DOWNLOAD PDF HISTORY OF THE ATOM TIMELINE

Chapter 1 : Chemistry Timline

Welcome to the atomic structure timeline. This site explores discoveries related to atomic structure including the electron, proton and neutron. The dates used for events are open to debate since many scientist's spent decades studying a topic.

Democritus first proposed the atomic theory that differs slightly from our modern atomic theory. He said "The universe is made up of atoms and the void between them. E The Alchemists proposed their theories in B. C , and were seen as evil pharmacists, who believed in potions and experimented with metals Share s C. E Robert Boyle was a philosopher, and he made the connection that any substance that can be broken down into two or more substances in not an element. He changed the way people thought of science, and conducted his tests during the time period of - Share The Alchemists believed in potions and experimented to make gold with other simple metals. Share An image of Robert Boyle. Share This is a photo of Antoine Lavoisier. He was named as the "Father of Chemistry" as he wrote the first list of extensive elements. Share John Dalton was the first person to discover the atom in He started the discovery of the microscopical atom. Share This is an Image of John Dalton. Share This is an image of Dmitri Mendeleev. Share Dmitri Mendeleev organized the known elements into 7 groups based on features and properties during the year of Share An image of Ernest Rutherford. Share An image of Albert Einstein. He discovered the amount of energy stored in a certain amount of matter during Share This is an image of Robert Millikan. Share Robert Millikan discovered the charge of electrons with the oil drop experiment he conducted. This was discovered in , as that is when he conducted the experiment. J Mosely made the contribution to the atom by figuring out the chemical concept of the atomic number. This happened during the time period of - His specialization in the X-Ray helped him determine this. Share An image of Henry G. Share In , J. J Thomson discovered the electron, by using a cathode ray tube. He demonstrated that cathode rays were negatively charged. Share The Plum Pudding model was created by J. J Thomson in in a magazine. Share An image of J. Share Neils Bohr created the Bohr model of the atom, with the atom in the center with the electrons orbiting it. This was created in Share An image of Niels Bohr. It showed the most accurate positions of electrons in an atom. Share James Chadwick was credited for discovering the neutron in , and made the theory that the neutrons helped stabilities the atoms.

Chapter 2 : The History of the Atom Timeline | Sutori

The famous chemist from France; mostly known for very carefully weighing all chemical experiements. 2 factors he founded: 1) the simplest substances, which Lavoisier called elements, could not be broken down any further and, 2) these elements always reacted with each other in same proptions.

Used the word "atomos" to describe this particle. Democritus Aristotle BC was a proponent of the continuum. He believed in the four elements of air, earth, water and fire. Aristotle felt that regardless of the number of times you cut a form of matter in half, you would always have a smaller piece of that matter. This view held sway for years primarily because Aristotle was the tutor of Alexander the Great. Aristotle Johann Becher and Georg Stahl developed the Phlogiston theory which dominated chemistry between and This problem was solved by assigning negative mass to phlogiston. Joseph Priestly discovered oxygen which he called "dephlogisticated air" in Priestly was an ardent phlogistonist until his dying day. Priestly was also an early anti-war activist who favored both the American and French Revolutions. He was shipped to the U. His house was used as a starting point for the American Chemical Society in The Priestly Medal is the highest award given by to an American chemist by the Society. Joseph Priestly Antoine Lavoisier was the first person to make good use of the balance. He was an excellent experimenter. After a visit with Priestly in , he began careful study of the burning process. He proposed the Combustion Theory which was based on sound mass measurements. He also proposed the Law of Conversation of Mass which represents the beginning of modern chemistry. Some people believe that Madame Lavoisier was every bit as good a scientist as her husband. This law was very radical at the time and was hotly contested by Claude Berthollet This law led directly to the proposal of the Atomic Theory in He also developed the concept of the mole and proposed a system of symbols to represent atoms of different elements. The symbols currently used were developed by J. Dalton recognized the existence of atoms of elements and that compounds formed from the union of these atoms. He therefore assumed that simplest ratios would be used in nature and came up with a formula for water of HO. He then assigned a relative atomic weight of one to hydrogen and developed a relative atomic weight scale from percent composition data and assumed atomic ratios. Today we would refer to these as equivalent masses. John Dalton also discovered color blindness, an affliction from which he suffered. He determined that five percent of the male population and less than one-tenth percent of the female population was color blind. He showed that at the same temperature and pressure, two volumes of hydrogen gas reacted with one volume of oxygen gas to produce two volumes of water as a gas. The hypothesis states that at the same temperature and pressure, equal volumes of gases contain the same number of molecules or atoms. The solution to the atomic weight problem was at hand in At the end of this five year period, a new conference would be called to discuss any problems that might develop; this second conference was never called.

Chapter 3 : History Of An Atom Timeline | Preceden

A Timeline on Atomic Structure. Hantaro Nagaoka proposed an atomic model called the Saturnian Model to describe the structure of an atom.

Thomson At the end of the nineteenth century, a scientist called J. Thomson discovered the electron. This is a tiny negatively charged particle that is much, much smaller than any atom An atom is the smallest particle of an element that can still be defined as that element. When he discovered the electron Electrons are tiny, negatively charged particles that orbit the nucleus of an atom in energy levels or shells. He noticed an interesting effect. This is shown in the experiment in Fig. Thomson did experiments on the beams of particles in his tube. They were attracted to a positive charge, so Thomson correctly concluded that they must be negatively charged themselves. Other experiments showed that it would take about electrons to weigh the same as the lightest atom, hydrogen. He called the tiny, negatively charged particles electrons. But where had these tiny particles come from? Since they were so small, Thomson suggested that they could only have come from inside atoms. Thomson proposed a different model for the atom. He said that the tiny negatively charged electrons must be embedded in a cloud of positive charge after all, atoms themselves carry no overall charge, so the charges must balance out. The charge on the electrons is far greater than the positive charge in the atom. The total charge carried by the electrons equals the positive charge in the atom. Ernest Rutherford The next development came about 10 years later. However, they got a big surprise. Look at their experiment below: In , Ernest Rutherford interpreted these results and suggested a new model for the atom. The positive charge must be concentrated in a tiny volume at the centre of the atom, otherwise the heavy alpha particles fired at the foil could never be repelled back towards their source. On this model, the electrons orbited around the dense nucleus centre of the atom.

Chapter 4 : History of the Atom

Timeline Events Leading to the Development of the Atomic Theory The first theory of the atom was proposed by Democritus around B.C. However it was John Dalton who proposed the first Atomic Theory in

He always founded out about compounds from combining oxygen and hydrogen, which makes water. Dalton realized that if elements were made up of atoms. And a combination of atoms are called a molecule. Dalton also came to the theory that atoms are indestructible and can not be cut anymore. From this point on, atomic theory is based off his findings. Becquerel did close work with potassium uranyl sulfate, which he exposed to sunlight and placed on photographic plates wrapped in black paper. When it was developed, the plates revealed an image of uranium crystals. Later experiments; Becquerel put the crystals in the light of the sun and the images were clear and strong which meant that the crystals were radioactive, so Becquerel was the first scientist to discover readioactivity. She found these two and many more elements from the element, uranium and it contained some traces of radioactivity. In she won the Noble Prize for physics along with Henri Becquerel. Oct 28, J. Thomson discovered that all atoms have electrons outside the nucleus. He discovered this by doing a series of experiements desgined to study the nature of electric discharge in a high-vacuum cathode-ray tube. Thomson electrically charged plates and magnets as evidence of "bodies smaller than regular atoms. His contribution helped understand atomic and subatomic processes. Thomson discovered about electrons in He found this out by doing an experiment with his gold foil model which contained a detecting screen acting as the membrane , particle emitter, and silt. This model suggested that most of the mass in an atom was contained in a small nucleus. Mosely based his work off of Rutherford and Bohr who also were on the list. Also Mosely had studied hard with X-rays before doing the Periodic Table, so after he was done with the Periodic Table he published his results of measurements of wavelengths from X-rays. This led to possible energy levels for their orbits. Bohr also developed his very own model of what an atom would look like with the nucleus and the electron lines. It is called the Bohr Model as you may know. His theory is based off of what we can only see, which would be the radiation emitted by the atom. Most of his work was associated with Niels Bohr. SO he was big on the electron deal; he stated that "We cannot always assign to an electron a position in space at a given time, nor follow it in its orbit. He also put his now-famous equation out for the world to see. His theory was based off of energy levels in the atom. After a decade long struggle, Chadwick did a test on Beryllium and bombarded the element with alpha particles. This caused some of the protons to be discharged, creating neutrons. Jan 1, Democritus discovers first atom Democritus discovers his atomic theory about atoms around B. His theory states that everything around us is made up of atoms. He also stated that atoms are indivisble and cannot be broken down. Finally, he said that in between the atoms, there is a bunch of free space and the morfe empty space there is, the heavier the atom gets. Democritus help influential help from Leucippus, his mentor. Couild go to B. E and the earliest date i could get was A. He thought of this because he didnt believe in atoms because they were "ultimate small. Aristotle also believed in a fifth element comprised of the heavens, which was the ruler of all the elements.

Chapter 5 : The History of The Atom timeline | Timetoast timelines

The History of the Atom Timeline: BC Scientist: Democritus (Greek Philosopher) Democritus was a Greek philosopher who was the first person to use the term atom.

This is something we now take as a given, and one of the things you learn right back at the beginning of high school or secondary school chemistry classes. This graphic takes a look at the key models proposed for the atom, and how they changed over time. Though our graphic starts in the s, the idea of atoms was around long before. In fact, we have to go all the way back to Ancient Greece to find its genesis. The Ancient Greek theory has been credited to several different scholars, but is most often attributed to Democritus â€" BC and his mentor Leucippus. These scholars imagined atoms as varying in shape depending on the type of atom. They envisaged iron atoms as having hooks which locked them together, explaining why iron was a solid at room temperature. Water atoms were smooth and slippery, explaining why water was a liquid at room temperature and could be poured. It was a long wait, however, before these foundations were built upon. He drew on the ideas of the Ancient Greeks in describing atoms as small, hard spheres that are indivisible, and that atoms of a given element are identical to each other. The latter point is one that pretty much still holds true, with the notable exception being isotopes of different elements, which differ in their number of neutrons. He also came up with theories about how atoms combine to make compounds, and also came up with the first set of chemical symbols for the known elements. He carried out experiments using cathode rays produced in a discharge tube, and found that the rays were attracted by positively charged metal plates but repelled by negatively charged ones. From this he deduced the rays must be negatively charged. By measuring the charge on the particles in the rays, he was able to deduce that they were two thousand times lighter than hydrogen, and by changing the metal the cathode was made from he could tell that these particles were present in many types of atoms. This discovery would win him a Nobel Prize in In , he put forward his model of the atom based on his findings. It was his later work at the University of Manchester which would provide further insights into the insides of an atom. This work came after he had already received a Nobel Prize in for his investigations into the chemistry of radioactive substances. Rutherford devised an experiment to probe atomic structure which involved firing positively charged alpha particles at a thin sheet of gold foil. During the experiment, most of the alpha particles did pass through the foil with little or no deflection. However, a very small number of the particles were deflected from their original paths at very large angles. The only possible explanation was that the positive charge was not spread throughout the atom, but concentrated in a small, dense centre: Most of the rest of the atom was simply empty space. He proposed a model where the electrons orbit the positively charged nucleus. He realised that classical physics could not properly explain what was going on at the atomic level; instead, he invoked quantum theory to try and explain the arrangement of electrons. In other words, it gets kind of weird. At any rate, the model still required refining. At this point, many scientists were investigating and trying to develop the quantum model of the atom. His model shows the nucleus surrounding by clouds of electron density. These regions of space are referred to as electron orbitals. In , the English physicist James Chadwick a student of Ernest Rutherford discovered the existence of the neutron, completing our picture of the subatomic particles that make up an atom. At any rate, the atom gives us a great example of how scientific models can change over time, and shows how new evidence can lead to new models.

Chapter 6 : Atomic Theory Timeline Project by Jennyfer Lee on Prezi

History of the Atomic Model disagreed with Democritus's model of the atom in Aristotle was a Greek philosopher. Many of his ideas were more thought based than.

His mentor, Leucippus, originally came up with the atomic theory, but it was then adopted by Democritus. Democritus hypothesized that atoms cannot be destroyed, differ in size, shape and temperature, are always moving, and are invisible. He believed that there are an infinite number of atoms. This hypothesis was created in BC. He published over 70 books. Born to a family of wealth. Democritus had no technology available to him and did not conduct any experiments to test his ideas. He had no proof that atoms existed and no evidence to back up his claims. He left it to later scientists to prove or disprove his ideas. Antoine Lavoisier - He was from France. He was known for his experimentation skills. He used this experiment to help himself come up with the Law of Conservation. The law states that matter cannot be made or destroyed. He also hints at the rearrangement of matter in reactions. Matter rearranged, but never disappeared. In experiments with phosphorus and sulfur, both of which burned readily, Lavoisier showed that they gained weight by combining with air. With lead calx, he was able to capture a large amount of air that was liberated when the calx was heated. He was a French nobleman who is considered to this day to be the father of modern chemistry. His work was crucial in a period of discovery that is now known as the Chemical Revolution, or even the First Chemical Revolution. John Dalton - He is from Cumberland, England. His atomic theory said that elements consisted of tiny particles called atoms. It states an element is one of a kind aka pure because all atoms of an element are identical. All the atoms that make up the element have the same mass. All elements are different from each other due to differing masses. He experiments with gases that first became possible at the turn of the nineteenth century led John Dalton in to propose a modern theory of the atom based on the following assumptions. When John Dalton died, 40, people attended his funeral procession. He discovered color blindness, and still today it is sometimes referred to as "Daltonism". Max Planck - He was from Keil, He worked in thermodynamics and led to the formulations of his quantum theory. It is used to describe the behavior of particles and waves at the atomic scale. These particles were later called photons. Planck made significant contributions to science throughout his life. Marie Curie - She was born in Warsaw, Poland. She traveled to Paris to continue her studies in getting her Licentiateship in Physics and Mathematical Sciences at the Sorbonne. Pierre was the head of the Physics Laboratory at the Sorbonne. In , Marie obtained her Science degree and three years later her husband Pierre died, leaving her the position of professor of General physics. This was the first time a woman had held this position. Here, Marie developed methods to separate radium from radioactive resides. This allowed careful study of the characterization. It was used for therapeutic properties. She was also a member of the Conseil du Physique Solvay at this time until She received many awards and honors for her scientific ideas and discoveries. Including two Nobel Prizes, Davy Medal of Royal Society, and her daughter won the Nobel Prize in , being the first mother and daughter to share the honor. Her awards were won and papers were written on how she isolated one-tenth of a gram of pure radium chloride from eight tons of pitchblende residue. This required much physical labor. She also determined the atomic weight of radium to be Marie Curie died in Savoy, France, after a short illness, on July 4, We now know that radium is toxic and should not be handled. However, it is used to fight cancer and in other forms of medicine. Robert Millikan contributed to the atomic theory in his own way. Ernest Rutherford described the atom as having a central positive nucleus surrounded by negative orbiting electrons. This conclusion was gathered from using the gold and foil experiment, which involved the firing and radioactive particles through thin metal foils and espying them by using screens coated with zinc sulfide. He found out that although most of the particles passed through the foil, 1 in bounced off, which lead him to the theory that most of the atom was made up of empty space. Albert Einstein - He was born in Ulm, Germany, Using Brownian motion, Einstein was able to accurately calculate the average distance an immersed visible particle would travel in a given time. His mathematic laws governing the movements of invisible particles could be tested and measured by observing the motion of the visible simply using a microscope and a stopwatch. Niels Bohr - He is from

Copenhagen, Denmark. His interpretation was that electrons orbited the nucleus of an atom in pre-defined energy levels, and if the energy level was dropped, they would emit a photon. This is how the basis of quantum theory was formed Erwin Schrodinger - He is from Vienna, Austria. Of which interpreted the floating motion of the electrons, instead of having a set path for them to travel. He figured the likelihood of the location of the electrons in atoms. According to Schrodinger, Orbitals are areas of space around the nucleus in an atom. James Chadwick - He was born in Bollington, England. Rutherford, Chadwick, and some others believed in the possibility that particles with no charge could be in the nucleus. In his spare time, through the s, Chadwick made a variety of attempts in the laboratory to find these neutral particles, but without success. He was, however, increasingly convinced in the existence of a neutral particle â€" the neutron. The Joliot-Curies believed they had managed to eject protons from a sample of wax using gamma rays. This did not make sense to Chadwick, who thought gamma rays were not powerful enough to do this. However, the evidence that protons had been hit with sufficient energy to eject them was convincing. The gamma ray source had been the radioactive element polonium. Chadwick drew the conclusion that the protons had actually been hit by the particle he was looking for: Feverishly, he began working in the Cavendish laboratory. Using polonium as a source of what he believed were neutrons, he bombarded wax. The protons behaved in exactly the manner they ought to if they had been hit by electrically neutral particles with a mass similar to the proton. Chadwick had discovered the neutron. Within two weeks he had written to the prestigious science journal Nature to announce the Possible Existence of a Neutron. His ideas were a basis for developing the wave mechanics theory. This theory has greatly improved our knowledge of the physical nature on the atomic scale. He received the Nobel Prize for Physics on his wave nature of electrons discovery in He believed that electrons can act like both particles and waves, just like light. He also said that waves produced by electrons contained in the orbit around the nucleus, set up a standing wave of a certain energy, frequency, and wavelength. He discovered that electrons can act like waves which helped explain some of the things electrons do that we had never been able to explain before. Today, quantum physics is applied in lasers, computers, and microscopes. Thomson - He was born in Cheetham Hill. Thomson was interested in atomic structure, which was evident in his book Treatise on the Motion of Vortex Rings which he won the Adams Prize for in Joseph returned to America in and delivered six lectures about electricity and matter at Yale University. He later discovered a method used to separate different kinds of atoms and molecules from the use of positive rays. This idea was developed by Aston, Dempster, and a few other people. Thomson was elected Fellow of the Royal Society in He served as President from Also, he received the Royal Medal and Hughes Medal in and and many other medals. Thomson studied in Great Britain and also in America. Thomson discovered electrons and noticed that an atom can be divided. Also, he concluded atoms are made of positive cores and negatively charged particles within it. He developed the Plum Pudding Model before the atomic nucleus was discovered. This model shows that the electrons are surrounded by a "pudding" of positive charges to balance the negative charges. Werner Heisenberg - He is from Wurzburg, Germany. One of his most memorable discoveries is the Uncertainty Principle. He said this means that electrons do NOT travel in neat orbits. Also, all electrons that contain photons will then change momentum and physics. Surrounding the outside of an atomic nucleus is an electron cloud, which is a name given to the electrons that are widely spreading and moving around.

Chapter 7 : History of the Atomic Model timeline | Timetoast timelines

Atomic theory Timeline Timeline Description: Atomic theory is the scientific theory of the nature of matter. The theory states that matter is made up of small particles called atoms. The theory states that matter is made up of small particles called atoms.

Many of his ideas were more thought based than scientifcially based. For this reason, Aristotle strongly disagreed with Democritus. He felt that there was no smallest part of matter and that different substances were made of earth, fire, air, and water. Aristotle did not have an atomic model due to the fact that he thought atoms did not exist. He was the first one to discover that all matter is made up of invisible particles called atoms. He created the name "atom" from the Greek word "atomos", which means uncuttable. He also discovered that atoms are solid, insdestructable, and unique. HIs model was just a round solid ball. Jan 1, Antoine Lavoisier Lavoisier was a French nobleman that founded several elements and put the first table of elements together. By using previous knowledge of atomic bonding, he discovered important elements like oxygen, hydrogen, and sulfur. He discovered that water was made of oxygen and hydrogen, and air included nitrogen. Lavoisier also created the first chemistry textbooks and tables. Jan 1, John Dalton John Dalton was an English chemist that created the Atomic Theory of Matter, a composition of previous findings by Democritus and his own findings. He included in this theory that all matter is made of atoms, that atoms cannot be created nor destroyed and also, atoms of different elements combine in whole ratios to form chemical compunds. His theory would later contribute to an advance in the atomic model. Jan 1, Henri Becquerel Henri Becquerel was born into a family of scientists. With influences from his father and grandfather, Bequerel worked with properties of the atom, such as magnetism and radioactivity. His biggest achievements were in the field of radioactivity. In his earlier works, Bequerel worked with light and the absorption of light by crystals. He also looked at the mechanics of X-rays. His discovery of radioactivity allowed later scientists to perfect the atomic model. Jan 1, J. Thomson was a very important scientist when it came to the atomic model. Up until his time, all models of the atom looked like a big solild ball. Thomson discovered the electron, which led him to create the "plum pudding" atomic model. In this model, he thought that the atom was mostly positive, and negative electrons wandered around the atom. The "plum pudding" model influenced other scientists to make better atomic models. Jan 1, Marie and Pierre Curie Marie and Pierre Curie were a European couple that contributed to atomic chemistry by exploring the mysteries of radioactivity. After radiation was discovered by Henri Baquerel, Marie decided to look further into this discovery. Through this she and her husband discovered the elements radium and polonium and won the Nobel Peace Prize for their works in radioactivity. Her discovery later added to the atomic model. In this theory, Planck stated that energy was given off in little packets of energy. These were called photons when talking about light. He discovered that the energy in wave form is restricted to specific quantaties. This discovery led to the understanding of energy levels in atoms, since quantums are leaps in the atom. This discovery later added to the advance in the atomic model. Thomson predicted that the electron was time smaller than the atom. Millikan wanted to prove this hypothesis. He preformed an "oil-drop experiment" in which he found that J. Millikan was also involved in the Quantum Theory after he was inspired by Max Planck. Millikan inspired other scientists to explore parts of the atom. Jan 1, Ernest Rutherford Ernest Rutherford was another scientist that changed the atomic model. He felt that J. He created the nucleus, and said that instead of the positive matter being the whole atom, it was just in the middle. He said the atom was mostly empty space and that the electrons surrounded the positive nucleus. This model influenced one of his own students to perfect the atomic model later on. Also, he created energy levels in the atom, where only a certain amount of electrons could fit on one energy level of the atom. This model is still used to this day. Mosely used X-rays to find the frquencies of elements on the periodic table. Before his discovery, the atomic number was just an assigned number to a random element. Mosely used these frequencies to find that the number of protons in the nucleus correlated with the atomic number. Jan 1, Erwin Schrodinger Erwin Scrhodinger was an Austrian scientist that worked with the Quantum model of the atom. He thought that the only way to find the location and energy of an electron in an atom was to calculate its

probability of being a certain distance from the nucleus. This equation influenced the Quantum mechanical model of the atom. Jan 1, Werner Heisenberg Werner Heisenberg was a German scientist that proposed the uncertainties of the Quantum model. Before this discovery, Rutherford had concluded that the nucleus was made of positive matter. It made sense that the atom was neutral because the negative electrons and the positive protons cancelled out. But, Chadwick started to question why there was a difference between the atomic mass and the number of protons. Chadwick then found that the missing component was a neutral part:

Chapter 8 : Atomic theory Timeline

Ernest Rutherford articulates his model of the atom, at the center of which exists a nucleus containing the majority of the atom's mass and all of its positive charge.

Chapter 9 : HISTORICAL OUTLINE of the Atomic Theory and the Structure of the Atom

In this model, the volume of the atom is composed primarily of the more massive (thus larger) positive portion (the plum pudding). The smaller electrons (actually, raisins in the plum pudding) are dispersed throughout the positive mass to maintain charge neutrality.