Surfactant Effects in Irradiated, Hanging-Droplet, Aqueous-Phase Glyoxal/Ammonium Sulfate Aerosol Mimic System

Daphna Fertil$^1$, Melissa M. Galloway$^2$, Joseph L. Woo$^1$

Department of Chemical and Biomolecular Engineering$^1$ and Department of Chemistry$^2$, Lafayette College, Easton PA

Introduction

- Secondary organic aerosol (SOA) are formed via in situ interactions with volatile organic compounds (VOCs).
- Our work has shown that when exposed to UV light, Methyl/glyoxal (MG) surface tension changes as a function of time.
- The main goal was to analyze the effects of irradiation on Glyoxal (G) and Ammonium Sulfate (AS) and see if there was any concentration dependencies.
- In addition, surface tension effects as a function of bulk organic concentration will be investigated in the presence of extra surfactants.

Methods

- Carbonyl-containing VOCs (VOCs) such as Glyoxal (G) and Methylglyoxal (MG) are SOA precursors.

Results & Discussion

- Figure 1: Graphical representation of dark chemistry occurring with the mixture of G and AS. It produces pyrazine and imidazole which are known to absorb UV radiation. Currently not much is known of the product when exposed to UV.

- Figure 2: The chemical structure of Sodium dodecyl sulfate. It contains both a strong polar and no polar region making it surface active surfactant.

- Figure 3: Schematic of Profile Analysis Tensiometer (PAT) experimental set up

- Figure 4: An example of hanging droplet in the PAT

- Table 1: An ANOVA analysis on the data. In both testing condition time was found to be a significant as it is less than $\alpha$ of 0.05. While exposure was found only to significant in the absence of SDS.

<table>
<thead>
<tr>
<th>G/AS</th>
<th>10uM SDS/G/AS</th>
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<tbody>
<tr>
<td>Exposure</td>
<td>0.002</td>
</tr>
<tr>
<td>Time</td>
<td>.016</td>
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<tr>
<td>Glyoxal Conc.</td>
<td>0.135</td>
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References