Corrosion

https://www.metallurgyfordummies.com/anti-corrosion.html

Corrosion: Chemistry

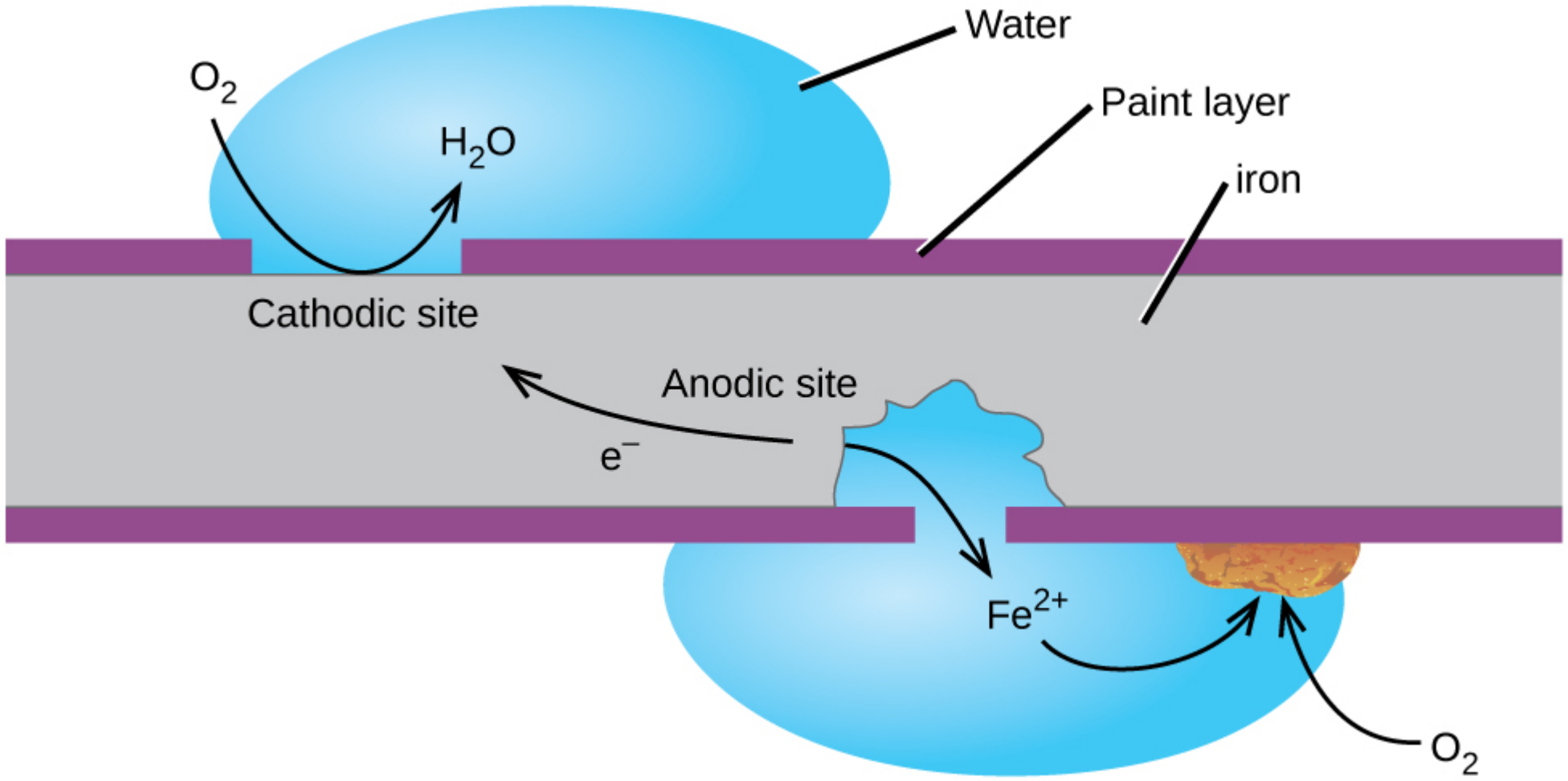
- *Corrosion is the unwanted reaction or destruction of a metal component by the environment.*
- The mechanism of corrosion is electrochemical and can be induced by the flow of current or will cause a current to flow. When a corroding metal is oxidized, the reaction

$$M \rightarrow M^{+n} + ne^{-}$$

- It must be accompanied by a reduction reaction, which is usually the reduction of oxygen, whether in the air or dissolved in water.

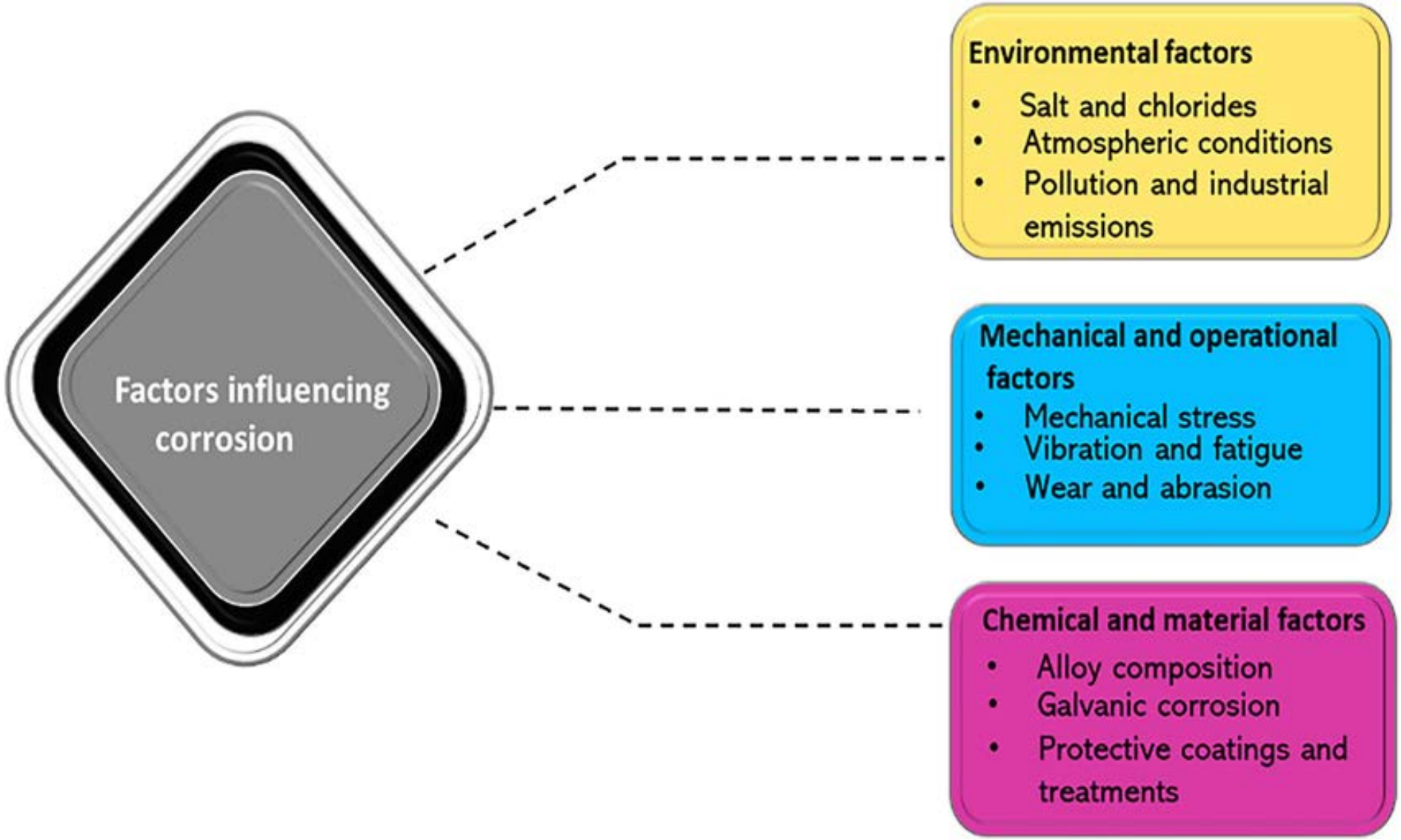
$$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O \qquad O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$$

Corrosion: Chemistry



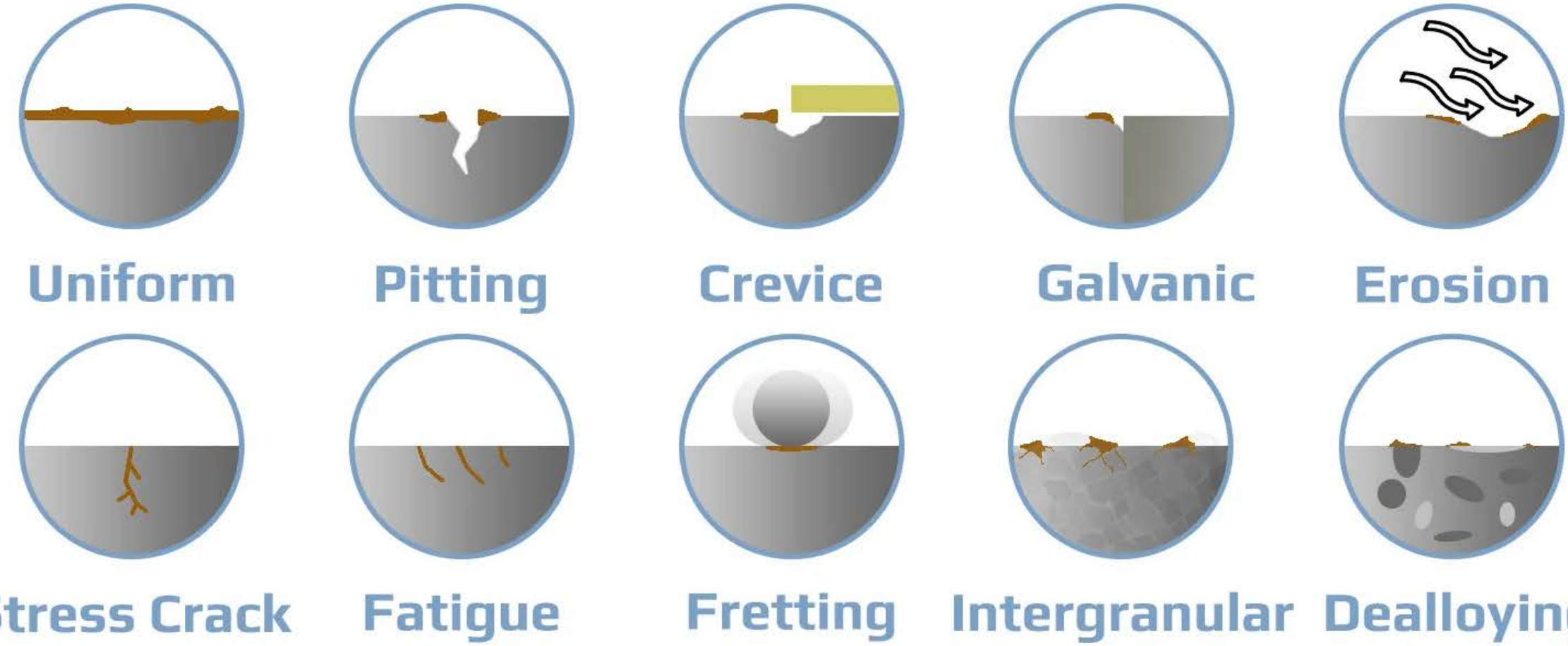
https://courses.lumenlearning.com/suny-binghamton-chemistry/chapter/corrosion/

Factors Affecting Corrosion



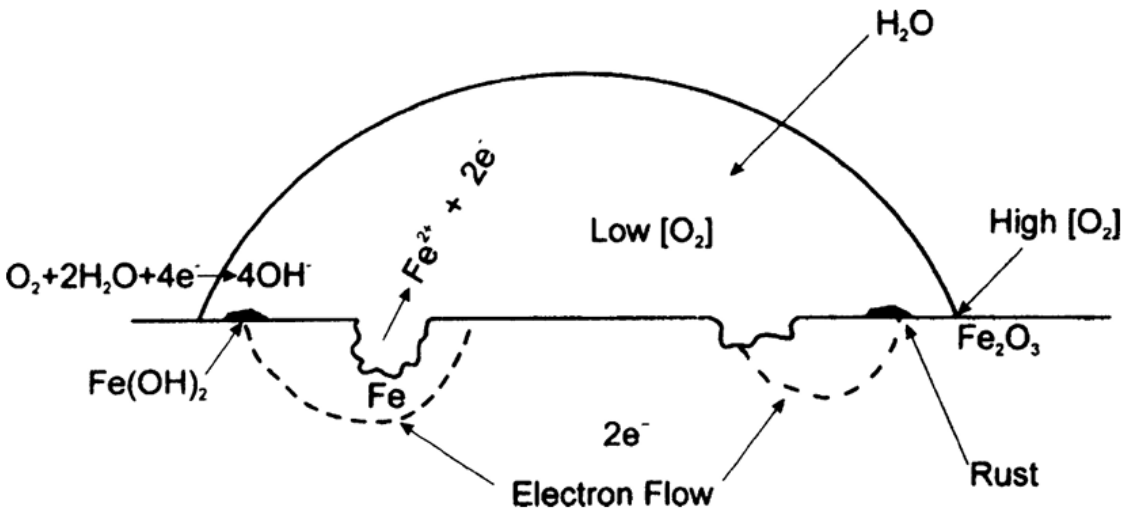
http://dx.doi.org/10.1002/jctb.7848

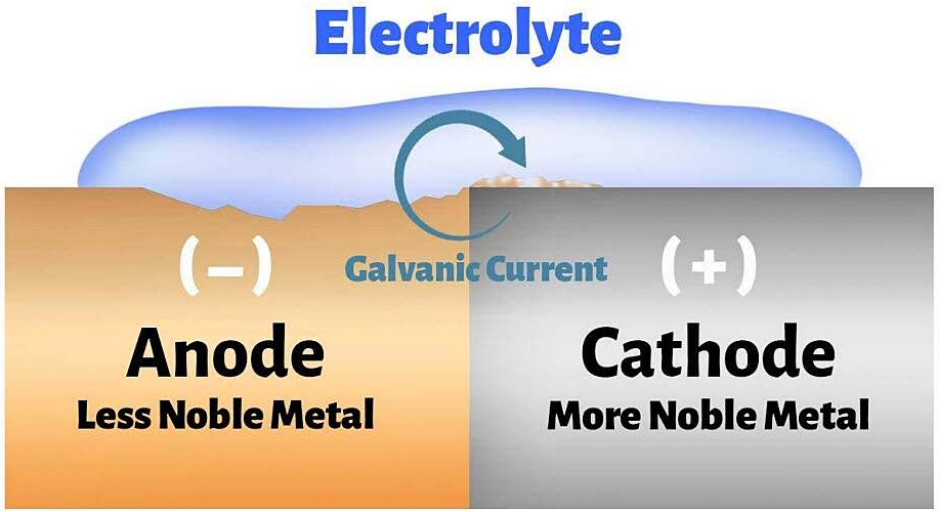
Types of Corrosion



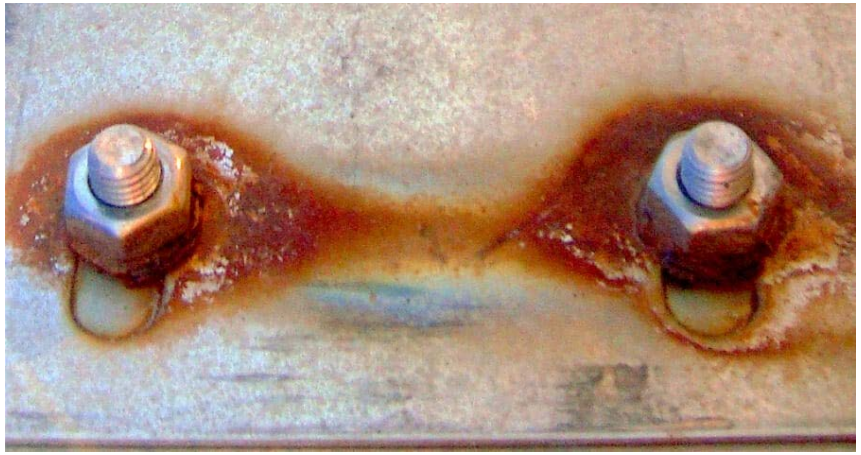
https://greenvci.com/types-of-corrosion/

Bimetallic Corrosion





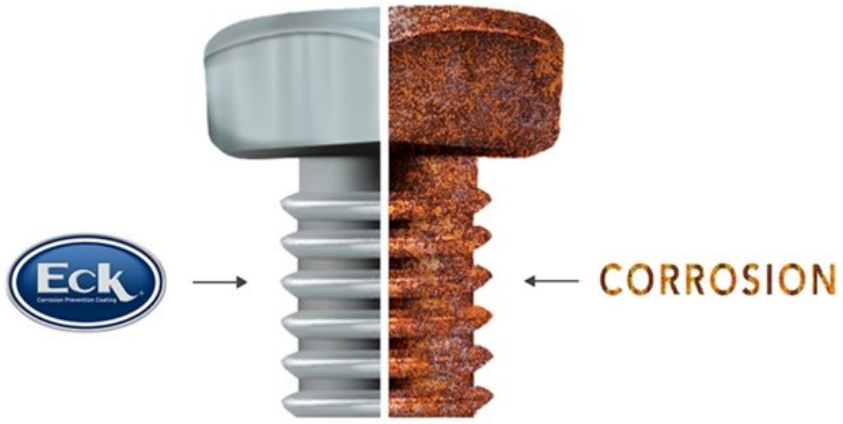
A gradient in O_2 concentration in the water drop makes the center portion of the iron anodic, where Fe → Fe^{+2} + 2e-, while the edge is cathodic and oxygen is reduced



https://sendcutsend.com/blog/how-to-avoid-galvanic-corrosion-on-your-laser-cut-parts/?srsltid=AfmBOopCm22llPRrj_bLXNtICYIeCYpW4kg_o33u-19t1wBBTMw5cWJw

Corrosion Protection

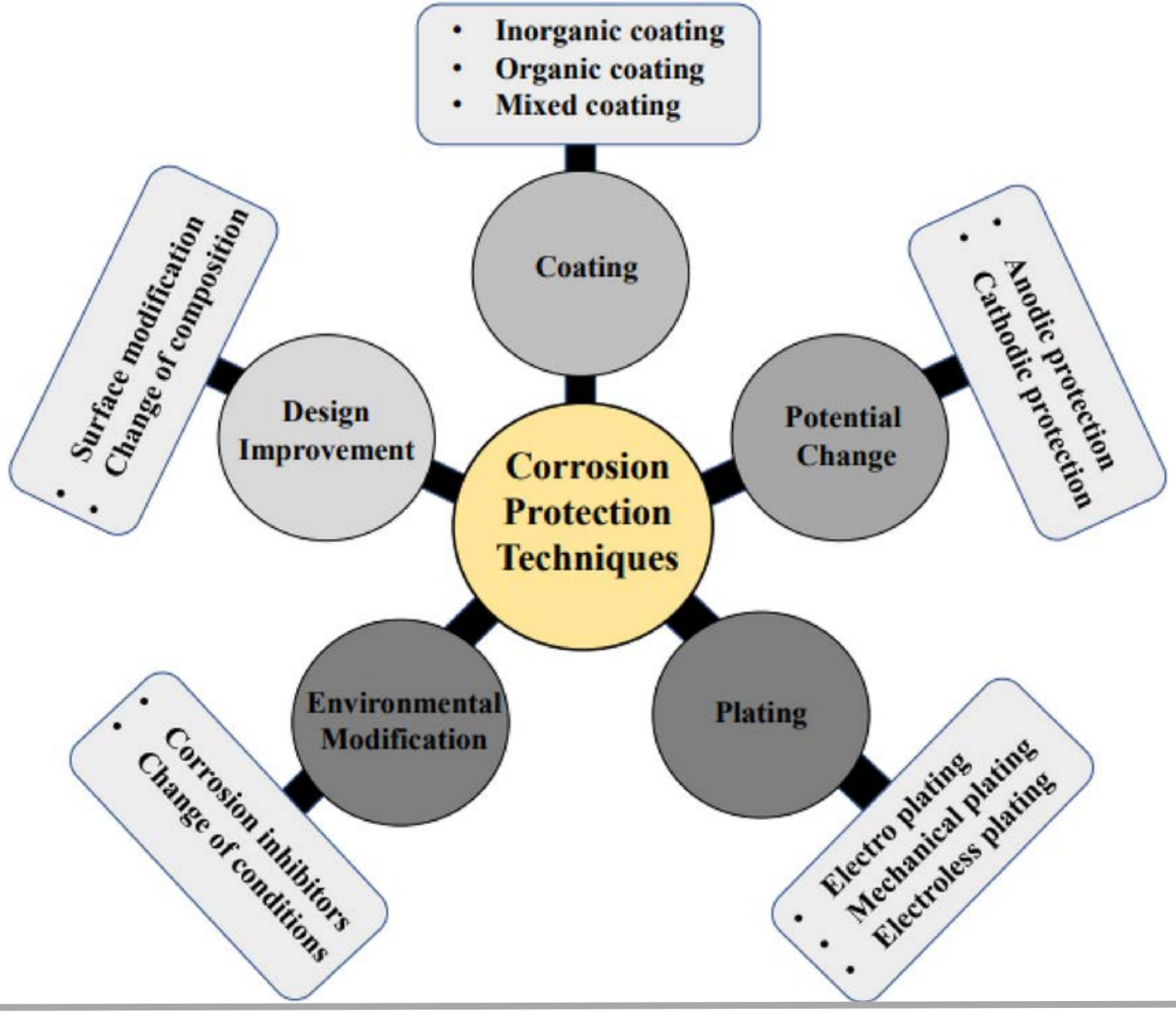
Corrosion protection means applying methods or materials to physically or chemically shield metals from corrosive environments.



ECK (Electrolysis, Corrosion Kontrol) is a patented, zinc-rich, petroleum-based coating that prevents dissimilar metal corrosion by acting as a barrier, sealing out moisture, and absorbing corrosive energy.

https://www.albertjagger.co.uk/our-products/adhesives-sealants-tapes/corrosion-prevention/eck-corrosion-prevention---tube

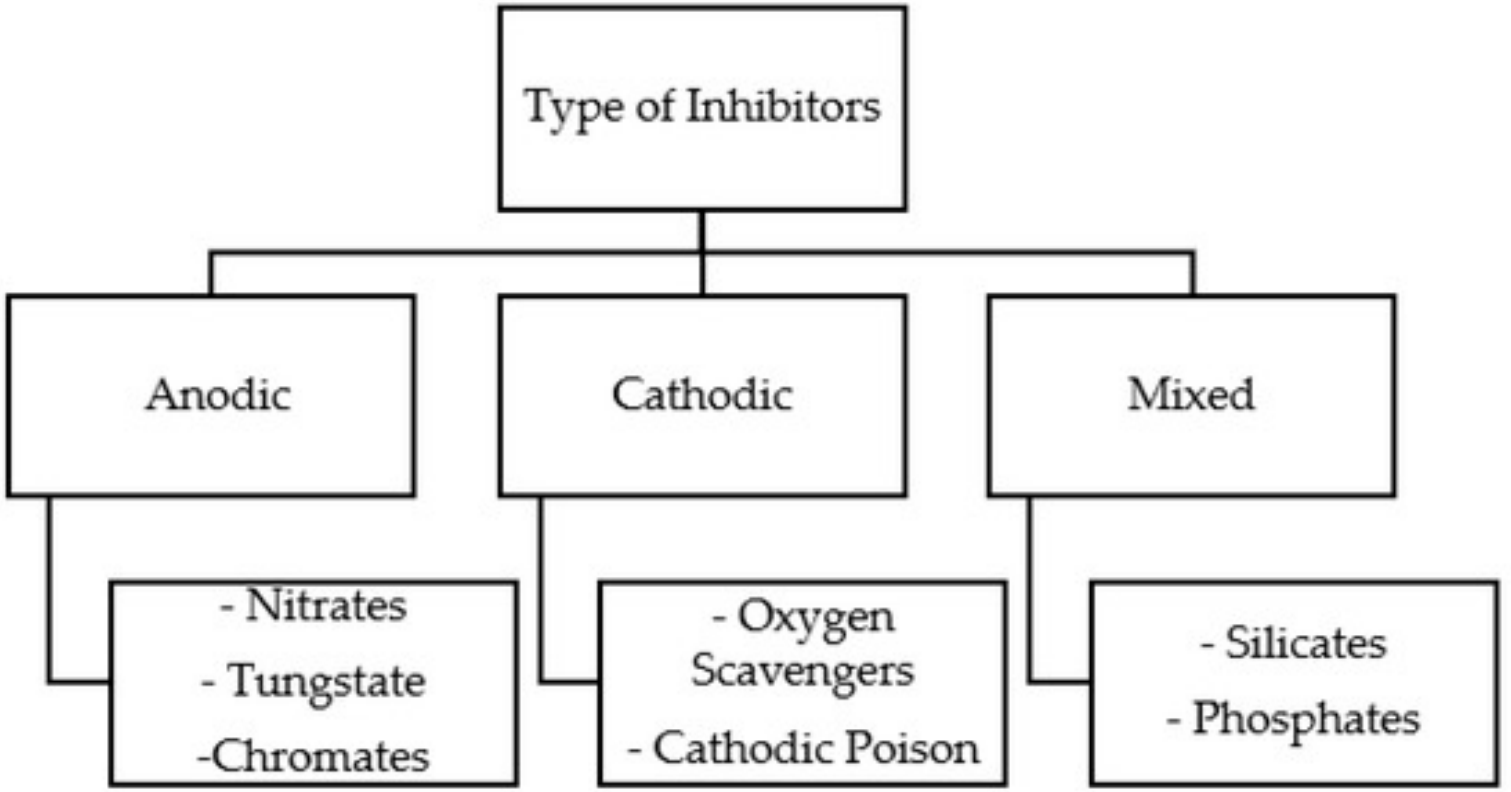
Types of Corrosion Protection



https://www.albertjagger.co.uk/our-products/adhesives-sealants-tapes/corrosion-prevention/eck-corrosion-prevention---tube

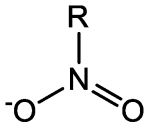
Corrosion Inhibition

Corrosion inhibitors are chemical substances added in small amounts to an environment to reduce corrosion. They usually form a thin protective film or alter electrochemical reactions.

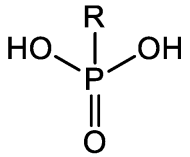


Corrosion Inhibition

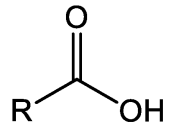
Organic Inhibitor Functionality:



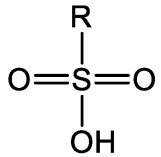
Nitrite



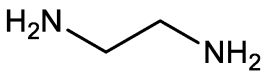
Phosphonic acid



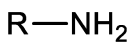
Carboxylic acid



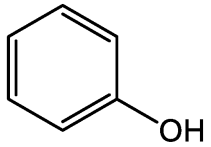
Sulfonic acid



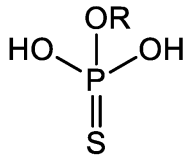
Ethylenediamine



Amines

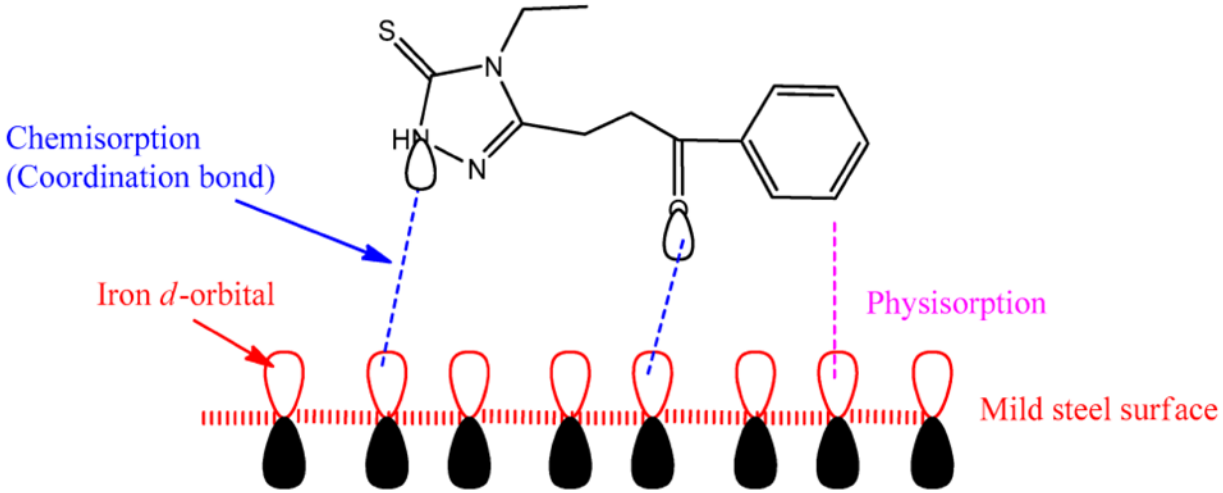


Phenol



Thiophosphoric acid

inhibition mechanism:



Organic corrosion inhibitors are compounds that are used to reduce or prevent corrosion by forming a protective film on metal surfaces

References

Book: *Applied Chemistry: A Textbook for Engineers and Technologists; Second Edition, by O. V. Roussak and H. D. Gesser*