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Environmental Issue: A Review on Acid Rain

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ABSTRACT: This reviewed paper aims to aware people about hazardous effects of acid rain.. It has been estimated that a thunderstorm transports the atmospheric pollutants more than 1000 km away from the point of origin within 2-4 days .About 70% of acidity of acid rain is due to oxide of sulphur and 30% due to nitrogen oxide emission. Acid rain is able to corrode buildings, monuments, statues, bridges, fences and railings etc. Acid dissolves in the oceans and lakes affects the population of water bodies. It affects flora and fauna reducing local biodiversity. Controlling acid rain is essentially an issue of international bargaining and cooperation because emitters and recipients are different. Hope this review paper will help to know the harmful effects of acid rain.

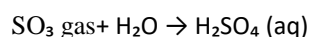
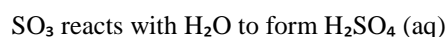
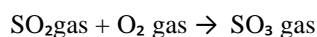
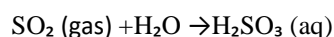
KEYWORDS: acid rain, pollution, sulphuric acid, buildings, Biodiversity

I. INTRODUCTION

Environment is harmed by anthropogenic activities. Natural disasters, melting of glaciers ozone depletion are some burning topics. Environmental issues like Climatechange, Global warming etc are discussed on papers in AC Rooms but not implemented on ground. Acid rain is rainfall with oxides of sulphur and nitrogen. Acid rain has a pH of less than 5.6. It travels through boundaries and cause damage in other countries. Acid rain can be explained in many types that acids deposit on earth from atmosphere. Acid rain can be more precisely called acid collection. It is of two types Wet and Dry. Wet collection of acidic rain is fog and snow. It affects flora and fauna. The dry collection is acidic gases and particles. Nearly half of the acid in the sky falls back to earth through dry collection. . Acid rain gets its name from the dissolving of sulphur oxides and nitrogen oxides in clouds and rain droplets causing the resulting sulphuric and nitric acids to fall as acid rain. The wind takes these acidic particles and collection to various surfaces of flora and fauna and also like houses, temples, buildings and vehicles. By rainstorm dry collected gases can also be washed from flora and buildings. The pure water of river and streams is contaminated and becomes acidic. Acid rain is very dangerous to biodiversity.

Chemistry of Acid Rain

The dilute combination of sulphuric acid and nitric acid makes the rain acidic. Sulphurous acid (H_2SO_3) and nitrous acid (HNO_2) are less stable and are present in very low amounts. Atmospheric sulphur which is discharged reacts with oxygen in atmosphere and form sulphur dioxide. Sulphuric acid is formed by reaction of sulphur dioxide with water. Acid rain also contains sulphurous acid. Oxidation of sulphur dioxide forms sulphur tri oxide. Nitrogen combines with atmospheric oxygen to form nitrogen dioxide. Nitrogen dioxide reacts with water to form nitrous acid and nitric acid.

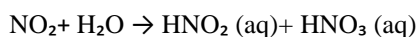
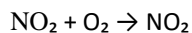


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Effect on flora and fauna

Acid rain blocks the stomata on the surface of leaf are clogged by acid rain. Gaseous exchange through stomata is hindered. When proper gaseous exchange is affected, it will cause malfunction in development of plants. Flora becomes vulnerable to pathogens. It causes heavy damages to plants and trees culminating to death. When ecosystem and food chain is affected survival of interdependent animal and plants become difficult and due to lack of food they die. All living organisms are interdependent on each other. Plants, animals and birds which depend on water for food, also started dying.

Effect on water bodies

Reproduction of plants and trees is affected by water pollution. Due to acid rain aluminium, lead, mercury is heavy metals present in soil flow through water current to nearby water bodies causing pollution in water. Levels of oxygen are also depleted due to chemicals present in polluted water bodies which causes aquatic flora and fauna respire properly. Due to unavailability of proper oxygen aquatic life die due to suffocation and poisoning caused by the presence of these chemicals.

Effect on soil

Soil contains many detrimental heavy minerals like aluminium and mercury. These heavy metals cannot be taken by plants and trees and are thus harmless. When they come in contact with acid rain, undergo chemical reactions with the acids. As a result compound of lead, aluminium and mercury are produced. Plants and trees can easily absorb these compounds such elements which are extremely harmful to living forms ultimately affecting the entire food chain. These chemicals not only harm the flora, but also the animals that feed on them.

Biomagnifications

In a food chain birds that eat on fish that are affected by harmful heavy metals (lead, mercury, and aluminium) accumulate these metals in their body. These metals in a food chain are then passed to animals that feed on birds having heavy metals in their body. In this way metals get introduced to each trophic level of the food chain. In each trophic level, the amount of chemical gets multiplied. This is known as biomagnifications. Due to multiplication it gets difficult to get rid of biomagnifications in a food chain.

Effect on human health

Acid rain is very harmful for health. Drinking water contaminated by heavy metals like aluminium, mercury and lead is very fatal for human beings. Acids are liquid in nature and are very small and fine particles. If present in air, they become harmful for lungs. They can even lead cancer if present in air. If contaminated (mercury) flora or fauna is eaten as sea food, they are hazardous to health.

Effect on buildings and monuments

Monuments were not built according to pollution parameters in atmosphere as the air was pure before industrial revolution. Acid rain is able to damage heritage buildings, monuments, temples etc. that costs the world about millions

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of dollars per annum. Reaction of acid rain with calcium carbonate (CaCO_3) form soluble calcium hydrogen carbonate or calcium bicarbonate



Lotus temple and Tajmahal in India , Leshan Giant Stute in Mount Emei (China), St. Paul's , Cathedral in London, and statue of liberty in New York are getting destroyed by acid rain.

Acid rain doesn't affect the area where there is pollution but it is the trans-boundary pollutant that travels across boundaries and cause damage in other countries. USA, China, Japan etc are high emitters and India, Developing countries and Canada high recipient. It has been estimated that a thunderstorm transports the atmospheric pollutants more than thousand kilometres away from the point of their origin within 2-4 days.

II. CONCLUSION

Acid rain caused due to industrial revolution in 1872 is very harmful to plants, animals, vehicles and buildings. If it is not controlled in time it can destroy the flora and fauna on earth. Acid rain has become an international issue of its serious and definite danger to life on earth. Many international treaties have been signed i.e. the sulphur emission reduction protocol and the convention on long range trans-boundary air pollution. There is solution to every problem, and acid rain is no exception. Damage can be largely avoided if pollution control technologies such as use of flue gas scrubbers in coal burning power plants to remove sulphur containing gases are adopted. Other way to reduce acid rain is to produce energy without using fossil fuels. People can use renewable energy sources like wind power and solar energy.

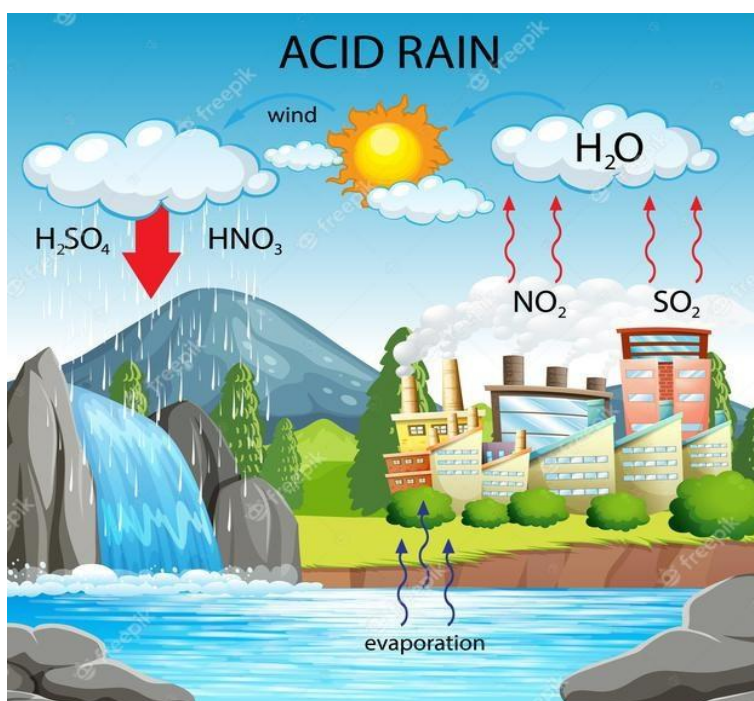


Fig.1 Precipitation chemistry

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REFERENCES

1. Aldhous, P. (1995). Global heat breeds super aphids , New Scientist P17
2. CSK Mishra, JW Kim, Amita Saxena 2006 -Environmental Issues And Options . Daya Publishing House, Delhi.
3. Essortment Home Science And Technology Net
4. Gene. E. Likens, Wayne Davis , Lori Zaikowski, Stephen C Nodvin Jan, 2, 2010. Encyclopaedia Of The Earth Journal
5. Gene. E. Likens and Richard T Holmes 2016. Discovery of Acid Rain.Environmental Studies p.4 Yale University Press Blog
6. Kalpana Kumari -2009, buzzle.com
7. Sondhi ,GS (2000) . Fundamental concepts of environmental chemistry, Narasa Publishing House, New Delhi
8. www.epa.gov>acid rain>