

CHAPTER 3

METALS AND NON-METALS

VEDA
ACADEMY

CLASS 10TH

NCERT EXERCISE AND SOLUTIONS - SCIENCE



Q. 1. Which of the following pairs will give displacement reactions?

- (a) NaCl solution and copper metal
- (b) $MgCl_2$ solution and aluminium metal
- (c) $FeSO_4$ solution and silver metal
- (d) $AgNO_3$ solution and copper metal.

ANSWER:-

- (d) $AgNO_3$ solution and copper

Q. 2. Which of the following methods is suitable for preventing an iron frying pan from rusting?

- (a) Applying grease
- (b) Applying paint
- (c) Applying a coating of zinc
- (d) All of the above.

ANSWER:-

- (c) Applying a coating of zinc

Q. 3. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be:

- (a) Calcium
- (b) Carbon
- (c) Silicon
- (d) Iron

ANSWER:-

- (a) calcium

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Q. 4. Food cans are coated with tin and not with zinc because:

- (a) Zinc is costlier than tin.
- (b) Zinc has a higher melting point than tin.
- (c) Zinc is more reactive than tin.
- (d) Zinc is less reactive than tin.

ANSWER:-

- (c) zinc is more reactive than tin.

Q. 5. You are given a hammer, a battery, a bulb, wires and a switch.

- (a) How could you use them to distinguish between samples of metals and non-metals?
- (b) Assess the usefulness of these tests in distinguishing between metals and non-metals.

ANSWER:-

- (a) Metals are naturally malleable. By hammering the given sample, we can check if it flattens into thin sheets—indicating it is a metal; otherwise, it is a non-metal. Metals also conduct electricity. To test this, we can set up an electrical circuit using a battery, bulb, wires, and a switch. If the bulb lights up, the sample is metallic due to the movement of free electrons. If the bulb remains off, the sample is non-metallic.
- (b) These tests help determine the physical properties of metals and non-metals, allowing for easy differentiation based on their characteristics.

Q. 6. What are amphoteric oxides? Give two examples of amphoteric oxides.

ANSWER:-

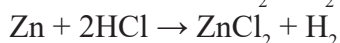
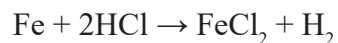
Oxides that can react with both acids and bases are called amphoteric oxides.
Examples: Zinc oxide (ZnO) and aluminium oxide (Al₂O₃).

Q. 7. Name two metals which will displace hydrogen from dilute acids, and two metals which will not.

ANSWER:-

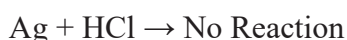
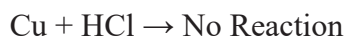
More reactive metals, such as iron and zinc, can displace hydrogen from dilute acids.

Examples:



Less reactive metals, like copper and silver, do not react with dilute acids and cannot displace hydrogen.

Examples:



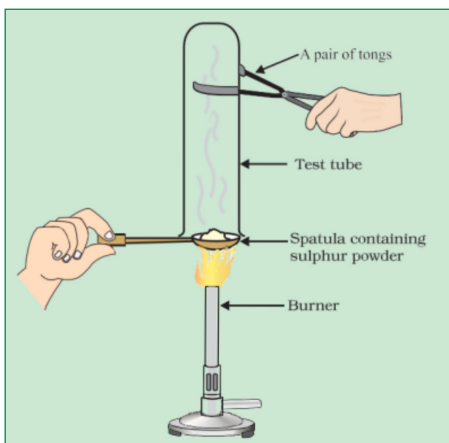
Q. 8. In the electrolytic refining of a metal M, what would you take as the anode, the cathode and the electrolyte?

ANSWER:-

In the electrolytic refining of metal M:

- i. Cathode → Pure metal M
- ii. Anode → Impure metal M
- iii. Electrolyte → Salt solution of metal M

Q. 9. Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in figure below.



- (a) What will be the action of gas on:
 - (i) dry litmus paper?
 - (ii) moist litmus paper?
- (b) Write a balanced chemical equation for the reaction taking place.

ANSWER:-

- (a)
 - i. No reaction occurs with dry litmus paper.
 - ii. Moist blue litmus turns red due to the formation of sulphur dioxide.
Sulphur dioxide is an acidic oxide and reacts with water to form sulphurous acid.
- (b) $S(s) + O_2(g) \rightarrow SO_2(g)$
 $SO_2(g) + H_2O(l) \rightarrow H_2SO_3(aq)$

Q. 10. State two ways to prevent the rusting of iron.

ANSWER:-

The deterioration of metals due to exposure to air and water is called rusting. Rusting can be prevented by:

- i. **Painting:** Forms a protective layer that prevents iron from directly contacting air and water.
- ii. **Galvanization:** Involves coating iron with a layer of zinc to protect it from rusting.



Q. 11. What type of oxides are formed when non-metals combine with oxygen?

ANSWER:-

Non-metals react with oxygen to form acidic oxides, which dissolve in water to produce acidic solutions.

Q. 12. Give reasons:

- Platinum, gold and silver are used to make jewellery.
- Sodium, potassium and lithium are stored under oil.
- Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.
- Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

ANSWER:-

- These metals are minimally reactive and possess a natural luster, making them ideal for jewellery-making.
- Highly reactive metals ignite upon contact with air. To prevent accidents, they are stored under oil.
- Aluminium is highly reactive and forms a stable Al_2O_3 layer upon exposure to oxygen. Additionally, it is an excellent heat conductor, making it suitable for cookware.
- Extracting metals from oxides is easier than from carbonates or sulphides. Hence, ores are typically converted into oxides through roasting and calcination.

Q. 13. You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.

ANSWER:-

Copper reacts with damp carbon dioxide in the air to form basic copper carbonate ($CuCO_3 \cdot Cu(OH)_2$), giving it a greenish layer and dulling its shiny brown appearance. The citric acid in lemon or tamarind neutralizes and dissolves this layer, restoring the copper's original look.

Q. 14. Differentiate between metal and non-metal on the basis of their chemical properties.

ANSWER:-

Metals	Non-metals
Metals are electropositive	Non-metals are electronegative.
React with water to form oxides and hydroxides. Some metals react with cold water, others with hot water or steam.	Do not react with water.
React with oxygen to form basic oxides, which have ionic bonds.	React with oxygen to form acidic or neutral oxides, which have covalent bonds.
React with dilute acids to produce a salt and hydrogen gas, except for Cu, Ag, Au, Pt, Hg, which do not react.	Do not react with dilute acids as they cannot replace hydrogen.



React with metal salt solutions based on their reactivity.	React with non-metal salt solutions.
Act as reducing agents	Acts as oxidising agents

Q. 15. A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used?

ANSWER:-

The man is using Aqua Regia, a mixture of three parts HCl and one part HNO₃. Although gold is one of the least reactive metals, it dissolves in Aqua Regia, causing the outermost layer to dissolve. As a result, the inner layer is exposed, making the gold appear shinier while also reducing its weight.

Q. 16. Give reasons why copper is used to make hot water tanks and not steel (an alloy of iron).

ANSWER:-

In the reactivity series, copper is less reactive than hydrogen, so it does not react with water. However, steel, an alloy of iron, can react with steam, making it susceptible to corrosion.

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