

Reasoning Questions Metals Nonmetals



Here are the answers to the reasoning questions based on metals and non-metals:

1. Why is sodium kept immersed in kerosene oil?

Sodium is a highly reactive metal. It reacts vigorously with oxygen and moisture present in the air. To prevent accidental fires and explosions, sodium is stored in kerosene oil to protect it from air and moisture.

2. Write equations for the reactions of:

(i) Iron with steam:

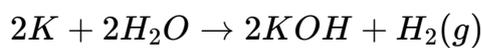


(ii) Calcium and potassium with water:

Calcium with water:



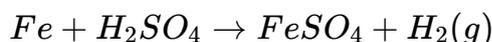
Potassium with water:



3. Which gas is produced when dilute hydrochloric acid is added to a reactive metal? Write the chemical reaction when iron reacts with dilute sulfuric acid (H_2SO_4).

Hydrogen gas (H_2) is produced.

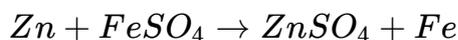
When iron reacts with dilute sulfuric acid:



4. What would you observe when zinc is added to a solution of iron(II) sulfate? Write the chemical reaction that takes place.

Zinc is more reactive than iron, so it displaces iron from iron(II) sulfate solution. The solution will turn colorless as iron gets displaced.

The reaction:



5. Which metals will displace hydrogen from dilute acids?

Metals like **zinc (Zn)**, **magnesium (Mg)**, **aluminum (Al)**, and **iron (Fe)** are reactive enough to displace hydrogen from dilute acids, such as hydrochloric acid or sulfuric acid.

6. Explain why platinum, gold, and silver are used to make jewelry.

Platinum, gold, and silver are used in jewelry because they are highly unreactive metals. They do not corrode, tarnish, or react with water or air, making them ideal for long-lasting jewelry.

7. Why are sodium, potassium, and lithium stored under oil?

Sodium, potassium, and lithium are highly reactive alkali metals that react vigorously with

moisture and oxygen in the air. Storing them under oil prevents contact with air and moisture, thereby preventing dangerous reactions.

8. Aluminum is a highly reactive metal, yet it is used to make utensils for cooking. Give reasons.

Aluminum forms a protective oxide layer (aluminum oxide, Al_2O_3) when it reacts with oxygen. This layer prevents further corrosion and makes it suitable for making utensils. Additionally, aluminum is lightweight and has good thermal conductivity, which is advantageous for cooking.

9. Why are carbonate and sulfide ores usually converted into oxides during the process of extraction?

Oxides are easier to reduce to the metal than carbonates or sulfides. Therefore, carbonate and sulfide ores are often converted to oxides by roasting or calcination before extracting the metal.

10. Explain why some metals, such as iron, corrode when exposed to moist air.

Corrosion occurs when metals like iron react with oxygen and moisture in the air, leading to the formation of oxides. For example, iron forms iron(III) oxide (rust) when it reacts with moisture and oxygen:



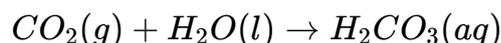
which further dehydrates to form rust.

11. Why are metals generally good conductors of electricity?

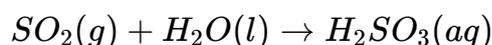
Metals have free-moving or delocalized electrons in their structure. When an electric potential is applied, these electrons flow freely, allowing metals to conduct electricity efficiently.

12. What type of oxides are formed when non-metals combine with oxygen? Give examples.

Non-metals form **acidic oxides** when they combine with oxygen. For example:



(carbon dioxide forms carbonic acid), and



(sulfur dioxide forms sulfurous acid).

13. What are amphoteric oxides? Provide two examples.

Amphoteric oxides are oxides that can react with both acids and bases to form salts and water. Examples include:

(i) **Aluminum oxide (Al_2O_3)**

(ii) **Zinc oxide (ZnO)**

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

o **Metals:**

1. Metals form **basic oxides** (e.g., Na_2O , MgO).
2. Metals tend to **lose electrons** to form positive ions (cations).
3. Metals react with acids to produce hydrogen gas (e.g., $Zn + HCl \rightarrow ZnCl_2 + H_2$).

o **Non-metals:**

1. Non-metals form **acidic oxides** (e.g., CO_2 , SO_2).
2. Non-metals tend to **gain electrons** to form negative ions (anions).
3. Non-metals do not react with acids in the same way as metals do.

15. Explain why copper is used to make hot water tanks instead of steel (an alloy of iron).

Copper is a better choice for hot water tanks because it is more resistant to corrosion, particularly in water, and it is an excellent conductor of heat. Steel, on the other hand, can rust and corrode when exposed to water over time.

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