The Process of Corrosion

Corrosion is the result of electrochemical reactions between materials and substances in a certain environment (Capeman, 2018).Corrosion happens through two processes, called oxidation and reduction. Oxidation is the transferring of electrons from one atom to the other (Capeman, 2018). Reduction is a chemical reaction in which an atom gains an electron from the reaction. When oxidized atoms are on a surface, they begin to damage the surface of the metal as it becomes unstable because of the metal experiencing reactions with the environment (Capeman, 2018). Within the two processes of corrosion, there are two different types. Corrosion can occur in the overall general area of the metal, known as generalized corrosion, or it can be heavily concentrated in one local spot, which is called localized corrosion (Frankel, 2008).

The process of generalized corrosion is rare because the rusting of the entire surface of one metal is unlikely. It leads to the thinning of the metal and in the end, deterioration (Frankel, 2008). Localized corrosion is more harmful and damaging to the metal. In this process, the attack of rusting happens in one single area and creates a ‘cavity’ within the metal (Frankel, 2008). Localized corrosion is difficult to prevent and slow down because the detection of the corrosion happens after the structure has been compromised and cracked. Out of the two types of corrosion, generalized corrosion is less common when compared to localized corrosion because it is unusual for an entire surface of a metal to be completely exposed and attacked by the specific acids that cause corrosion (Frankel, 2008).

Most of the time, a certain area or part is heavily weighted and affected by the acid which causes the corrosion to occur more in that area. Some metals resist corrosion when the process collides with oxygen. The metal creates a thin oxide film which prevents the corrosion to proceed (Corrosion Prevention, n.d.). The oxide wraps around the metal and creates a barrier, obstructing any other reaction with oxygen. If the oxide film becomes damaged because of stress, the metal will corrode heavily concentrated in that specific, vulnerable area (Corrosion Prevention, n.d.).

Most metals react to corrosion with oxygen, but not all. Sometimes, because the reaction is so slow, the corrosion isn’t noticeable (Venkateswaran, 2014). For such metals which are prone to rust and corrosion, non-metallic coatings such as paint and oil can assist in slowing down or preventing the process (Venkateswaran, 2014). However, most metals are easily oxidized and are subjects to corrosion because they tend to lose electrons to oxygen in the air and water (Capeman, 2018). As these oxygen atoms gain electrons, or ‘reduce’, they begin to form an oxide with the surface of the metal, which ultimately results in corrosion.