The corrosion suffered by mild-steel (MS) was mainly of a general type. Approximately 1.3 mm thick corrosion product was found to be deposited on the panels of MS exposed for twelve months.

Monthly corrosion rate of mild-steel was found in the range of 391 to 1815, 95 to 787, 151 to 1003 and 25 to 416 mg/sq.dm for industrial, urban, marine and rural environments respectively. Monthly corrosion rate of zinc was found in the range of 25 to 1147, 9 to 95, 15 to 119 and 7 to 59 mg/sq.dm for industrial, urban, marine and rural environments respectively. Monthly corrosion rate of aluminium was found in the range of 2.2 to 21.8, 1.1 to 7.9, 1.6 to 15.9 and 1.0 to 7.10 mg/sq.dm for industrial, urban, marine and rural environments respectively.

Monthly corrosion rate of mild-steel, zinc and aluminium was found to be higher in rainy months than that of winter and summer months at all study environments. The yearly corrosion rates of MS vary between 7607 to 18679, 1137 to 2438, 1904 to 3401 and 632 to 2549 mg/sq.dm for industrial, urban, marine and rural environments respectively. The yearly corrosion rate of Zn was found in the range of 301 to 621, 72 to 506, 143 to 653 and 64 to 551 mg/sq.dm for industrial, urban, marine and rural environments respectively. The yearly corrosion rates of Al vary between 19.8 to 46.1, 8.1 to 29.8, 14.9 to 39.8 and 8.6 to 22.9 mg/sq.dm for industrial, urban, marine and rural environments respectively.

The yearly corrosion rates of Cu vary between 2.83 to 4.04, 1.82 to 2.42, 2.21 to 2.98 and 1.18 to 1.83 mg/sq.dm for industrial, urban, marine and rural environments respectively. The yearly corrosion rate of Copper was found to be low compared to other metals in all stations.

The monthly corrosion rate ratio of MS:Zn was vary from 7 to 21, 5 to 13, 4 to 12 and 1 to 9 for industrial, urban, marine and rural environments. The monthly corrosion rate ratio of MS:Al was vary from 76 to 212, 64 to 163, 46 to 110 and 19 to 79 for industrial, urban, marine and rural environments. The monthly corrosion rate ratio of Zn:Al was vary from 5 to 17, 6 to 16, 4 to 20 and 4 to 19 for industrial, urban, marine and rural environments respectively.
The yearly corrosion rate ratio of MS:Zn was vary from 13 to 35, 4 to 18, 5 to 16 and 3 to 112 for industrial, urban, marine and rural environments. The yearly corrosion rate ratio of MS:Al was vary from 76 to 212, 70 to 132, 82 to 158 and 60 to 128 for industrial, urban, marine and rural environments. The yearly corrosion rate ratio of Zn:Al was vary from 5 to 17, 7 to 21, 6 to 20 and 7 to 28 for industrial, urban, marine and rural environments respectively.

The corrosion rate of aluminium was found to be very low as compared to MS and Zn due to the formation of a more protective oxide film on the surface. Thus, we found the resistivity towards the environment was in the increasing order as MS < Zn < Al < Cu. It can be says that aluminium and copper coated sheets would give better performance compared to MS or Zinc.

Monthly corrosion rate of MS indicates a close correlation with rainfall. The regression coefficient value of “r” was found as 0.81, 0.65, 0.94 and 0.92 for industrial, urban, marine and rural environments respectively. Monthly corrosion rate of Zn indicates a close correlationship with rainfall. The value of “r” was found as 0.62, 0.69 and 0.67 for industrial, urban and marine environments respectively.

Monthly corrosion rate of MS indicates a close correlation with number of rainy days. The regression coefficient value of “r” was found as 0.86 for marine environment. Monthly corrosion rate of Zn indicates a close correlation with number of rainy days. The value of “r” was found as 0.61, 0.69 and 0.67 for industrial, urban and marine environments respectively. The monthly corrosion rate of Al indicates a close correlation with number of rainy days. The value of “r” was found as 0.68 for marine environment.

Monthly corrosion rate of mild-steel has a weak correlation with minimum relative humidity (r = 0.19) for urban environment. Monthly corrosion rate of MS indicates a close correlation with minimum relative humidity. The value of ‘r’ was found as 0.63, 0.86 and 0.79 for industrial, marine and rural environments respectively.
The monthly corrosion rate of Zn indicates a weak correlation with minimum relative humidity \((r = 0.21)\) for industrial environment. Monthly corrosion rate of Zn indicates a close correlation with minimum relative humidity. The value of ‘r’ was found as 0.68, 0.72 and 0.90 for urban, marine and rural environments respectively.

The monthly corrosion rate of Al indicates a weak correlation with minimum relative humidity \((r = 0.35)\) for marine environment. Monthly corrosion rate of Zn indicates a close correlation with minimum relative humidity. The value of ‘r’ was found as 0.76, 0.79 and 0.76 for industrial, urban and rural environments respectively.

The monthly corrosion rate of MS indicates a positive correlation with sulphation rate. The value of ‘r’ was found as 0.54 and 0.64 for urban and rural environments. The monthly corrosion rate of zinc indicates weak correlation with sulphation rate. The value of ‘r’ was found as 0.31 and 0.43 for urban and rural environments respectively. The monthly corrosion rate of Al indicates correlation with sulphation rate. The value of ‘r’ was found as 0.17, 0.29, 0.11 and 0.46 for industrial, urban, marine and rural environments respectively.

The monthly corrosion rate of MS indicates a positive correlation with atmospheric salinity rate \((r = 0.51)\) for marine environment.

No correlation appeared to exit between corrosion rate of mild-steel, zinc and aluminium and Copper with temperature for industrial, urban, marine and rural environments.

Corrosion of metals controlled mainly by the number of rainy days and the amount rainfall in the first instance followed by the average relative humidity, sulphation rate and atmospheric salinity rate.
The corrosion of mild-steel under partly sheltered conditions is about one-third than that of suffered by fully outdoor condition. It is due to the reason that in partly sheltered conditions plates are protected from rain, sunlight and dust fall.

The plates exposed vertically suffer less corrosion than those exposed at an angle of 45°. The reason undoubtedly was being the retention of moisture and atmospheric particles for longer periods on a panel exposed at an angle of 45°.

To reduce the atmospheric corrosion, following steps may be taken as a preventive measure:

1) The most important method of minimizing atmospheric corrosion is by minimizing time of wetness.
2) In a good design, rain or dew should drain easily from surface and not be trapped in crevices between members or as ponds due to angles in structural members.
3) The surface finish can affect the time wetness; smooth surfaces are likely than texture surfaces to trap deposited pollutants and hence can have a lower time of wetness.
4) Removal of pollutant from the environment which are responsible for corrosion.
5) By addition of the other metal to the base metal to make the metal passive.
6) By applying coating between metal and corrosive environment like paint, metallic coating and greasing.
Air pollution:
Air consist some gases due to combustion of fuels, industries releases gases as a result there is a presence of foreign matter, in sufficient concentration, which may adversely affect the human-being, living organisms and deteriorate the material.

Anode:
It is an electrode at which oxidation reaction is taking place, reaction occurring at anode is:

\[ M(s) \rightarrow M^{n+} + ne^- \]

Atmospheric Corrosion:
Atmosphere Corrosion may be defined as the corrosion of materials exposed to the air and its pollutants rather than immersed in a liquid, it may be dry, damp and wet categories.

Cathode:
It is a electrode at which reduction reaction is taking place is called Cathode. Cathode reaction is:

\[ O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-_{(aq)} \]

Corrosion: The degradation of metals or materials by its environment.

Corrosion Fatigue:
Cracking that results from the combined action of a corrosive environment and repeated or alternating stress.

Corrosion potential:
The potential at which the rate of oxidation and rate of reduction are equal.

Crevice corrosion: Corrosion taking place in a crevice.

Critical Humidity: It is humidity level above which corrosion is in air increases rapidly.
**Condensation:**

The process of change of phase of material from vapour to liquid or solid state caused by decreasing temperature or by increasing pressure or both.

**Contaminant:** Unwanted material is usually harmful or of a nuisance value or both.

**Dry Oxidation:**

This takes places in the atmosphere with all metals that have a negative free energy of oxide formation.

**Damp Oxidation:**

It is characterized by the presence of a thin, invisible film of electrolyte solution on the metal surface.

**Dispersion:** A system consisting of particulate matter suspended in air or other gases.

**Dew point:**

The actual temperature at which condensation takes place is known as the dew point.

**Electrolyte:**

A substance that exists in water as ions; the resulting solution can carry an electrical current are called Electrolyte.

**Environment:**

The surroundings or conditions (physical, chemical, mechanical) in which a material exists are called Environment.

**Fatigue:**

A process of leading to fracture resulting from repeated stress cycles well below the normal tensile strength. Such failures start as tiny cracks which grow to cause total failure.

**Film:** It is a thin surface layer that may or may not be visible.

**Fog:** It is Visible aerosols are in which the dispersed phase is liquid.
Galvanic Corrosion:

When two dissimilar conducting materials in electrical contact with each other are exposed to an electrolyte, a current is called as galvanic current which flow from one to another galvanic corrosion is that part of the corrosion that occurs at the anodic member of such couple. The extent of galvanic corrosion is directly related to galvanic current by Faraday’s law.

Grain boundary:

A portion of a solid metal in which the atoms are arranged in an orderly pattern. The irregular junction of two adjacent grains is known as a grain boundary.

Inhibitor:

A substance which sharply reduces corrosion rate when added to water, acid or other liquid in small amounts.

Mist:

Mist means a light dispersion of minute water droplets suspended in the atmosphere producing a thin grayish veil over the landscape.

Noble Metal:

A metal which is not very reactive, e.g., Platinum, gold and silver and may be found naturally in metallic form on earth.

Oxidation:

Loss of electrons, as when a metal goes from the metallic state to the corroded state. Thus, when a metal reacts with oxygen, sulfur, etc., to form a compound such as oxide.

Particles: It is a small discrete mass of solid or liquid matter.

Passivator:

An inhibitor which changes the potential of a metal appreciably to a more cathodic or noble value (as when chromate is added to water).
**Passivity:** The phenomenon of an active metal becoming passive.

**Patina:**
A green coating which slowly develops on copper and some copper alloys consisting mainly of copper sulfates, and carbonates after long term exposure to the atmosphere.

**Pitting:** It is highly localized corrosion resulting in deep penetration at only a few spots.

**Polarization:** Change of potential caused by current flow.

**Relative Humidity:**
It is the ratio (%) of the amount of moisture in the air compared to what it could hold if saturated at the temperature involved.

**Rusting:**
Corrosion of iron or an iron-base alloy to form a reddish-brown product which is primarily hydrated ferric oxide.

**Scale:** An accumulation of corrosion product on a surface.

**Smog:** It is a mixture of smoke and fog.

**Smoke:**
They are small gas-borne particles resulting from incomplete combustion, consisting predominantly of carbon and other combustible material.

**Tarnish:** It is surface discoloration of a metal surface caused by a thin film of corrosion product.

**Time of wetness:**
The period during which a metallic surface is covered by adoptive or liquid film of electrolyte enabling atmospheric corrosion to product. is called time of wetness (TOW).