NUR AFRICA ACADEMY
CHEMISTRY GRADE 7 REVISION



CENTER OF WISDOM

OCTOBER 2020 G.C

THE STRUCTTURE OF SUBSTANCES

4.1.Historical development of the atomic nature of substances

- The ancient Greek philosophers described matter as continuous or discrete.

A. Democritus (460 - 370 B.C) : - thought that substances are made up of tiny indivisible particles and he called atoms.

B. Aristotle (384 -322 B.C) : - argued that matter is continuous.

4.2.ATOMIC THEORY

Daltons atomic theory

- Dalton is the father of modern atomic theory.

The main postulates of Dalton atomic theory

1.Matter consists of very small particles called atoms.

2.Atoms are indivisible.

3.All atoms of a given elements are identical ,they have the same mass and properties.

4.Atoms of one element are different from atoms of other elements in mass and other properties.

5.A chemical reaction involves only the separation ,combination ,or rearrangement of atoms.

6.Atoms combine in a fixed small whole number ratio to form compounds.

Shortcoming of Dalton atomic theory

- Atoms are indivisible
- Atoms of the same element have the same mass.

MODERN ATOMIC THEORY

Main points of modern atomic theory

- An element is made up of atoms.
- Atoms are built up from small particles called protons , electrons and neutrons.
- All atoms of the same element have the number of protons (electrons)but different number of neutrons.
- Atoms of different elements are different.
- Atoms of different elements combine in small whole numbers to form compounds.
- In ordinary chemical reactions , atoms are created , destroyed , or changed but they are rearranged.

4.3.THE STRUCTURE OF THE ATOM

THE SUBATOMIC PARTICLES

- An atom contains three fundamental subatomic particles; protons ,electrons and neutrons.
- It has a definite numbers of protons , electrons and neutrons.
- An atom has two regions nucleus and electronic shell (orbit).

Relative charge and mass of subatomic particles

Table ;4.2.Nature and location of subatomic particles

Particle	***location***	***Actual 1,mass***	***Relative mass***	***Charge***
Proton	Nucleus	1.67 x 10 -24	1	+
Electron	Shell	9.01 x 10 -28	0	-
neutron	Nucleus	1.675 x 10 -24	1	0

Atomic mass and mass number

- Atomic number is the number of protons in an atom and symbolized by ‘’ Z ‘’

- Atomic number = Number of protons
- Mass number (A) is the number of protons and neutrons in an atom. It is symbolized by ‘’ A ‘’ .
- Mass number = Number of protons + number of neutrons OR

A = P + n

UNIT 5

PERIODIC CLASSIFICATION OF THE ELEMENTS

5.1.HISTORICAL DEVELOPMENT OF THE PERIODIC CLASSIFICATION OF THE ELEMENTS

Law of Triad-Group of Three

- *J. W. Dobereiner* in 1817 arranged similar elements in a group of three or triads in in increasing order of their atomic masses.
- Then, he observed that the atomic mass of the middle element is nearly equal to the average atomic the other two elements.

Law of Octave-Group of Eight

- *John Newlands* in 1863,he reported the law of octaves(law of eight) and it States that when elements are arranged in increasing order of their atomic masses, the eight element has similar properties to the first one.

5.2 MENDELEEV'S PERIODIC CLASSIFICATION

- *Mendeleev's* periodic law States that “ the properties of elements are periodic functions of their atomic masses .“

5.3.MODERN PERIODIC TABLE

- The founder of modern periodic table is *Henry* Mosley in 1913 and it States that “ the properties of the elements are periodic functions of their atomic numbers."

STRUCTURE OF MODERN PERIODIC TABLE

- In modern periodic table , the elements are classified in periods and groups.

- *Period* is the horizontal raw of elements in the periodic table.
- There are ***seven*** periods in the modern periodic table and the numbers are arranged by Arabic numerals ,1 to 7.
- Period 1 contains ***2*** elements ,H to He.
- Period 2 contains ***8*** elements ,Li to Ne.
- Period 3 contains ***8*** elements ,Na to Ar.
- Period 4 contains ***18*** elements ,K to Kr.
- Period 5 contains **18** elements , Rb to XE .
- Period 6 contains **32** elements ,Cs to Rn.
- Period 7 is ***incomplete*** ,it starts with Fr.

- ***Groups*** *(families) are* the vertical column of the elements in the periodic table.
- There are ***18*** groups in modern periodic table.
- Each group is represented by *Roman numerals*, I to VIII followed by the letters A or B.
- The" A "groups are designated with IA to VIII and referred to as the main groups or *representative elements*. "A“ group elements (main groups) : IA, IIA, IIIA ....VIIIA.

- ***The “ B ‘’*** groups that are designated with IB to VIIB, are known as *transition elements*.
- They are placed between group IIA and IIIA.
- All transition elements are ***metals.*** Iron ,copper , gold and zinc are some examples of transition elements.
- "B" group elements /sub groups /:IB,IIB,IIIB…VIIIB.

Electronic configuration and arrangement of Elements

- The *period* number of an element corresponds to the number of *shells* in its atom.
- **Example:** If an element has 3 shells (K,L and M) then it belongs to the third period.
- The *group* number of an element is equal to the number of its valence numbers.
- **Example**: If the valence electron of an element is 1 , it belongs to group IA ,
- if it has 2 valence electrons , the element is found in group IIA and so on.

✓ ***All elements in the same group have the same number of valence electrons***.

- Example : group IA elements have 1 valence electron and
  group IIA elements have 2 valence electrons , etc.

- ***Metallic elements are found to the left and center of the periodic table.***
- ***Non metallic elements are found to the right of the periodic table.***

Some periodic properties in the periodic table

- A periodic property is a physical or chemical property which changes periodically with increasing atomic number.

Some periodic properties of the elements are: -

- Nuclear charge
- Atomic size and
- Metallic and non metallic character.

Trends Across a period

1.Nuclear charge : It is the total charge of protons in the nucleus of an atom.

- The nucleus of an atom is positively charged due to protons.
- Generally , nuclear charge increase across a period due to the increase of atomic numbers.

2.Atomic size/atomic radius / : It is the distance from the nucleus to the outermost shell of an atom.

3.Metallic and non metallic characters

- From left to right across a period ,metallic character decrease while non metallic character increases.
- Generally , across a period metallic character Decreases and non metallic character increases.

Trends Down a Group

I. Nuclear Charge

- Down a group nuclear charge increase due to increase in the number of protons in the nucleus.

II. Atomic size:

- Down a group atomic size of elements increase due the addition of new shells

III. Metallic and non metallic characters

- Down a group metallic character of elements for Group IA,IIA and IIIA increase due to increase in atomic size.
- Non metallic character of elements for Group IVA, VA,VIA and VIIA elements decrease.

Importance/advantage / of the modern periodic table

- ✓ To predicting the properties of elements
- ✓ To predict the new elements
- ✓ To read , deduce and state the basic information about a given element.

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