

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based notes of Chapter -03)

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METALS AND NON-METALS

CORROSION

Most of the metals keep on reacting with the atmospheric air. This leads to formation of a layer over the metal. In the long run, the underlying layers of the metal keep on getting lost due to conversion into oxides or sulphides or carbonate, etc. As a result, the metal gets eaten up. This process is called corrosion.

Rusting of Iron: Rusting of iron is the most common form of corrosion. When iron articles; like gate, grill, fencing, etc. come in contact with moisture present in air, the upper layer of iron turns into iron oxide. Iron oxide is brown-red in color and is known as rust. This phenomenon is called rusting of iron.

If rusting is not prevented in time, the whole iron article would turn into iron oxide. This is also known as corrosion of iron. Rusting of iron gives huge loss every year.

Prevention of Rusting: For rusting, iron must come in contact with oxygen and water. Rusting is prevented by preventing the reaction between atmospheric moisture and the iron article. This can be done by painting, greasing, galvanization, electroplating, etc.

METHODS OF PREVENTION OF CORROSION

There are various methods of preventing corrosion and rusting of iron. Our main concern is to know the various methods to prevent the rusting of iron because iron is a strategic metal as it plays a very important role in the

development of a nation. Some of the important methods of prevention of corrosion are as follows:

a) Painting

This is a common method of preventing iron from rusting. You might have observed that your parents paint iron gate in the garden and iron grills in your house. This painting prevents rusting by providing a coating over iron objects.

b) Oiling and greasing

To put a layer of oil and grease on the iron objects also prevents them from rusting. Iron parts of various machines and vehicles are oiled and greased to prevent rusting and to minimize friction.

c) Galvanization

In this method we put a layer of zinc metal on the iron objects and this process is known as **galvanization**. This method is used on large scale for making galvanized iron sheets for making boxes and for roof covering. Galvanised iron sheets are used to make drum, trunks and other iron containers. Galvanised iron sheets are also used for building roofs and manhole covers. In brief, galvanization prevents rusting in a big way.

d) Alloying: This is a very good method for improving the quality of different metals.

In this method a particular metal with other metal or non-metal is mixed in a fixed proportion to improve its quality like resistance towards corrosion, strength, hardness, shining and high tensile strength. For example iron metal cannot be used for making utensils because it will rust but when it is mixed with nickel and chromium metal it becomes stainless steel.

INTEXT QUESTIONS PAGE NO. 55

Question 1: Metallic oxides of zinc, magnesium and copper were heated with the following metals.

Metal	Zinc	Magnesium	Copper
Zinc oxide Magnesium oxide Copper oxide			

In which cases will you find displacement reactions taking place? Answer :

Answer:

<u>Metal</u>	<u>Zinc</u>	<u>Magnesium</u>	<u>Copper</u>
Zinc oxide	No reaction	Displacement	No reaction
Magnesium oxide	No reaction	No reaction	No reaction
Copper oxide	Displacement	Displacement	No reaction

Question 2: Which metals do not corrode easily?

Answer: More reactive a metal is, more likely it is to be corroded. Therefore, less reactive metals are less likely to get corroded. This is why gold plating provides high resistance to corrosion.

Question 3: What are alloys?

Answer: Alloys are homogeneous mixtures of two or more elements. The elements could be two metals, or a metal and a non-metal. An alloy is formed by first melting the metal and then dissolving the other elements in it. For example, steel is an alloy of iron and carbon.

EXERCISE QUESTIONS PAGE NO. 56 and 57

Question 1: Which of the following pairs will give displacement reactions?

- (a) NaCl solution and copper metal (b) MgCl₂ solution and aluminium metal
(c) FeSO₄ solution and silver metal (d) AgNO₃ solution and copper metal.

Answer : (d) AgNO₃ solution and copper metal

Question 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 (We can also apply grease and paint to prevent iron from rusting. However, in case of iron frying pan, grease and paint cannot be applied because when the pan will be heated and washed again and again, the coating of grease and paint would get destroyed.)

Question 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) The element is likely to be calcium.

Question 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) Food cans are coated with tin and not with zinc because zinc is more reactive than tin.

Question 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) With the hammer, we can beat the sample and if it can be beaten into thin sheets (that is, it is malleable), then it is a metal otherwise a non-metal. If, we can use the battery, bulb, wires, and a switch to set up a circuit with the sample. If the sample conducts electricity, then it is a metal otherwise a non-metal.

(b) The above tests are useful in distinguishing between metals and non-metals as these are based on the physical properties. No chemical reactions are involved in these tests.

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

Answer : Those oxides that behave as both acidic and basic oxides are called amphoteric oxides. Examples: aluminium oxide (Al_2O_3), zinc oxide (ZnO)

Question 7: Name two metals which will displace hydrogen from dilute acids, and two metals which will not

Answer : Metals that are more reactive than hydrogen displace it from dilute acids. For example: sodium and potassium. Metals that are less reactive than hydrogen do not displace it. For example: copper and silver.

Question 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 a metal M:

Anode → Impure metal M

Cathode → Thin strip of pure metal M
Electrolyte → Solution of salt of the 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) There will be no action on dry litmus paper.

(ii) Since the gas is sulphur dioxide (SO₂), it turns moist blue litmus paper to red because sulphur dioxide reacts with moisture to form sulphurous acid.

(b)


