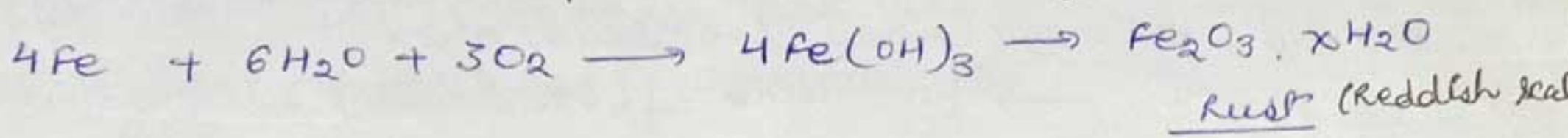


What is corrosion of metals? Explain the basic reason of metallic corrosion? (UPTU 2002-03 I SEM) 03 1/2 Marks

The loss of metallic material by means of chemical or electrochemical attack by its environment is known as corrosion. For ex:- Rusting of iron [well known example of corrosion] i.e. Atmospheric corrosion of iron.



The basic reason for metallic corrosion is that, metals are being extracted from their ores through the process of reduction which is known as metallurgy. Thus, metals are considered as higher energy state and have a natural tendency to lose some amount of energy and come back to lower energy state i.e. combined form (ore). This is done by the process of oxidation which is known as corrosion.

Corrosion of metals occurs when these metals (high energy) are exposed to environment, the exposed metal surface began to decay forming more stable metal compounds (lower energy).

Define corrosion. (UPTU 2000-01 I SEM)

Refer Q. 11.

OR. Har

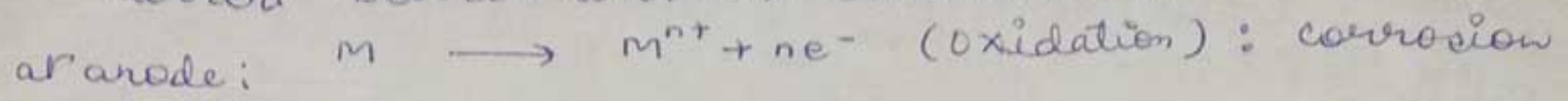
Q. 12.

Ans.

Q.13. Explain the mechanism of hydrogen evolution and oxygen absorption in electrochemical corrosion. (UPTU 2005-06 II SEM)

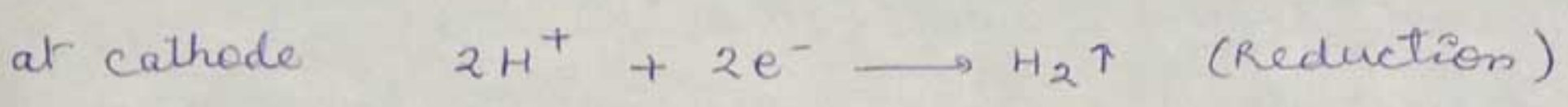
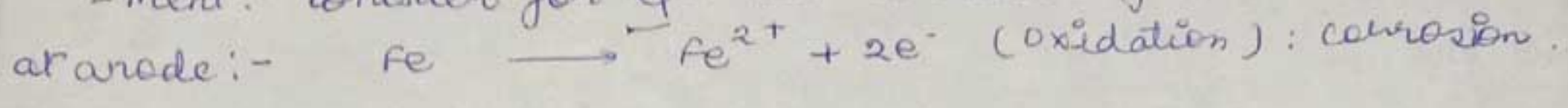
Q.14. Discuss the mechanism of electrochemical corrosion. (UPTU 2000-01 I SEM)

Ans Electrochemical corrosion involves dissolution of metal as corresponding metal ions with the liberation of free electrons at anodic area. This results in flow of electric current between anodic & cathodic area.



The electrons evolved are consumed by cathodic reaction in two ways:-

(i) Hydrogen evolution:- usually occurs in acidic environment. Consider for eg - the corrosion of Fe.

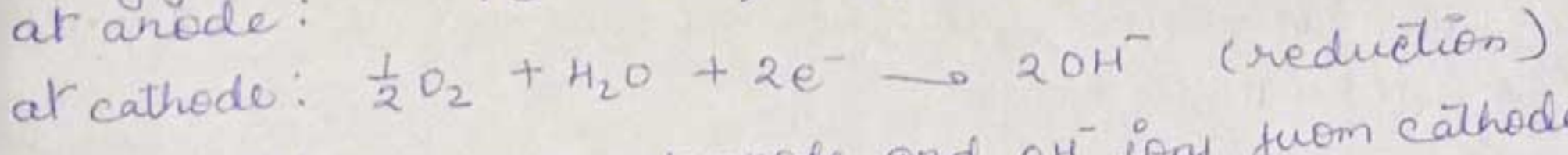
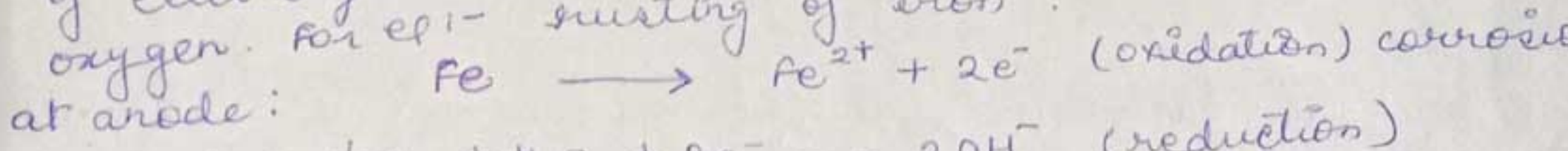


[H^+ comes from acidic solution]

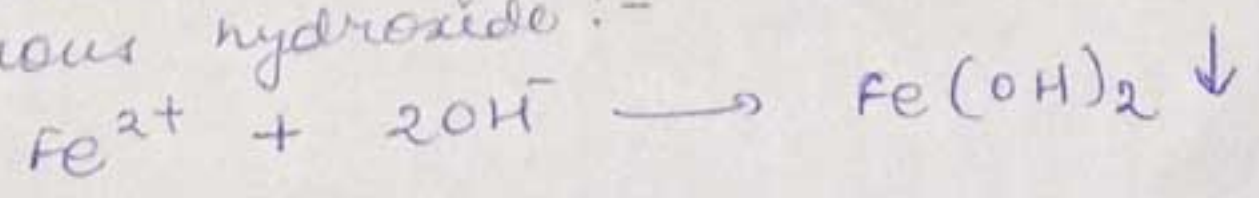
Thus, Overall reaction is: $Fe + 2H^+ \rightarrow Fe^{2+} + H_2 \uparrow$

All metals above hydrogen in electrochemical series have a tendency to get dissolved in acidic solution with evolution of hydrogen.

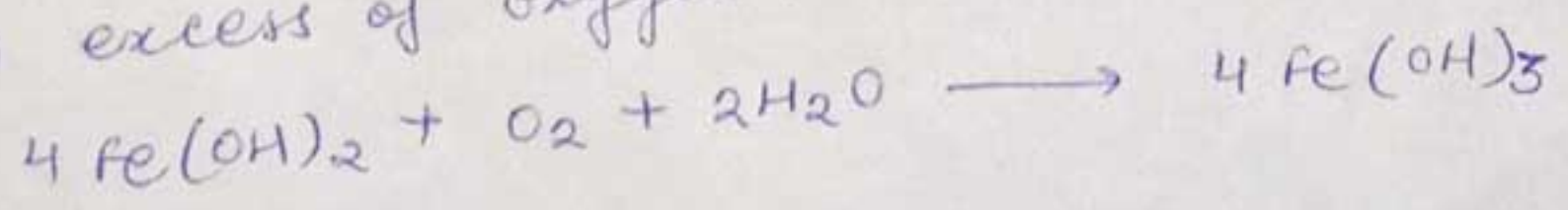
(ii) Oxygen absorption:- occurs in neutral aqueous solution of electrolytes like NaCl. In the presence of atmospheric oxygen. For eg:- rusting of Iron.



Now Fe^{2+} ions from at anode and OH^- ions from cathode diffuse and forms ferrous hydroxide:-



In excess of oxygen:-



mention various methods for prevention of corrosion.

(UPTU 2003-04 I SEM) 05 Marks

Some corrosion occurs naturally and therefore can't be prevented but can be minimised by various means.

① Nature of metal.

In proper designing the things which are sharp bends and crevices. Relative areas of cathodic and anodic metal and on nature of surface film etc. drainage and crevices.

② Nature of environment :- which depends upon temperature, humidity of air, its pH & be on conductance of corroding medium.

③ Stress :- depends upon the nature and magnitude of stress.

Q. No. 20 What is meant by the term Passivity?

(UPTU 2000-01 I SEM) 02 Marks

Ans. The phenomenon in which a metal or alloy exhibits a much higher corrosion resistance than expected from the position in electrochemical series is known as passivity. It is due to the formation of a protective thin layer over the surface of metal or alloy. This layer makes the surface inert towards corrosion. Examples of passive metals are - ~~Fe~~ Ti, Al or etc. This passivity exists in certain environmental conditions which could maintain this protective invisible layer or film of oxide on the surface.

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(UPTU 2003-04 I SEM) 05 marks

Corrosion occurs naturally and therefore can't be eliminated completely but can be minimised by various means. Such as:-

- ①. Proper designing :- In proper designing the things which must be avoided are - sharp bends and corners, galvanic coupling, improper drainage and crevices etc.
- ②. Use of modified metal :- Properties of metal should be modified which can be done by changing its composition by refining or alloying.
- ③. Modified environment :- ~~the~~ Environment can also be modified by removing corrosive constituents as well as by using inhibitors.
- ④. Protective coating :- It is an important tool for prevention of corrosion. It works barrier between metal and environment.
- ⑤. Cathodic Protection :- The basic principle of this method is to force the metal to be protected to behave as or function as cathode. This can be done by two ways either by appropriate galvanic coupling or by impressed current.

By using above methods corrosion of metals can only be prevented not removed.

Q.16.

Explain four methods for prevention of corrosion

(UPTU 2006-07 I SEM) 05 marks

Ans

See Q.15.