

It takes many scientists exploring different possibilities to develop a theory. A scientific theory is an expression of our best understandings of a phenomena. The atomic theory took shape only after many debates, novel ideas, and experiments. However, theories are constantly evolving as we gather more information and gain a wider perspective. Even today, scientists are making discoveries that will add to our understanding of the atom.

PART 1 (Define the following terms in the space provided.)

- (a) atom _____

- (b) atomic theory _____

- (c) quantum mechanical model _____

- (d) relative mass _____

- (e) subatomic particles _____

PART 2 (Answer the following questions in the space provided.)

1. Identify the scientist responsible for each of the following:

- (a) • proposed that all matter can be divided into smaller and smaller pieces until a single indivisible particle (ie the **atom**) is reached _____
• the idea was not popular, at the time, since there was no experimental evidence to support it
- (b) • supported an earlier theory that all matter is made up of four basic substances: earth, water, air, and fire _____
• because of his reputation the theory was supported for almost 2000 years
- (c) • reconsidered the ancient idea that each element is composed of atoms _____
• suggested atoms were like small spheres and each element had a unique type of atom with a particular mass
- (d) • experimented with electric current in glass cathode ray tubes _____
• proposed that each atom was composed of smaller particles (ie a positive sphere with negative **electrons** scattered throughout it)
- (e) • experimented with positively charged particles and thin gold foil _____
• proposed that all of the atom's positive charge and most of the mass is concentrated in the centre (ie the **nucleus**) while the electrons surround the nucleus and occupy most the atom's volume
- (f) • discovered that the nucleus contains neutral particles (ie **neutrons**) as well as positively charged particles (ie **protons**) _____
- (g) • suggested that electrons surround the nucleus in specific energy levels, called shells _____
• the model still used today

2. Complete the following chart comparing the subatomic particles of an atom.

Name	Symbol	Relative Mass	Electric Charge	Location
proton		1		
neutron		1		
electron		~ 0		

3. Whose model was known as:
- (a) the billiard ball model _____
 - (b) the plum pudding model _____
 - (c) the planetary model _____
 - (d) the Bohr-Rutherford model _____

4. In his experiments, J. J. Thomson discovered a tiny stream of negatively charged particles.

(a) What were these particles eventually called?

(b) According to Thomson, where are these particles located in the atom?

(c) Why did Thomson conclude that atoms also contain a positive charge?

(d) According to Thomson, where are the positive charges located in the atom?

5. Rutherford's experiment consisted of shooting positively charged particles at thin gold foil.

(a) What did he expect to happen to the particles?

(b) Why did the results surprise him?

(c) Based on the results, he revised the atomic model to include what?

(d) How did James Chadwick, Rutherford's student, refine the concept of the nucleus?

6. According to Bohr's model of the atom:

(a) how do electrons change shells (or orbits)? _____

(b) what happens when electrons drop from a higher orbit to a lower orbit?

(c) what is the maximum number of electrons in the 1st shell? the 2nd shell? the 3rd shell? _____

7. Atoms contain electrons, which are negatively charged. Why are atoms electrically neutral?
