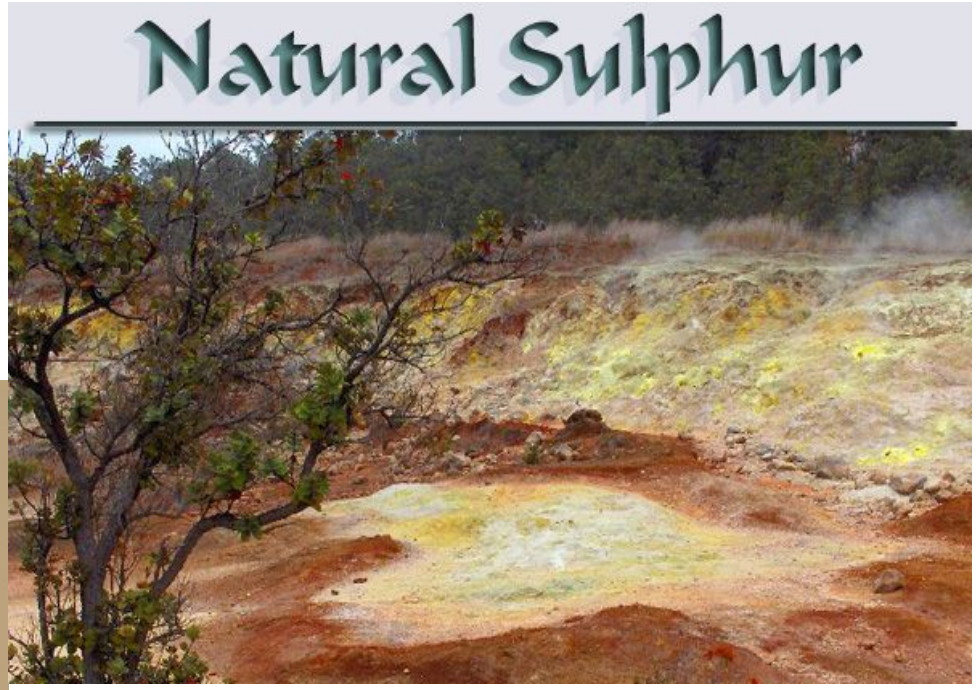
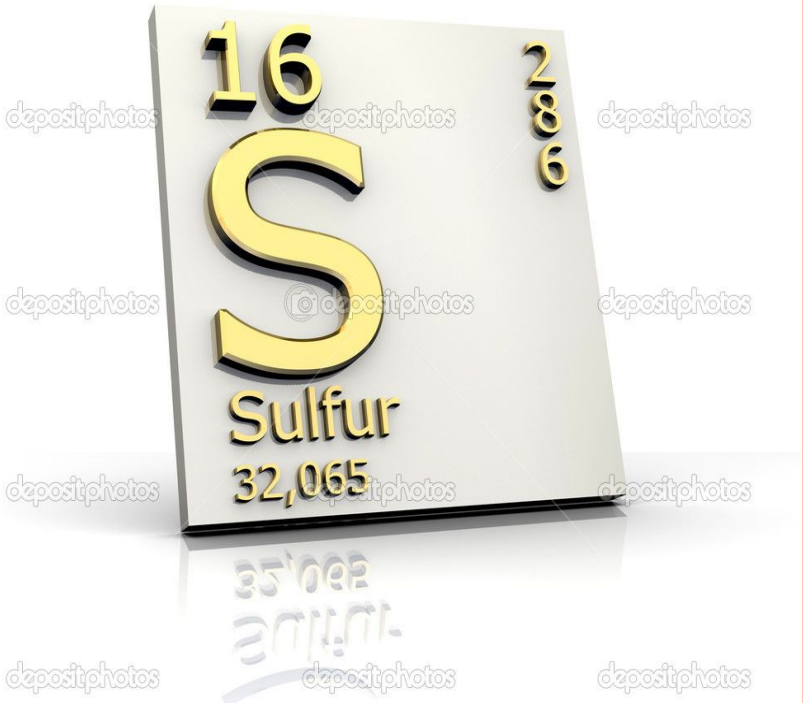
The Sulphur cycle. The Sulphur dioxide problems



Sulphur is a chemical element with symbol **S** and atomic number 16,atomic mass number 32. It is an abundant, multivalent non-metal. Elemental sulfur is a bright yellow crystalline solid at room temperature. Chemically, sulfur reacts with all elements except for gold, platinum, iridium, nitrogen, tellurium, iodine and the noble gases.

Sulphur is one of the components that make up proteins and vitamins. Proteins consist of amino acids that contain sulphur atoms. Sulphur is important for the functioning of proteins and enzymes in plants, and in animals that depend upon plants for sulphur. Plants absorb sulphur when it is dissolved in water. Animals consumer these plants, so that they take up enough sulphur to maintain their health



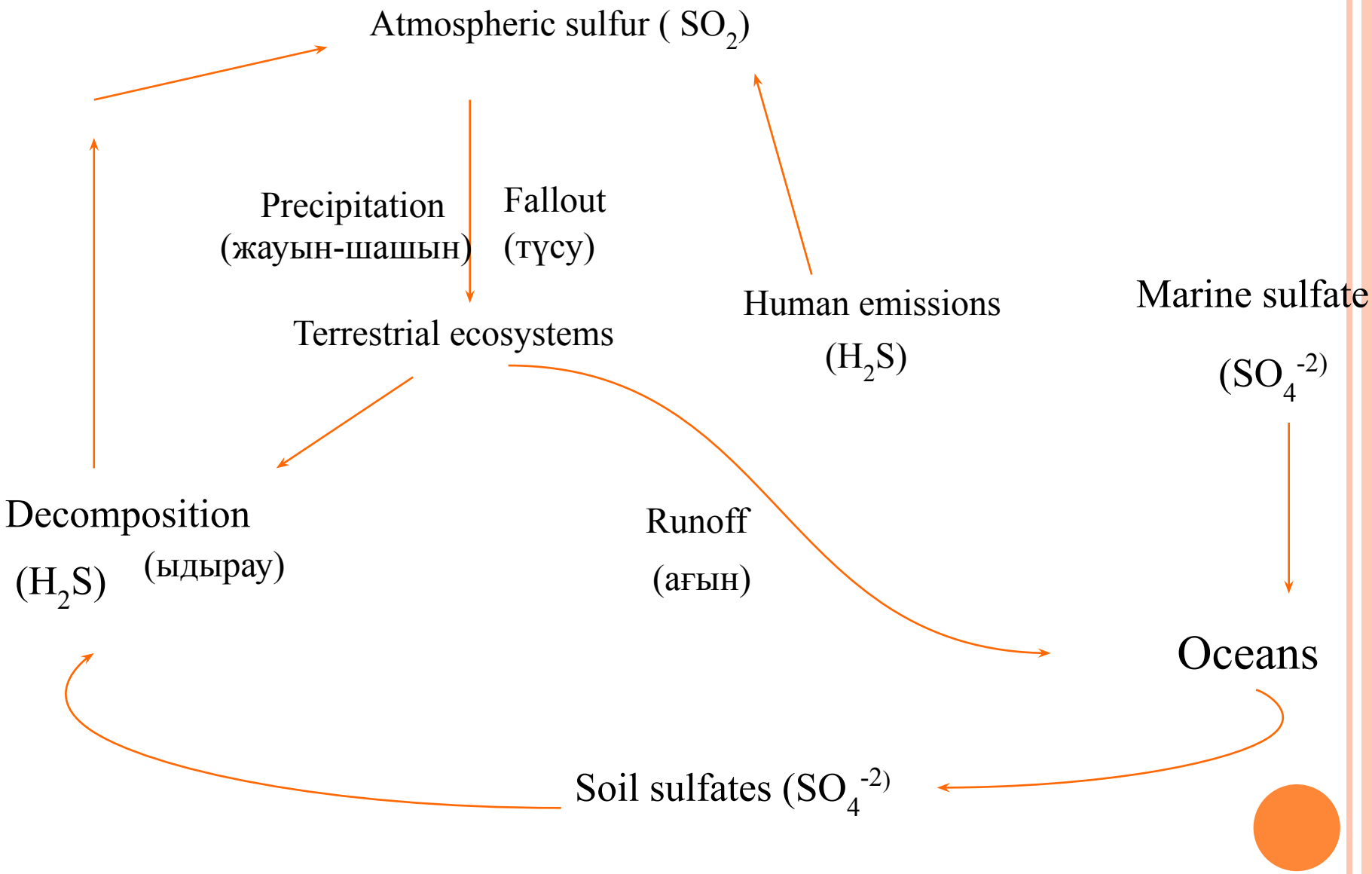
The Sulphur Cycle

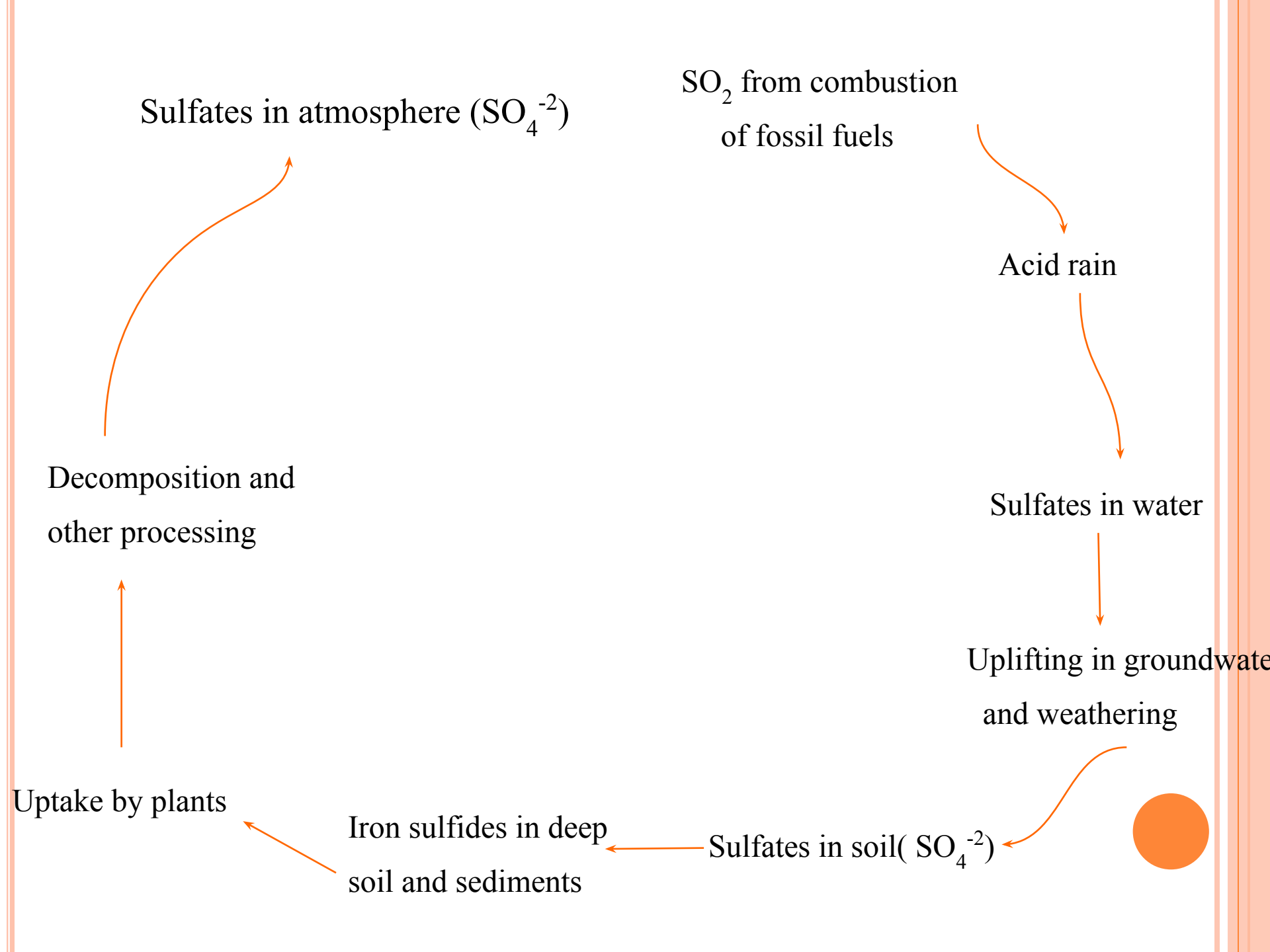
*THE **SULPHUR CYCLE** IS THE COLLECTION OF PROCESSES BY WHICH SULFUR MOVES TO AND FROM MINERALS AND LIVING SYSTEMS. SUCH BIOGEOCHEMICAL CYCLES ARE IMPORTANT IN GEOLOGY BECAUSE THEY AFFECT MANY MINERALS. BIOCHEMICAL CYCLES ARE ALSO IMPORTANT FOR LIFE BECAUSE SULFUR IS AN ESSENTIAL ELEMENT, BEING A CONSTITUENT OF MANY PROTEINS AND COFACTORS.

*The sulfur cycle describes the movement of sulfur through the atmosphere, mineral forms, and through living things. Although sulfur is primarily found in sedimentary rocks or sea water, it is particularly important to living things because it is a component of many proteins.

Sulfur is released from geologic sources through the weathering of rocks. Once sulfur is exposed to the air, it combines with oxygen, and becomes sulfate SO_4. Plants and microbes assimilate sulfate and convert it into organic forms.

The Sulphur Cycle




Sulfates in atmosphere (SO_4^{-2})
SO_2 from combustion of fossil fuels
Acid rain
Sulfates in water
Uplifting in groundwate and weathering
Sulfates in soil(SO_4^{-2})
Iron sulfides in deep soil and sediments
Uptake by plants
Decomposition and other processing

What is sulfur dioxide?

*Sulfur dioxide is a gas. It is invisible and has a nasty, sharp smell. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles.

*About 99% of the sulfur dioxide in air comes from human sources. The main source of sulfur dioxide in the air is industrial activity that processes materials that contain sulfur, is the generation of electricity from coal, oil or gas that contains sulfur. Some mineral ores also contain sulfur, and sulfur dioxide is released when they are processed. In addition, industrial activities that burn fossil fuels containing sulfur can be important sources of sulfur dioxide.

* Sulfur dioxide is also present in motor vehicle emissions, as the result of fuel combustion. In the past, motor vehicle exhaust was an important, but not the main, source of sulfur dioxide in air. However, this is no longer the case.

How does sulfur dioxide affect human health?

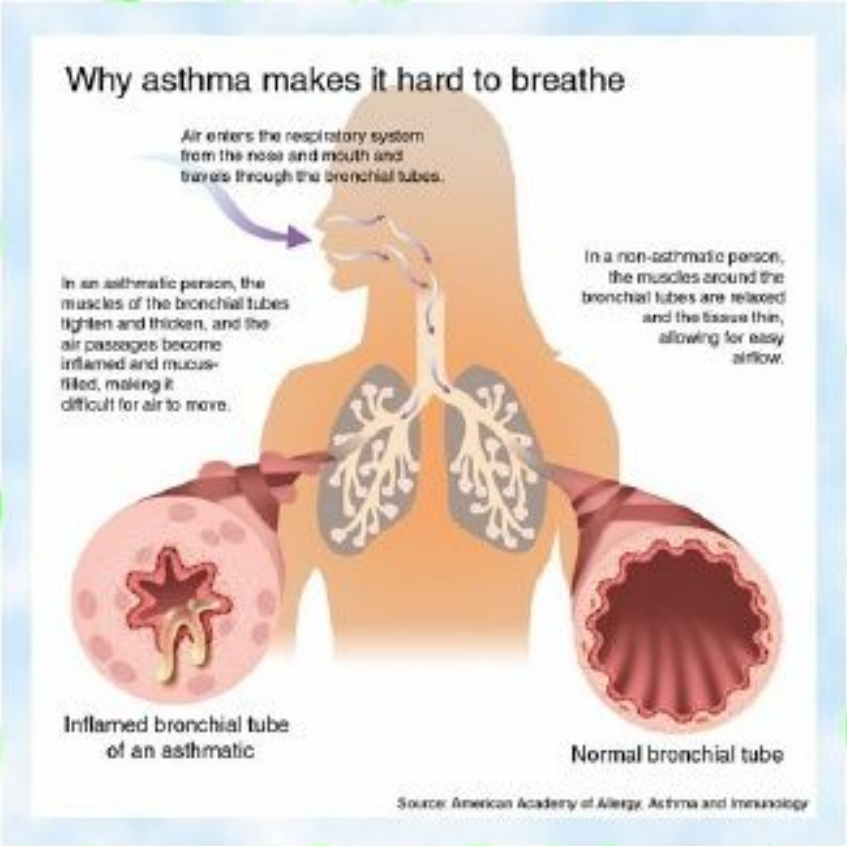
- Sulfur dioxide affects human health when it is breathed in. It irritates the nose, throat, and airways to cause coughing, wheezing, shortness of breath, or a tight feeling around the chest. The effects of sulfur dioxide are felt very quickly and most people would feel the worst symptoms in 10 or 15 minutes after breathing it in.

- Those most at risk of developing problems if they are exposed to sulfur dioxide are people with asthma or similar conditions.
- Sulfur dioxide affects the respiratory system, particularly lung function, and can irritate the eyes.

- When sulfur dioxide irritates the respiratory tract and increases the risk of tract infections. It causes coughing, mucus secretion and aggravates conditions such as asthma and chronic bronchitis.

Health Problems

- **Sulfur dioxide (SO2) and nitrogen oxides (NOx) gases turn in to particles that can be inhaled deep into people's lungs.**
- **In high levels of the fine particles there is an increase in illnesses, a key component of urban smog, cause inflammation and damage to tissues, and premature death from respiratory diseases such as:**
- **Asthma and Bronchitis.**



Maximum permissible concentration of sulfur

The maximum allowable concentration of hydrogen sulfide, for prolonged exposure, is 10 ppm. The maximum allowable concentration of sulfur dioxide, for prolonged exposure, is 5 ppm.

Concentration, ppm	Effect
0.3 - 1.0	Detected by taste
More than 1.0	Injurious to plant foliage
3	Noticeable odor
5	Immediate irritation to nose and throat
6 – 12	Irritation to eyes
20	Suggested maximum allowable concentration for 30 to 60 minutes' exposure
400 – 500	Immediately dangerous to life