

CBSE Test Paper-02
Chapter 03 Metals and Non Metals

1. An element belonging to 16th group of periodic table is used in the manufacturing of vulcanized rubber. This element reacts with hot and conc. HNO_3 to form sulphuric acid. The concerned element is: **(1)**
 - a. Oxygen
 - b. Sulphur
 - c. Germanium
 - d. Silicon
2. Malachite is an ore of: **(1)**
 - a. Mercury
 - b. Zinc
 - c. Iron
 - d. Copper
3. Name the reducing agent in the following reaction: **(1)**
$$3\text{MnO}_2 + 4\text{Al} \rightarrow 3\text{Mn} + 2\text{Al}_2\text{O}_3$$
 - a. Al_2O_3
 - b. Al
 - c. MnO_2
 - d. Mn
4. Cryolite is used in the electrolytic reduction of Alumina (Al_2O_3) to: **(1)**
 - a. Decrease the melting point of Al_2O_3
 - b. All of these
 - c. Act as a flux to separate gangue.
 - d. To slow down the reaction.
5. Which of the following metal reacts neither with cold water nor with hot water but reacts with hot steam to produce hydrogen gas? **(1)**
 - a. Mg
 - b. Fe
 - c. Ca
 - d. Na

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6. Name one property which is not shown by ionic compounds. **(1)**
 7. Why does calcium float in water? **(1)**
 8. Give an example of metal which can be easily cut with a knife. **(1)**
 9. Can all minerals of a metal act as ores? Justify. **(1)**
 10. A, B and C are 3 elements which undergo chemical reactions according to following equations: **(3)**
 - a. $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$
 - b. $3CSO_4 + 2B \rightarrow B_2(SO_4)_3 + 3C$
 - c. $3CO + 2A \rightarrow A_2SO_3 + 3C$

Answer of the following:

- i. Which element is most reactive?
 - ii. Which element is least reactive?
11. What property is made use of in the concentration of ore by: **(3)**
 - i. gravity separation
 - ii. froth floatation process?
12. A piece of granulated zinc was dropped into copper sulphate solution. After sometime the colour of the solution changed from blue to colourless. Why? **(3)**
13. What would happen to copper vessel if it is left for a few days in humid atmosphere without being cleaned? **(3)**
14. You are given a hammer, a battery, a bulb, wires and a switch. **(5)**
 - i. How could you use them to distinguish between samples of metals and non-metals.
 - ii. Assess the usefulness of these tests in distinguishing between metals and non-metals.
15. Give reasons: **(5)**
 - i. Platinum, gold and silver are used to make jewellery.
 - ii. Sodium, potassium and lithium are stored under oil.
 - iii. Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.
 - iv. Carbonate and sulphide ores are usually converted into oxides during the process of extraction.
 - v. Lemon or tamarind juice are effective in cleaning tarnished copper vessels.

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Answers

1. b. Sulphur

Explanation: The element is Sulphur. Sulphur is used to manufacture sulphuric acid and in the vulcanisation of rubber. $S + 2HNO_3 \rightarrow H_2SO_4 + 2NO$

2. d. Copper

Explanation: Malachite is a copper carbonate hydroxide mineral with the formula **$CuCO_3 \cdot Cu(OH)_2$**

3. b. Al

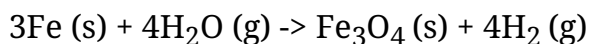
Explanation: Aluminium is the reducing agent in the reaction. It reduces manganese dioxide (MnO_2) to manganese (Mn) and itself gets oxidised to aluminium oxide. Manganese dioxide acts as an oxidising agent.

4. a. Decrease the melting point of Al_2O_3

Explanation: The difficulty of separating aluminium from oxygen in the alumina is overcome by the use of cryolite as a flux to dissolve the oxide mineral. Pure cryolite melts at 1012 °C. It dissolves the aluminium oxides sufficiently well to allow easy extraction of the aluminium by electrolysis.

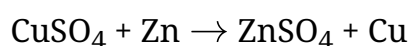
5. b. Fe

Explanation: Sodium reacts vigorously with water. Such is the reaction that it has to be stored under kerosene. Calcium can react with cold water. Magnesium reacts with hot water. Heated iron reacts with water when hot steam is passed over it.



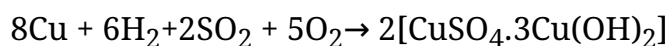
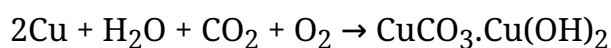
6. Ionic compounds do not conduct electricity in the solid state.
7. Calcium is heavier than water which should sink in water but when calcium metal is dropped in water it floats because it reacts with water to form hydrogen gas and due to the sticking of the H_2 gas bubbles on calcium metal surface, it starts floating.
8. Sodium and potassium are metals which can be easily cut with a knife.

9. Only those minerals can act as ores from which a metal can be conveniently and profitably extracted.
10. i. Most reactive element is B as it has replaced both A and C from their compounds.
ii. Element C is least reactive as it has been replaced both by A and B.
11. i. In the gravity separation process, the densities of ores and the gangue are the basis of concentration process.
ii. In the froth floatation process, the difference in the wetting properties of the ore particles and gangue particles with water and oil is the basis of concentration process.
12. Zinc is above copper in the reactivity series, so zinc is more reactive than copper, hence Zinc displaces copper from its (copper's) salt solution.



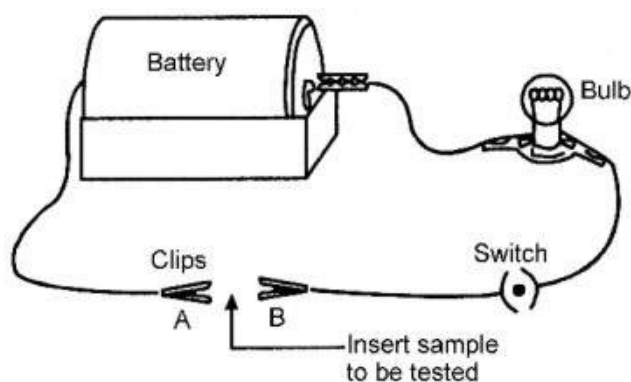
The colour of CuSO_4 solution was blue, which changed to colourless due to formation of ZnSO_4 solution, which is colourless.

13. Copper is not affected by dry air at ordinary temperature. On exposure to moist air, it gets covered with a beautiful green coating of either basic carbonate or basic sulphate.



Copper present in bronze or in utensils is corroded by moist air containing acidic oxides like carbon dioxide, sulphur dioxide etc. The greenish layer formed is of basic copper carbonate or basic copper sulphate. This phenomenon is called 'corrosion of metals'.

14. i. Set up the electric circuit as shown ahead :

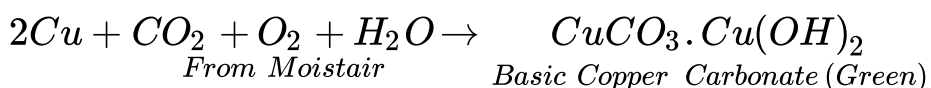


Insert the sample to be tested between clips A and B. If the bulb glows, the sample

is metal. If the bulb does not glow, the sample is non-metal. Thus metals are good conductors of electricity whereas non-metals are poor conductors of electricity.

ii. If a substance produces a sound when struck beating with hammer, it is a metal and if no sound is produced, it is a non-metal. Metals are sonorous whereas non-metal are non-sonorous.

15. a. Platinum, gold and silver are used to make jewelry because of their bright shiny surface and high resistance to corrosion. Also they have high malleability and ductility.
- b. Sodium, potassium and lithium are stored under oil to prevent their reaction with oxygen, moisture and carbon dioxide of air so as to protect them.
- c. Aluminum metal forms a thin layer of aluminum oxide all over its surface under the action of moist air. This layer prevents the metal underneath from further corrosion. It is cheap, easily available, malleable and ductile. Therefore, it is used to make utensils for cooking.
- d. It is easier to obtain a metal from its oxides as compared to its sulphides and carbonates. So, prior to reduction, metal carbonate and sulphides must be converted into metal oxides. A carbonate ore is converted into oxide by calcination whereas a sulphide ore is converted into oxide by roasting.
- e. When copper vessels are exposed to moist air, they form a green coating of basic copper carbonate [$CuCO_3 \cdot Cu(OH)_2$].



The sour substances such as lemon or tamarind juice contain acids. Lemon juice contains citric acid and tamarind contains tartaric acid. These acids dissolve the coating of copper oxide or basic copper carbonate present on the surface of tarnished copper vessels and make them shining red-brown again.