CLASS 10- SCIENCE

CHAPTER 3- METALS AND NON-METALS

PART 2- PHYSICAL PROPERTIES OF NON-METALS

PHYSICAL PROPERTIES OF NON-METALS

1) Non-metals are neither malleable nor ductile i.e. they can neither be beaten into thin sheets nor can be drawn into thin wires, as they are brittle and break into pieces when hammered or stretched.

Examples- Sulphur, phosphorus

Exceptions- Graphite (allotrope of carbon)

2) Non-metals do not conduct heat and electricity.

Examples- Oxygen, nitrogen, sulphur etc.

Exceptions- Graphite (allotrope of carbon) is the only non-metal which is a good conductor of heat and electricity.

PHYSICAL PROPERTIES OF NON-METALS (cont.)

3) Non-metals may be solid, liquid or gaseous at the room temperature i.e. they can exist in all the three physical states.

Examples- Solid non-metals- Carbon, sulphur, phosphorus

Liquid non-metal- Only bromine is a liquid non-metal

Gaseous non-metals- Hydrogen, oxygen, nitrogen, chlorine

4) Non-metals are not strong. They have a low tensile strength and cannot hold large weights.

Example- Graphite (allotrope of carbon)

PHYSICAL PROPERTIES OF NON-METALS (cont.)

5) Non-metals are generally soft.

Examples- Sulphur and phosphorus are non-metals which are solid but still soft.

Exception- Diamond (allotrope of carbon) is the hardest natural substance even though it is a non-metal.

6) Non-metals are not sonorous i.e. they do not produce sound when hit with an object.

Examples- Sulphur, oxygen, nitrogen etc.

PHYSICAL PROPERTIES OF NON-METALS (cont.)

7) Non-metals are not lustrous i.e. they do not have a shiny surface instead they have a dull appearance.

Examples- Sulphur, phosphorus

Exceptions- Iodine and diamond (allotrope of carbon) are lustrous with a shiny appearance

8) Non-metals have comparatively low melting and boiling points.

Examples- Sulphur, phosphorus, nitrogen, chlorine etc.

Exception- Diamond and graphite (allotropes of carbon)

PHYSICAL PROPERTIES OF NON-METALS (cont.)

9) Non-metals have low densities i.e. they are light substances.

Example- Sulphur, phosphorus etc.

Exception- Diamond, iodine

10) Non-metals have different colors.

Examples- Sulphur (yellow), graphite (black), phosphorus (white or red), chlorine (yellowish green), hydrogen and oxygen (colorless)

CONCLUSION

From the above explanation, the elements cannot be classified as metals or non-metals only on the basis of their physical properties as there are many exceptions in almost all the properties. However, the elements can be classified more clearly as metals or non-metals on the basis of their chemical properties.

IMPORTANT DEFINITIONS

1) Malleability- The property of metals which allow them to be beaten into thin sheets is called malleability.

Examples- Gold, silver, aluminium, iron, copper

2) Ductility- The property of metals which allow them to be drawn into thin wires is called ductility.

Examples- Gold, silver, copper, aluminium, iron, magnesium, tungsten

IMPORTANT DEFINITIONS (cont.)

3) Metallic Lustre- The property of metals of having a shiny surface or a lustrous appearance is called metallic lustre.

Examples- Gold, silver, copper

4) Sonority- The property of metals to produce a deep or ringing sound when struck with a hard object is called sonority and such metals are said to be sonorous.

Examples- Iron, copper, aluminium, silver, tin

IMPORTANT DEFINITIONS (cont.)

5) Metals- Metals are the elements which are malleable and ductile and can conduct heat and electricity. They are also known as electropositive elements because they can form positive ions by losing electrons.

Examples- Gold, silver, aluminium, iron, zinc, sodium, potassium, tin, lead, mercury

6) Non-metals- Non-metals are the elements which are neither malleable nor ductile and also they do not conduct heat and electricity. They are also known as electronegative elements because they can form negative ions by gaining electrons.

Examples- Carbon, sulphur, phosphorus, oxygen, nitrogen, hydrogen, chlorine, bromine

IMPORTANT DEFINITIONS (cont.)

7) Allotropes- Allotropes are two or more forms of the same chemical element in the same physical state i.e. solid, liquid or gas. They differ from each other in their physical and sometimes chemical properties.

Examples- Oxygen exists in three allotropic forms: Monoatomic oxygen, diatomic molecule and a triatomic molecule known as ozone.

Similarly solid carbon exists in two allotropic forms: Diamond and graphite.

Likewise, phosphorus also occurs in two allotropic forms: White phosphorus and red phosphorus.

THANK YOU