

## China's Air Pollution

### China's Pollution Stats:

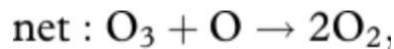
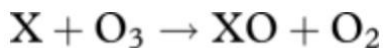
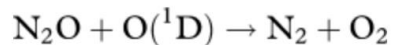
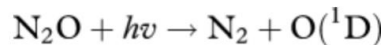
- Greatest pollution occurs in the east but significant levels are widespread
- Sources of pollution are intense in northeast corridor that extends from Shanghai to Beijing.
- Average exposure to PM<sub>2.5</sub> was 52 µg/m<sup>3</sup>
- Highest particulate concentrations are south of Beijing
- This contributes to 1.6 million deaths/year.
- Lung cancer is now the leading cause of death in China.
- 92% of China's population experienced unhealthy PM<sub>2.5</sub>
- 46% of China's population have experienced PM<sub>2.5</sub> above the highest EPA threshold of >250 µg/m<sup>3</sup>
- particulate matter can remain airborne for days to weeks and travel thousands of kilometers
- China is the world's leading source of SO<sub>2</sub> and particulate matter from coal combustion

### Sources for Air Pollution in China:

- Species/Compounds involved are O<sub>3</sub>, CO<sub>2</sub>, NO, NO<sub>2</sub>, N<sub>2</sub>O, SO<sub>2</sub>, VOC's
- Particulate sources include electric power plants, industrial facilities, automobiles, biomass burning, and fossil fuels used in homes and factories for heating.
- Cement factories are one of the leading causes of air pollution in China in which they produce lots of dust in various sizes.
- Cement factories are often built near places that have a lot of coal to reduce coal transportation costs.
- majority of PM<sub>2.5</sub> comes from photochemical reactions between numerous sulfates, nitrogen oxides, and other inorganic and organic chemicals.
- nitrogen dioxide converts sulfur dioxide to sulfates via an aqueous oxidation mechanism
- this mechanism supposedly played a role in the historic London Fog
- Ground level ozone is created by chemical reactions between NO<sub>x</sub> and VOC's in the presence of sunlight

### Loss of Ozone via NO

- N<sub>2</sub>O is transported to the stratosphere and broken down via photolysis by the following reactions below.
- NO is produced which is primary source of reactive nitrogen (NO<sub>x</sub>)
- Nitrogen oxides, hydrogen oxides and chlorine radicals destroy ozone via catalytic cycles below where X = {NO, HO, Cl}
- Recycling of X molecules allows just ONE X to destroy many ozone molecules typically of the range from 10<sup>3</sup>-10<sup>5</sup>



### **Sources:**

- <https://www.aljazeera.com/news/2017/12/china-deadly-smog-rolls-171223082432453.html>
- <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0135749>
- <https://cen.acs.org/articles/95/i4/Peering-Chinas-thick-haze-air.html>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3306630/>
- [http://www.noaanews.noaa.gov/stories2009/20090827\\_ozone.html](http://www.noaanews.noaa.gov/stories2009/20090827_ozone.html)
- <http://factsanddetails.com/china/cat10/sub66/item392.html>