1

REVIEW OF BASIC CHEMICAL PRINCIPLES

1.1 ATOM AND ATOMIC STRUCTURE

An atom is the smallest particle of an element that can enter into a chemical combination. Atoms of the same elements are similar in composition, but one element differs from the other in size, position, and movement of its atoms. An element is a substance composed of atoms with the same atomic number, or nuclear charge. In solid matter, the atoms vibrate within the confines of very small spaces, whereas in gas the atoms exhibit a considerable range of movement.

The concept of atoms being the smallest particles of matter was first postulated by Democritus or Leucippus in approximately 425 B.C., but it was not before Dalton's atomic theory was formulated in the first decade of the nineteenth century that this idea became scientifically established. Since then Crookes, Thomson, and others, working on the conduction of electricity in rarefied gases, made revisions in the theory above and concluded that the atom was composed of still smaller particles. The structure of the atom became a subject of research interest, and by the end of the nineteenth century it became known that the atom had the following components:

1. Electrons, small negatively charged components of atoms of all substances
2. Protons, positively charged particles of much greater mass than electrons

With the advancement of science in the twentieth century, it became clear that atoms also contain neutrons. The neutrons have a mass number of 1, but have zero (0) charge. Less fundamental particles were also detected, the positrons. Positrons are particles with the mass of an electron and the charge of a proton. The fundamental particles of the atom recognized today are (1) electrons, (2) protons, and (3) neutrons.