Subject Name - chemistry
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Experiment No. 5

Demonstration of effect of environmental conditions on metal corrosion.

* Aim:- To Demonstration of effect of environmental conditions on metal corrosion

* objective:- To understand the effect of different pH on corrosion of metal

* Apparatus:- Beaker 100ml, Burette stand etc.

* chemicals: Hydrochloric acid, Sulfuric acid, Sodium hydroxide etc.

* Questions -

Q. 1) A solution is made up to contain 0.01M HCl. what is its pH?

Ans → $pH = -\log(H_3O^+) = -\log(0.01) = \boxed{2}$

Q. 2) A solution is made up to contain 0.01M NaOH. what is its pH?

Ans → $pH = -\log(0.01) = \boxed{2}$, Now $p(OH) = 14 - pH$

$\therefore p(OH) = 14 - 2 = \boxed{12}$

Q 3) A pure metal rod half immersed vertically in water starts corrosion at bottom. Justify

Ans → When a rod is immersed in water, the region inside the water is exposed to lower oxygen as compared to the region in the upper part which is exposed to air. The region exposed in the air, being protected by oxygen acts as a cathode while the portion inside the water behaves like an anode experiencing electrochemical corrosion due to the difference in electrochemical potential. The difference in cation occurs due to air having more oxygen as compared to water, making the surroundings of both portions of the rod very different.

Q 4) what is the effect of temperature on the rate of wet corrosion?

Ans → Since wet corrosion are essentially electrochemical in nature, increased temperature tends to speed up the ions taking part in that reaction. Thus the rate of corrosion increases with increase in temperature due to increase in energy and thus the rate of reactions

Q 5) whether there will be corrosion in alkaline and neutral medium? Justify.

Ans → Yes, corrosion does occur in alkaline & neutral medium via absorption of O_2

Rusting of Iron happens due to dissolved oxygen in water by oxygen absorption mechanism. At the anodic portion, iron gets dissolved due to the oxidation reaction which takes place and electrons flow to the cathodic area, combining with oxygen, if present in enough amounts to form ferrous hydroxide which in turn oxidizes into ferric hydroxide.

- Reactions:- Anode → $Fe \rightarrow Fe^{2+} + 2e^-$

  Cathode → $\frac{1}{2}O_2 + H_2O + 2e^- \rightarrow 2OH^-$ $Fe^{2+} + 2OH^- \rightarrow Fe(OH)_2$

  (in presence of enough O_2) ↓

  $2Fe(OH)_2 + \frac{1}{2}O_2 + H_2O \rightarrow 2Fe(OH)_3 \rightarrow Fe_2O_3 \cdot 2H_2O$ (yellow rusts)

  Limited supply of O_2 → white Fe_3O_4 from ⇒ (Black anhydrous magnite)