

Chapter 4 – Metal and Non-Metal

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

- | | |
|---|--------------------------|
| (a) Metals | (b) Sodium and Potassium |
| (c) Metal : Mercury and Non-metal : Bromine | (d) Graphite |
| (e) Magnesium | (f) Zinc |
| (g) Nitrogen | (g) Iodine |
| (i) Sulphur and Phosphorus | (j) Carbon |
| (k) Hydrogen | (l) Corrosion |
| (m) Chlorine | |

2. Fill in the following blanks with suitable words:

- | | |
|-----------------------|----------------------------|
| (a) good, electricity | (b) poor |
| (c) reactive | (d) basic copper carbonate |
| (e) acidic, basic | |

3. State whether the following statements are true or false:

- | | | | | |
|-----------|-----------|-----------|-----------|-----------|
| (a) False | (b) False | (c) False | (d) True | (e) False |
| (f) False | (g) False | (h) True | (i) False | |

4. Match the uses of metals and non-metals given in Column I with the jumbled names of metals and non-metals given in Column II:

- | | | | | |
|-----------|---------|---------|----------|----------|
| (a) (iii) | (b) (v) | (c) (i) | (d) (iv) | (e) (ii) |
|-----------|---------|---------|----------|----------|

Subjective Type Questions

Short Answer Type Questions

1. (a) (i) **Malleability:** Malleability is the property of a metal by which it can be beaten into thin sheets without breaking.

Examples: Gold and aluminium are highly malleable.

- (ii) **Ductility:** Ductility is the property of a metal by which it can be drawn into thin wires.

Examples: Copper and silver are highly ductile.

- (b) Zinc can be beaten into thin sheets. Zinc is a metal, and metals are malleable. Phosphorus, sulphur, and oxygen are non-metals, which are brittle and break easily when hammered.

2. To find out which box is made of metal, we can use the property of metal, like striking both boxes. Metals are sonorous, which means that metals make a ringing sound when we strike them with a hard object. The wooden box will produce a duller sound.

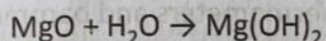
3. (i) Malleable and ductile materials: Copper, Gold, Silver

- (ii) Brittle materials: Sulphur, Phosphorus, Carbon (pencil lead).

4. The handle of an electrician's screw driver is made up of plastic or wood because these materials are poor conductors of electricity. This prevents the electric current from passing through the handle to the electrician's hand.

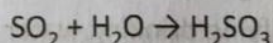
5. (a) Magnesium oxide (MgO) is basic in nature.

Reason: Magnesium is a metal, and metallic oxides are generally basic. Magnesium oxide reacts with water to form magnesium hydroxide (Mg(OH)_2), which is a base.



- (b) Sulphur dioxide (SO_2) is acidic in nature.

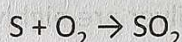
Reason: Sulphur is a non-metal, and non-metallic oxides are generally acidic. Sulphur dioxide dissolves in water to form sulphurous acid (H_2SO_3).



6. Element A is a non-metal. Element A is soft, brittle, and does not conduct electricity and shows all the properties of non-metals. Element B, being hard, malleable, ductile, and a good conductor of electricity, shows the characteristic properties of a metal.
7. (a) The green coating formed on the surface of copper is basic copper carbonate, which is a mixture of CuCO_3 and Cu(OH)_2 .
- (b) The green coating is basic in nature because it contains copper hydroxide (Cu(OH)_2), which is a base.
8. The iron nail dipped in oil will not rust because oil forms a protective layer around the nail and prevents air and moisture from coming in contact with the iron surface.
9. The two differences between metals and non-metals are:

Property	Metals	Non-metals
Malleability	They can be beaten into thin sheets.	They cannot be beaten into thin sheets; they are brittle.
Electrical Conductivity	Metals are good conductors of electricity.	Non-metals are poor conductors of electricity (except graphite).

10. When sulphur burns in air, it reacts with oxygen to form sulphur dioxide (SO_2) gas. Sulphur dioxide is an acidic oxide because its aqueous solution turns the blue litmus paper red.



11. (a) Sodium and potassium are very reactive metals. They react vigorously with oxygen and moisture present in the air and can even catch fire. Hence, they are stored in kerosene to prevent contact with air and moisture.
- (b) Copper metal is a good conductor of electricity and is also ductile i.e., it can be drawn into thin wires. Therefore, copper is used for making electric wires.
12. (a) Metals are used for making bells because they are sonorous, which means they produce a loud ringing sound when struck.
- (b) Phosphorus is a very reactive non-metal. It catches fire easily when exposed to air. So, it is kept under water.
13. (a) Iron: It is used for making machinery, tools and buildings.
- (b) Copper: It is used for making electrical wires due to its high electrical conductivity.
- (c) Aluminium: It is used for making kitchen utensils because it is lightweight and resistant to corrosion.
- (d) Zinc: It is used for galvanising iron to prevent rusting.
- (e) Mercury: It is used in thermometers and barometers because it is a liquid metal.
14. (a) Oxygen: It is used for respiration by living organisms and in hospitals for patients with breathing problems.
- (b) Nitrogen: It is used in the manufacture of fertilisers to promote plant growth.
- (c) Sulphur: It is used in making sulphuric acid and in fireworks.
- (d) Chlorine: It is used in purifying drinking water to kill germs.
- (e) Iodine: It is used as an antiseptic in the form of tincture of iodine for treating wounds.

Long Answer Type Questions

1. (a) Metals and Non-metals

Metals: are elements that are malleable, ductile and good conductors of heat and electricity.

Examples: Iron, Copper, Aluminium, Gold, Sodium.

Non-metals: are elements that are usually brittle, dull and poor conductors of heat and electricity.

Examples: Sulphur, Carbon, Oxygen, Nitrogen, Chlorine.

(b) Classification

Metals	Non-metals
Sodium	Sulphur
Copper	Carbon
Aluminium	Nitrogen
Iron	Oxygen
Magnesium	Chlorine
Gold	

(c) (i) Carbon (in the form of graphite) can conduct electricity.

(ii) Oxygen is the element essential for the survival of living organisms.

2. (i) Take three test tubes and place clean iron nails in each of them.

(ii) Pour some tap water into test tube 1.

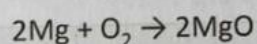
(iii) Pour boiled or distilled water into test tube 2, add a layer of oil on top, and cork it.

(iv) Put some anhydrous calcium chloride into test tube 3 and cork it.

(v) After 10 to 12 days, observe that the nail in test tube 1 has rusted because it is exposed to both air and water, while the nails in test tubes 2 and 3 do not rust. This shows that rusting of iron takes place only in the presence of both air and moisture.

3. (a) • When oxygen reacts with magnesium, it forms magnesium oxide (MgO).

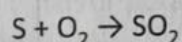
Reaction:



Magnesium oxide is a basic oxide because its solution in water turns red litmus paper blue.

• When oxygen reacts with sulphur, it forms sulphur dioxide (SO₂).

Reaction:



Sulphur dioxide is an acidic oxide because its solution in water turns blue litmus paper red.

Magnesium oxide is basic in nature and sulphur dioxide is acidic in nature.

(b) Only a few metals, such as gold, silver and platinum, are suitable for making jewellery because:

(i) They are lustrous, giving jewellery a shiny appearance.

(ii) They are malleable and ductile, so they can be easily shaped into thin wires or sheets.

(iii) They are resistant to corrosion, which means they do not rust or tarnish easily.

4. (a) Characteristics of Metals and Non-metals

Metals	Non-metals
Metals are malleable (can be beaten into thin sheets).	Non-metals are brittle (break easily when hammered).
Metals are ductile (can be drawn into wires).	Non-metals are non-ductile (cannot be drawn into wires).
Metals are good conductors of heat and electricity.	Non-metals are poor conductors of heat and electricity (except graphite).
Metals are lustrous (shiny in appearance).	Non-metals are non-lustrous (dull in appearance, except iodine).
Metals form basic oxides.	Non-metals form acidic oxides.

(b) Uses of Metals and Non-metals

Metals	Non-metals
Iron is used for making tools, machinery and buildings.	Oxygen is used for respiration and in hospitals.
Copper is used in electrical wires.	Nitrogen is used in fertilisers to promote plant growth.
Aluminium is used for making aeroplanes and kitchen utensils.	Sulphur is used in making sulphuric acid and fireworks.
Gold and silver are used in jewellery.	Chlorine is used to purify drinking water.
Zinc is used for galvanising iron to prevent rusting.	Iodine is used as an antiseptic on wounds.

5. Physical Properties of Metals and Non-metals

Metals	Non-metals
1. Metals are malleable and ductile.	1. Non-metals are neither malleable nor ductile. They are brittle.
2. Metals are good conductors of heat and electricity.	2. Non-metals are poor conductors of heat and electricity (except graphite, which is a good conductor of electricity).
3. Metals are lustrous (or shiny).	3. Non-metals are not lustrous (or shiny). They are dull except iodine.
4. Metals are hard except sodium and potassium.	4. Non-metals are soft except diamond.
5. Metals are sonorous. They make a ringing sound when struck.	5. Non-metals are not sonorous. They do not make a ringing sound when struck.

Chemical Properties of Metals and Non-metals

Metals	Non-metals
1. Metals form basic oxides.	1. Non-metals form acidic oxides.
2. Metals react with water (or steam) to produce hydrogen gas (except copper, silver and gold, which do not react with water or steam).	2. Non-metals do not react with water (or steam).

Multiple Choice Questions (MCQ)

- (b) Potassium
- (c) Copper
- (b) Sodium
- (c) Potassium
- (d) Both (a) and (b)
- (d) Both (a) and (c)
- (b) Sulphur
- (a) Carbon
- (a) Aluminium
- (d) Sodium
- (b) Brittleness

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

- | | |
|-------------------------|--|
| (a) Rotation | (b) Great Bear or Big Dipper |
| (c) Revolution | (d) Big Dipper, Little Dipper and Cassiopeia |
| (e) Southern Hemisphere | (f) Equinox |
| (g) Eclipse | |

2. Fill in the following blanks with suitable words:

- | | | | |
|----------------|--------------|------------------|--------------|
| (a) east, west | (b) rotation | (c) west to east | (d) 365 days |
| (e) Orion | (f) 23.5° | (g) diamond ring | (h) total |

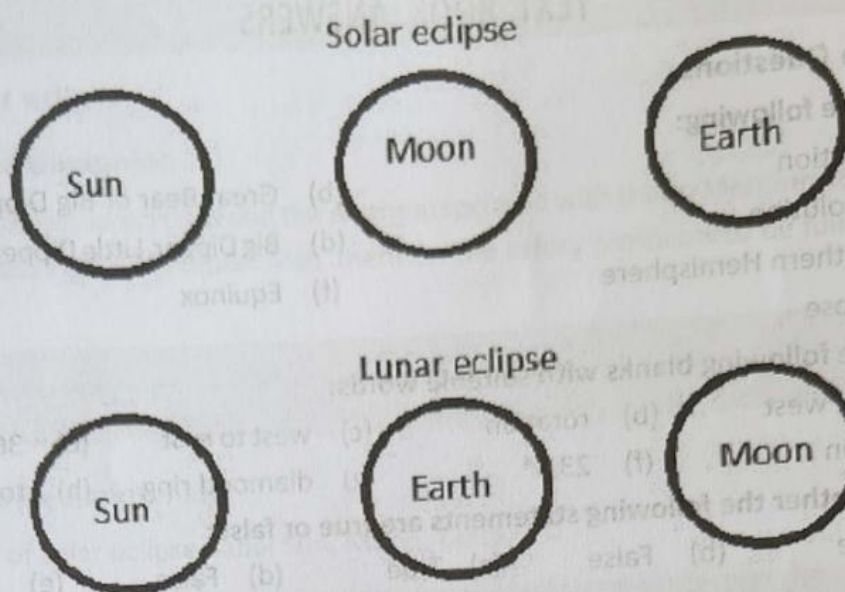
3. State whether the following statements are true or false:

- | | | | | |
|-----------|-----------|----------|-----------|-----------|
| (a) False | (b) False | (c) True | (d) False | (e) False |
|-----------|-----------|----------|-----------|-----------|

Subjective Type Questions

Short Answer Type Questions

1. Rotation is the Earth spinning on its own axis, which takes about 24 hours and causes day and night. Revolution is the Earth's movement in a fixed orbit around the Sun, which takes about 365 days and causes the seasons.
2. Earth's rotation (spinning on its axis) causes day and night, while its revolution (orbiting the Sun) causes seasons.
3. Yes, all stars move, but the Pole star (Polaris) appears stationary because it is located almost directly above the Earth's axis of rotation.
4. The difference is because the Earth rotates on its axis from west to east, which causes different parts of the world to face the sun at different times. Since India and the USA are on nearly opposite sides of the globe, when it is daytime in India it is night in America.
5. Padmashree will see Orion overhead today at approximately 7:56 pm, which is about four minutes earlier than the previous night. This is because the Earth's rotation relative to the stars is slightly less than 24 hours, causing stars to appear to rise about four minutes earlier each day.
6. (a) Seasonal constellations are those that are most visible during a particular time of year. For example, Orion is considered a winter constellation, and Scorpius is a summer constellation.
(b) Constellations change with the seasons because the Earth revolves around the Sun. As Earth orbits, our view of the night sky shifts, which makes different parts of the celestial sphere visible at different times of the year.
7. Summers are hotter than winters because of the Earth's axial tilt, which causes one hemisphere to receive more direct sunlight during its summer.
8. The blank circles are:



Long Answer Type Questions

- Day and night are caused by the Earth's rotation on its axis, which is an imaginary line running through the planet. As the Earth spins, one side faces the sun, experiences day, while the opposite side faces away from the sun, experiencing night. The continuous rotation causes the cycle to repeat, with each side getting sunlight and darkness in turn over a 24-hour period.

Refer to Figure 4 page 210

- Stars appear to rise in the east and set in the west.

Reason: This apparent movement is due to the Earth's rotation from west to east on its axis.

- Stars shift their position slowly over the months because of the Earth's revolution around the Sun. As the Earth moves along its orbit, the night sky changes, and different constellations become visible at different times of the year.

- There are four main seasons on Earth: spring, summer, autumn and winter. The Earth's axis is tilted by about 23.5 degrees, and this tilt, along with its revolution around the Sun, causes the change in seasons. As the Earth revolves, different hemispheres tilt towards or away from the Sun, receiving varying amounts of sunlight. When the Northern Hemisphere tilts towards the Sun in June, it experiences summer, while the Southern Hemisphere has winter. In December, the situation reverses. The angle at which sunlight falls also affects temperature, as direct rays cause summer while slanting rays cause winter. Thus, the Earth's tilt and revolution together lead to the formation of seasons.

- The Moon can block the Sun completely during a total solar eclipse because, despite being much smaller than the Sun, the Moon is also significantly closer to Earth, making its apparent size from our perspective roughly the same as the Sun's, allowing it to fully obscure the Sun during alignment.

- Lunar eclipses can be seen from a large part of the Earth because the Earth's shadow

is much larger than the Moon, so when the Earth is between the Moon and the Sun, the entire Moon falls within the shadow, making it visible from almost half of the Earth's surface. However, a total solar eclipse occurs only when the Moon's small shadow falls directly onto Earth, meaning only a narrow strip of land can witness the total eclipse.

Multiple Choice Questions (MCQ)

- | | |
|-----------------------------------|---|
| 1. (b) axis | 2. (a) West to East |
| 3. (c) 24 hours | 4. (b) night |
| 5. (b) formation of day and night | 6. (c) Big Dipper |
| 7. (d) Pole Star | 8. (c) 1° |
| 9. (d) 22nd December | 10. (a) equator |
| 11. (a) Moon | 12. (c) Adithya saw the Sun directly with his eyes. |