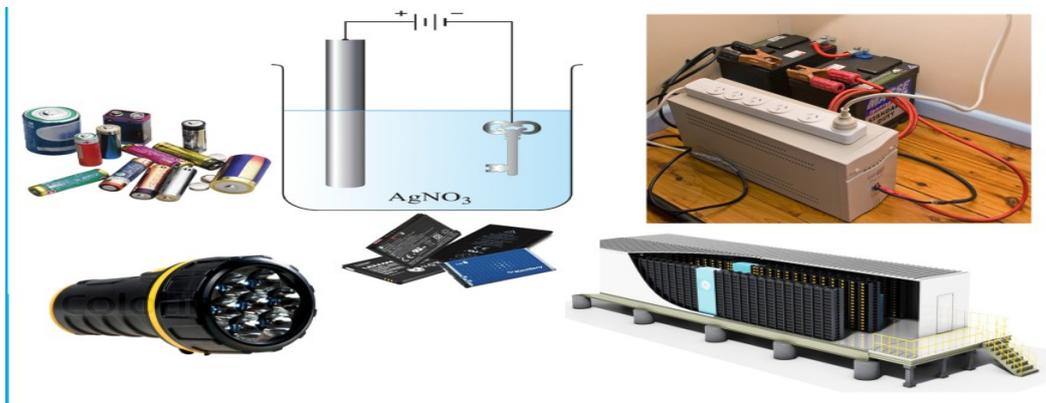


Reactivity series and Electrochemistry

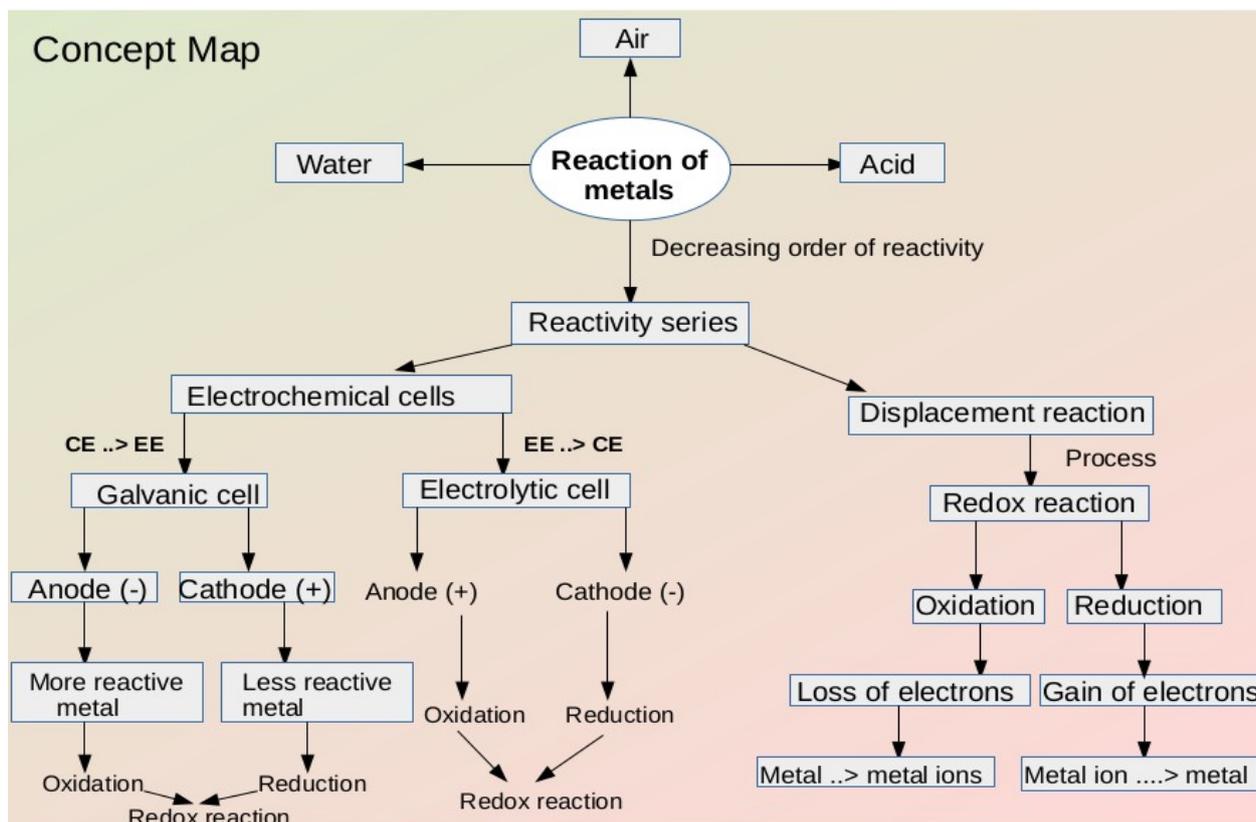
Notes & Questions Based on Video 1



The important concepts discussed in this chapter are ,

- ◆ Reactivity of metals with water, air and acids.
- ◆ Reactivity series_ Displacement reaction.
- ◆ Galvanic cell _Figure with explanation of the mechanism.
- ◆ Electrolytic cell with explanation of the mechanism
- ◆ Electroplating , applications of electroplating .

The concept map of this chapter is given.



Reaction of metals with water.

Take three beakers having the same quantity of water. Take pieces of sodium, magnesium and copper of same size and drop each one to each beaker. Observe the reactions.

Observations :-

- ◆ Sodium reacts vigorously with water and a gas formed. When a burned match stick is shown at the mouth of the test tube a pop sound is produced. When phenolphthalein is added to water, the colour becomes pink.
- ◆ Magnesium reacts very feebly.
- ◆ Copper does not react with water.

Inference (Conclusion) :-

- ◆ When sodium reacts with water, hydrogen gas and sodium hydroxide (alkali) are formed. In presence of phenolphthalein alkali develops pink colour. Pop sound is produced due to the formation of hydrogen gas. Balanced equation of the reaction ; $\text{Na} + 2\text{NaOH} \dots\dots > 2\text{NaOH} + \text{H}_2$
- ◆ When magnesium reacts with water very feeble amount hydrogen is formed. Equation of the reaction is, $2\text{Mg} + \text{H}_2\text{O} \dots\dots > 2\text{MgO} + \text{H}_2$

Drop magnesium and copper metal in **hot water** and observe the differences in their reactions. Record observation of these two experiments.

Observations : -

- ◆ Magnesium reacts speedily with hot water than cold water.
- ◆ Copper has no reaction with hot water.

Inference (Conclusion) :-

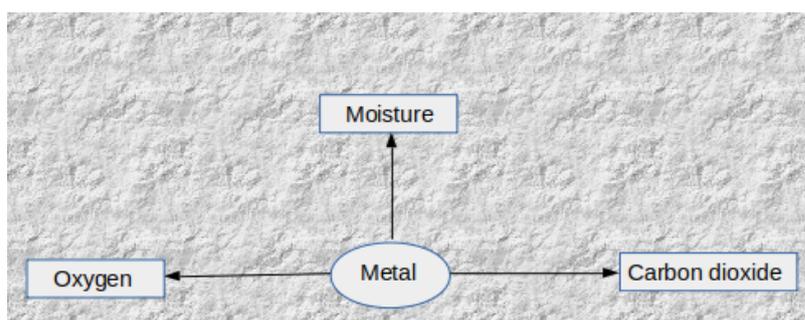
- ◆ According to collision theory as temperature increases speed (rate) of chemical reaction increases. So magnesium reacts speedily with hot water.
- ◆ **Decreasing order of reactivity of these metals.**

Sodium > Magnesium > Copper or **Na > Mg > Cu.**

Reactions of Metals with Air.

Every metal reacts with its surrounding (air) which containing **oxygen, moisture and carbon dioxide.**

The flow chart is given.



Freshly cut surfaces of metals will have a shiny appearance. This property is known as **metallic lustre**. Cut a piece of sodium using a knife. Observe the freshly cut portion. You can see that its shining fades after sometime. **What may be the reason?**

This is due to the conversion of sodium into its compounds by reacting with oxygen, moisture and carbon dioxide in the atmosphere. The final compound is **sodium carbonate**.

A fresh magnesium ribbon losing its lustre when kept exposed in the air for some days. **Can you think the reason?**

This is also due to the reaction of magnesium with atmospheric air and finally converts into magnesium oxide (MgO). Balanced equation of the chemical reaction is , $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

It can be seen that the **lustre of Aluminium vessels** diminishes as time passes by. In the case of copper vessels, it takes months for the **loss of its lustre** by the formation of verdigris.

- This is due to reaction of Aluminium with atmospheric air to form Aluminium oxide (Al_2O_3) Balanced equation is , $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
- Copper reacts with atmospheric air, CO_2 , moisture to form **verdigris**. (Basic copper carbonate).

Does the shining of gold fade even after a long time? **What is your opinion?**

- The shining of gold does not fade even after a long time. Gold does not react with atmospheric air, moisture and carbon dioxide.

List the above metals in the decreasing order of their reactivity with air and thereby losing lustre.

- Sodium > Magnesium > Aluminium > Copper > Gold or **Na > Mg > Al > Cu > Au**

Important Questions .

1. Sodium metal is kept in kerosene. What is the reason?
2. Suggest a method to identify the alkali?
3. What will be the rate or speed of reaction of sodium with hot water compared with the reaction rate of cold water?
4. Hydrogen is colourless, odourless and lesser density gas. How can we identify formation of hydrogen gas?
5. The shining of gold does not fade even after a long time. What may be the reason?

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