Supplementary Information

Insights into Secondary Organic Aerosol Formed via Aqueous-phase Reactions of Phenolic Compounds Based on High Resolution Mass Spectrometry

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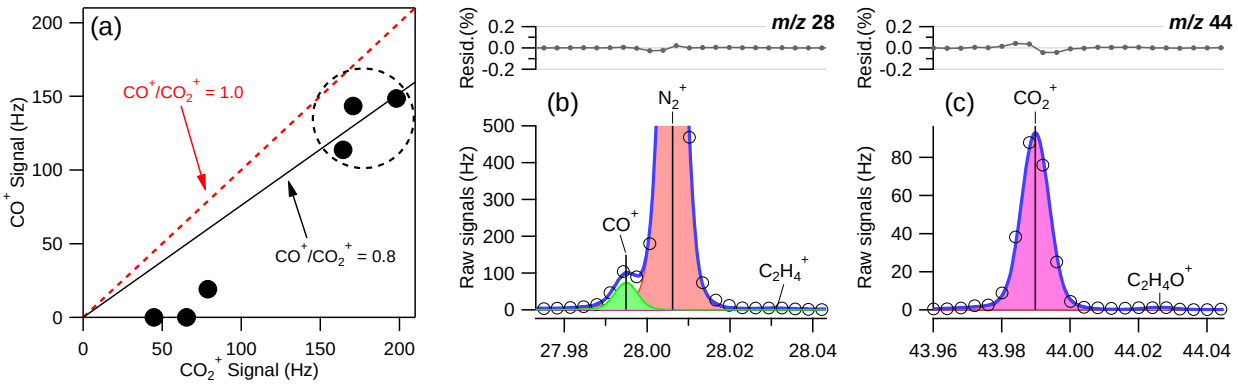
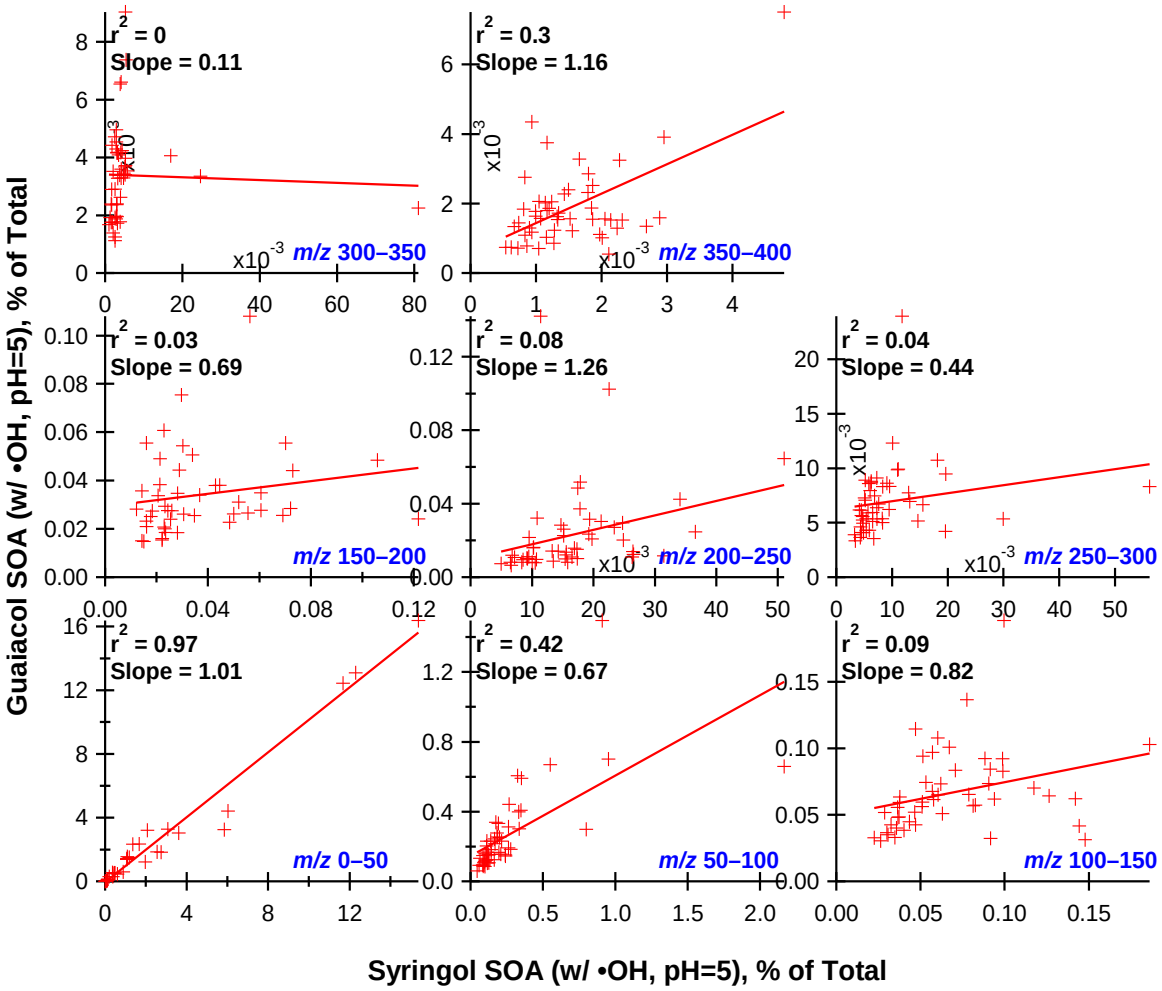


Fig. S1. (a): correlations between CO^+ and CO_2^+ signals from PIKA fits for phenolic SOA products, (b) and (c): raw mass spectra of syringol SOA products (w/ •OH and pH=7) at *m/z* 28 and *m/z* 44 respectively. The shaded areas are the PIKA fits for each ion, and the solid blue line presents the sum of the PIKA fits. The residual as percent of total fit shown above is < 0.1% for both *m/z* 28 and 44. When CO^+ signal is low, the PIKA fitting of CO^+ might be significantly biased due to the huge interference of gaseous N_2^+ signal. We therefore determine the average CO^+ / CO_2^+ ratio (= 0.8) based on three data points with good S/N for CO^+ and CO_2^+, i.e., the 3 points circled in (a).



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27 **Fig. S2.** UMR spectra correlations between guaiacol and syringol SOA. Both SOA products
28 were produced in the presence of •OH at pH 5. The mass spectra correlations were performed
29 separately for each 50 *m/z*'s.

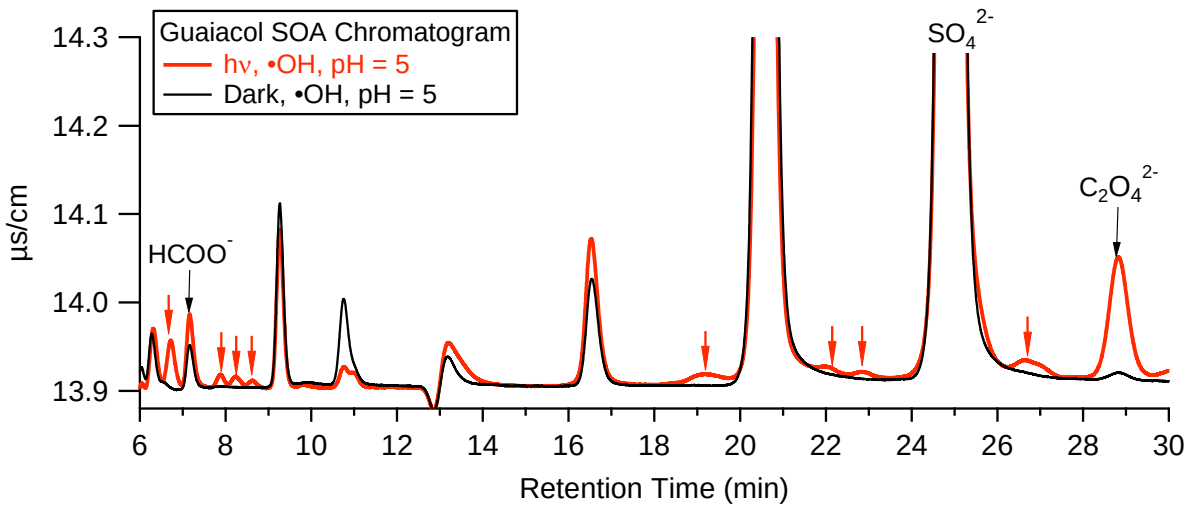

Fig. S3. Ion chromatogram of guaiacol SOA produced via aqueous-phase photoreactions in the presence of •OH at pH = 5. The unidentified peaks are marked in the chromatogram.

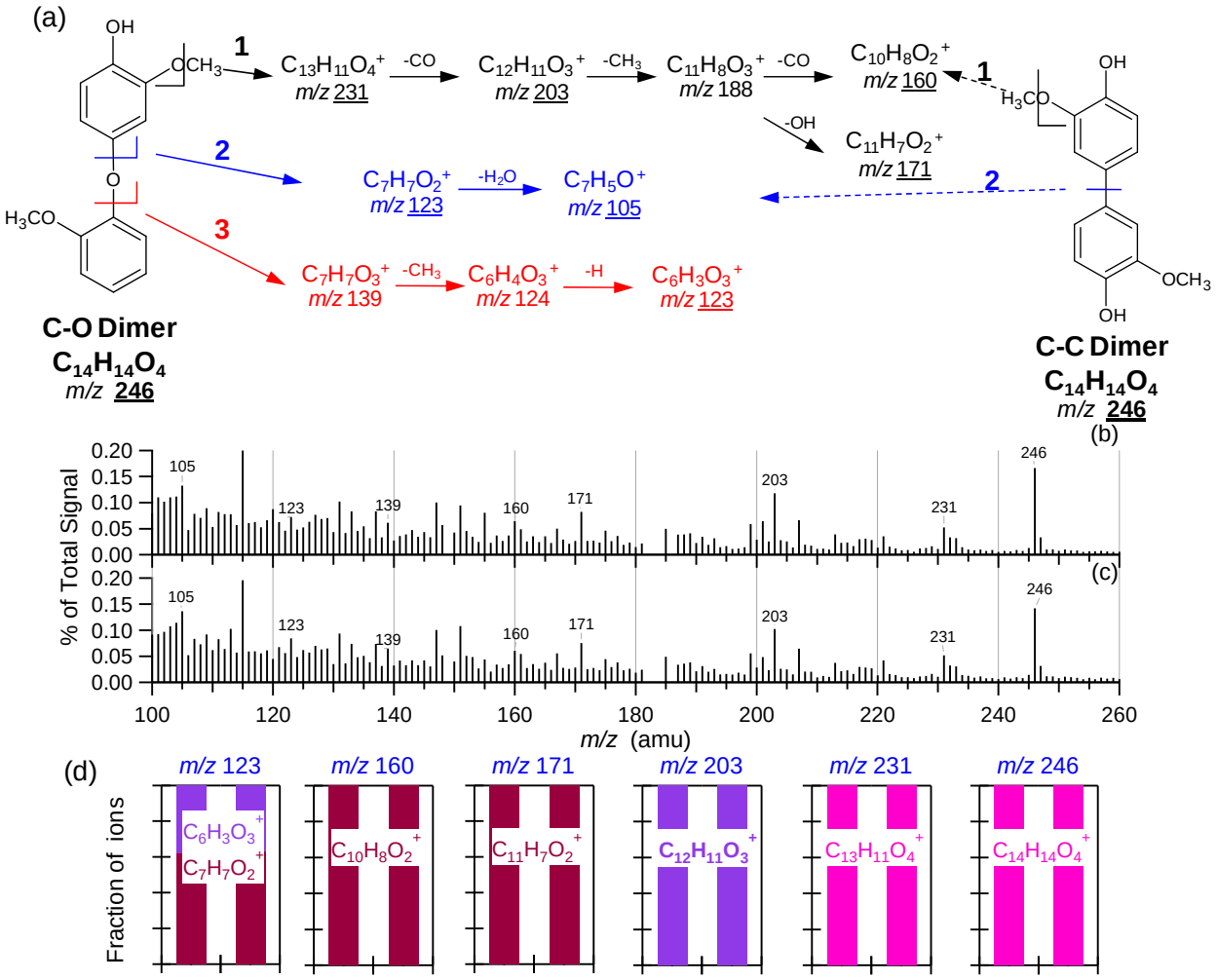

Fig. S4. (a) Postulated fragmentation mechanism and ions of guaiacol C-C and C-O dimers, (b-c) AMS UMR spectra (*m/z* 100 – 260) of guaiacol SOA produced via aqueous-phase photoreactions under different experimental conditions (b) w/o •OH, pH=5, (c) w/ •OH, pH=5, (d) ions as well as their fractions at *m/z*'s which are significant in (b)-(c) and underscored in (a). Ions with different number of O in (d) are shown in different colors.

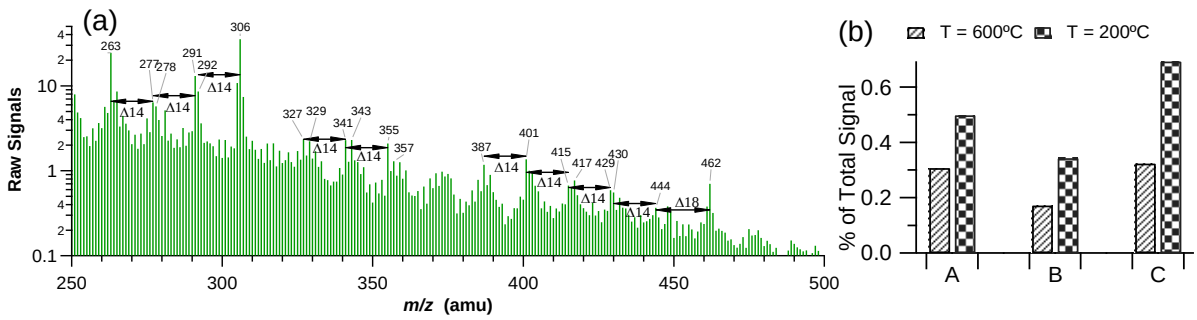

Fig. S5. (a) UMR spectrum of syringol SOA produced in the presence of •OH at pH 5, (b) fraction of *m/z*'s > 306 to the total signal of SOA produced under different experimental conditions (A: w/ •OH, pH=5; B: w/ •OH, pH=7; and C: w/o •OH, pH=5) at an AMS vaporizer temperature (T) of 600°C or 200°C.