# "A Study of Acid Rain Causes and Prevention Technique"

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**Abstract:** *Acid rain is mixture of deposited material, wet and dry which comes from the atmospheric contents, which contains more than normal level of sulfuric and nitric acid. In simple words, rain which is acidic in nature due to the presence of certain pollutants in air of this type. It can be in the form of rain, snow, sleet or fog that has been made acidic because of presence of sulfur dioxide (SO2) and nitrogen oxide (NOx) of their acid form. The oxide form mostly comes from fossil fuel burning and industrial combustions.*

***Key Words***: **Acid rain, FGD, causes, prevention, methods**

## 1. INTRODUCTION

Normal rain water is slightly acidic in nature which has pH range between 5.3 to 6.0 because of carbon dioxide and water present in air forms carbonic acid by reacting with each other. The carbonic acid is weak acid, when the pH level of rain water decreases due to mixing of such a pollutants. Acid rain shows the significant effect on the environment and living organisms. The aquatic plants and animals require pH range about 4.8 to 5.5 to survive. If the pH range falls below this range i.e. more acidic, it becomes difficult to survive in the nature to the aquatic life. At pH less than 5, most fish eggs cannot hatch. Lower pH can leads to death of adult fish. The acid rain causes vulnerable diseases and insect by destroying leaves of plants. The pH range due to acid rain of soil also effects on soil chemistry and biology. High soil acidity also denatures enzymes for soil microbes. While the hydrogen ion of acid rain also leaches away the minerals and nutrients such as magnesium and calcium. The acid rain does not affect directly to the human health because the acid rain water is too dilute and therefore does not show serious effect. Intensified levels of acid which deposited in dry form in air can shows heart problems such as asthma. There are some solutions to prevent acid rain or to decrease effect of acid rain such as cleaning up exhaust pipes and smoke slacks, restoring the damaged environments and some alternative energy source and the individual, national and international actions.

## 1.1 Causes of acid rain:

Acid rain is resulted when nitrogen oxides (NOx) and sulfur dioxide (SO2), the oxide forms of nitrogen and sulfur react with water and atmospheric oxygen to form sulfuric and nitric acid. This is then mix with rain water before falling on ground. While small portion of NOx and SO2 that forms acid rain is from natural sources such as volcanoes, which mostly gives after burning of fossil fuel. Burning of fossil fuel for production of electricity, The So2 and NOx is mostly comes from electric power generator, Vehicle and heavy equipments. Oil refineries and other industries the pH scale showing result less than 7 are acidic in nature. The neutral water shows pH 7. While our regular water show pH less than 7 i.e. slightly acidic. The normal rain water shows pH about 5.6 while acid rain shows pH about 4.3. Acid rain causes damage to environment in significant amount. It does not affect only living organisms but the stone statues and building starts to dissolve when comes in contact to acid rain. It even shows effect on paint on cars. Acid rain also called as "Acid Precipitation" or "Acid Deposition". It weakens the trees and susceptibility to damage from other stress. Acid rain also depletes soil of plant nutrition and buffers.

## 2. Methods of prevention of acid rain:

**FGD (Flue Gas Desulfurization)**

Coal- fired power plant may use as SO2 scrubber to meat. The requirement of phase –II of the acid rain SO2 reduction program. Various technologies exists to remove SO2 from flue gas produced by electricity generating plants. This review contains the information about the elements concentration and distribution in coal; bottom ash and fly ash of coal- fired power plant in Netherland were studied. All large coal-fired power plants in Netherland are equipped with wet flue gas desulfurization (FGD) plant. It appears that 90% of total particulate matter in the FGD plant was removed, but fly dust emitted contains 40% fly ash and 10% gypsum particles, 50% of the fly dust emitted originates in evaporated droplets. The heavy metals are introduced in the FGD plants by the flue gases, but primarily by the limestone. The gaseous elements are introduced by the flue gases. The heavy metals leave the FGD through media which decreases important of gypsum, sludge, and waste water effluents.

**Liming Process:**

The addition of calcium carbonate to catchments or water courses i.e. liming is widely used to mitigate freshwater acidification. The liming increased the abundance. Liming means the addition of the calcium carbonates to the fresh water body is intended to raise the pH of river and lakes

and occurs through different methods. Limestone can be added directly in the bulk into the river or distributed over river catchments (catchment liming). The overall liming of fresh water shows the increased in abundance of fish, however if decreased deposition engenders recovery independently, liming may be shows the risk of negative impacts on fish and aquatic microbes.

**Powder Coating:**

The metals such as iron show the rusting due to acid rain. The corrosion of iron due to acid rain can be decrease or eliminated by several methods such as rust resistant alloy like weathering steel, stainless steel or galvanization method which includes surface coating with the external layer of metallic zinc, bluing means immersing the steel parts into a solution of potassium nitrate, sodium hydroxide and water. Organic coating such as painting to avoid the rust or powder coating which includes application of dry powder on metal surface, later the object is heated to turn the powder into a thin film and thus metal is protected, The powder used like acyclic polyester, nylon, urethane.

## 3. CONCLUSIONS

We had studied about the acid rain, about its causes of formation and the effect of acid rain on living micro-organisms, water bodies and soil chemistry. Acid rain also causes rusting of iron due to corrosion. The oxides of nitrogen and sulfur react with water and atmospheric oxygen to form nitric acid and sulfuric acid respectively, which when mix with rain water before falling on ground. Some techniques like FGD, liming process and powder coating to prevent the iron from corrosion.

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