, b22â€”a20; cf. De Anima ii 1, a6â€” As for the efficient cause, it is qualitatively, although not numerically, identical with the formal cause, at least in the organism case, since human beings give birth to human beings, and the same goes for all other living things. Thus, even though Aristotle admits four different kinds of cause, in a sense it is only really matter and form that play any ineliminable explanatory role in his system. In fact, Aristotle does not simply focus on the case of artefacts because their pre-existing matter is easier to identify. It is characteristic of the matter of artefacts that numerically the same stuff which makes up one object can later be used as the matter of another: One might think that at least the body does exist after death, but in fact Aristotle would disagree. Whether a dead body is really a body might seem like a trivial linguistic issue, which can simply be decided by fiat. The obvious way to resolve the problem might seem to be simply to drop the insistence that the body cannot exist without being coupled to a living human soul. Allowing that a dead body remains the same body as its living counterpart will not help the difficulty of what to say about the matter that predates the coming to be of the organism, when there is no apparent body, living or dead. What is more, Aristotle is

deeply committed to his position that the human body is essentially ensouled, because of his view that things are defined by their functions Meteorologica iv 12, a10â€”15; Generation of Animals ii 1,b24â€” If so, he contradicts himself. Aristotle believes that all sensible substances can be analyzed into matter and form, but such an analysis is not restricted to the things he calls substances. Matter can itself be divided into matter and form: Again, clay has its own matterâ€”mud, sayâ€”and so on. Eventually, if one pursues this hierarchy of matter far enough downwards, Aristotle believes that one will reach the four elements, earth, air, fire and water. He agrees with Empedocles that everything in the sub-lunar world is ultimately made up of different ratios of these four elements. Matter then should really be understood as a relative notionâ€”it is always the matter of something. Aristotle distinguishes between homoiomerous and heteromerous parts Parts of Animals i 1, b25â€” Homoiomerous parts are stuffs, like bronze or flesh, which Aristotle believes have no internal structure. Every part of a homoiomerous stuff is the same as every other part, containing the same ratio of elements. The bodily organs, hands, feet, eyes, hearts, etc. Even if nothing biological can exist when not alive, it seems clear that the elements at least must be able to do so. Prime matter One obvious question pertains to how low such underlying levels might go. Aristotle believes that everything is made of earth, air, fire and water. Aristotle also thinks that these elements can change into one another On the Heavens iii 6, a14â€” The thing that underlies this kind of change cannot be any of the elements, since it must be capable of possessing the properties characteristic of each of the elements successively, capable of being first cold and then hot, for example. This prime matter is usually described as pure potentiality, just as, on the form side, the unmoved movers are said by Aristotle to be pure actuality, form without any matter Metaphysics xii 6. It exists eternally, since, if it were capable of being created or destroyed, there would have to be some even lower matter to underlie those changes. Because it is the matter of the elements, which are themselves present in all more complex bodies, it is omnipresent, and underlies not only elemental generation and destruction, but all physical changes. For it does not depart from its own character at all. It both continually receives all things, and has never taken on a form similar to any of the things that enter it in any way. For it is laid down by nature as a recipient of impressions for everything, being changed and formed variously by the things that enter it, and because of them it appears different at different times. More recently, opponents of attributing a doctrine of prime matter to Aristotle have complained that there is insufficient evidence for his holding this kind of view, and that it is so philosophically unappealing that principles of charity militate against it as an interpretation. Physics i 9, a31, ii 1, a10 and a29; Metaphysics v 4, b32 and a7â€”10, v 6, a5â€”6, viii 4, a23, ix 7, a24â€”7; Generation of Animals i 20, a Nature is prime matter and this in two ways, either prime in relation to the thing or prime in general; for example, in the case of bronze works the bronze is prime in relation to them, but prime in general would be perhaps water, if everything that can be melted is water. In other passages too Aristotle seems to leave the question of whether or not there is prime matter deliberately open. In Metaphysics ix 7, he uses a conditional to talk about the possibility: For example, if earth is airy, and air is not fire but firey, fire is prime matter, being a this. If a material could not be so described, it would be prime matter. Again, he shows himself aware of prime matter as a possibility, without wanting to commit to it here. Another key passage where Aristotle has been thought to commit himself more decisively to prime matter is Metaphysics vii 3. Here we are told: For it is something of which each of these things is predicated, whose being is different from each of its predicates for the others are predicated of substance, and substance is predicated of matter. Therefore this last is in itself neither substance nor quantity nor anything else. Nor is it the denials of any of these; for even denials belong to things accidentally. Those who wish to avoid attributing a doctrine of prime matter to Aristotle must offer a different interpretation: In addition to disputing the correct interpretation of these passages where Aristotle explicitly mentions prime matter, much of the debate has centered around, on the one hand, whether what he says about change really commits him to it, on the other, whether the idea is really absurd. Some opponents of prime matter have argued that Aristotle does not, after all, wish to insist that there is always something which persists through a change see Charlton , Appendix, and In particular, when one of the elements changes into another, there is an underlying thingâ€”the initial elementâ€”but in this case it does not persist. While readers have usually supposed that these terms are used interchangeably to refer to the substance, in cases of accidental change, and the matter in substantial changes,

this assumption can be challenged. In the elemental generation case, perhaps there is no thing that remains, just an initial elements that underlies. The main philosophical objections to prime matter are that it is, at best, a mysterious entity that we cannot know anything about, since we never perceive it directly, but only the things it underlies. Of course, there can be good theoretical reasons for believing in things that we never actually see. No one has ever seen a quark, but we can still know things about them, based on the kind of theoretical work that they are required to perform. At worst, prime matter is said to be outright contradictory. It is supposed to be capable of taking on any form whatsoever, and thus to have no essential properties of its own. The idea that it has no essential properties of its own seems to make it difficult for us to characterize it positively in any way: Moreover, if it is what ultimately underlies all properties, it seems that it must be able to take on properties that are inconsistent with what we would like to be able to think of as its own nature: But how can prime matter be simultaneous invisible and blue? To get around these problems, it looks as though proponents of prime matter will have to distinguish between two different kinds of property that prime matter has, or perhaps two different ways in which it has properties. There are its essential properties, which define the kind of entity that it is, and which it has permanently, and then there are its accidental properties, which it gains and loses as it underlies different sorts of thing. A worry about this solution is, if one can distinguish between the prime matter and its essential properties, this might suggest that there is a need for a further entity to act as the underlying thing for those properties, and then this further entity would need to have its own nature, and something to underlie that nature, and so on. It seems best to try to avoid such an infinite regress by insisting that prime matter can underlie its own essential properties, without being a compound of those properties and some further matter. While the predominant view has been that this role is reserved for matter, other scholars have maintained either that Aristotle means it to be form, or that he does not see the need for a principle of individuation at all. Some of this controversy seems to have resulted from a failure to be clear about what a principle of individuation is, or what problem it is supposed to solve. To see why this is so, one may focus on a controversy about individuation which Popper sought to dissolve, by pointing out that it derived from a false opposition. This was a controversy begotten by a disagreement between Anscombe and Lukasiewicz regarding the principle of individuation in Aristotle see Anscombe et al. Popper points out that their disagreement is only apparent, due to the fact that they are answering different questions: On the other hand, Anscombe says that it is matter which makes an individual the individual it is, numerically distinct from other individuals of the same and other species. Yet this is an issue about numerical distinctness rather than unity. The traditional view has been that individuation is a metaphysical issue: However, some scholars have argued that Aristotle at no point addresses this issue, but is instead concerned with the epistemological question of how we tell one individual from another see Charlton It is worth considering why one might think that the metaphysical issue is not worth pursuing.

Chapter 5 : Chemical substance - Wikipedia

Matter underlies and persists through substantial changes. A substance is generated (destroyed) by having matter take on (lose) form. A house is created when bricks, boards, etc., are put together according to a certain plan and arranged in a certain form. It is destroyed when the bricks, boards.

Aristotle on Substance, Matter, and Form Matter underlies and persists through substantial changes. A substance is generated destroyed by having matter take on lose form. A house is created when bricks, boards, etc. It is destroyed when the bricks, boards, etc. An animal is generated when matter contributed by the mother combines with form contributed by the father. This suggests that the primary substances of the Categories, the individual plants and animals, are, when analyzed, actually compounds of form and matter. And in the Metaphysics, Aristotle suggests that a compound cannot be a substance Z3, a This may seem a strange move for Aristotle to be making. But the idea may be this: The possibilities seem to be: Aristotle actually discusses more possibilities - this is a simplification. In Z3, Aristotle considers the claim of matter to be substance, and rejects it. Qualities, and other non-substances of the Categories, are not separable. They only exist in substances. Separability, then, amounts to independent existence. For Aristotle seems to count form as, in some way, a this something e. But, as a rough gloss, individuality seems to be what is at issue. It seems that the matter of a compound is capable of existing separately from it. The wood of which a tree is composed can continue to exist after the tree has ceased to exist. We can certainly pick out a definite, particular, batch of matter as a singular object of reference: Separate from a substance, matter fails to be a this. It owes what individuality it has to the substance it is the matter of. What makes this quantity of wood one thing is that it is the wood composing this one tree. This batch of wood no longer has any unity once it no longer composes the tree it used to be the matter of - unless it now happens to be the matter of some other substance that gives it its unity. So matter cannot simultaneously be both separable and individual, and therefore matter cannot be substance. The only remaining candidate for primary substance seems to be form which Aristotle now begins to call essence. It is clear that Aristotle is now focusing on the concept of the substance of something - i. Most commentators think not, but for different reasons. Some think that the kind of essence or form that Aristotle counts as primary substance is one that is not in any way universal; a form that is as individual as the compound whose form it is. Thus, Socrates and Callias would each have his own distinct individual form - there would be as many individual human forms as there are humans. The individual substances of the Categories are, indeed, compounds of matter and form, but They are not just heaps, or piles, of components. But a structure considered by itself, as an element, is not the structure of the syllable. At the end of Z. Primary cause of being. The nature of a plant or animal. Not an element, but a principle. The resulting view is not Platonism: And it cannot exist if it is not the form of something. The substantial form i. This may seem wrong, since when Socrates dies, his matter persists, although he no longer exists. Animals and plants metabolize; the matter that they are composed of differs from time to time. So what makes Socrates the kind of thing he is, and what makes him remain, over time, the same thing of that kind, is the form that he continues to have. For Aristotle, the form of a compound substance is essential to it; its matter is accidental. Socrates could have been composed of different matter from that of which he is actually composed. Form may be accidental to the matter that it informs, but it is essential to the compound substance i. Form is what makes the individual plants and animals what they are. Therefore, it is the substance of those individuals. Substances are supposed to be objects of knowledge, and objects of knowledge are universals, Aristotle says b21, b Similarly, substances are supposed to be, par excellence, definable, and it is universals, rather than individuals, that are definable, according to Aristotle 90b4, 97b25, a28, b20, a5. On the Soul Go to previous lecture on the Four Causes.

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Chapter 6 : What is Matter? - Chemistry | Socratic

The awkward matter of substance The regulatory noose is tightening further, and the implications stretch wider than we might think Earlier this year it became evident that, if Guernsey was going to thrive or even survive as an offshore finance centre, it would have to continue conforming to the ever-tougher governance and tax requirements.

No one factor can predict if a person will become addicted to drugs. A combination of factors influences risk for addiction. The more risk factors a person has, the greater the chance that taking drugs can lead to addiction. Gender, ethnicity, and the presence of other mental disorders may also influence risk for drug use and addiction. Although taking drugs at any age can lead to addiction, the earlier that drug use begins, the more likely it will progress to addiction. This is particularly problematic for teens. Because areas in their brains that control decision-making, judgment, and self-control are still developing, teens may be especially prone to risky behaviors, including trying drugs. Can drug addiction be cured or prevented? However, addiction is treatable and can be successfully managed. People who are recovering from an addiction will be at risk for relapse for years and possibly for their whole lives. Research shows that combining addiction treatment medicines with behavioral therapy ensures the best chance of success for most patients. Results from NIDA-funded research have shown that prevention programs involving families, schools, communities, and the media are effective for preventing or reducing drug use and addiction. Although personal events and cultural factors affect drug use trends, when young people view drug use as harmful, they tend to decrease their drug taking. Therefore, education and outreach are key in helping people understand the possible risks of drug use. Teachers, parents, and health care providers have crucial roles in educating young people and preventing drug use and addiction. Points to Remember Drug addiction is a chronic disease characterized by drug seeking and use that is compulsive, or difficult to control, despite harmful consequences. This is why drug addiction is also a relapsing disease. Relapse is the return to drug use after an attempt to stop. Relapse indicates the need for more or different treatment. Surges of dopamine in the reward circuit cause the reinforcement of pleasurable but unhealthy activities, leading people to repeat the behavior again and again. Over time, the brain adjusts to the excess dopamine, which reduces the high that the person feels compared to the high they felt when first taking the drugâ€”an effect known as tolerance. They might take more of the drug, trying to achieve the same dopamine high. No single factor can predict whether a person will become addicted to drugs. A combination of genetic, environmental, and developmental factors influences risk for addiction. Drug addiction is treatable and can be successfully managed. More good news is that drug use and addiction are preventable.

Chapter 7 : Substance | Define Substance at www.nxgvision.com

the substance or substances of which any physical object consists or is composed: the matter of which the earth is made. physical or corporeal substance in general, whether solid, liquid, or gaseous, especially as distinguished from incorporeal substance, as spirit or mind, or from qualities, actions, and the like.

He illustrates the various categories: To give a rough idea, ideas of substance are man, horse; of quantity: There is an important distinction pointed out by Aristotle between individual objects and kinds of individual objects. Thus, for some purposes, discussion of substance is a discussion about individuals, and for other purposes it is a discussion about universal concepts that designate specific kinds of such individuals. Thus Fido the dog is a primary substanceâ€"an individualâ€"but dog or doghood is the secondary substance or substantial kind. Each arm of this distinction raises different issues. Aristotle was mainly, if not exclusively, concerned with questions of the first kind, but, as we shall see in sections 2. This association of substance with kinds carries over into a use of the term which is perhaps more scientific, especially chemical, than philosophical. This is the conception according to which substances are kinds of stuff. They are not individual objects nor kinds of individual object. Examples of this usage are water, hydrogen, copper, granite or ectoplasm. Atoms, fundamental kinds of stuff, gods, or abstract entities, such as Platonic Forms or numbers, might be considered to be substantial to the point of being indestructible or eternal: It seems, in summary, that there are at least six overlapping ideas that contribute to the philosophical concept of substance. Substances are typified as: We shall see later that the Kantian tradition adds a seventh mark of substance: It should be remarked in passing that at least one major expositor of Aristotle Irwin: This can be expressed as: The substances in a given system are those entities crucial from the teleological or design perspective of that system. Different philosophers emphasize different criteria from amongst this list, for reasons connected with their system as a whole. One could plausibly say that an account is intuitively more appealing, the more of the criteria it can find a place for. Probably, the Aristotelian tradition comes nearest to doing this. History of the philosophical debate on substance Almost all major philosophers have discussed the concept of substance and an attempt to cover all of this history would be unwieldy. The selection made will concentrate on those philosophers in whom the broadly analytic tradition has shown most interest. First we shall look at the development of the concept in the ancient world, culminating in the work of Aristotle. His account dominated debate through the Middle Ages and until the early modern period. We shall consider various rationalist and empiricist treatments of the concept. They thought, that is, that the being of the universe hence they were pursuing substance in sense i consisted in some kind or kinds of stuff. Thales, for example, thought that everything was essentially water, and Anaximenes that everything was a form of air. Atoms are objects in our ordinary sense, though they are not our ordinary objects: They are the subjects of predication, but they do not change their intrinsic properties. Classical atoms are, therefore, strong instances of i and ii , but somewhat deviant cases of iii and v. Plato rejected these materialist attempts to explain everything on the basis of that of which it was made. According to Plato, the governing principles were the intelligible Forms which material objects attempted to copy. These Forms are not substances in the sense of being either the stuff or the individuals or the kinds of individuals out of which all else is constructed. Rather they are the driving principles which give structure and purpose to everything else. In itself, the rest would be, at most, an unintelligible chaos. The Forms meet criterion i â€"ontological basicnessâ€"but in a slightly eccentric way, because they do not, in a normal sense, constitute things. They meet ii â€"durabilityâ€"in a strong fashion, for they are eternal. They are not, in the intended senses, the subjects of predication, and in no sense the subjects of change, so they do badly on iii and iv. They do not do well on v for they are not individual things in any normal sense, though they are individuals, of a very unusual kind. They are in no way kinds of stuff, hence failing vi. It reflects his emphasis on criterion i , together with his particular view about the way in which forms are basic. These will be discussed in turn. The primary substances are individual objects, and they can be contrasted with everything elseâ€"secondary substances and all other predicablesâ€"because they are not predicable of or attributable to anything else. Thus, Fido is a primary substance, and dogâ€"the secondary

substanceâ€”can be predicated of him. Fat, brown, and taller than Rover are also predicable of him, but in a rather different way from that in which dog is. The interpretation of these expressions is, as usually with Aristotelian cruxes, very controversial, but a useful way of looking at it is as follows. Dog is said of Fido because it characterizes him as a whole. Fat and the others are described as being in because they pick out a constituent feature that could be said to be, in a logical though not a physical sense, part of, or in him. Fido the individual is not attributable to any further thing at all. This account is intuitive, but perhaps it cannot be treated as a formally adequate definition of the notion of primary substance or individual. Fido the individual could be said to be in a certain location and so attributed to something, namely a place. It is natural to reply to this that an object is not an attribute of a place in the same way as a property is an attribute of a thing: Although this may be true, it presupposes that we already have a grasp on the sense in which properties belong to objects and how this differs from the various ways that objects belong to or can be attributed to things, and that we can call upon this informal understanding in interpreting the theoretical account. Whether this is legitimate might depend on what the objective was. If the objective were to explain the difference between substance and property in an entirely non-circular way by appealing to the fact that properties are in substances but substances are not in things, this would involve taking the notion of being in as primitive. If we have to distinguish the sense in which properties are in substances from the way in which substances can be in thingsâ€”such as placesâ€”before we can make the original point, then there has not been a non-circular account. If, on the other hand, the objective is simply to differentiate between concepts already in play, then Categories achieves its objective. If we understand his project in this way, we can see Aristotle as presenting various marks of substance in Categories. The marks of primary substance are: Being objects of predication but not being themselves predicable of anything else at least, not in the way entities in the other categories are: Being able to receive contraries. If substance did not exist it would be impossible for things in any of the other categories to exist. There could be no instances of properties if there were no substances to possess them. So we need marks for being a secondary substance, or substance concept. On this he says two things. For only they, of things predicated, reveal the primary substance. For if one is to say of the primary substance what it is, it will be more apt to give the species than the genus. The first is, however, once again intuitive but not compelling. Only in Section 3. The division between being said of and being inâ€”that is, between substance concepts and other propertiesâ€”seems intuitively clear enough until one remembers that substance concepts are complex and are definable in terms of other properties. Aristotle denies that this is so when they enter into the definition of a substance. The features that specifically make an object the kind of substance that it is, are called differentiae, and Aristotle says the differentia also is not in a subject. For footed and two-footed are said of man as subject, but are not in a subject; neither footed not two-footed is in man. The issue is what constitutes the unity of the species or secondary substance: In order to begin to see how Aristotle tackled this problem we need the apparatus of form and matter, which does not appear in the Categories. We will see when discussing contemporary theories in section 3. This takes place mainly in Metaphysics, Book Z. In the latter, the analysis of substances in terms of form and matter is developed, whereas these notions have no place in Categories. Graham In the earlier, Categories, substances are simply individuals; in the later work they are complexes of form and matter. Whether this represents a change of view, or whether the purposes of the Categories simply did not require reference to the metaphysical analysis of substance is a moot point. Aristotle analyses substance in terms of form and matter. The form is what kind of thing the object is, and the matter is what it is made of. Relative to the human body, matter is flesh and blood. The matter of an axehead is the iron from which it is made. Aristotle acknowledges that there are three candidates for being called substance, and that all three are substance in some sense or to some degree. First, there is matter, second, form and third, the composite of form and matter. Aristotle acknowledges that matter can be a subject of predication and of change, thereby meeting one of the main criteria set up in Categories b35ff. Two of the criteria of substancehood presented in the Introduction above are: But, without seeming to give much argument, he strongly favours v over vi. The elimination of matter as a good candidate for being substance, leaves either form alone or the composite of form and matter. The composite seems more consonant with the doctrine of Categories, for the composite is the individual. Aristotle, however, chooses the form as more paradigmatically

substance. This has puzzled some commentators. The choice of form as substance causes perplexity because the form seems to be a universal and equivalent to the secondary substance, and so not the most fundamental case of substance. But whether substantial forms are universals in Aristotle is a controversial matter. Interpreters disagree about whether the doghood that is in Fido is best regarded as the universal, or as the particular instance of the universal doghood, other dogs exemplifying numerically different instances of the same universal. On this view, the most perspicuous way of regarding the individual substance is not as the composite of form and matter though this is not wrong but as the form individualized in the matter. The matter is still an essential component in the substance, but not, so to speak, as an equal partner with the form, but as the catalyst by means of which the form becomes an individual substance.

Chapter 8 : DrugFacts: Understanding Drug Use and Addiction | National Institute on Drug Abuse (NIDA)

It thus appears that in rejecting the claim that matter is substance, Aristotle is rejecting the subject criterion as the basis for deciding what a primary substance is. To be a substance is not to be an ultimate subject, for the ultimate subject of change.

For the purposes of this discussion, it is convenient to divide the various types of ionizing radiation into two major categories: In the first group are the radiations that are normally viewed asâ€¦ At the most fundamental level, matter is composed of elementary particles, known as quarks and leptons the class of elementary particles that includes electrons. Quarks combine into protons and neutrons and, along with electrons, form atoms of the elements of the periodic table , such as hydrogen , oxygen , and iron. Atoms may combine further into molecules such as the water molecule , H2O. Large groups of atoms or molecules in turn form the bulk matter of everyday life. Depending on temperature and other conditions, matter may appear in any of several states. At ordinary temperatures, for instance, gold is a solid, water is a liquid, and nitrogen is a gas, as defined by certain characteristics: These states can be further categorized into subgroups. Solids, for example, may be divided into those with crystalline or amorphous structures or into metallic, ionic, covalent, or molecular solids, on the basis of the kinds of bonds that hold together the constituent atoms. Less-clearly defined states of matter include plasmas, which are ionized gases at very high temperatures; foams, which combine aspects of liquids and solids; and clusters, which are assemblies of small numbers of atoms or molecules that display both atomic-level and bulklike properties. The mass of a body is a measure of this resistance to change; it is enormously harder to set in motion a massive ocean liner than it is to push a bicycle. Another universal property is gravitational mass, whereby every physical entity in the universe acts so as to attract every other one, as first stated by Newton and later refined into a new conceptual form by Albert Einstein. This transformation occurs, for instance, during nuclear fission , in which the nucleus of a heavy element such as uranium splits into two fragments of smaller total mass, with the mass difference released as energy. In the quantum view, elementary particles behave both like tiny balls and like waves that spread out in spaceâ€”a seeming paradox that has yet to be fully resolved. Its detailed nature has yet to be determined. On the other hand, through the contemporary search for a unified field theory , which would place three of the four types of interactions between elementary particles the strong force , the weak force , and the electromagnetic force, excluding only gravity within a single conceptual framework, physicists may be on the verge of explaining the origin of mass. Although a fully satisfactory grand unified theory GUT has yet to be derived, one component, the electroweak theory of Sheldon Glashow , Abdus Salam , and Steven Weinberg who shared the Nobel Prize for Physics for this work predicted that an elementary subatomic particle known as the Higgs boson imparts mass to all known elementary particles. After years of experiments using the most powerful particle accelerators available, scientists finally announced in the likely discovery of the Higgs boson. For detailed treatments of the properties, states, and behaviour of bulk matter, see solid , liquid , and gas as well as specific forms and types such as crystal and metal. Learn More in these related Britannica articles:

Chapter 9 : meaning - Usage of "matter" and "substance" - English Language & Usage Stack Exchange

3 a: physical material from which something is made or which has discrete existence. b: matter of particular or definite chemical constitution. c: something (such as drugs or alcoholic beverages) deemed harmful and usually subject to legal restriction possession of a controlled substance substance abuse.

Their definitions are circularly defined, so there is some obvious synonymous overlap. That said, there are certain contexts where one word sounds inherently more appropriate than the other. Here are a few examples: Water and ice are the same substance. There was a stange yellow substance left on the windshield. No substance in the world would give a human being the strength of Superman. Much of the matter reconverged after the supernova explosion. Stars are made up of hydrogen, helium, and a small percentage of other matter. The most common substance in stars is hydrogen. In such sentences, how would someone know when to use matter, and when to use substance? Water and ice are the same matter. Water and ice are the same particular kind of matter. The second sentence conveys the sentiment more accurately; so, it would be better to use the word substance. There was a stange yellow matter left on the windshield. There was a stange yellow particular kind of matter left on the windshield. Again, substance is the better fit. Much of a particular kind of matter reconverged after the supernova explosion. In that case, the meaning is obscured by inserting "a particular kind of", so matter is the better word to use. Once again, gravity affects all matter, not just a particular kind of matter used in satellites, so matter is the better word. Stars are made up of hydrogen, helium, and a small percentage of another particular kind of matter. However, I could say: Stars are made up of hydrogen, helium, and a small percentage of other particular kinds of matter. Stars are made up of hydrogen, helium, and a small percentage of other substances.