

## Vocabulary: Element Builder



### Vocabulary

- Atom – the basic unit of matter.
    - An atom is the smallest particle of an element that still has all the properties of the element.
    - Atoms are made up of smaller particles called *protons*, *neutrons*, and *electrons*. The smaller electrons orbit around a central nucleus of protons and neutrons.
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- Atomic number – the number of protons in the nucleus of an atom.
    - Elements are distinguished from one another by their atomic numbers.
    - For example, any atom with two protons is an atom of helium.
    - The symbol for the atomic number is Z.
    - In an element symbol, the atomic number is shown at lower left.
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- Electron – a negatively charged particle that moves around the nucleus.
    - The mass of an electron is less than one thousandth of the mass of a proton.
  - Electron dot diagram – a diagram that shows the element symbol surrounded by dots representing *valence electrons*.
    - For example, the electron dot diagram at right shows that neutral helium atoms have two valence electrons.
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- Element – a pure substance that cannot be broken down into simpler substances by ordinary chemical means.
    - Elements are made of one type of atom.
    - Atoms of different elements are distinguished by the number of protons in the nucleus. For example, all carbon atoms have 6 protons.
  - Energy level – a particular region where electrons can orbit a nucleus.
  - Ion – an atom or molecule that has an electrical charge because it has gained or lost electrons.
    - An atom with more protons than electrons is a positively charged ion, or *cation*.
    - An atom with more electrons than protons is a negatively charged ion, or *anion*.
    - In an element symbol, the electric charge is shown at upper right.
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- Isotope – one of several forms of the same element.
    - All isotopes of a given element have the same number of protons, but differ in the number of neutrons.
    - Most isotopes are *radioactive*. Usually only one or two stable isotopes exist for a given element.
  - Mass number – the number of protons plus neutrons in the nucleus of an atom.
    - For example, the mass number of helium is 4 (2 protons and 2 neutrons).
    - The symbol for the mass number is  $A$ .
    - In an element symbol, the mass number is shown at upper left.
- Mass Number

$^4_2\text{He}$
- Neutron – a particle with no charge located in the nucleus of an atom.
    - Neutrons have slightly more mass than protons.
    - The number of neutrons is described by the neutron number,  $N$ .
    - To find the number of neutrons, subtract the atomic number from the mass number.
  - Nucleus – the positively charged, dense center of an atom.
    - The nucleus contains protons and neutrons.
  - Periodic table – a chart that organizes the chemical elements based on their properties.
  - Proton – a positively charged particle located in the nucleus of an atom.
    - Protons have slightly less mass than neutrons.
    - The number of protons determines the element.
  - Radioactive – capable of releasing *radiation*.
    - In a radioactive atom, the nucleus can spontaneously decay and emit particles and/or light. These emissions are called radiation.
    - The energy released by radioactive substances can be harnessed to produce electricity in a nuclear power plant. This energy also can be used to create a massive explosion in a nuclear bomb.
    - If the emissions change the number of protons in the nucleus, the atom becomes a different element.
  - Valence electrons – electrons found in the outermost energy level of an atom.