## Photooxidation of levoglucosan in atmospheric aqueous aerosols

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Biomass burning is an important primary source of aerosols, significantly affecting radiactive forcing of the Earth [1]. A fingerprint of biomass burning, levoglucosan (1,6-anhydro- $\beta$ -D-glucopyranose), was most abundant (up to 6.90  $\mu$ g m<sup>-3</sup>), accounting for 1–6% of total carbonaceous aerosols during a biomass burning episode [2]. While levoglucosan is more persistant in air [3], degradation of abundant levoglucosan may substantially contribute to atmospheric secondary organic aerosols due to biomass burning.

This study experimentally examined photooxidation of levoglucosan in airborne (fog and rain) droplets. Hydroxyl radicals ( $\cdot$ OH) are responsible for the major degradation of levoglucosan with a second order rate constant of  $2.1 \times 10^9 \text{ M}^{-1} \text{ s}^{-1}$ , much higher than  $\cdot$ OH-oxalic acid reaction ( $1.4 \times 10^6 \text{ M}^{-1} \text{ s}^{-1}$ ). Based on a  $\cdot$ OH concentration of  $5.0 \times 10^{-13}$  M in aqueous droplets [4], atmospheric lifetime of levoglucosan would be less than 16 min, much shorter than that of oxalic acid (16.5 days) and of tropospheric aerosols (5–15 days) [5].

While levoglucosan was completely depleted within 2.5 hours, more than 50% of total organic carbons (TOC) remained in our reaction system up to 4 hours, suggesting substantial amounts of reaction intermediates during the degradation of levoglucosan. Concentration profiles of identified intermediates suggest that levoglucosan can be a precursor of abundant short chain dicarboxylic acids (such as malonic acid) and monocarboxylic acids (such as dihydroxy-propanoic acid) in particulates relevant to biomass burning. A few cyclic-structure intermediates, comprising a basis structure of levoglucosan, could undergo further ring cleavage to yield carboxylic acids.

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## Geology, geochemistry of ore-forming fluids and hydrothermal alteration dynamics of the Zhaoping gold belt in Northwestern Jiaodong Peninsula, Eastern China

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Zhaoping fault belt, with proven resource/reserves about 800 t, is the most important auriferous fault belt in Jiaodong gold province[1-5]. We studied the geology and geochemistry of ore-forming fluids and hydrothermal alteration dynamics of the gold deposit belt in this paper. The superposition of multistage hydrothermal alteration and mineralization led to the formation of large and rich ores. The minor boiling of fluid in the early metallogenesis and the later mixed superposition of fluids with different natures are among the most important factors controlling the gold, silver polymetallic sedimentation and mineralization. It shows that the main metallogenesis fluid is of intermediate temperature, low salinity, low density, low oxygen fugacity and intermediate degree of mineralization. In the late stage of main metallogenesis, gold mineralization further superimposed Pb-Zn-Ag polymetallic mineralization. From north to south, the intensity of phyllic alteration becomes stronger, reflecting under the same physical and chemical conditions, the intensity of water-rock reaction in the fault belt weakens gradually from south to north.

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