The development of the atomic theory essay

Science, Physics

The Development of the Atomic Theory Have you ever wondered how the atomic theory came to be? Or have you have wondered who it was that helped in its development? There was not Just one man who came up with the atomic theory, but there were many scientists that contributed to its development. One of these scientists was Democratic, a Greek philosopher. Democratic was the son of Housemistress, and he was a student of Magicians and Cleanness. By some authorities he was thought of as the greatest of the Greek physical philosophers.

He was born in Abider in Thrace sometime between 470 and 60 BC. Democratic studied under the Greek philosopher Leucosis, whose system he later on developed further. Democratic visualized atoms; atom is a Greek word for indivisible, which means as moving through space, then colliding to form the universe and the natural objects in it. Democratic was said to have excelled in all the branches of knowledge. " His name was associated with the first exposition of the atomic theory of matter, according to which all matter is composed of single, indivisible atoms exactly alike qualitatively. (Greek: pig 1) His theory was different room the theory of early philosophers, who believed that matter was composed of particles that differed qualitatively from each other, and that disagreed only concerning their differences. Democratic believed that the first principles of the universe were atoms and empty space, and that everything else was only thought to exist. He also believed that the space which the atoms moved in and their motion within that space was without end. Democratic' theory also included that atoms were unlimited in size and number, and that they generate all composite things.

He wrote extensively n the nature of matter, but only fragments of his original work still remain today. Democratic also contributed to ethics, theology, andpsychology. The second scientist that helped in the development of the atomic theory was John Dalton, who was an English chemist. The idea of the atom was first suggested by Democratic, but his assumption was said to not be useful in explaining chemical phenomena, because he did not have experimental evidence to support those assumptions.

It was the late sass's when early chemists began to explain chemical behavior in terms of the atom. " Joseph Priestly, Antoine Lavalieres, and others were the nest that set the stage for the foundation of chemistry. "(Early pig. L) They did this by demonstrating that substances can combine to form new materials. It was John Dalton, though, who put the pieces together and helped in the development of the atomic theory in 1803. In Talon's theory he had five basic assumptions the first one stated that all matter consisted of tiny particles called atoms.

Dalton along with others anticipated the atoms that composed all matter as tiny, solid spheres in different stages of motion. The second assumption was that atoms are indestructible and unchangeable. Atoms of an element cannot be created, destroyed, divided into smaller pieces, or transformed into atoms of another element. Dalton based this hypothesis on the law of conservation of mass which was stated by Antoine Lavisher and others around 1785. The third assumption was that elements are characterized Day

ten welling AT tenet atoms. Dalton gauges EAI t Tanat all atoms AT ten same element have equal weights.

Therefore, every single atom of an element, such as oxygen, is alike to every other atom. On the other hand atoms of different elements, like oxygen and mercury, differ from each other. The fourth assumption was that in chemical reactions, atoms combine in small, whole-number ratios. The experiments that Dalton and others performed indicated that chemical reactions happen according to atom to atom ratios which were accurate and well-defined. The fifth assumption was that when elements react, it is possible that their atoms may Join in more than one whole-number ratio.

Dalton used this hypothesis to describe the reason it was that the ratios of two elements in various compounds, such as oxygen and nitrogen in nitrogen oxides, differed by multiples of each other. John Talon's theory was accepted because of its explanation of the law of conservation of mass, definite proportions, multiple proportions, and other observations. The third scientist that helped in the development of the atomic theory was Robert Milliken, who was a Nobel Prize winning physicist and one of the best known scientists in America. He was born in Morrison, Illinois.

His father and mother were Sills Franklin and Mary Jane Milliken. Robert Milliken went to college at Oberlin in 1887 where he then began to have an interest in problem solving and experimentation. In 1893, after receiving his master's degree, he was given a owlish by Columbia University. Later, Milliken became ateacherand wrote several physics textbooks. Robert Milliken realized that he was going to have to do important research if he

wanted to make a name for himself, so he began to search for a research project that could produce fundamental results.

Scientists in the past had estimated that the electron was a subdivision of the atom with a unit charge of constant value. Then in 1907 Robert Milliken began to explore ways to measure that charge. He then refined the method that was developed by the Scottish physicist C. T. R. Wilson, and Milliken developed the " oil drop experiment. " Then over the next few years he refined it, and then finally in 1913, Milliken published the value of the electronic charge. " He showed that the mass of an electron was truly 1/2000 of the simplest type of hydrogen atom.

His experiment also showed that the charge to mass ratio was very high. This meant that although the mass of an electron is much smaller than that of a hydrogen atom it has about the same size charge as a negative ion of hydrogen. "(Robert 1909 pig 1) The fourth scientist that helped in the placement of the atomic theory was James Chadwick, who discovered the neutron in 1932. He was born in 1891 in Manchester, England, and he graduated from Manchester University in 1911. He then stayed to work with Ernest Rutherford. Chadwick created an experiment that would help to answer the question of an unknown nucleus mass source.

He smashed alpha particles into beryllium, a rare metallic element. He then allowed the radiation that was released from it to hit another target which was paraffin wax. After the beryllium radiation hit the hydrogen atoms in the wax, the atoms were sent into a detecting chamber. In physics it was recognized to be the only particle to have approximately the same mass as a

hydrogen atom. The results of the experiment showed that an impact with beryllium atoms would release enormous neutral particles, which Chadwick called neutrons. This provided the answer for the hidden mass in atoms.

His discovery helped to develop experimental work Tort all clients Because neutrons AAA not nave any electrical charge, neutrons fired from a source have the capability to go through deep layers of materials and go to the nuclei of the target atoms. After Chadwick work, scientists all over began to attack all types of materials with neutrons. The fifth scientist who helped develop the atomic theory was J. J Thomson, who discovered the electron in 1897. He put his work towards a new theory that stated the atom was made up of small particles. Thomson discovered the electrons, and he proved his theory with the use of the cathode ray tube.

Scientists did many experiments, trying to find the structure of the atom. They passed an electric current through a vacuum tube, and saw light glowing inside the tube. It traveled in a straight line and they were not able to explain it. J. J. Thomson began doing more experiments on the cathode tube. He put two electric plates in its path, one of which was positively charged and another which was negatively charged. The glowing light bent towards the positively charged plate, and he found that the glowing light was smaller particles that were even smaller than the atom.

In conclusion to this experiment, J. J. Thomson found the particle called the electron, and so his atomic theory was found. He stated that electrons came out of the trace gas that was inside of the cathode tube. Then because of what he stated, a new theory which said that atoms were dad of tiny

particles came to the attention of people. Thomson discovered the electrons, and it was then proved that atoms are made up of protons, neutrons, and electrons, and he also proved that the atom was divisible.

Because the atom was neutral, he suggested that the negatively charged electron was equal to the positively charged proton, and that neutrons did not have charges. He also suggested considering the atom as a sphere, with positively charged particles. These positively charged particles were surrounded by the negatively charged electrons which were placed there because of electrostatic forces. Matthews 6 The sixth scientist that helped in the development of the atomic theory was Ernest Rutherford who was born in New Zealand. Rutherford worked with and studied under James Chadwick in England.

He performed many experiments with radioactive alpha particles. At the time it was unclear what that alpha particle was, they Just knew that it was very tiny. Rutherford fired tiny alpha particles at solid objects such as gold foil. He found that most of the alpha particles would pass through the gold foil, but there was a small amount that passed through at an angle and bounced straight back. These experiments that he did suggested that gold foil, and mater had holes in it, and that these holes allowed most of the alpha particles to pass directly through.

There was still a small amount though that bounced straight back because they hit a solid object. In 1911 Rutherford anticipated a ground- breaking view of the atom. He suggested that the atom was made up of a small, and dense core of positively charged particles in the center or nucleus of the

atom, and that they were enclosed in a swirling ring of electrons. The alpha particles bounced off because the nucleus was so dense. The electrons were very small, and they parade out to great distances so then the alpha particles were able to pass through the area of the atom.

Rutherford atom represented a tiny solar system with the positively charged nucleus always at the center and the electrons that revolved around the nucleus. In the development of the atomic theory there were many clients Tanat contributed to It Day experiments, research, Ana Nora work . Because AT what all these scientists researched and learned we have all this information on the atomic theory today. If it had not of been for their research and dedication, we would not know the things we know about the atomic theory.