

thomson's "plum
pudding" model
essay sample



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Thomson's "Plum Pudding" Model Essay Sample

Evaluate a type of model used in science and its uses and limitations. A model is a three-dimensional representation of a person or thing or of a proposed structure, typically on a smaller scale than the original. Scientists use models to present patterns they observe in the world. Models may be actual physical constructions of mental images; they can also be mathematical models, for example the model of a structure of an atom or graphing a wave. There are many uses and limitations of using models in science. The Plum Pudding Model is an atom model proposed by J. J Thomson, the physicist who discovered the electron. In Thomson's "Plum Pudding Model" each atom was a sphere filled with a positively charged fluid. The fluid was called the "pudding." Scattered in this fluid were electrons known as the "plums." The radius of the model was 10⁻¹⁰ meters. Thomson suggested that the positive fluid held the negative charges, the electrons, in the atom because of electrical forces. Thomson's "Plum Pudding Model" is used in science, because it was the first model utilising electrons. He and his fellow scientists knew that electrons were negatively charged, but they couldn't immediately explain why, then, most atoms carried a neutral charge. This caused further research of the features of the atom.

Thomson's "Plum Pudding Model" brought along several benefits. J. J Thomson was the first person to suggest the theory of the atom containing positive and negative particles, and demonstrated the latter which he called electrons. He experimented with cathode ray tubes to show how electron beams were deflected by magnetic forces. He also showed the hydrogen atom has one electron. His atomic theory identified that electrons inside an

atom could show, meaning that atoms were not invisible. Although there are benefits of Thomson's "Plum Pudding Model", there are also limitations. Since the weight of an electron is about a thousandth part of a hydrogen atom, it would mean that a single atom, especially of the heavier elements, would contain many thousand electrons. But J. J. Thomson himself found that the number of electrons in an atom cannot be greatly different from the atomic weight. According to this model, hydrogen can give rise to only one spectral line, contrary to the observed fact of several lines. This model could not explain the large angle scattering of alpha particles by thin metal foils.