**Question 1:**

Give an example of a metal which

(i) is a liquid at room temperature.

(ii) can be easily cut with a knife.

(iii) is the best conductor of heat.

(iv) is a poor conductor of heat.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/science/JeEPBThG$driIypjM1Yp5g!!#optionContent1)

(i) Metal that exists in liquid state at room temperature → Mercury

(ii) Metal that can be easily cut with a knife → Sodium

(iii) Metal that is the best conductor of heat → Silver

(iv) Metals that are poor conductors of heat → Mercury and lead

**Question 2:**

Explain the meanings of malleable and ductile.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/Dg5a1zAzcSJyj6dQts8dow!!#optionContent1)

Malleable: Substances that can be beaten into thin sheets are called malleable. For example, most of the metals are malleable.

Ductile: Substances that can be drawn into thin wires are called ductile. For example, most of the metals are ductile.

**Question 1:**

Why is sodium kept immersed in kerosene oil?

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/2zHWTuP9sv2d0DpeO7b6WA!!#optionContent1)

Sodium and potassium are very reactive metals and and combine explosively with air as well as water. Hence, they catch fire if kept in open. Therefore, to prevent accidental fires and accidents, sodium is stored in kerosene oil.

**Question 2:**

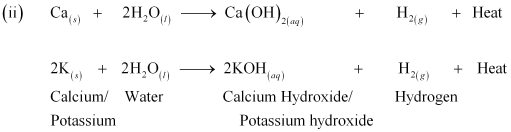
Write equations for the reactions of

(i) iron with steam

(ii) calcium and potassium with water

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/E45GQ2CU0cdH@amYuaWkzA!!#optionContent1)

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**Question 3:**

Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Metal** | **Iron (II) sulphate** | **Cooper (II) sulphate** | **Zinc sulphate** | **Silver nitrate** |
| A. | No reaction | Displacement |  |  |
| B. | Displacement |  | No reaction |  |
| C. | No reaction | No reaction | No reaction | Displacement |
| D. | No reaction | No reaction | No reaction | No reaction |

Use the Table above to answer the following questions about metals A, B, C and D.

(i) Which is the most reactive metal?

(ii) What would you observe if B is added to a solution of copper (II) sulphate?

(iii) Arrange the metals A, B, C and D in the order of decreasing reactivity.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/HNmsRxfwfmkFRYyOgmpW7A!!#optionContent1)

Explanation

A + FeSO4 → No reaction, i.e., A is less reactive than iron

A + CuSO4 → Displacement, i.e., A is more reactive than copper

B + FeSO4 → Displacement, i.e., B is more reactive than iron

B + ZnSO4 → No reaction, i.e., B is less reactive than zinc

C + FeSO4 → No reaction, i.e., C is less reactive than iron

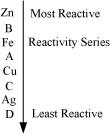
C + CuSO4 → No reaction, i.e., C is less reactive than copper

C + ZnSO4 → No reaction, i.e., C is less reactive than zinc

C + AgNO3 → Displacement, i.e., C is more reactive than silver

D + FeSO4/CuSO4/ZnSO4/AgNO3 → No reaction, i.e., D is less reactive than iron, copper, zinc, and silver

From the above equations, we obtain:



(i) B is the most reactive metal.

(ii) If B is added to a solution of copper (II) sulphate, then it would displace copper.

B + CuSO4 → Displacement

(iii) The arrangement of the metals in the order of decreasing reactivity is:  
B > A > C > D

**Question 4:**

Which gas is produced when dilute hydrochloric acid is added to a reactive metal? Write the chemical reaction when iron reacts with dilute H2SO4.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/T@Sii4mfPBPm2TW4exz4Ow!!#optionContent1)

Hydrogen gas is evolved when dilute hydrochloric acid is added to a reactive metal.

When iron reacts with dilute H2SO4, iron (II) sulphate with the evolution of hydrogen gas is formed.

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**Question 5:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/Nei9Vif@eOt5aWAZfmN2Fw!!#optionContent1)

Zinc is more reactive than iron. Therefore, if zinc is added to a solution of iron (II) sulphate, then it would displace iron from the solution.

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**Question 1:**

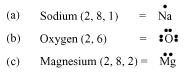
(i) Write the electron-dot structures for sodium, oxygen and magnesium.

(ii) Show the formation of Na2O and MgO by the transfer of electrons.

(iii) What are the ions present in these compounds?

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/vcRGE8cKjdpvwdhIxaSCEQ!!#optionContent1)

(i) The representation of elements with valence electrons as dots around the elements is referred to as electron-dot structure for elements.



(ii)

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(iii) The ions present in Na2O are Na+ and O2− ions and in MgO are Mg2+ and O2− ions.

**Question 2:**

Why do ionic compounds have high melting points?

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/TUtxqguyTr0mmiSS@umHWg!!#optionContent1)

Ionic compounds have strong electrostatic forces of attraction between the ions. Therefore, it requires a lot of energy to overcome these forces. That is why ionic compounds have high melting points.

**Question 1:**

Define the following terms.

(i) Mineral (ii) Ore (iii) Gangue

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/paqem2@h4OtNJvxVn4E@bg!!#optionContent1)

(i) Mineral: Most of the elements occur in nature as in combined state as minerals. The chemical composition of minerals is fixed.

(ii) Ore: Minerals from which metals can be extracted profitably are known as ores.

(iii) Gangue: The impurities (sand, silt, soil, gravel, etc.) present in the ore are called gangue.

**Question 2:**

Name two metals which are found in nature in the free state.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/9cIjPFG@ZmFUFJhLZwHlbA!!#optionContent1)

The metals at the bottom of the reactivity series are mostly found in free state. For example: gold, silver, and platinum.

**Question 3:**

What chemical process is used for obtaining a metal from its oxide?

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/$upiWipIshyFHIoHcN8GYg!!#optionContent1)

The chemical process used for obtaining a metal from its oxide is reduction. In this process, metal oxides are reduced by using suitable reducing agents such as carbon or by highly reactive metals to displace the metals from their oxides.

For example, zinc oxide is reduced to metallic zinc by heating with carbon.

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Manganese dioxide is reduced to manganese by treating it with aluminium powder. In this case, aluminium displaces manganese from its oxide.

http://cbse.meritnation.com/img/curr/1/10/10/147/1005/Chapter%203_html_784a3b96.gif

Oxides of more reactive metals are reduced by electrolysis.

**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**](http://cbse.meritnation.com/study-online/solution/Science/Gz5Y1zN7xkWRX0WDbK6aBw!!#optionContent1)

|  |  |  |  |
| --- | --- | --- | --- |
| Metal | Zinc | Magnesium | Copper |
| 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**](http://cbse.meritnation.com/study-online/solution/Science/WKekXpK@ZKKSnnwcBpJXlg!!#optionContent1)

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 2:**

Which metals do not corrode easily?

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/WKekXpK@ZKKSnnwcBpJXlg!!#optionContent1)

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**](http://cbse.meritnation.com/study-online/solution/Science/ky$SduHU0NIGw2aF4n7T5A!!#optionContent1)

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.

**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**](http://cbse.meritnation.com/study-online/solution/Science/NDmruDyxu6ywRAVtbiGhOA!!#optionContent1)

(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**](http://cbse.meritnation.com/study-online/solution/Science/iNTrGxjAPWZASVkcoVeG4w!!#optionContent1)

(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**](http://cbse.meritnation.com/study-online/solution/Science/9pbKYf6zu3EooRILhotYgw!!#optionContent1)

(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**](http://cbse.meritnation.com/study-online/solution/Science/SVTA1EkmOPBi9wi5Tw79fg!!#optionContent1)

(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**](http://cbse.meritnation.com/study-online/solution/Science/ctMBYK9YGhii2WDa1777$w!!#optionContent1)

(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. Similarly, 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.

**Question 6:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/71$uzOr8XybzJXBkp8AjXw!!#optionContent1)

Those oxides that behave as both acidic and basic oxides are called amphoteric oxides.

Examples: aluminium oxide (Al2O3), zinc oxide (ZnO)

**Question 7:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/6pnJiYN72MivYJoMR$czmQ!!#optionContent1)

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**](http://cbse.meritnation.com/study-online/solution/Science/CbxggtRb@Ufk9i5p7IyRfQ!!#optionContent1)

In the electrolytic refining of a metal M:

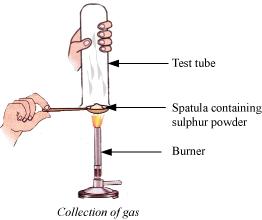
Anode → Impure metal M

Cathode → Thin strip of pure metal M

Electrolyte → Solution of salt of the metal M

**Question 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**](http://cbse.meritnation.com/study-online/solution/Science/3H$H$G$IO2JRjxVv405N7g!!#optionContent1)

(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)

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**Question 10:**

State two ways to prevent the rusting of iron.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/AdudcDqpy8LEMNq2WXlvzQ!!#optionContent1)

Two ways to prevent the rusting of iron are:

**(i)** **Oiling, greasing, or painting:** By applying oil, grease, or paint, the surface becomes water proof and the moisture and oxygen present in the air cannot come into direct contact with iron. Hence, rusting is prevented.

**(ii)** **Galvanisation:** An iron article is coated with a layer of zinc metal, which prevents the iron to come in contact with oxygen and moisture. Hence, rusting is prevented.

**Question 11:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/TlCT@YiyykGAHK6VyIHatQ!!#optionContent1)

Non-metals combine with oxygen to form acidic oxides.

For example:

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**Question 12:**

Give reasons

(a) Platinum, gold and silver are used to make jewellery.

(b) Sodium, potassium and lithium are stored under oil.

(c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.

(d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/ugwC4uzvTKyLdXolvEhAPw!!#optionContent1)

(a) Platinum, gold, and silver are used to make jewellery because they are very lustrous. Also, they are very less reactive and do not corrode easily.

(b) Sodium, potassium, and lithium are very reactive metals and react very vigorously with air as well as water. Therefore, they are kept immersed in kerosene oil in order to prevent their contact with air and moisture.

(c) Though aluminium is a highly reactive metal, it is resistant to corrosion. This is because aluminium reacts with oxygen present in air to form a thin layer of aluminium oxide. This oxide layer is very stable and prevents further reaction of aluminium with oxygen. Also, it is light in weight and a good conductor of heat. Hence, it is used to make cooking utensils.

(d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction because metals can be easily extracted from their oxides rather than from their carbonates and sulphides.

**Question 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**](http://cbse.meritnation.com/study-online/solution/Science/RhFleWPdjI2CXYpjHfMehw!!#optionContent1)

Copper reacts with moist carbon dioxide in air to form copper carbonate and as a result, copper vessel loses its shiny brown surface forming a green layer of copper carbonate. The citric acid present in the lemon or tamarind neutralises the basis copper carbonate and dissolves the layer. That is why, tarnished copper vessels are cleaned with lemon or tamarind juice to give the surface of the copper vessel its characteristic lustre.

**Question 14:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/aSolTBkpjJz8DnnnTmH$KA!!#optionContent1)

|  |  |
| --- | --- |
| **Metal** | **Non-metal** |
| Metals are electropositive. | Non-metals are electronegative. |
| They react with oxygen to form basic oxides.  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_11809490.gif  These have ionic bonds. | They react with oxygen to form acidic or neutral oxides.  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_ma7e9625.gif  These have covalent bonds. |
| They react with water to form oxides and hydroxides. Some metals react with cold water, some with hot water, and some with steam.  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_22b63ac2.gif | They do not react with water. |
| They react with dilute acids to form a salt and evolve hydrogen gas. However, Cu, Ag, Au, Pt, Hg do not react.  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_788409cb.gif | They do not react with dilute acids. These are not capable of replacing hydrogen. |
| They react with the salt solution of metals. Depending on their reactivity, displacement reaction can occur.  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_m7e63f357.gif | These react with the salt solution of non-metals. |
| They act as reducing agents (as they can easily lose electrons).  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_m73f9a646.gif | These act as oxidising agents (as they can gain electrons).  http://cbse.meritnation.com/img/curr/1/10/10/147/1057/Chapter%203_html_12fc25f7.gif |

**Question 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**](http://cbse.meritnation.com/study-online/solution/Science/e5yZbJ37sTQ$vRlnyL9@TQ!!#optionContent1)

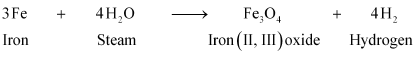
He must have dipped the gold metal in the solution of aqua regia − a 3:1 mixture of conc. HCl and conc. HNO3. Aqua regia is a fuming, highly corrosive liquid. It dissolves gold in it. After dipping the gold ornaments in aqua regia, the outer layer of gold gets dissolved and the inner shiny layer appears. That is why the weight of gold ornament reduced.

**Question 16:**

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

* [**Answer**](http://cbse.meritnation.com/study-online/solution/Science/5VWxuYJY46k5$THWiOrDiw!!#optionContent1)

Copper does not react with cold water, hot water, or steam. However, iron reacts with steam. If the hot water tanks are made of steel (an alloy of iron), then iron would react vigorously with the steam formed from hot water.



That is why copper is used to make hot water tanks, and not steel.

**STUDY NOTES**

**Physical Properties Of Metals And Non-Metals**

**Do you know how many elements are there in our periodic table?**

There are 114 elements in the modern periodic table. These elements can be broadly classified as metals and non-metals depending on their properties.

Elements that lose electrons to form compounds are called **metals** whereas elements that gain electrons to form compounds are called **non-metals**. Here, we will discuss metals and non-metals along with their physical properties in detail.

**Metals**

These elements are electropositive and contain less than or equal to three electrons in their valence shell. Metals such as aluminium, copper, and iron are widely used around us. Metals are used for the construction of bridges, automobiles, airplanes, ships, trains, etc. We will now discuss the physical properties of metals.

**Physical properties of metals:**

**1. Metallic Lustre:** The surface of most metals is shiny. The lustre associated with metals is known as **metallic lustre**. For example, iron, copper, gold, and silver are very shiny. Metals such as gold and silver are very lustrous. Therefore, they are used for making jewellery.

|  |
| --- |
| Silver is used for making mirrors because of its excellent shine and reflective nature. |

Some metals do not look very lustrous. This is because they either lose their lustre or their lustre gets reduced when exposed to air for a long time. This happens due to the formation of a layer of oxide, carbonate, and sulphide on their surface. If a metal surface is rubbed with sand paper, then this layer gets removed and the shiny surface of the metal can be seen

**Reaction Of Metals With Oxygen, Water, And Acids**

Metals such as aluminium, copper, and iron are widely used around us. Metals are used for the construction of bridges, automobiles, airplanes, ships, trains etc.

We have earlier studied about the physical properties of metals. Now, let us try to learn about their chemical properties. Here, we will study about the reaction of metals with oxygen, water, and acids.

1. **Reaction of metals with oxygen**

On heating, magnesium burns with a dazzling white flame to form magnesium oxide. Similarly, when aluminium is heated, it reacts with oxygen present in the air to form aluminium oxide.

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Almost all metals combine with oxygen to form metal oxides. The general reaction for the process is:

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All metals are not equally reactive. Therefore, the reactivity of metals with oxygen also varies. Some metals such as sodium react with oxygen at room temperature. Metals such as magnesium do not react with oxygen at room temperature and require heating. On the other hand, metals such as zinc do not react with oxygen easily and require very strong heating. Silver and gold do not react with oxygen even at high temperatures.

**All metal oxides are basic in nature and turn red litmus paper blue.** These basic oxides react with acids to form salt and water. However, the oxides of aluminium and zinc show the properties of both acids and bases. **Chemicals that show both acidic and basic properties are said to be** **amphoteric in nature**. Hence, aluminium oxide and zinc oxide are amphoteric oxides. They react with both acids and bases to give their respective salts and water.

**Corrosion: Causes And Prevention**

You must have observed that when metals such as iron, silver, and copper are exposed to air for some time, they lose their shine. For example, iron, when exposed to moist air for a long period of time, acquires a coating of a brown-flaky substance.



This is because metals react with moisture and the different gases present in the air. **The process of breaking down of metals because of their reactions with moisture and gases present in the air is known as corrosion.** Rusting of iron is the most common example of corrosion.

**DO YOU KNOW?**

Rust is a general term given to iron oxides, which are formed when iron reacts with oxygen in the presence of moisture. Rust primarily consists of hydrated iron (III) oxides, Fe2O3 .*n*H2O. The number of water molecules in rust is variable. Hence, they are represented by *n.*

**Other examples of corrosion:**

**1.** You must have observed that ornaments made of silver lose their shine after some time

**Reaction Of Metals With Solution Of Salts Of Other Metals; And The Reactivity Series**

In the reaction of metals with air, water, and acids, we observed that some metals react very vigorously, some others react rather slowly, and some do not react at all.

**What can you conclude from the given information? Are all elements equally reactive?**

As different metals react with the same chemicals in different ways, the reactivity of metals cannot be similar.

**If the reactivity of metals is different, then how can we determine the reactivity of two metals?**

Displacement reactions help us for this. Actually, some metals are more reactive than others. Metals that are more reactive can displace the less reactive metals from their salts in a solution or molten form. The general equation for such reactions is given as:

http://cbse.meritnation.com/img/lp/1/10/10/147/359/863/215/3.6.08_sonali_chemistry_10.2.3.2.3_SJT_SG_html_12993b44.gif

Such reactions are called **displacement reactions**. In displacement reactions, a more reactive metal replaces a less reactive metal from the latterâ€™s salt.

For example, iron can replace copper from copper sulphate solution, but copper cannot replace iron from iron (II) sulphate solution.

http://cbse.meritnation.com/img/lp/1/10/10/147/359/863/215/3.6.08_sonali_chemistry_10.2.3.2.3_SJT_SG_html_7e138e0b.gif

**Formation Of Ionic Compounds And Their Properties**

We know that common salt is an important dietary mineral essential for animal life. Common salt is chemically known as sodium chloride. The chemical formula of sodium chloride is NaCl. It suggests that it is made up of sodium, which is a reactive metal, and chlorine, which is a non-metal.

**Do you know that sodium chloride does not exist as molecules, but aggregates as oppositely charged ions?**

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| **An ion is a charged species, which can be negatively charged or positively charged. A negatively charged species is called an â€˜anionâ€™ and a positively charged species is called a â€˜cationâ€™.** |

Sodium chloride (NaCl) is formed by the combination of sodium (Na+) and chloride (Cl-) ions. Sodium and chloride ions are oppositely charged. Hence, they are held by a strong electrostatic force of attraction in sodium chloride compound. **But why do they react or combine with each other?** This can be explained by considering the formation of sodium chloride.

This representation of elements with valence electrons as dots around elements is referred to as **Electron Dot structures** for elements.

**Do you know what type of a compound sodium chloride is? Sodium chloride is an ionic compound.**

**Ionic compounds**

These are compounds that are formed by the transfer of electrons. In other words, these are compounds that are made up of ions.

The bonding in such compounds is called **ionic bonding**. This type of bonding is also known as **electrostatic bonding** as the forces that hold the ions together are electrostatic in nature. The transfer of electrons always takes place from a metal to a non-metal. Thus, metals and non-metals combine with each other to attain a noble gas configuration

**Extraction And Refining Of Metals**

We know that metals are highly reactive. Therefore, they do not occur in the free state. For example, sodium, potassium, etc. are never found in the free state and occur in nature in chemically combined forms known as **minerals.**

**Elements or compounds, which occur naturally in the Earthâ€™s crust, are known as minerals.** Most minerals found in the earthâ€™s crust contain metals. Some metals are also found in the oceans in the form of salts such as sodium chloride, magnesium chloride, etc.

There are some minerals which contain a large amount of a particular metal and from them, metals can be extracted profitably (using practically possible techniques).

**The minerals from which metals can be extracted commercially are known as ores.**

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| **The process by which a pure metal is obtained from its ore is known as** **extraction.** |

**Do you know that metals are classified into three groups on the basis of their reactivity series?** Thethree groups are as follows:

1. Metals of low reactivity
2. Metals of medium reactivity
3. Metals of high reactivity

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| **Reactivity series**  The reactivity series is a list of metals arranged in the order of their decreasing reactivity (as shown in **Figure 1**).  The metals at the bottom of the reactivity series are less reactive and they often exist in nature in the free state. For example, gold, silver, and platinum are less reactive metals.  The metals at the top of the reactivity series are very reactive. Hence, they never occur in nature in the free state. For example, sodium, potassium, calcium, etc. are highly reactive, but do not occur in nature in the free state.  The metals in the middle of the reactivity series are moderate |