ST.LAWRENCE HIGH SCHOOL

JESUIT MINORITY INSTITUTION

CLASS 6 **SUB: GENERAL SCIENCE**

STUDY MATERIALS **DATE: 08.05.2020**

Dalton's Atomic Theory

The main points of Dalton's atomic theory are:

1. Everything is composed of atoms, which are the indivisible building blocks of matter and cannot be destroyed.
2. All atoms of an element are identical.
3. The atoms of different elements vary in size and mass.
4. Compounds are produced through different whole-number combinations of atoms.
5. A chemical reaction results in the rearrangement of atoms in the reactant and product compounds.

Atomic theory has been revised over the years to incorporate the existence of atomic isotopes and the interconversion of mass and energy. In addition, the discovery of subatomic particles has shown that atoms can be divided into smaller parts. However, Dalton's importance in the development of modern atomic theory has been recognized by the designation of the atomic mass unit as a Dalton.

What is Atomic Number?

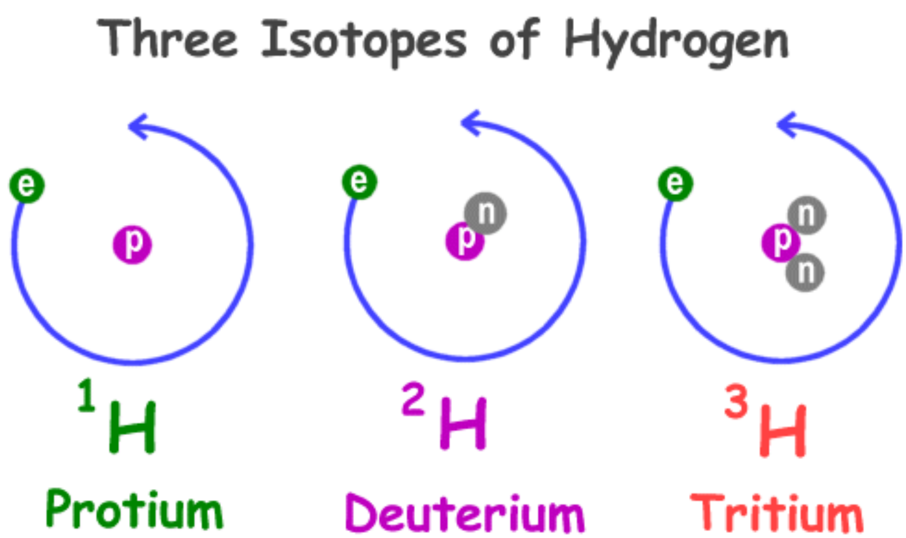
The atomic number or proton number of a chemical element is the number of protons found in the nucleus of every atom of that element. The atomic number uniquely identifies a chemical element. It is identical to the charge number of the nucleus.

What is Atomic mass?

The mass of an atom of a chemical element expressed in atomic mass units. It is approximately equivalent to the number of protons and neutrons in the atom (the mass number) or to the average number allowing for the relative abundances of different isotopes. Although the SI unit of mass is kilogram, the atomic mass is often expressed in the non-SI unit dalton where 1 dalton is defined as $^{1}/_{12}$ of the mass of a single carbon-12 atom, at rest.

What are Isotopes?

Each of two or more forms of the same element that contain equal numbers of protons but different numbers of neutrons in their nuclei, and hence differ in relative atomic mass but not in chemical properties; in particular, a radioactive form of an element.



The periodic table contains an enormous amount of important information:

Atomic number:

The atomic number uniquely identifies a chemical element. It is identical to the charge number of the nucleus. The number of protons in an atom is referred to as the atomic number of that element. The number of protons defines what element it is and also determines the chemical behavior of the element. For example, carbon atoms have six protons, hydrogen atoms have one, and oxygen atoms have eight.

Atomic symbol:

The atomic symbol (or element symbol) is an abbreviation chosen to represent an element ("C" for carbon, "H" for hydrogen and "O" for oxygen, etc.). These symbols are used internationally and are sometimes unexpected. For example, the symbol for tungsten is "W" because another name for that element is wolfram. Also, the atomic symbol for gold if "Au" because the word for gold in Latin is *aurum*.

Atomic weight: The standard atomic weight of an element is the average mass of the element in atomic mass units (amu). Individual atoms always have an integer number of atomic mass units; however, the atomic mass on the periodic table is stated as a decimal number because it is an average of the various isotopes of an element. The average number of neutrons for an element can be found by subtracting the number of protons (atomic number) from the atomic mass.

Atomic weight for elements 93-118: For naturally occurring elements, the atomic weight is calculated from averaging the weights of the natural abundances of the isotopes of that element. However, for lab-created trans-uranium elements — elements with atomic numbers higher than 92 — there is no "natural" abundance. The convention is to list the atomic weight of the longest-lived isotope in the periodic table. These atomic weights should be considered provisional since a new isotope with a longer half-life could be produced in the future.
Within this category are the superheavy elements, or those with atomic numbers above 104. The larger the atom's nucleus — which increases with the number of protons inside — the more unstable that element is, generally. As such, these outsized elements are fleeting, lasting mere milliseconds before decaying into lighter elements, according to the International Union of Pure and Applied Chemistry (IUPAC). For instance, superheavy elements 113, 115, 117 and 118 were verified by the IUPAC in December 2015, completing the seventh row, or period, on the table.

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