

Metals and Nonmetals

EXERCISE [PAGE 53]

Exercise | Q 1 | Page 53

Complete the table.

| Property of metal | Use in every day life |
|-------------------------------|-----------------------|
| i. Ductility | |
| ii. Malleability | |
| iii. Conduction of heat | |
| iv. Conduction of electricity | |
| v. Sonority | |

Solution:

| Property of metal | Use in every day life |
|-------------------------------|---|
| i. Ductility | In electrical wires, cable wires etc. |
| ii. Malleability | Aluminium foil |
| iii. Conduction of heat | Cooking wares, microwave, electric press, straightening machine, electric belts |
| iv. Conduction of electricity | Bulb, tubelight, lamp, refrigerator, television |
| v. Sonority | Cymbals, doorbells |

Exercise | Q 2.1 | Page 53

Identify the odd term

Gold, silver, iron, diamond

Solution: **Iron** is odd one out because iron is non-lustrous in nature and others are lustrous.

Exercise | Q 2.2 | Page 53

Identify the odd term

Ductility, brittleness, sonority, malleability

Solution: Brittleness is odd one out because it is a property of non-metals and rest are the properties of metals.

Exercise | Q 2.3 | Page 53

Identify the odd term

Carbon, bromic, sulphur, phosphorus

Solution: Bromine is odd one out because it is liquid non-metal and others are solid non-metals.

Exercise | Q 2.4 | Page 53

Identify the odd term.

Brass, bronze, iron, steel

Solution: Iron is odd one out because it is not an alloy and others are alloys.

Exercise | Q 3.1 | Page 53

Write scientific reason.

The stainless steel vessels in Kitchen have copper coating on the bottom.

Solution: The stainless steel vessels in Kitchen have copper coating on the bottom because copper is good conductor of heat and electricity, by using copper cookware, any meal can be prepared in a perfect and gentle way. They are the best pots and pans for cooking and roasting. This is particularly due to the fact that copper has excellent material properties and is cheap metal as compare to other metals.

Exercise | Q 3.2 | Page 53

Write scientific reason.

Copper and brass vessels are cleaned with lemon.

Solution: Copper vessels get tarnished due to corrosion of copper metal. It forms a layer of copper oxide, which is basic in nature. When lemon juice which contains citric acid is added to it, neutralisation reaction takes place thus the vessel gets cleaned.

Exercise | Q 3.3 | Page 53

Write scientific reason.

Sodium metal is kept in kerosene.

Solution: Sodium metal is kept in kerosene because sodium is very reactive metal. It is **kept in kerosene** to prevent it from coming in contact with oxygen and moisture. If this happens, it will react with the moisture present in air and form Sodium hydroxide. This is a strongly exothermic reaction, and lot of heat is generated. It will result out in the form of fire.

Exercise | Q 4.1 | Page 53

Answer the following:

What is done to prevent corrosion of metals?

Solution: We can prevent corrosion by selecting the following things:

1. metal type
2. protective coating
3. environmental measures
4. sacrificial coatings
5. design modification

Metal Type :

One simple way to prevent corrosion is to use a corrosion resistant metal such as aluminium or stainless steel. Depending on the application, these metals can be used to reduce the need for additional corrosion protection.

Protective Coatings :

The application of a paint coating is a cost-effective way of preventing corrosion. Paint coatings act as a barrier between metal and atmospheric moisture to avoid its contact. For example : black paint.

Another possibility is applying a powder coating. In this process, a dry powder is applied to the clean metal surface to avoid its contact with surrounding oxygen. For example : acrylic, polyester, epoxy, nylon and urethane.

Environmental Measures :

Corrosion is caused by a chemical reaction between the metal and gases in the surrounding environment. By taking measures to control the environment, these unwanted reactions can be minimized. For example : this would be decrease by treating the water in water boilers with softeners to adjust hardness, alkalinity or oxygen content.

Sacrificial Coatings :

Sacrificial coating involves coating the metal with an additional metal type that is more likely to oxidize.

There are two main techniques for sacrificial coating:

Cathodic Protection : The most common example of cathodic protection is the coating of iron alloy steel with zinc, this process is known as galvanizing. Zinc is a more active metal than steel and when it starts to corrode it oxides which inhibits the corrosion of the

steel. This method is known as cathodic protection

Anodic Protection : Anodic protection involves coating the iron alloy steel with a less active metal, such as tin. Tin will not corrode, so the steel will be protected as long as the tin coating is in place. This method is known as anodic protection

Design Modification :

Design modifications can help reduce corrosion and improve the durability of any existing protective anti-corrosive coatings. Ideally, designs should avoid trapping dust and water, encourage movement of air, and avoid open crevices. Ensuring the metal is accessible for regular maintenance will also increase longevity.

Exercise | Q 4.2 | Page 53

Answer the following:

What are the metals that make the alloys brass and bronze ?

Solution: Brass: It is an alloy, that contains **copper** and **zinc** as major constituents.

Bronze: It is an alloy, that contains **copper** and **tin** as major constituents.

Exercise | Q 4.3 | Page 53

Answer the following

What are the adverse effects of corrosion ?

Solution: The adverse effects of corrosion are as follows:

1. Damage to commercial airplanes that could result in possible in-flight problems
2. Damage to oil pipelines that could cause a costly and dangerous rupture that creates significant environmental damage.
3. Damage to bridge supports that could cause a bridge failure
4. Release of harmful pollutants from iron corrosion that contaminates the air
5. Costs of repairing or replacing household equipment that fails
6. Lose of efficiency
7. Contamination of product
8. Damage of metallic equipments
9. Inability to use metallic materials
10. Lose of valuable materials such as blockage of pipes, mechanical damage of underground water pipes
11. Accidents due to mechanical lose of metallic cars, aircrafts etc.
12. Causes pollution due to escaping products from corrosion
13. Depletion of natural resource

Exercise | Q 4.4 | Page 53

Answer the following

What are use of Noble metals. ?

Solution: Uses of Noble metals are:

Uses of Silver : It is a shiny, heavy metal, and the best conductor of electricity.

1. It is used for making silver ornaments and expensive utensils such as glasses, mugs, etc.
2. It is used for making coins.
3. Salts of silver like silver chloride are used for making photographic films.
4. Silver foils are used for decorating sweets.
5. Silver is also used for making mirrors using a process called sputtering.

Uses of gold : Gold is bright yellow and a highly malleable and ductile metal.

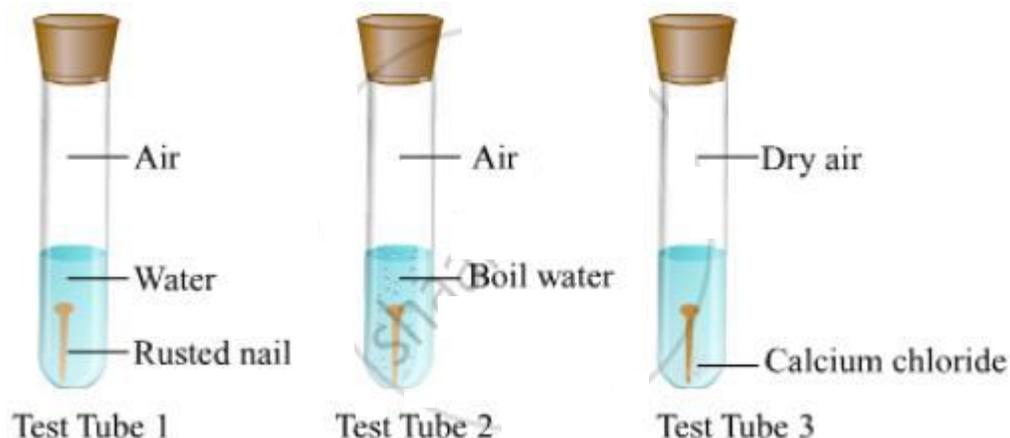
1. Gold is used as the index of wealth. The countries which have more gold reserve are considered to be wealthy.
2. It is used for making ornaments.
3. It is used for making high-value coins and medals.
4. It is used for covering the mainframe of artificial satellites.

Uses of platinum : Platinum is silvery white, a highly malleable and ductile metal.

1. It is used for making ornaments and watches.
2. It is used as a catalyst in the manufacture of sulphuric acid and nitric acid.
3. It is used in platinum catalytic converters.
4. It is also used in chemical laboratories.

Exercise | Q 5 | Page 53

Three experiments to study the process of rusting are given below. Observe the three test tubes and answer the following questions.



- A. Why the nail in the test tube 2 is not rusted ?
B. Why is the nail in the test tube 1 is rusted highly ?
C. Would the nail in the test tube 3 get rusted ?

Solution: Essential requirement for corrosion are:

- Supply of oxygen
- Presence of water
- Material itself

(A) The nail in the test tube 2 is not rusted because in test tube 2, we take boiling water. So, all the dissolved oxygen is removed from water and if the iron nail donot get supply of oxygen then corrosion is not carried out.

(B) The nail in the test tube 1 is rusted highly because in the test tube 1, iron nail meets with all the requirements which is essential for the process of corrosion. That's Supply of oxygen in dissolved form, presence of water and material itself.

(C) The nail in the test tube 3 is not rusted because calcium chloride is one of the best absorbent. So, it absorbs all the dissovded oxygen present in water. Hence corrosion process is not take place.