

1 **Supplementary Information**

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

5 Yele Sun<sup>1</sup>, Qi Zhang<sup>1\*</sup>, Cort Anastasio<sup>2</sup>, Jun Sun<sup>3</sup>

6 <sup>1</sup>Department of Environmental Toxicology, University of California, Davis, CA 95616, USA

7 <sup>2</sup>Department of Land, Air & Water Resources, University of California, Davis, CA 95616, USA

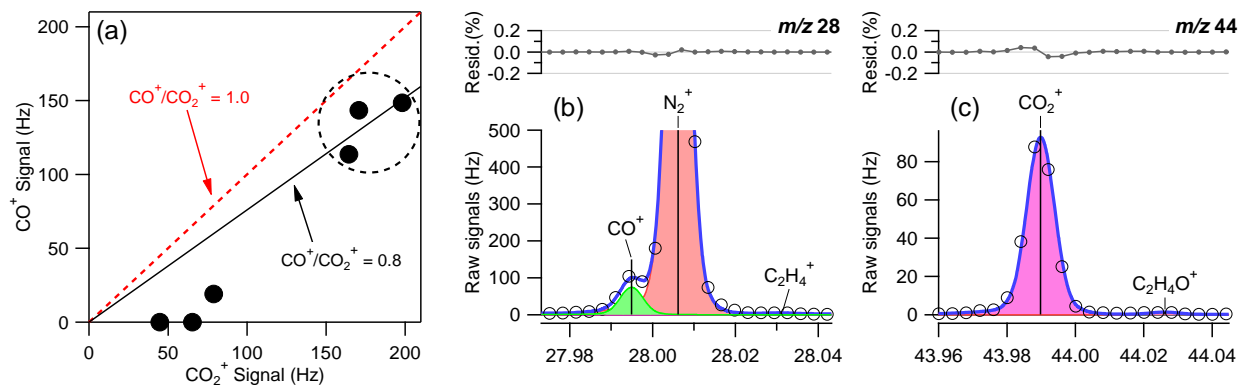
8 <sup>3</sup>College of Architecture and Environment, Sichuan University, Chengdu, Sichuan 610065,  
9 China

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11 Correspondence to: Q. Zhang (dkwzhang@ucdavis.edu)

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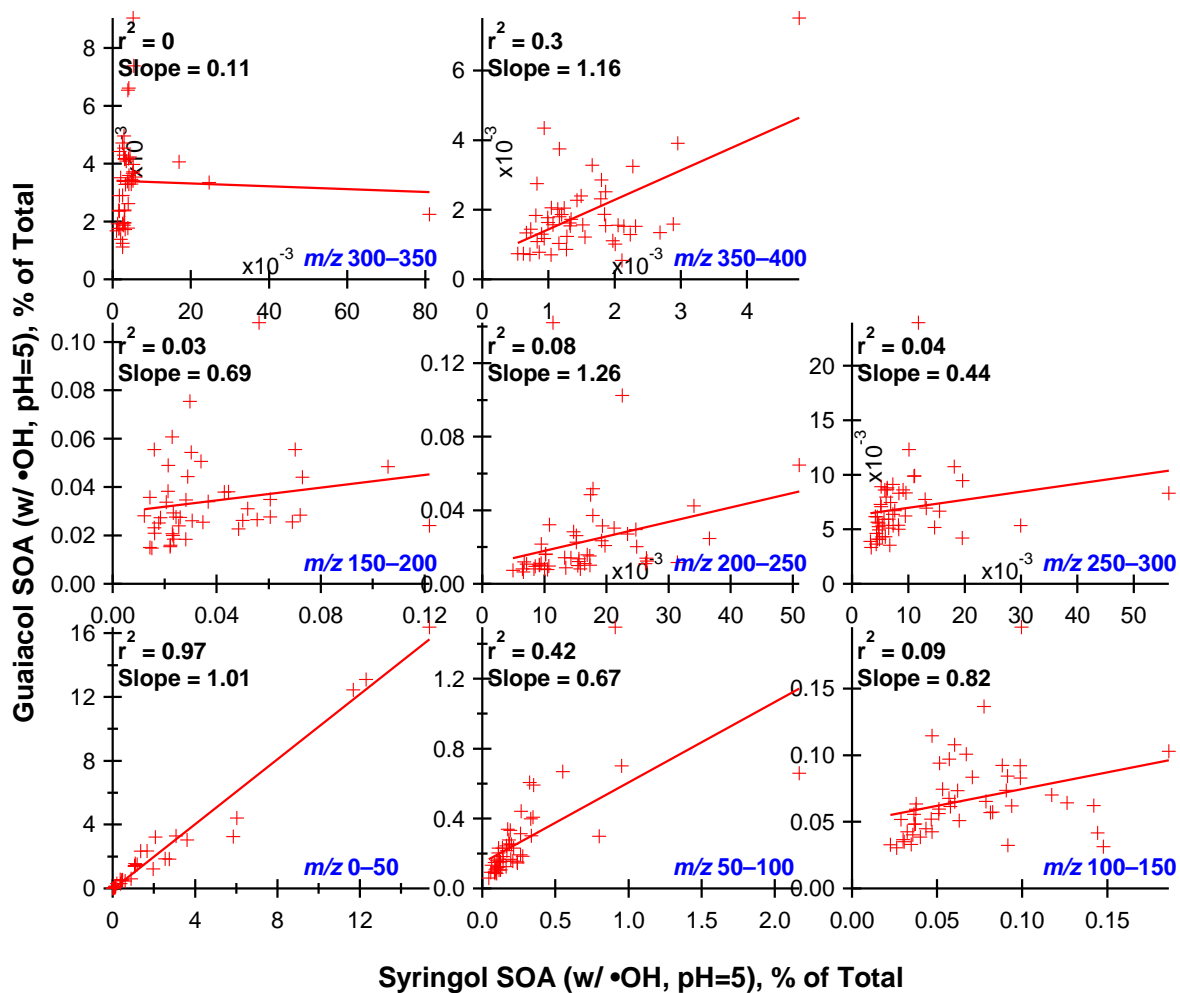
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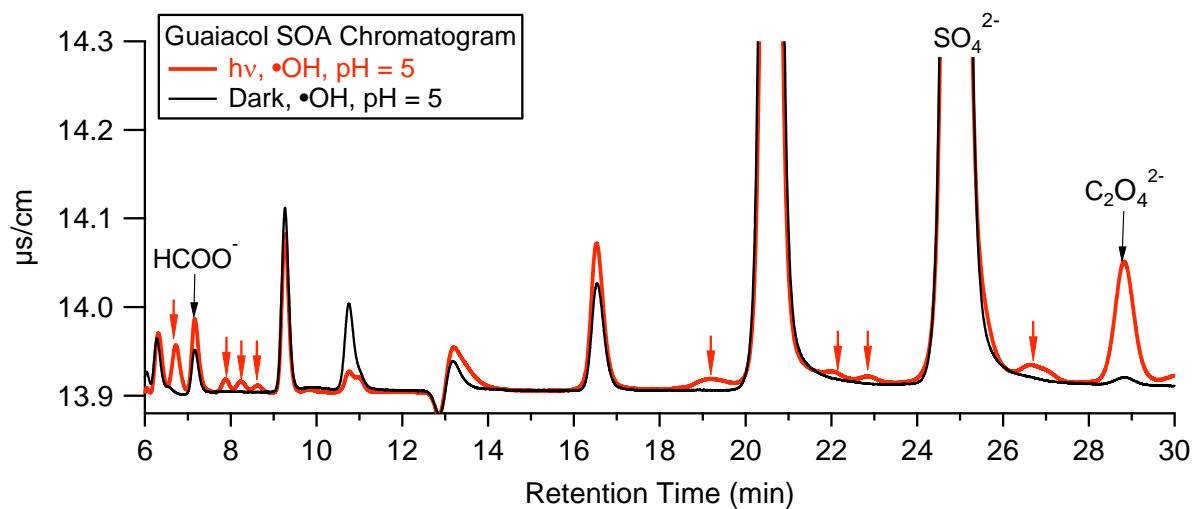
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18 **Fig. S1.** (a): correlations between  $\text{CO}^+$  and  $\text{CO}_2^+$  signals from PIKA fits for phenolic SOA  
 19 products, (b) and (c): raw mass spectra of syringol SOA products (w/  $\bullet\text{OH}$  and  $\text{pH}=7$ ) at  $m/z$  28  
 20 and  $m/z$  44 respectively. The shaded areas are the PIKA fits for each ion, and the solid blue line  
 21 presents the sum of the PIKA fits. The residual as percent of total fit shown above is  $< 0.1\%$  for  
 22 both  $m/z$  28 and 44. When  $\text{CO}^+$  signal is low, the PIKA fitting of  $\text{CO}^+$  might be significantly  
 23 biased due to the huge interference of gaseous  $\text{N}_2^+$  signal. We therefore determine the average  
 24  $\text{CO}^+ / \text{CO}_2^+$  ratio ( $= 0.8$ ) based on three data points with good S/N for  $\text{CO}^+$  and  $\text{CO}_2^+$ , i.e., the 3  
 25 points circled in (a).



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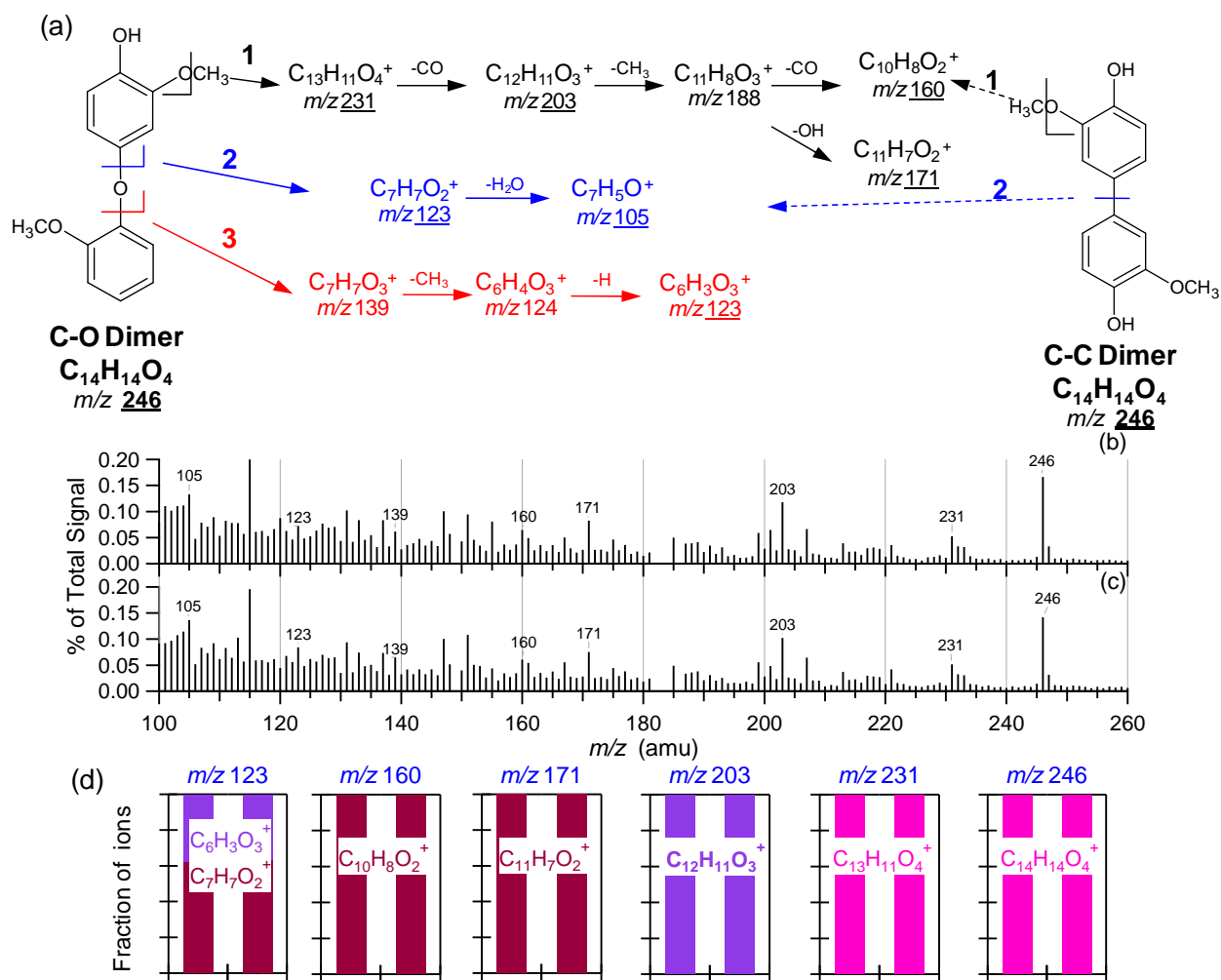
27 **Fig. S2.** UMR spectra correlations between guaiacol and syringol SOA. Both SOA products  
 28 were produced in the presence of •OH at pH 5. The mass spectra correlations were performed  
 29 separately for each 50  $m/z$ 's.



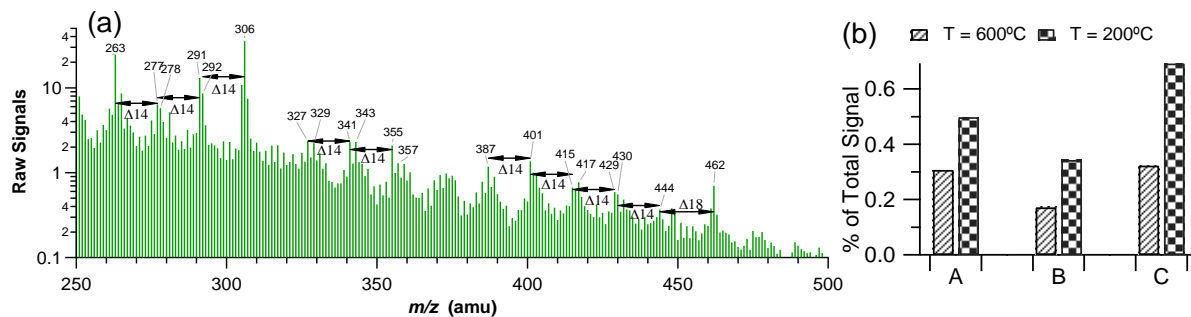
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31 **Fig. S3.** Ion chromatogram of guaiacol SOA produced via aqueous-phase photoreactions in the  
32 presence of  $\bullet\text{OH}$  at  $\text{pH} = 5$ . The unidentified peaks are marked in the chromatogram.

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



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 42 **Fig. S5.** (a) UMR spectrum of syringol SOA produced in the presence of  $\bullet\text{OH}$  at pH 5, (b)  
 43 fraction of  $m/z$ 's  $> 306$  to the total signal of SOA produced under different experimental  
 44 conditions (A: w/  $\bullet\text{OH}$ , pH=5; B: w/  $\bullet\text{OH}$ , pH=7; and C: w/o  $\bullet\text{OH}$ , pH=5) at an AMS vaporizer  
 45 temperature (T) of  $600^\circ\text{C}$  or  $200^\circ\text{C}$ .