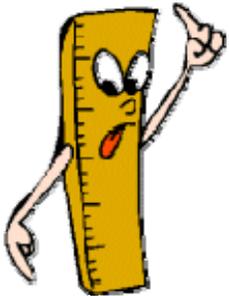


# Acid Rain

## WHAT IS ACID RAIN?

Acid gases are produced when fossil fuels like coal and oil are burned in power stations, factories and in our own homes. Most of these acid gases are blown into the sky, and when they mix with the clouds it can cause rain - or snow, sleet, fog, mist or hail - to become more acidic.

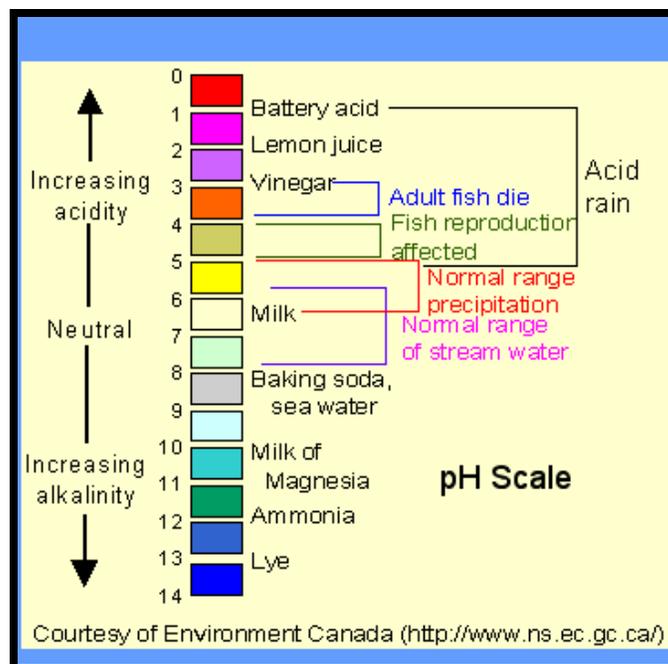


## HOW DO WE MEASURE ACIDITY?

There is a special scale called the pH scale that measures the strength of acids and alkalis on a scale of 1-14. A low pH number means something is acid. A high number means something is alkali. A substance with the pH of 7 is neutral (see diagram below).

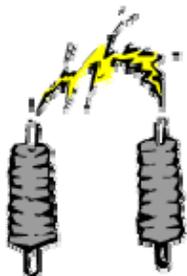
Acidity can be tested using litmus paper. If the litmus paper turns red, then the substance is an acid; if it turns blue, then the substance is a base.

Usually rain is little acidic, and has pH of about 5.5, if the pH of rainfall is less than 5.5, then the rain is probably polluted by acid gases.



The opposites of acids are alkalis; for example, toothpaste and baking powder are both alkalis. Strong alkalis can also be dangerous, such as ammonia and bleach. Lemon juice, vinegar and cola are all acidic. Rain is naturally acidic, but acid gases make it even more acidic, sometimes as acid as lemon! Nature can also produce acid gases, such as volcanoes. When they erupt, the smoke that comes out of the crater is also full of acid gases.

### WHAT ARE THE MAIN GASES THAT CAUSE ACID RAIN?



When we burn fuels, chemicals called 'sulphur' and 'nitrogen' are released into the air. Once in the air, they undergo a series of chemical reactions with water to become sulphur dioxide and 'nitrogen oxides', both which can be very dangerous for plants, animals and people. Most of the 'sulphur' comes from power stations, which make electricity. Most of the 'nitrogen oxides' come from car and truck exhausts.

### A PROBLEM ALL OVER THE WORLD

Air pollution can be carried over long distances. When acid gases are released, they move high into the atmosphere and are pushed by strong winds towards other countries. In the USA, the winds blow the air pollution to certain areas in Canada. In other parts of the world, acid rain in Sweden is caused by air pollution in Britain and other countries of Europe. The pollution produced in Britain ends up mostly in Scandinavia/

### THE EFFECTS OF ACID RAIN

- \* takes away important minerals from the leaves and the soil.
- \* Can acidify a lake, killing off organisms that cannot survive in such an environment
- \* You can recognize a lake where the organisms have been killed off by acid rain - it looks very clean and crystal clear because the tiny plants and other organisms have mostly died.





- \* Acid rain can also ruin buildings because the acid eats into metal and stone.
- \* It also damages stained glass and plastics.
- \* Some types of building materials are softer than others, and it is the softer ones which are most affected by acid rain.
- \* In many places in the world, ancient and famous buildings and monuments are affected by acid rain.
- \* Buildings are naturally eroded by rain, wind, frost and the sun, but when acidic gases are present, it speeds up the erosion.

\* For example, the Statue of Liberty in New York City has had to be restored because of acid rain damage.



**Directions:** Please complete the following questions on separate paper.

1. Describe the pH differences between an acid and a base.
2. What is the pH of lemon juice? ...of vinegar? Which one is potentially more harmful? How do you know?
3. What is another name that describes bases?
4. Why is lye considered to be a dangerous base?
5. Describe how rain becomes acidic.
6. What are the gases that are involved in the formation of acid rain?
7. Why is acid rain considered a world problem?
8. List three harmful effects of acid rain.