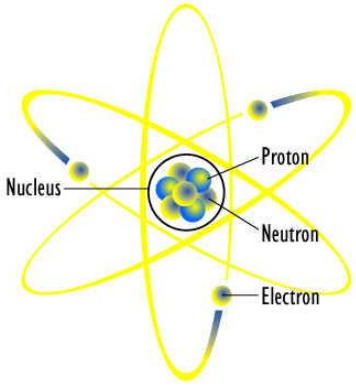
Atoms to Molecules

The Atom Itself

- **Atoms** make up almost everything in the universe, whether they are standalone particles or puzzling compositions of them.
- An **element** is in its simplest form: it cannot be made any simpler by chemical means.
    - An atom is the smallest unit of a chemical element.
- There are two parts of an atom: the **nucleus** and the **electrons.**
    - **Protons** and n**eutrons** make up the nucleus. They are of the same size, but a neutron has no charge, and a proton has a positive charge.
        - The number of protons in an atom's nucleus determines what element it is.
    - **Electrons** are much smaller than either protons or neutrons and have a negative electrical charge.

Study Tip

All atoms of a certain element are identical in atomic number, but different isotopes have different masses.



The nucleus and the electrons are the main parts of an atom.

Atomic Properties

- Because the mass of an electron is negligible, the **atomic mass** of an atom is the mass of its protons and neutrons.
- Two atoms of the same element have the same number of protons, but the number of neutrons in each nucleus can be different. Atoms of an element with different amounts of neutrons are called **isotopes**.
- When an atom either gains or loses electrons, it becomes an **ion**. An atom with more protons than electrons is positively charged, and vice versa.
- When two or more atoms link up, they form a **molecule** with a molecular mass of the sum of all the atoms in the molecule.
- The **molecular mass** is the sum of all of the masses of the atoms in the molecule.

Concept Check

- What are the different parts of the atom, and what are their differences?
- What is atomic mass?
- How does an atom become an ion?