TALENT & OLYMPIAD

Metals and Non-Metals

ᡐ 🛛 Metals

Metals, group of elements that exhibit all or most of the following physical qualities: they are solid at room temperatures; opaque, except in extremely thin films; good electrical and thermal conductors; lustrous when polished; and have a crystalline structure when in the solid state. Metals and nonmetals are separated in the periodic table by a diagonal line of elements. Elements to the left of this diagonal are metals, and elements to the right are nonmetals. Metallic elements can combine with one another and with certain other elements, either as compounds, as solutions, or as intimate mixtures. A substance composed of two or more metals, or a substance composed of a metal and certain nonmetals such as carbon are called alloys. Alloys of mercury with other metallic elements are known as amalgams.

Physical Properties

Metals are generally very strong and resistant to different types of stresses. Though there is considerable variation from one metal to the next, in general metals are marked by such properties as hardness, the resistance to surface deformation or abrasion; tensile strength, the resistance to breakage; elasticity, the ability to return to the original shape after deformation; malleability, the ability to be shaped by hammering; fatigue resistance, the ability to resist repeated stresses; and ductility, the ability to undergo deformation without breaking..

Chemical Properties

Metals typically have positive valences in most of their compounds, which means they tend to donate electrons to the atoms to which they bond. Also, metals tend to form basic oxides. Typical nonmetallic elements, such as nitrogen, sulphur, and chlorine, have negative valences in most of their compounds-meaning they tend to accept electrons—and form acidic oxides

Non-Metals

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Only eighteen elements in the periodic table are generally considered nonmetals, compared to over eighty metals, but nonmetals make up most of the crust, atmosphere and oceans of the earth. Bulk tissues of living organisms are composed almost entirely of nonmetals. Most nonmetals are monatomic noble gases or form diatomic molecules in their elemental state, unlike metals which (in their elemental state) do not form molecules at all.

Non-metals are basically defined as elements that are not metals.

Their physical properties generally include:

- 1. They are poor conductors.
- 2. They are brittle, not ductile in their solid state.
- 3. They show no metallic lustre.
- 4. They may be transparent or translucent.
- 5. They have low density.
- 6. They are gases, liquids, or solids.
- 7. Theyform molecules which consists of atoms covalently bonded; the nobel gases are monoatomic.

Theirchemical properties are generally:

- 1. They usually have four to eight valence electrons.
- 2. They have high electron affinities, (except noble gases)
- 3. They are good oxidizing agents, (except noble gases)
- 4. They have hydroxides which are acidic, (except noble gases)
- 5. They are electronegative.

Difference between Metals and Non-Metals

Chemical Properties

Metals:

- Usually have 1-3 electrons in their outer shell.
- Lose their valence electrons easily.
- Form oxides that are basic.
- Are good reducing agents.
- Have lower electronegativities.

Nonmetals:

- Usually have 4-8 electrons in their outer shell.
- Gain or share valence electrons easily.
- Form oxides that are acidic.
- Are good oxidizing agents.
- Have higher electronegativities.

Physical Properties

Metals:

- Good electrical conductors and heat conductors.
- They are malleable i.e.can be beaten into thin sheets.
- They are ductile i.e.can be stretched into wires.
- Possess metallic lustre.
- Opaque as thin sheet.
- Solid at room temperature (except Hg).

Nonmetals:

- Poor conductors of heat and electricity.
- They are brittle if a solid.
- They are non-ductile.
- Do not possess metallic lustre.
- Transparent as a thin sheet.
- Solids, liquids or gases at room temperature.



A substance composed of two or more metals is called:

(a) Alloys(c) Non-metals(e) None of these

(e) None of th

Answer: (a)



Which one of the following is a metal?

(a) Aluminium(c) Silver(e) None of these

Answer: (d)

SUMMARY



(b) Gold

(d) All of these

(b) Metalloids(d) All of these

- Metals are good conductor of heat and electricity.
- Non-metals are bad conductor of heat and electricity.
- Metals and non-metals are separated in the periodic table by a diagonal line of elements.
- Metals are malleable and ductile
- Non-metals are brittle.

Self Evaluation



1.	Which one of the following is a metal?										
-	(a) Carbon (b) Oxygen										
	(c) Iron	(d) Both (a) and (b)									
	(e) None of these										
2.	Which one of the following is a non-metal?										
	(a) Chlorine	(b) Hydrogen									
	(c) Copper	(d) Both (a) and (b)									
	(e) None of these										
3.	Name the metal which is liquid at room temperature.										
5.	(a) Sodium	(b) Magnesium									
	(c) Mercury	(d) Bromine									
	(e) None of these										
4.	What is the nature of the oxide which is formed when a metal reacts with oxygen?										
	(a) Basic	(b) Acidic									
	(c) Neutral	(d) All of these									
	(e) None of these										
5.	What is the nature of the oxide which is formed when a non-metal reacts with oxygen?										
	(a) Basic	(b) Acidic									
	(c) Neutral	(d) All of these									
	(e) None of these										
6.	Which one of the following statements is correct?										
	Statement 1: Metals are malleable and ductile										
	Statement 2: Non-metals are malleable and ductile										
	(a) Statement 1										
	(b) Statement 2										
	(c) Both statements are corre	ect									

(d) Both statements are incorrect

Which one of the following statements is correct? 7.

Statement 1: Non-metals are poor conductors of heat

Statement 2: Non-metals are good conductors of heat

- (a) Statement 1
- (b) Statement 2
- (c) Both statements are correct
- (d) Both statements are incorrect

8. Metals can be drawn into thin wires. This property of metal is known as:

(a) Malleability

(b) Ductility (c) Both (b) and (c)

(c) Conductivity

(e) None of these

9. The property due to which non-metals break on hammering is called:

(a) Ductility

(b) Malleability

(c) Conductivity (d) None of these (d) Brittleness

10. Which one of the following statements is correct? Statement 1: Metals are lustrous

Statement 2: Non-metals are not lustrous

- (a) Statement 1
- (b) Statement 2
- (c) Both statements a re correct
- (d) Both statements are incorrect

	Answers – Self Evaluation Test																	
1.	С	2.	D	3.	С	4.	А	5.	В	6.	А	7.	А	8.	В	9.	D	10. C