Sulfur dioxide (SO₂) is a chemical compound consisting of one sulfur atom and two oxygen atoms. It is a colorless gas with a sharp, pungent odor, often described as smelling like a burnt match. SO₂ is produced naturally through volcanic eruptions and the decay of organic matter, but it is also a significant byproduct of human activities, particularly from the burning of fossil fuels such as coal and oil, which contain sulfur impurities. In industrial processes, it is used in the production of sulfuric acid, a key component in many chemical manufacturing industries. Additionally, SO₂ is utilized as a preservative and antioxidant in the food and wine industries due to its ability to inhibit microbial growth and prevent oxidation. However, it has notable environmental and health impacts. When released into the atmosphere, SO₂ can react with water vapor to form acid rain, which can damage forests, aquatic ecosystems, and infrastructure. Exposure to high concentrations of SO₂ can also cause respiratory problems, including irritation of the airways, asthma attacks, and other breathing difficulties, especially in vulnerable populations such as children, the elderly, and individuals with pre-existing respiratory conditions.