**Lect.2.****2-Molecules and Ions.**

A molecule is an aggregate of at least two atoms in a definite arrangement held together by chemical bonds.

A molecule may contain atoms of the same element or atoms of two or more elements joined in a fixed ratio, Hydrogen gas, for example, is a pure element, but it consists of molecules made up of two H atoms each. Water, on the other hand, is a molecular compound that contains hydrogen and oxygen in a ratio of two H atoms and one O atom.

Like atoms, molecules are electrically neutral.

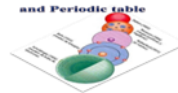
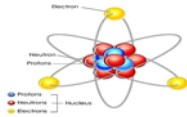
The hydrogen molecule, **symbolized as H_2 , is called a diatomic molecule because it** contains only two atoms.

Other elements that normally exist as diatomic molecules are nitrogen (N_2) and oxygen (O_2), as well as the Group 7A elements— fluorine (F_2), chlorine (Cl_2), bromine (Br_2), and iodine (I_2).

Of course, a diatomic molecule can contain atoms of different elements. Examples are hydrogen chloride (HCl) and carbon monoxide (CO).

The vast majority of molecules contain more than two atoms. They can be atoms of the same element, as in ozone (O_3), which is made up of three atoms of oxygen, or they can be combinations of two or more different elements. Molecules containing more than two atoms are called polyatomic molecules.

Like ozone, water (H_2O) and ammonia (NH_3) are polyatomic molecules.



Lect.2.

General Chemistry

Dr. Reem.S.Najm

Lect.2.

2-1 What is an ion?

An ion is a charged atom or molecule.

It is charged because the number of electrons does not equal the number of protons in the atom or molecule.

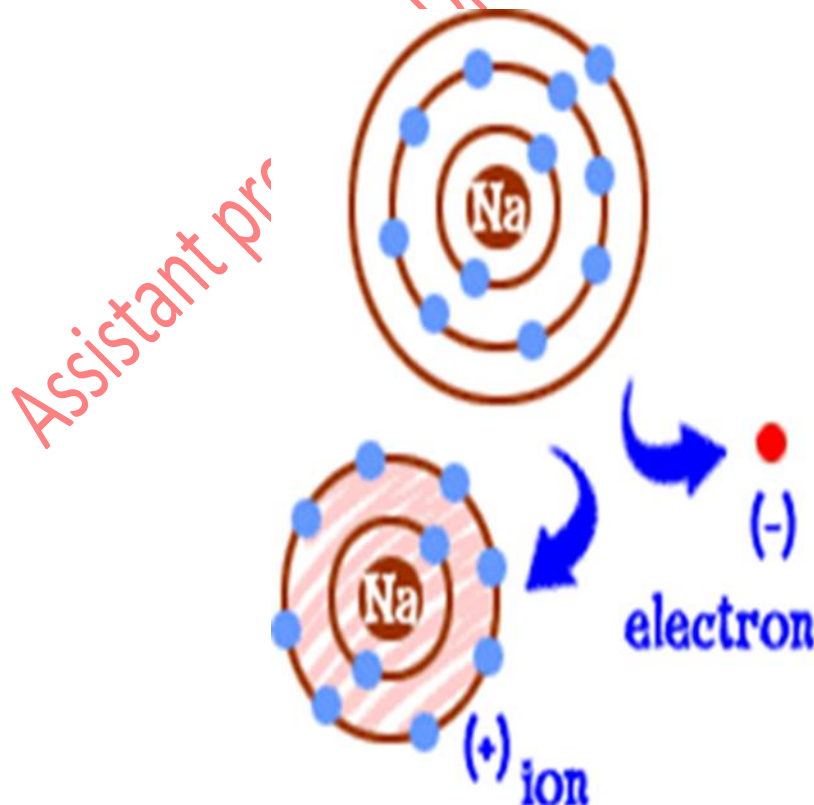
An atom can acquire a positive charge or a negative charge depending on whether the number of electrons.

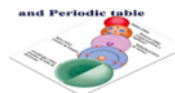
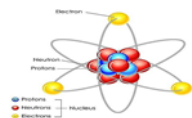
in an atom is greater or less than the number of protons in the atom.

When an atom is attracted to another atom because it has an unequal number of electrons and protons, the atom is called an ION.

If the atom has more electrons than protons, it is a negative ion, or ANION.

If it has more protons than electrons, it is a positive ion.





Lect.2.

2-2The Periodic Table

The Periodic Table is an elemental table that is primarily used in chemistry.

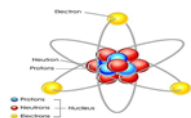
It is a diagram that scientists designed to organize all of the known elements.

Within the Periodic Table there are several ways that the elements are categorized.

Understanding the Periodic Table is one of the most important concepts to grasp in basic chemistry.

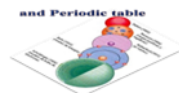
Read more to find out about the history and organization of the Periodic Table.

ASSIS



Lect.2.

General Chemistry



Dr. Reem.S.Najm

Lect.2.

2-3. Brief History

The first real elemental table is credited to the Russian chemistry professor, Dimitri Mendeleev.

He developed this table in 1869, grouping the 63 known elements of his day based on their properties, such as atomic weight.

In 1913, Henry Moseley realized that the order was dependent not on atomic weight, but the number of protons the atom contained.

This is the atomic number that chemists use to list the elements today.

Families

The families on the Periodic Table, which are sometimes referred to as groups, are shown in the Periodic Table by vertical columns.

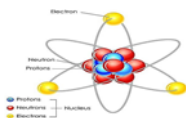
Each of the 18 columns is a family.

They are typically labeled by Roman numerals and letters, but more recent methods use the numbers 1 through.

These families share similar properties. There are four families that .18 are given specific names because they are so closely related.

The IA family, called the alkali metals, are given to losing a single electron.

A common element in this family is element 11, sodium (Na), which is typically seen as a sodium ion (Na⁺)



Lec.2.

Periods

The periods for which the Periodic Table got its name are shown by the rows of the table.

These are labeled by numbers 1 through 7 and contain elements that increase in atomic number from left to right.

Periods are significant because they also have similar properties. They increase in atomic weight as well, and most items in the period tend to form similar types of compounds.

Blocks

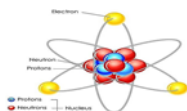
Another categorization used to group them are blocks.

Blocks are set up by splitting the Periodic Table into rectangular-like sections.

There are four sections in all, The first two families make up the s-block, the last six families make up the p-block, and the 10 in between make up the d-block.

The last block is made up of two rows of elements that are usually shown separated below the table. This block contains elements 57 through 70 (Lanthanoids) and 89 through 102 (Actinoids).

The elements within each block are from the same atomic orbital type. An atomic orbital cannot be observed, but it is a mathematically derived area where the electrons of the atom are most likely to be found.



Lect.2.

Metals

When you look past the positioning on the Periodic Table, you can categorize the elements in other ways as well.

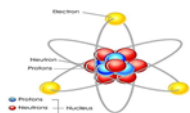
There are many different metals on the Periodic Table, They are split up into six different types: alkali, alkaline, lanthanoids, actinoids, transition, and post-transition. These are grouped together on the Periodic Table in different forms, but they are all somewhat related by their properties.

Nonmetals

Nonmetals are another classification and are split up into three different categories.

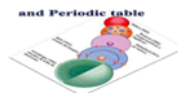
These include noble gases, halogens, and other nonmetals, which is a catchall category.

These include elements like hydrogen (H), Chlorine (Cl), and Neon (Ne). Most of these are gases, but can actually be liquids at certain temperatures.



Lect.2.

General Chemistry



Dr. Reem.S.Najm

Lect.2.

Metalloids

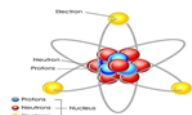
A third classification, called metalloids is another catchall group.

There are only a few of these on the Periodic Table, and they are found wedged in between the metals and nonmetals.

These elements contain properties of both metals and nonmetals, but cannot be completely categorized as either. Because scientists are always looking to discover new elements, the Periodic Table is forever changing. There have been 118 elements discovered so far. Not all of them occur naturally on Earth and are manmade instead.

Knowing the groups, periods, and families on the elemental table can help you find the properties of any new elements that are discovered later.

It also allows you to know exactly what the properties are of the elements that are already known.



Lect.2.

General Chemistry

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Lect.2.

Questions for Lec. 1 & Lect.2

Q1\ Full the blanks..

1-Chemistry is **a science deals with, the matter and how it interacts -1 with other matter and/or energy.**

2-Substances **differ from one another in composition and can be identified by their appearance, smell, taste, and other properties.**

3- Matter is typically found in one of three different physical states are:
‘Solid, Liquid ,Gas

4-Mixtures are either **homogeneous** or **heterogeneous**

5-This type of mixture is called a **heterogeneous** mixture because the **composition is not uniform.**

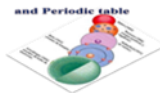
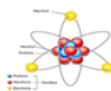
6-The fundamental unit of a chemical substance **is called an atom**

7-A molecule **is a combination of two or more atoms held together in a specific shape by attractive forces.**

8- At the center of an atom is **nucleus** containing **protons** and **neutrons.**

9- **A molecule** is a combination of two or more atoms held together in a specific shape by attractive forces.

10-The number of protons in an atom is called its(**atomic number -**) also called the **proton number.**

**Lect.2.**

11-Atoms are arranged in the periodic table in order of increasing **atomic number**.

12-The number of protons in the nucleus of each atom of an element **is (called the atomic number (Z))**.

13-The mass number (A): **is the total number of neutrons and protons present in the nucleus of an atom of an element**.

14-The number of neutrons in **an atom is equal to the difference (between the mass number and the atomic number, or (A-Z))**.

15-**The mass number (A)**: is the total number of neutrons and protons present in the nucleus of an atom of an element.

16-**A molecule** is an aggregate of at least two atoms in a definite arrangement held together by chemical bonds.

17- Like atoms, **molecules** are **electrically neutral**.

18-The hydrogen molecule, **symbolized as H₂**, is called a **diatomic molecule** because it contains **only two atoms**.

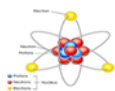
19-A molecule **is an aggregate of at least two atoms in a definite arrangement held together by chemical bonds**.

20-When an atom is attracted to another atom because it has an unequal number of electrons and protons, the atom is called **an ION**.

21- If the atom has more electrons than protons, **it is a negative ion, or ANION**.

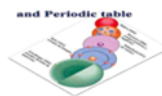
22-If it has more protons than electrons, **it is a positive ion**.

23- The Periodic Table is an elemental table **that is primarily used in chemistry. It is a diagram that scientists designed to organize all of the known elements**



Lect.2.

General Chemistry



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Lect.2.

24-He developed this table **in 1869, grouping the 63 known elements of his day based on their properties, such as atomic weight.**

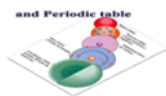
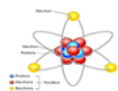
25-The families **on the Periodic Table, which are sometimes referred to as groups, are shown in the Periodic Table by vertical columns.**

26- Each of the **18 columns is a family.**

27-There are many different metals on the Periodic Table, **They are split up into six different types: alkali, alkaline, lanthanoids, actinoids, transition, and post-transition. These are grouped together on the Periodic Table in different forms, but they are all somewhat related by their properties.**

28-A third classification, called **metalloids** is another catchall group. There are only a few of these on the Periodic Table, and they are found wedged in between the metals and nonmetals.

Assistant professor Dr. Reem.S.Najm 2021/1/20

**Lect.2.****Q2\\Put(True) or(false) for the following sentences.**

1-A third classification, called metalloids is another catchall group(True).

2-A common element in this family is element 10, sodium (Na), which is typically seen as a sodium ion (Na⁻)(false).

3-Substances differ from one another in composition and can be identified by their appearance, smell, taste, and other properties(True)

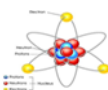
4-Matter is typically found in one of three different physical states or phases(True).

5-At the center of an atom is nucleus containing protons and neutrons(True)

6-There are many different metals on the Periodic Table, They are split up into six different types: alkali, alkaline only(false).

7-The last block is made up of two rows of elements that are usually shown separated below the table. This block contains elements 57 through 70 (Lanthanoids) and 89 through 102 (Actinoids). (True)

8-The number of protons in an atom is called its(atomic number -) also called the proton number(True).



Lect.2.

General Chemistry



Dr. Reem.S.Najm

Lect.2.

Q3\\ choose the correct answer.

1-differ from one another in composition and can be identified by their appearance, smell, taste, and other properties. (a) **Substances** , b) elements c)ion

2- is a combination of two or more substances in which the substances retain their distinct identities. (a)atom, **b) A mixture**, c) molecule.

3- Atoms are arranged in the periodic table in order of increasing.....

a)**atomic number**, b) proton number, c) elements.

4-A third classification, called..... is another catchall group

a) metalloids b) heterogeneous , c) Periodic Table

5-Each of the 18 columns is.....

a) **a family** , b) homogeneous, c) vertical columns

Q4\\Defined

Chemistry , 2- Substances 3- A mixture 4- proton number 5- atomic number 6- ION.,