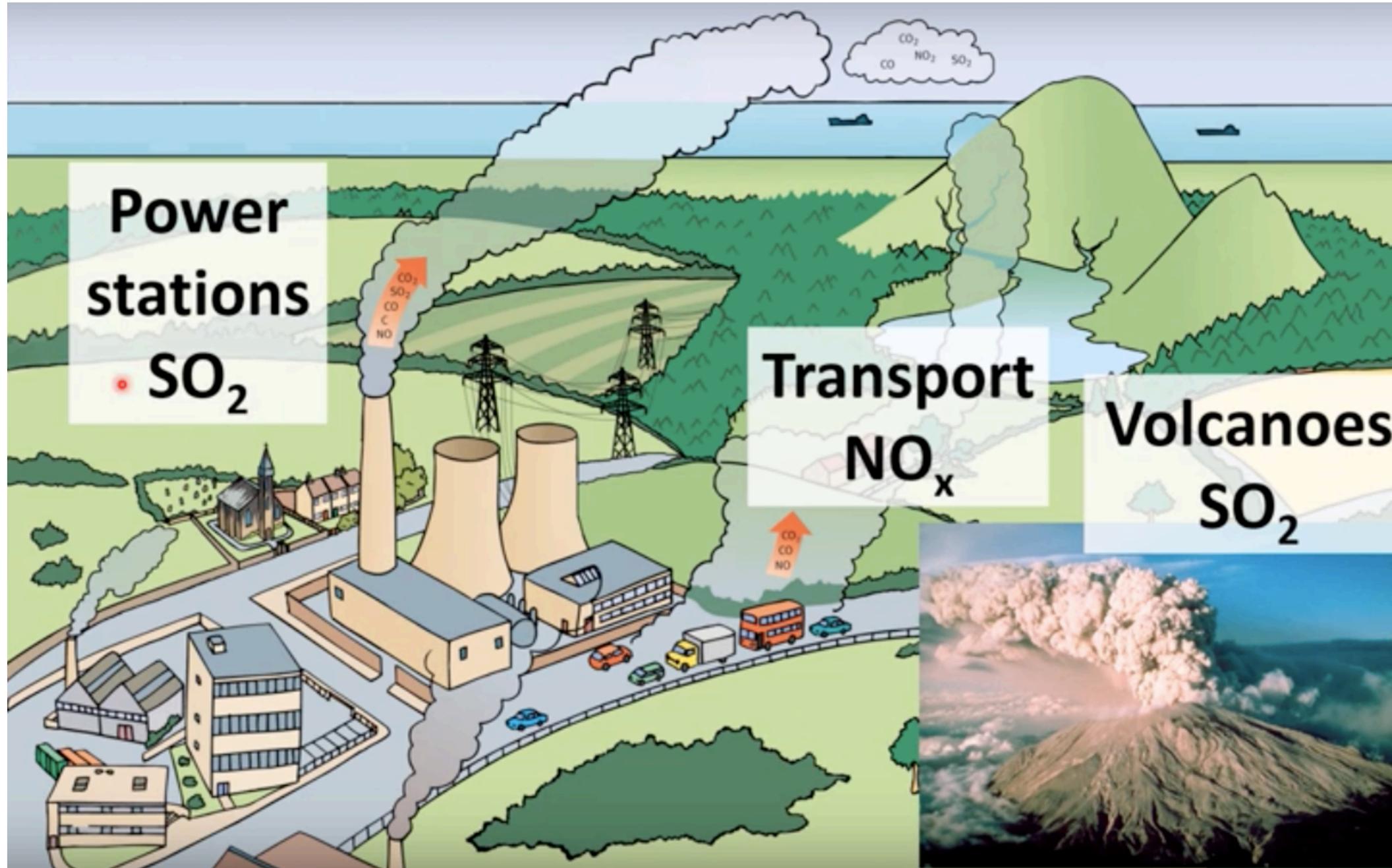


8.5 Acid deposition

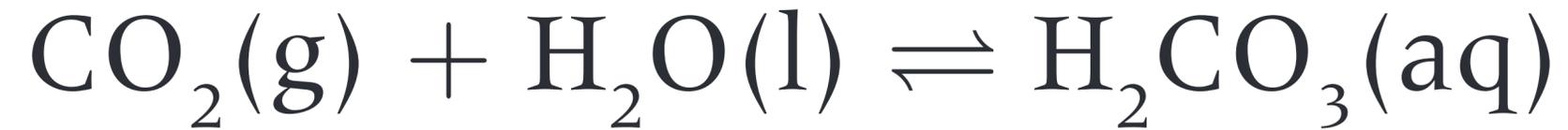


8.5 Acid deposition

Acid deposition: Process by which acid-forming pollutants are deposited on the Earth's surface.

The most common sources are the emissions of nitrogen and sulfur oxides that cause acid rain.

Normal rainwater has a pH of 5.6 due to the carbon dioxide in the atmosphere:



Acid rain has a pH less than 5.6.

The major causes (pollutants) are:

SO_2 NO and NO_2

Common sources:

- volcanic eruptions
- decomposition of vegetation
- combustion of fossil fuels

Reactions:

1. At high temperatures in internal combustion engines,



The NO(g) then reacts with atmospheric oxygen,



(NO₂ causes the brown color of smog)



The $\text{NO}_2(\text{g})$ then reacts with water to produce nitric and nitrous acid,



Where nitrous acid (a weak acid) is easily oxidized to become nitric acid (a strong acid):

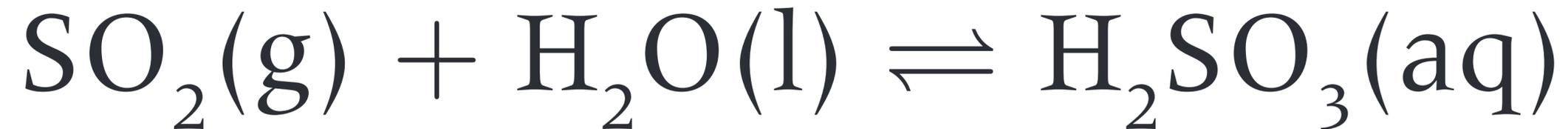


2. The burning of coal, which contains $\approx 3\%$ sulfur, produces sulfur dioxide:

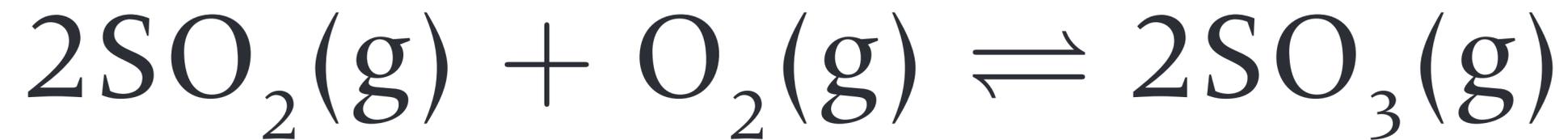


The $SO_2(g)$ can then...

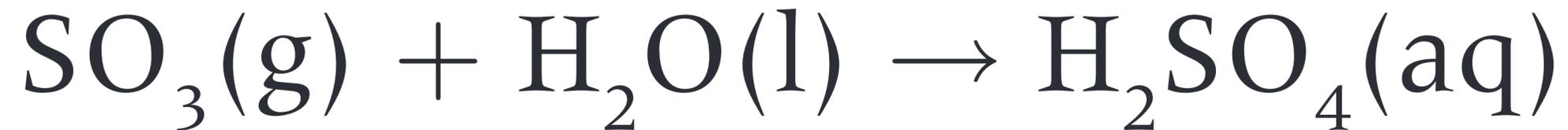
i.) react with water to form sulfurous acid:



ii.) react with atmospheric oxygen,



and the $\text{SO}_3(\text{g})$ reacts with water, to form sulfuric acid:

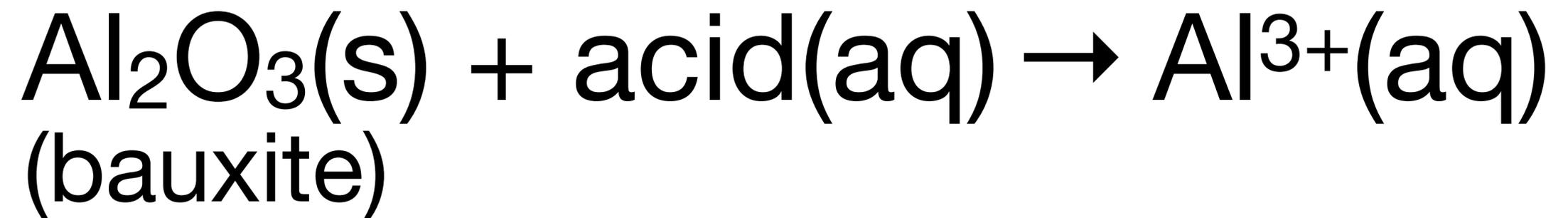


Some effects of acid rain:



1. Deforestation.

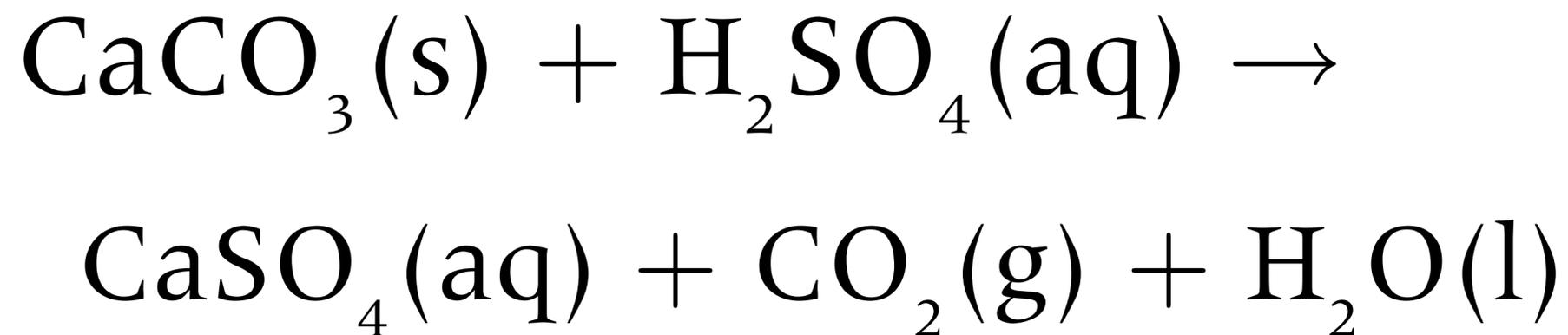
The leaching of dangerous metal ions from rock into soil water. Mainly the Al^{3+} ion:





2. Statues and building materials

Limestone and marble are common building materials. Both containing CaCO_3 which will react with acids.



Some methods to lower the effects of acid rain:

- 1. Switching to alternative or more efficient energy sources.**
- 2. Improving the design of car engines to lower the amounts of NO_x and SO_x produced.**
- 3. Removing sulfur from fuels.**

4. Removing SO_2 before it reacts with water by adding it to a mixture of calcium carbonate, calcium oxide (lime) and/or calcium hydroxide (slaked lime):

