

Chapter 7: Metals and non-metals

Question. 1. Fill in the blanks :

- (1) Gold of 100% purity is **24** carat gold.
- (2) The stainless steel utensils used at home are made of an alloy of iron with carbon, **nickel** and **chromium**
- (3) **Silver** is used in medicines.
- (4) To prepare ornaments **22** carat gold is used.
- (5) Non-metals are **bad** conductors of heat and electricity.

Question. 2. Rewrite the following statements by selecting the correct options :

- (1) Metalloids have properties of both **metals and non-metals**
(a) metals (b) non-metals
(c) both metals and non-metals (d) neither metals nor non-metals
- (2) **Hg** is a metal.
(a) Hg (b) S
(c) P (d) Br
- (3) **Br** is a non-metal.
(a) Ag (b) Ag
(c) Br (d) Cu
- (4) **Antimony** is a metalloid.
(a) Aluminium (b) Antimony
(c) Zinc (d) Mercury
- (5) **Gallium** is a metal which is in liquid form at ordinary temperature.
(a) Gallium (b) Magnesium
(c) Sodium (d) Scandium

Question. 3. State whether the following statements are True or False:

- (1) Metals are sonorous. **True**
- (2) Diamond is the softest natural substance. **False**
- (3) The density of lithium is lower than water. **True**
- (4) Sulphur is brown in colour. **False**
- (5) Germanium is a metalloid. **True**

Question. 4. Identify the odd term:

- (1) Magnesium, Mercury, Sodium, Iron. **Mercury**
- (2) Magnesium, Aluminium, Sulphur, Copper. **Sulphur**
- (3) Iron, Copper, Graphite, Phosphorus. **Phosphorus**
- (4) Tin, Bronze, Steel, Stainless steel. **Tin**
- (5) Gold, Silver, Iron, Diamond. **Diamond**
- (6) Ductility, Brittleness, Sonority, Malleability. **Brittleness**
- (7) Carbon, Bromine, Sulphur, Phosphorus. **Bromine**
- (8) Brass, Bronze, Iron, Steel. **Iron**

Question. 5. Consider the relation between the items in the first pair and write the correlation for second pair:

- (1) Mercury: Metal:: Carbon: **Non-Metal**
- (2) Wood: Bad conductor of electricity:: Copper: **Good conductor of electricity**
- (3) Gold: Noble metal:: Copper: **Metal**
- (4) Iron and carbon :Steel :: Copper and Tin: **Bronze**

(5) 0:2, 6:: Mg:2, 8, 2

Question. 6. Match the columns:

Column 'A'	Answer	Column 'B'
(1) Copper	Conduction of heat	(a) Low melting point
(2) Sodium	Low melting point	(b) Liquid
(3) Magnesium	2, 8, 2	(c) High melting point
(4) Boron	High melting point	(d) Conduction of heat
		(e) 2, 8, 2

Question. 7. Define the following:

(1) Ductility: Ductility is the property of a material that allows it to be stretched or drawn into thin wires without breaking.

(2) Malleability: Malleability is the property of a material that enables it to be hammered or rolled into thin sheets without breaking.

(3) Metalloids: Metalloids are elements that have properties intermediate between metals and non-metals, such as silicon and boron.

(4) Corrosion: Corrosion is the gradual destruction of materials, usually metals, due to chemical reactions with the environment, such as rusting of iron.

(5) Alloy: An alloy is a mixture of two or more elements, where at least one is a metal, and the resulting material has enhanced properties, such as steel (iron and carbon).

Question. 8. Answer the following questions in one sentence:

(1) Name a metal which is in liquid state at ordinary temperature.

Answer: Mercury is a metal that is in liquid state at ordinary temperature.

(2) Name two metals which are malleable.

Answer: Gold and silver are two malleable metals.

(3) Name two metals which are ductile.

Answer: Copper and aluminum are two ductile metals.

(4) Name two non-metals having high melting points.

Answer: Carbon (as diamond) and silicon are non-metals with high melting points.

(5) State the property of the metals for which they can be drawn into wires.

Answer: The property that allows metals to be drawn into wires is ductility.

(6) State the property of the metals due to which they can be beaten into thin sheets.

Answer: The property that allows metals to be beaten into thin sheets is malleability.

(7) Which of the following metals react with cold water? Sodium, iron, copper, potassium.

Answer: Sodium and potassium react with cold water.

(8) What are the constituents of stainless steel?

Answer: Stainless steel consists of iron, chromium, and nickel.

(9) State the atomic number and electronic configuration of sodium.

Answer: Sodium has an atomic number of 11, and its electronic configuration is 2, 8, 1.

(10) State the atomic number and electronic configuration of nitrogen.

Answer: Nitrogen has an atomic number of 7, and its electronic configuration is 2, 5.

Question. 9. Answer the following questions:

(1) State the properties of metals.

Answer:

1. Metals are shiny (lustrous).
2. They are good conductors of heat and electricity.
3. Metals are malleable and ductile.
4. They have high melting and boiling points.

(2) State the properties of non-metals.

Answer:

1. Non-metals are poor conductors of heat and electricity.
2. They are brittle and break easily.
3. Non-metals are not malleable or ductile.
4. They have relatively lower melting and boiling points.

(3) How are metal ions formed? Give two examples.

Answer:

1. Metal ions are formed when metals lose electrons to become positively charged.
2. Example 1: Sodium loses one electron to form Na^+ .
3. Example 2: Calcium loses two electrons to form Ca^{2+} .

(4) How are metal oxides formed? Explain with an example.

Answer:

1. Metal oxides are formed when metals react with oxygen.
2. Example: Magnesium reacts with oxygen to form magnesium oxide ($2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$).

(5) How will you show that metal oxides are basic in nature?

Answer:

1. Dissolve a metal oxide (e.g., magnesium oxide) in water.
2. Test the solution with litmus paper; it turns blue, indicating it is basic in nature.

(6) How do metals react with water? Explain with an example.

Answer:

1. Metals react with water to form metal hydroxides and hydrogen gas.
2. Example: Sodium reacts with water to form sodium hydroxide and hydrogen ($2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$).

(7) How will you show that non-metal oxides are acidic in nature?

Answer:

1. Dissolve a non-metal oxide (e.g., carbon dioxide) in water.
2. Test the solution with litmus paper; it turns red, indicating it is acidic in nature.

(8) How are non-metal ions formed? Give two examples.

Answer:

1. Non-metal ions are formed when non-metals gain electrons to become negatively charged.
2. Example 1: Chlorine gains one electron to form Cl^- .
3. Example 2: Oxygen gains two electrons to form O^{2-} .

(9) What is meant by noble metals? Give two examples.

Answer:

1. Noble metals are metals that resist corrosion and oxidation in moist air.
2. Examples: Gold and Platinum.

(10) What are the uses of noble metals?

Answer:

1. Noble metals are used in making jewelry and coins.
2. They are also used in electronics and catalytic converters.

(11) What is done to prevent corrosion of metals?

Answer:

1. Metals are coated with paint, oil, or another metal (galvanization).
2. Applying protective coatings like electroplating or using alloys prevents corrosion.

(12) What are the adverse effects of corrosion?

Answer:

1. Corrosion weakens metal structures, reducing their strength.
2. It leads to economic loss due to the damage of equipment and infrastructure.

(13) What are the metals that make the alloys brass and bronze?

Answer:

1. Brass is made of copper and zinc.
2. Bronze is made of copper and tin.

Question. 10. Give scientific reasons:

(1) A metal can be drawn into a wire. Explain why.

Answer: Metals are ductile, meaning they can be stretched without breaking. This property allows them to be drawn into thin wires without losing their strength.

(2) A metal can be hammered into a thin sheet. Explain why.

Answer: Metals are malleable, which allows them to be flattened without breaking. This property enables metals to be hammered into thin sheets for various applications.

(3) The stainless steel vessels in the kitchen have copper coating on the bottom.

Answer: Copper is an excellent conductor of heat, improving heat distribution during cooking. The copper coating enhances the cooking efficiency of stainless steel vessels.

(4) Copper and brass vessels are cleaned with lemon.

Answer: Lemon contains citric acid, which reacts with the oxidized layer (tarnish) on copper and brass. This reaction helps remove tarnish and restore the shine of the vessels.

(5) Sodium metal is kept in kerosene.

Answer: Sodium is highly reactive with moisture and oxygen in the air. Keeping sodium in kerosene prevents it from reacting and ensures its stability.

(6) Ornaments are generally not made from 24-carat gold.

Answer: 24-carat gold is pure gold and is too soft for daily wear. Alloys with other metals (like copper) are used to enhance strength and durability for ornaments.

(7) Gold and platinum are called noble elements.

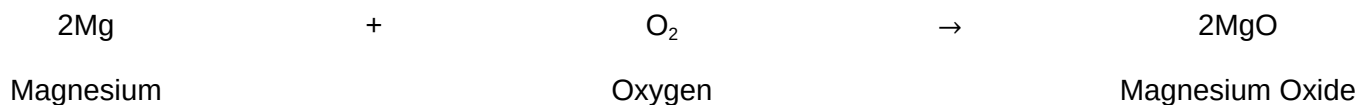
Answer: Gold and platinum are resistant to corrosion and oxidation, even in harsh environments. Their stability makes them valuable for jewelry and industrial applications.

Question. 11. Explain the following reactions with the help of balanced equations:

(1) Magnesium combines with oxygen.

Answer: When magnesium reacts with oxygen, it forms magnesium oxide.

Balanced Equation:



(2) Magnesium oxide reacts with dilute HCl.

Answer: Magnesium oxide reacts with dilute hydrochloric acid to produce magnesium chloride and water.

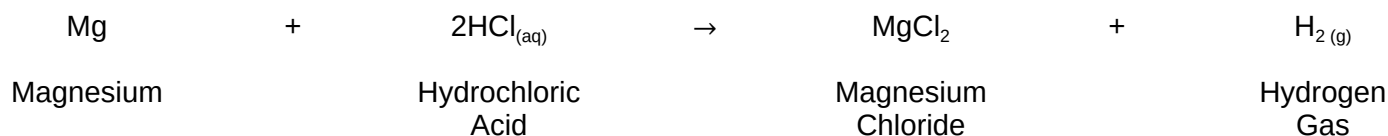
Balanced Equation:



(3) Magnesium reacts with dilute HCl.

Answer: When magnesium reacts with dilute hydrochloric acid, it produces magnesium chloride and hydrogen gas.

Balanced Equation:



(4) Sodium reacts with water.

Answer: Sodium reacts vigorously with water to produce sodium hydroxide and hydrogen gas.

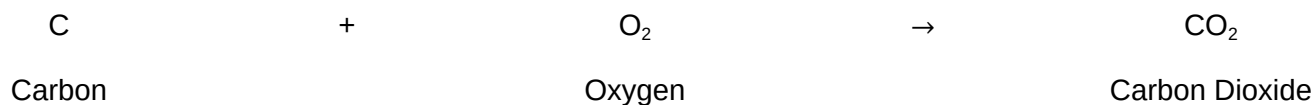
Balanced Equation:



(5) Carbon burns in air.

Answer: When carbon burns in the presence of oxygen, it produces carbon dioxide.

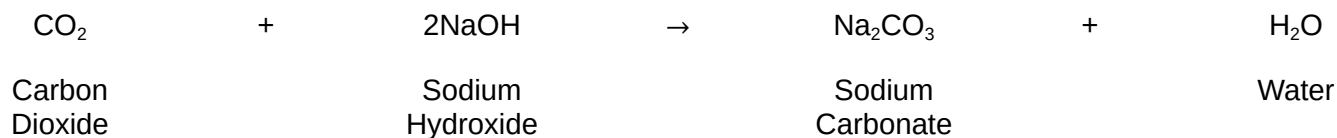
Balanced Equation:



(6) Carbon dioxide reacts with sodium hydroxide.

Answer: Carbon dioxide reacts with sodium hydroxide to form sodium carbonate and water.

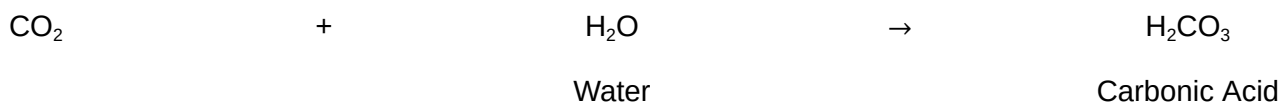
Balanced Equation:



(7) Carbon dioxide reacts with water.

Answer: When carbon dioxide dissolves in water, it forms carbonic acid.

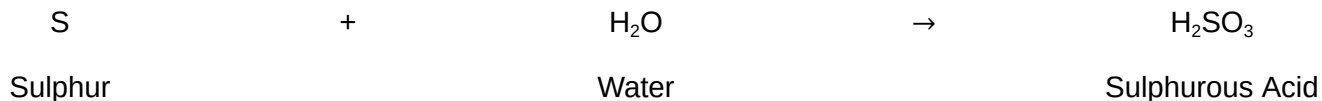
Balanced Equation:



(8) Sulphur dioxide reacts with water.

Answer: Sulphur dioxide reacts with water to form sulfurous acid.

Balanced Equation:



Question. 12. Write short notes:

(1) The Purity of Gold:

Answer:

The purity of gold is commonly expressed in carats (ct) or fineness, where pure gold is defined as 24-carat gold, containing 99.9% gold with no other metals. However, since pure gold is too soft for practical use, it is often alloyed with metals like copper or silver, resulting in lower carat values such as 18ct (75% gold) and 14ct (58.3% gold). The purity can be tested using methods like acid tests or electronic testers, which evaluate the gold's resistance to tarnishing and corrosion.

(2) Alloys:

Answer:

Alloys are mixtures of two or more metals or a metal with non-metals, designed to enhance specific properties such as strength, ductility, and corrosion resistance. Examples include bronze (copper and tin) and brass (copper and zinc), which exhibit improved characteristics compared to their individual components. Alloys are widely used in various applications, from construction materials to everyday items, due to their superior performance and versatility.

Question. 13. Distinguish between the following:

Metals and Non-metals:

Metals	Non-Metals
Metals are usually solid at room temperature (except mercury).	Non-metals can be solid, liquid, or gas at room temperature.
Metals are good conductor of heat	Non-metals are bad conductor of heat
Metals are good conductor of electricity	Non-metals are bad conductor of electricity
Metals are shiny and can be polished.	Non-metals usually have a dull appearance.
Metals are ductile i.e. it can be shaped into wires	Non-metals are not ductile i.e. it can't be shaped into wires
Metals are malleable i.e. it can be hammered into thin sheet	Non-metals are not malleable i.e. it can't be hammered into thin sheet
Example: Gold, Copper	Example: Carbon, Sodium