It has been estimated that on a global basis, natural sources, such as volcanoes, contribute about as the same amount of sulfur oxides to the atmosphere as human industrial activities. This amounts to 75-100 million tons from each source per year. However, in industrial countries such as in Europe and North America, human activities contribute 95 % of the sulfur oxides and natural sources only 5 %. In the Western States, natural sources of sulfur oxides may be more important.

**Human Sources of Sulfur Oxides**

In 1980, emissions of sulfur dioxide totaled 24.1 million tons in the United States. Of this total 66 % came from electric power companies. Electric power companies that burn coal are a major source of sulfur oxides. Other industrial plants contributed about 22 %. Smelting of metals such as copper, zinc, lead, and nickel can produce large amounts of sulfur dioxide. In Canada, 45% of the emissions are from smelting operations, compared to only 6 % in the United States.

Coal contains mainly carbon with some hydrogen. When coal is burned it reacts with oxygen in the air to produce carbon dioxide and water and large amounts of heat.

\[ C + O_2 \rightarrow CO_2 \]

In addition, coal may contain from 1-4 % of the element, sulfur. When the coal is burned with oxygen in the air, the sulfur is reacted to form **sulfur dioxide**.

\[ S + O_2 \rightarrow SO_2 \]

**Wood Smoke**

In certain resort towns, a significant source of visible smog conditions results from the burning of large quantities of wood in fireplaces and stoves. The smoke contains solid particles which may provide the initial bit of solid or catalyst that initiates the reactions to produce sulfuric acid or nitric acid in the water droplets. This is a well recognized problem in Aspen and Vail Colorado. Steps are being taken to reduce the burning of wood.

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