

The effect of releasing gaseous acids into the atmosphere as a result of modern I...



The modern lifestyle fifty years ago required a lower amount of electricity as the only electric needed was for lights. Fresh foods were purchased on a daily basis and were used immediately so there was no requirement for fridges.

There was no central heating to heat homes, coal fires were used and sweeping brushes were used instead of vacuum cleaners. No electrical devices such as microwaves and no hair devices were available.

Transport fifty years ago was a lot less than in modern lifestyles as there would have only been one car per street as opposed to two cars per household today.

The modern lifestyle has many more cars, aeroplanes, vans and lorries in daily use than fifty years ago.

As a result of this we required a lot less electricity and transport fifty years ago, which are the two most damaging factors to the environment today, in the modern lifestyle.

Another large factor is the internal combustion engine. As when any type of fossil fuel is burned, in factories, power stations and homes, they produce lots of different gaseous acids that are harmful to the environment, such as sulphur dioxide (SO₂) and nitrogen oxide (NO_x).

The effect of releasing gaseous acids into the atmosphere, as a result of modern lifestyles, results in Acid Rain and more serious Global Warming.

The gaseous acids released into the atmosphere are blown into the sky. They react with tiny droplets of water in clouds to form sulphuric and nitric acids, which cause rain, snow, sleet, hail, fog and mist to become acidic, known as acid precipitation. It can also be deposited by blowing around in the wind.

The human modern lifestyle has attributed to this.

One main feature of acid rain is that it erodes buildings built from limestone, a form of calcium carbonate and marble.

The starting components of acid rain are sulphur and oxygen, which produce sulphur dioxide (SO_2). When sulphur dioxide reacts with air ($\text{SO}_2 + \text{O}_2$) it produces sulphur trioxide (SO_3). Sulphur trioxide then reacts with water to produce sulphuric acid ($\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$). If nitrogen dioxide is present in the atmosphere, the reaction is speeded up, catalyst.

Oxides of nitrogen produced by car exhausts, occurs when nitrogen (N_2) and oxygen react together at very high temperatures, such as a power station or an internal combustion engine. This produces nitrogen monoxide ($\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$). If nitrogen monoxide reacts with air it produces nitrogen dioxide ($2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$). When nitrogen dioxide reacts with water, nitric acid is produced ($\text{NO}_2 + \text{H}_2\text{O} \rightarrow 2\text{HNO}_3$).

Acid rain has serious effects on living organisms such as humans through poor air quality. Sulphur dioxide and nitrous oxides create breathing problems such as asthma and coughs.

Trees and soil suffer one of the serious impacts of acid rain as hydrogen ions

leech essential nutrients needed by plants and trees to survive, as nutrients
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go deep into subsoil so the roots can not reach them. With acid rain falling onto the outside of leaves, it makes them drop onto the soil and acidify the ground.

Soil can sometimes help to stop the effects of acid rain as soil, which is deep in lime or alkaline substances, can neutralise the acid in the water seeping through it. However soils that are sandy do not neutralise therefore the acid will eventually end up in rivers.

Acid rain also affects rivers and lakes, as the acidity levels go up, the pH level falls. With the pH of water below 4.5 most fish will die, this will have a detrimental effect on wildlife as if the fish die, the birds that feed on the fish will also die.

Acid rain is a global issue and 26 countries have signed an agreement to control and reduce emissions released into the atmosphere. Things are getting better as there are restrictions on power stations where the acid content is removed and new cars are all fitted with catalyst converters.

Acid Rain Forming Emissions Fall Sharply, EPA Reports:

“(11/16/07) For the first time ever, sulphur dioxide (SO₂) emissions from the power sector fell below 10 million tons as reported by the U. S.

Environmental Protection Agency’s Acid Rain Program and Related Programs 2006 Progress Report. 2006 marks the 12th year of what is widely hailed as one of the most successful environmental programs in U. S. history.”

(Yosemite 16/11/07)

“ In 2006, annual SO₂ emissions from acid rain program electric power generation sources fell sharply, with reductions of 830, 000 tons from 2005 levels and an overall reduction of 40 percent from 1990 levels. NO_x emissions were down by over 3 million tons since 1990 and had decreased to nearly half the level anticipated without the Acid Rain Program. These reductions have led to a significant decrease in acid deposition, resulting in improved water quality in U. S. lakes and streams. Reduced formation of fine particles, improved air quality and human health related benefits are all results from the reduction of these emissions.” (Yosemite 16/11/07)