

WorksheetCloud: MEMORANDUM

Grade 9

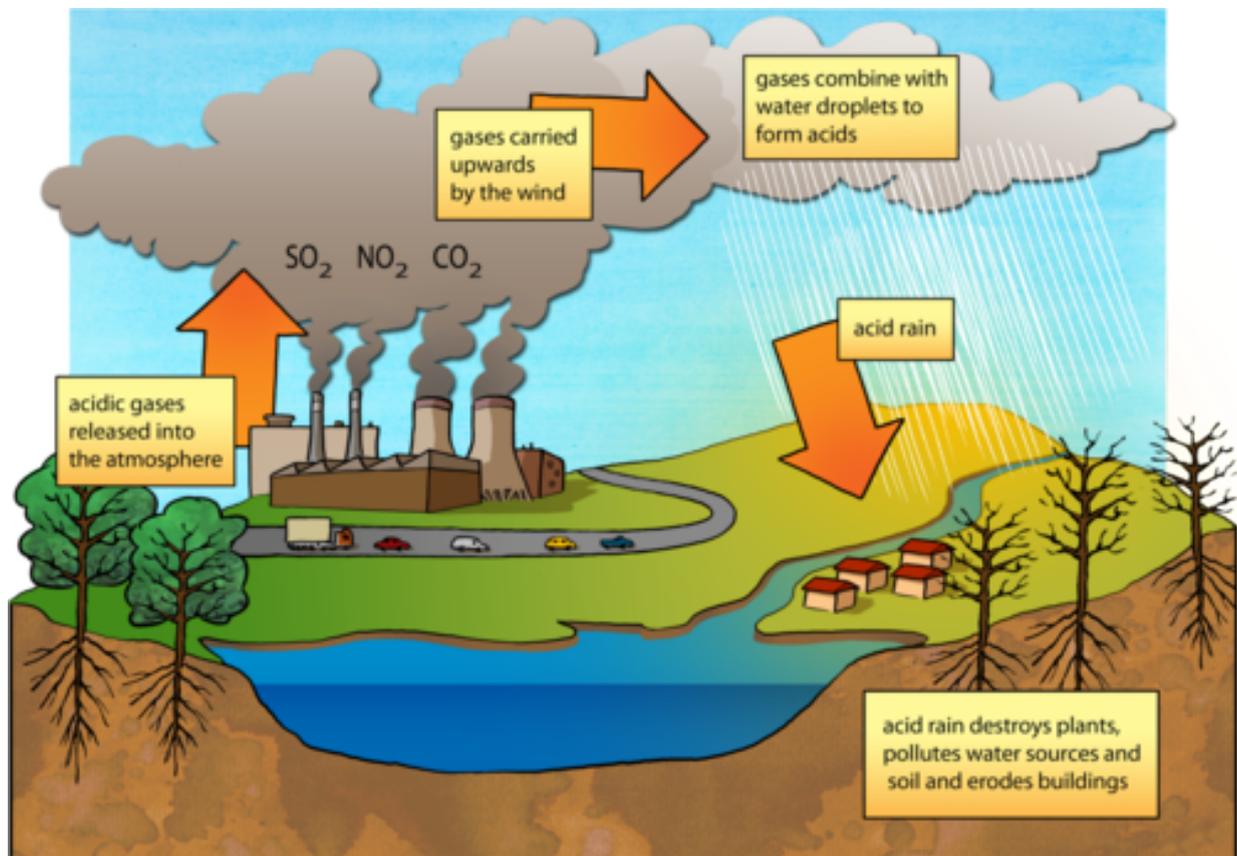
Subject: Natural Sciences

Topic: Acids and Bases: Non-metal oxides and water

WHAT IS ACID RAIN?

INSTRUCTIONS:

1. Study the diagram showing how acid rain forms.
2. Do some extra reading and research about acid rain.
3. Answer the questions about acid rain.



QUESTIONS:

Which three gases are shown in the diagram that contribute to the formation of acid rain? Write their names and formulae.

They are sulfur dioxide (SO₂), carbon dioxide (CO₂) and nitrogen dioxide (NO₂).

What are some of the sources of these gases? You can do some extra reading about this to help you answer this question.

The main sources of these gases which contribute to acid rain are from human activity, such as electricity generation in fossil fuel power plants (especially coal), factories emitting smoke and the exhaust fumes from motor vehicles. Acid rain can also occur due to natural phenomena, such as volcanoes which emit sulfur dioxide into the atmosphere. Some processes in the ocean and in wetlands also produce the gases which form acids.

Write the equations for how two of these gases which you have learnt about react with the water in the atmosphere to form acids.



What are the names of these two acids?

Sulphurous acid and carbonic acid.

What are some of the environmental impacts of acid rain? Study the diagram for some clues and do some extra reading.

The impacts include:

- **damage of plant life, both wilderness areas and also crops, depending on where the rain falls**
- **the rain leaches into soil and makes it more acidic; this kills microorganisms living in the soil, damages plants further by contaminating soil water**
- **the rain can fall into various water sources and also run off into water sources such as rivers, lakes and dams; this causes the water to become more acidic; aquatic animals and plants can die; human water sources become too acidic as well**

Acid rain can also damage buildings as it 'eats away' the stone. What property of acids allow it to do this?

Acids are corrosive and so they can corrode surfaces over time.

Factories used to have quite short funnels to let out the smoke, but it was found that this caused many problems in the local towns and cities near the factory as the gases would combine with water in the immediate environment to cause acid rain.

Factories then started to build much higher smoke funnels so that the smoke was let out high enough to be blown further away. Do you think this is an efficient way to help reduce acid rain? Explain your answer.

Learners need to justify their answers. They may say that it helps the local environment as the gases are carried further away and therefore do not pollute the town or city that the factory is in or near. But this does not do anything to minimize the acid rain that could potentially form as the same amount of gases are still emitted; they are just carried further away. The acid rain therefore can still form and fall on the vegetation and areas outside of the towns and cities.

Do some research to find out about the possible ways to prevent or minimize the formation of acid rain. Write a paragraph to summarize these methods below.

There are several solutions to minimizing the formation of acid rain. For example, coal-powered stations can use filters and other processes in their smoke towers to remove sulfur gases before the smoke is released into the atmosphere. Countries can take bigger steps by signing treaties to reduce their sulfur and other greenhouse gas emissions. The move towards using renewable energy sources will also help to reduce the reliance on coal and other fossil fuels, thereby reducing the emission of acid-producing gases into the atmosphere.