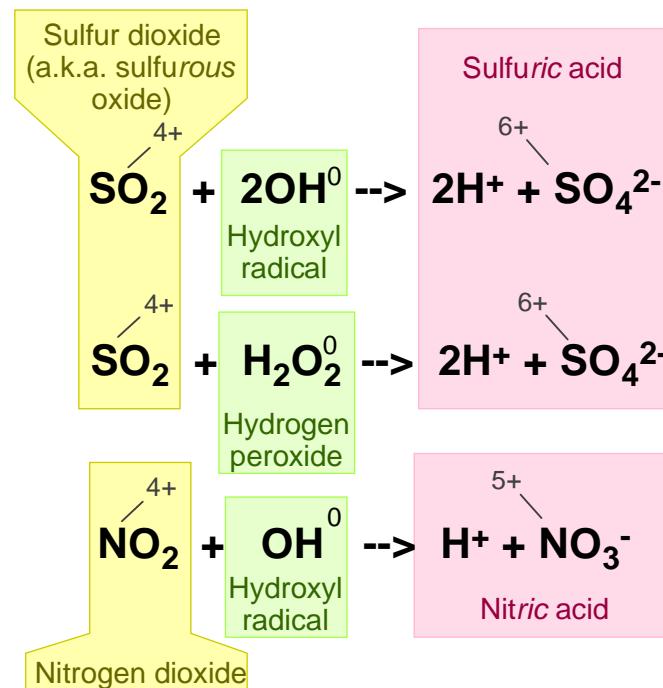


# Acid rain I - the big picture

Acid rain is rain made acidic by the oxidation of not-fully-oxidized sulfur and nitrogen compounds, which are commonly released to the atmosphere where coal and/or petroleum are burned. These compounds are oxidized in reactions in which the **not-fully-oxidized anthropogenic species** reacts in the atmosphere with a **natural oxidizing agent** to yield a **fully oxidized strong acid**:



Thus acid rain can also be considered "oxidized rain", wherein the oxidized and thus most highly charged forms of S and N attract the O of H-O species and conversely repel the H<sup>+</sup> ions of those species, thereby generating acidity.

Production of SO<sub>2</sub> and NO<sub>2</sub> is commonly so extensive that all available OH and H<sub>2</sub>O<sub>2</sub> are removed from the atmosphere downwind from the site of combustion. Thus pH of rain generally does not go below

about 4 near a point source, because the oxidizing agent (not the pollutant) is expended. In such cases, SO<sub>2</sub> and NO<sub>2</sub> travel downwind until they encounter sufficient OH and H<sub>2</sub>O<sub>2</sub> for their removal. Thus lessening emissions of SO<sub>2</sub> and NO<sub>2</sub> from a point source leads to a smaller area of acid rain and higher pH far downwind, but it does not necessarily lead to higher pH near the source.

The ecological impact of acid rain varies with the bedrock of the region on which it falls. Areas with bedrock that buffers acidity suffer relatively little, because the pH of soil water and riverwater are not lowered. On the other hand, in areas of bedrock with little buffering capacity (e.g., granite), pH of soil water and stream water can go so low that many plants and much aquatic life die.

A schematic map of a hypothetical region of acid rain:

