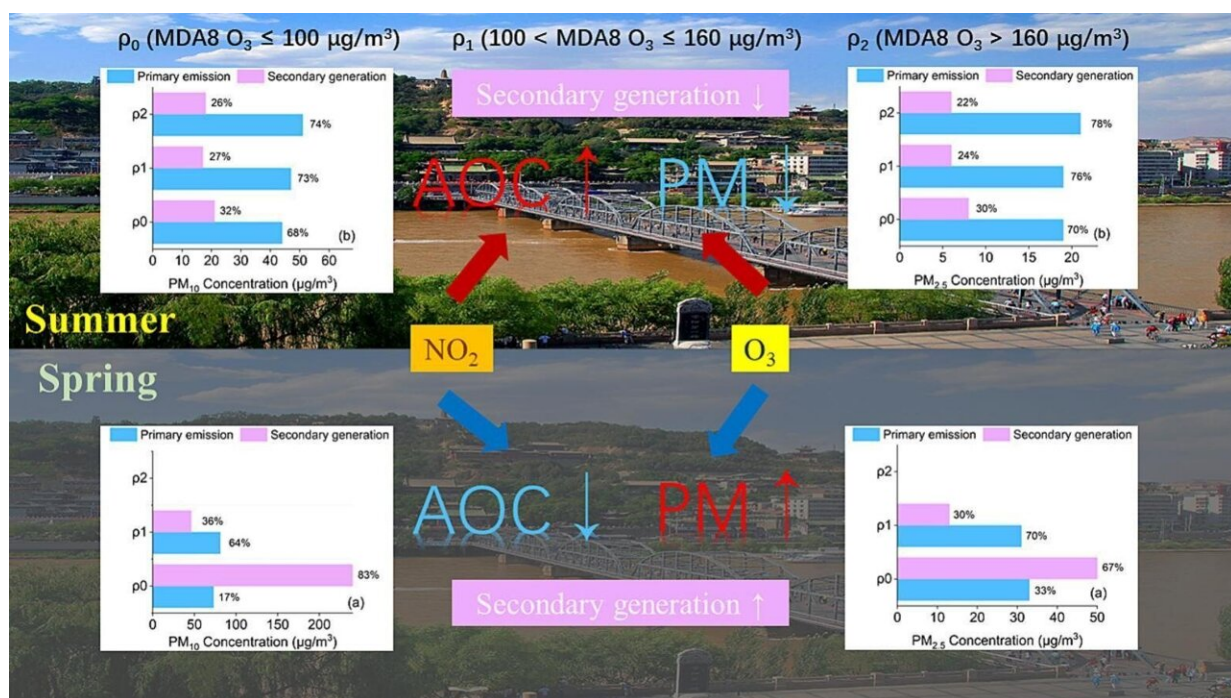


Researchers reveal relationship between air oxidation and air pollution

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Credit: *Science of The Total Environment* (2023). DOI: 10.1016/j.scitotenv.2023.169664

In the atmospheric environment, the pollutants emitted by human activities are oxidized to secondary pollutants and gradually removed from the atmosphere. Therefore, the understanding of atmospheric oxidation is of great significance for air pollution control.

At present, research on air pollution mainly focuses on analyzing the concentration change and mutual transformation of air pollutants, and there are relatively few studies on the relationship between air [oxidation](#) and air pollution.

A research team led by Prof. Gao Xiaoqing from the Northwest Institute of Eco-Environment and Resources of the Chinese Academy of Sciences used empirical equations to estimate the emission of primary pollutant particles and the formation of secondary pollutant particles in the atmosphere, and they analyzed the change characteristics of major atmospheric oxidants in Lanzhou.

[The study](#) is published in *Science of the Total Environment*.

The researchers explored the possible causes of the change in [pollutant](#) source and concentration in heavily polluted weather, and elucidated the mechanism of atmospheric oxidation affecting the secondary formation of atmospheric particles.

The results show that atmospheric oxidation has a threshold effect on the secondary formation of atmospheric particles. When the concentration of atmospheric oxidant is low ($\text{MDA8 O}_3 \leq 100 \mu\text{g}/\text{m}^3$), the oxidation process of atmospheric volatile organic compounds is easier to achieve, thus generating more secondary aerosols and promoting the formation of secondary particles.

When the concentration of atmospheric oxidant is higher than $160 \mu\text{g}/\text{m}^3$, the proportion of secondary particulate matter is lower than that of primary particulate matter. The total oxidant agent Ox ($\text{O}_x = \text{O}_3 + \text{NO}_2$) is negatively correlated with the sulfur oxidation rate and nitrogen oxidation rate, indicating that the formation rate of SO_2 and NO_2 is inhibited by the high concentration of O_x .

The high-pressure ridge over Lanzhou was maintained for a long time, which reduced the surface wind speed and weakened the transport and diffusion of pollutants near the surface. The $\text{PM}_{2.5}$ in Lanzhou's atmosphere is mainly from the Hexi Corridor area, and the PM_{10} is mainly from the southeast of Lanzhou.

This study deepens the understanding of atmospheric oxidation affecting the formation mechanism of air pollution, and provides a reference for the prevention and control of air pollution and the improvement of air quality in Lanzhou.

More information: Xiyin Zhou et al, Influence of atmospheric oxidation capacity on atmospheric particulate matters concentration in Lanzhou, *Science of The Total Environment* (2023). [DOI: 10.1016/j.scitotenv.2023.169664](https://doi.org/10.1016/j.scitotenv.2023.169664)

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