

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based notes of Chapter -03)

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DATE:- 19/05/2021

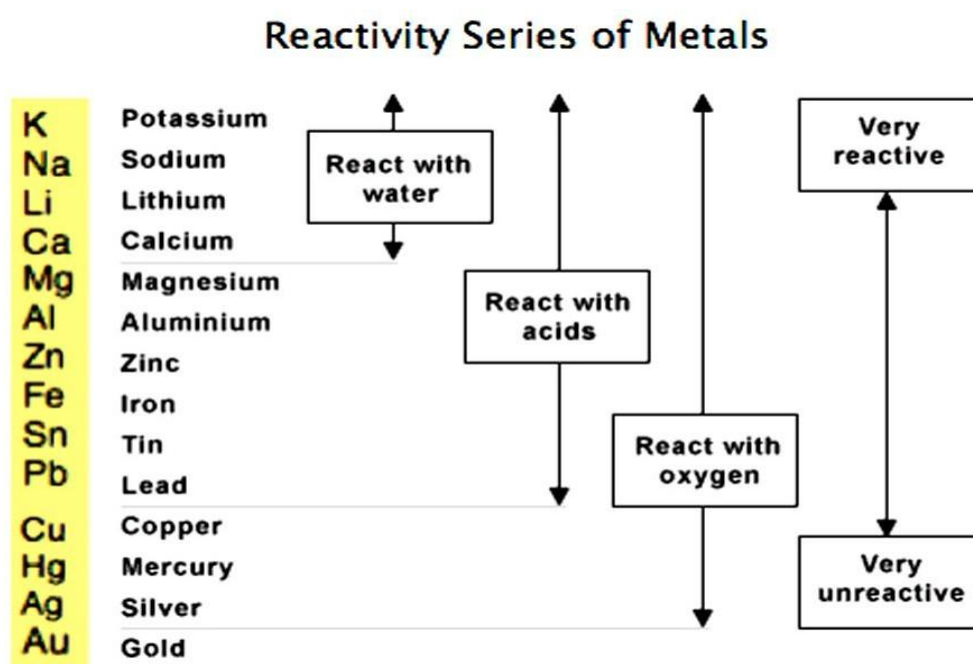
METALS AND NON-METALS

REACTIVITY SERIES OF METALS

A series of metallic elements arranged in the increasing or decreasing order of their reactivity is called a reactivity series of metals.

In the reactivity series, copper, gold, and silver are at the bottom and hence least reactive. These metals are known as noble metals.

The most active metal, potassium, is at the top of the list and the least reactive metal, gold, is at the bottom of the list. Although hydrogen is a non-metal it is included in the activity series due to the fact that it behaves like a metal in most chemical reactions i.e., the hydrogen ion has a positive charge [H⁺] like other metals.



Following points become evident from the activity series of metals.

- The higher the metal in the series, the more reactive it is i.e., its reaction is fast and more exothermic.
- This also implies that the reverse reaction becomes more difficult i.e., the more reactive a metal, the more difficult it is to extract it from its ore. The metal is also more susceptible to corrosion with oxygen and water.
- The reactivity series can be established by observation of the reaction of metals with water, oxygen or acids.
- Within the general reactivity or activity series, there are some periodic table trends:

a) Down Group 1(I) the "Alkali Metals", the activity increases



b) Down Group 2(II) the activity increases e.g., $\text{Ca} > \text{Mg}$.

c) In the same period, the Group 1 metal is more reactive than the group II metal and the group II metal is more reactive than the Group III metal and all three are more reactive than the "Transition Metals". e.g., $\text{Na} > \text{Mg} > \text{Al}$ (in Period 3) and $\text{K} > \text{Ca} > \text{Ga} > \text{Fe/Cu} / \text{Zn}$ etc. (in Period 4)

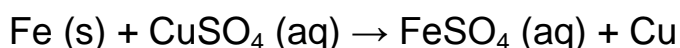
REACTION OF METALS WITH SOLUTION OF OTHER METAL SALTS:

Reaction of metals with solution of other metal salt is displacement reaction. In this reaction more reactive metal displace the less reactive metal from its salt.

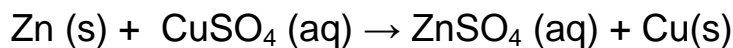
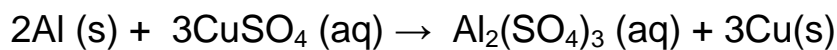
More Reactive Metal A + Salt Solution of Less reactive metal B →

Salt of More Reactive metal A + Less reactive Metal B

Examples: Iron displaces copper from copper sulphate solution.



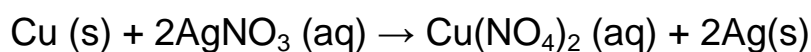
Similarly, aluminium and zinc displace copper from the solution of copper sulphate.



In all the above examples, iron, aluminium and zinc are more reactive than copper.

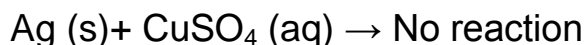
That's why they displace copper from its salt solution.

When copper is dipped in the solution of silver nitrate, it displaces silver and forms copper nitrate.

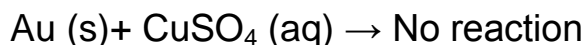


In this reaction copper is more reactive than silver and hence displace silver from silver nitrate solution forming copper nitrate.

Silver metal does not react with copper sulphate solution. Because silver is less reactive than copper and not able to displace copper from its salt solution.



Similarly, when gold is dipped in the solution of copper nitrate, no reaction takes place. Because copper is more reactive than gold.



In similar way no reaction takes place when copper is dipped in the solution of aluminium nitrate. Because copper is less reactive than aluminium.

