

Development of the Atomic Theory

Atom – The smallest particle into which an _____ can be divided and still be the _____ substance.

Element – A pure substance that cannot be separated into simpler substances by physical or chemical means.

- _____ make up elements.
- Elements are made of only _____ kind of atom.
- Elements combine to form _____.
- All matter is made of elements or compounds, so all matter is made of _____.

- Atoms are so small that, until recently, no one had ever seen one. But ideas, or theories, about atoms have been around for over 2,000 years.

Theory – A unifying explanation for a broad range of hypotheses and observations that have been supported by testing.

Democritus (_____ B.C.)

- **Democritus proposed that if you kept cutting a substance in half forever, eventually you would end up with an “uncuttable” particle.**
- **He called these particles *atoms*, meaning “ _____ ” in Greek.**
- **Democritus thought that atoms were _____, _____ particles of a _____ material and in different _____ and _____.**
- **He thought that atoms were always moving and formed different materials by combining with each other.**
- **Aristotle _____ with Democritus’s idea that you would end up with an indivisible particle. Because Aristotle had greater public influence, Democritus’s ideas were _____ for centuries.**

John Dalton (_____)

- **Scientists knew that elements combined with each other in specific _____ to form compounds.**

- **Dalton claimed that the reason for this was because elements are made of _____.**
- **He published his own three-part _____:**
 - 1) *All substances are made of atoms. Atoms are small particles that cannot be created, divided, or destroyed.*
 - 2) *Atoms of the same element are exactly alike, and atoms of different elements are different.*
 - 3) *Atoms join with other atoms to make new substances.*
- **Much of Dalton's theory was correct, but some of it was later proven _____ and revised as scientists learned more about atoms.**

J.J. Thomson (1897)

- **Thomson used a _____ tube to conduct an experiment which showed that there are small particles _____ atoms.**
- **This discovery identified an error in Dalton's atomic theory. Atoms can be _____ into smaller parts.**

- **Because the beam moved _____ from the negatively charged plate and _____ the positively charged plate, Thomson knew that the particles must have a _____ charge.**
- **He called these particles corpuscles. We now call these particles _____.**
- **Electrons – The _____ charged particles found in all atoms.**
- **Thomson changed the atomic theory to include the presence of electrons. He knew there must be _____ charges present to balance the negative charges of the electrons, but he didn't know where.**

- Thomson proposed a _____ of an atom called the “_____” model, in which negative electrons are scattered throughout soft blobs of positively charged material.

Ernest Rutherford (_____)

- Rutherford conducted an experiment in which he shot a beam of _____ charged particles into a sheet of _____ foil.
- Rutherford predicted that if atoms were soft, as the plum-pudding model suggested, the particles would _____ the gold and continue in a straight line.

- **Most of the particles did continue in a straight line. However some of the particles were _____ to the sides a bit, and a few bounced straight back.**
- **Rutherford realized that the plum-pudding model did not explain his observations. In _____ he changed the atomic theory and developed a new model of the atom.**

- **Rutherford's model says that most of the atom's mass is found in a region in the center called the _____.**
- **Nucleus – The tiny, extremely _____, _____ charged region in the _____ of an atom.**
- **Rutherford calculated that the nucleus was _____ times smaller than the diameter of the atom.**
- **In Rutherford's model the atom is mostly _____, and the _____ travel in random paths around the _____.**

Niels Bohr (_____)

- **Bohr suggested that electrons travel around the nucleus in definite _____.**
- **These paths are located at certain "levels" from the nucleus.**
- **Electrons _____ travel between paths, but they can jump from one path to another.**

Modern Theory: Schrödinger and Heisenberg

- **Our current model of the atom says that electrons _____ travel in definite paths around the nucleus.**
- **The exact path or position of moving electron _____ be predicted or determined. Rather, there are regions inside the atom where electrons are _____ to be found.**
- **_____ – Regions inside an atom where electrons are likely to be found.**