

Acid Rain

What is Acid Rain?

Acid rain refers to rain or dust that has higher than normal amounts of nitric and sulfuric acids. These harmful acids come largely from factories that burn fossil fuels for power, such as coal. The toxins are released into the air from smoke stacks and the wind can blow them over hundreds of miles.



Factories that burn fossil fuels for power release toxins into the air that cause acid rain.

Harmful Effects

- **Harms Forests:** Acid rain depletes nutrients from the soil such as calcium, magnesium, potassium, and sodium. It also creates a chemical reaction that increases toxic metals in the soil such as aluminum, mercury, and lead. This change in the soil causes damage or death to trees.
- **Damages Crops:** Acid rain damages the protective wax on vegetable leaves such as radishes, beets, and carrots. This allows acid to get into the leaves, which kills the plant.
- **Destroys Lakes and Streams:** Acid rain changes the pH level of water. This causes plankton and insects to decline. It also releases toxic metals from the lake bottom which damages eggs, embryos, and mature fish.
- **Ruins Buildings and Statues:** Acid rain causes the limestone in buildings and statues to dissolve and crumble.
- **Human Health Risks:** Sulfur dioxide and nitrogen oxides are the pollutants that cause acid rain. When released in the air, these gases form particles that can be inhaled deep into people's lungs. This can lead to heart and lung disorders such as asthma and bronchitis.

Interesting Facts

- The pH scale measures acidity. The scale ranges from 0 to 14. The lower the pH number the more acidic the substance.
- Sulfur is necessary for plants and animals to live but is poisonous in large amounts.
- The pollutants responsible for acid rain can come from natural sources such as volcanic emissions and ocean spray.
- Acid rain causes steel bridges, vehicles, and other metal structures to corrode or rust.
- Acid rain is also called acid deposition.
- The chemist Robert Angus Smith, was the first to report about the dangers of acid rain in 1872 in his book *Air and Rain: the Beginnings of Chemical Climatology*.

Solutions

- **Alternative Energy Sources:** Instead of using coal, which releases toxins that cause acid rain, other energy sources can be used. For example, nuclear power, hydroelectric, wind, solar, and geothermal.
- **Scrubbers:** Install scrubbers in factories. Scrubbers treat the exhaust to remove toxins that cause acid rain.
- **Electrostatic Precipitators (ESP):** Install ESPs in factories. ESPs are emissions control units that trap and remove harmful dust particles.
- **Baghouses:** Install baghouses in factories. Baghouses are large filtration systems that remove particles to prevent coal ash from being released into the air.
- **Regulations:** Establish and enforce laws that control emissions.

Scrubbers

An examination of a solution that will reduce the toxins that cause acid rain.

Advantages	Disadvantages
Remove 95% of the sulfur oxides.	Not all scrubbers remove nitrogen oxides.
Reduce the toxins that cause acid rain, which helps to preserve lakes, forests, crops, and buildings.	Wet scrubbers produce a sludge that can contaminate ground water if not safely stored.
Reduce the risks to human health.	Can be expensive to install at an existing factory.