

CE of Chamber- Generated SOA

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Alion & EPA

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Collection Efficiency of the Aerosol Mass Spectrometer for Chamber-Generated Secondary Organic Aerosols

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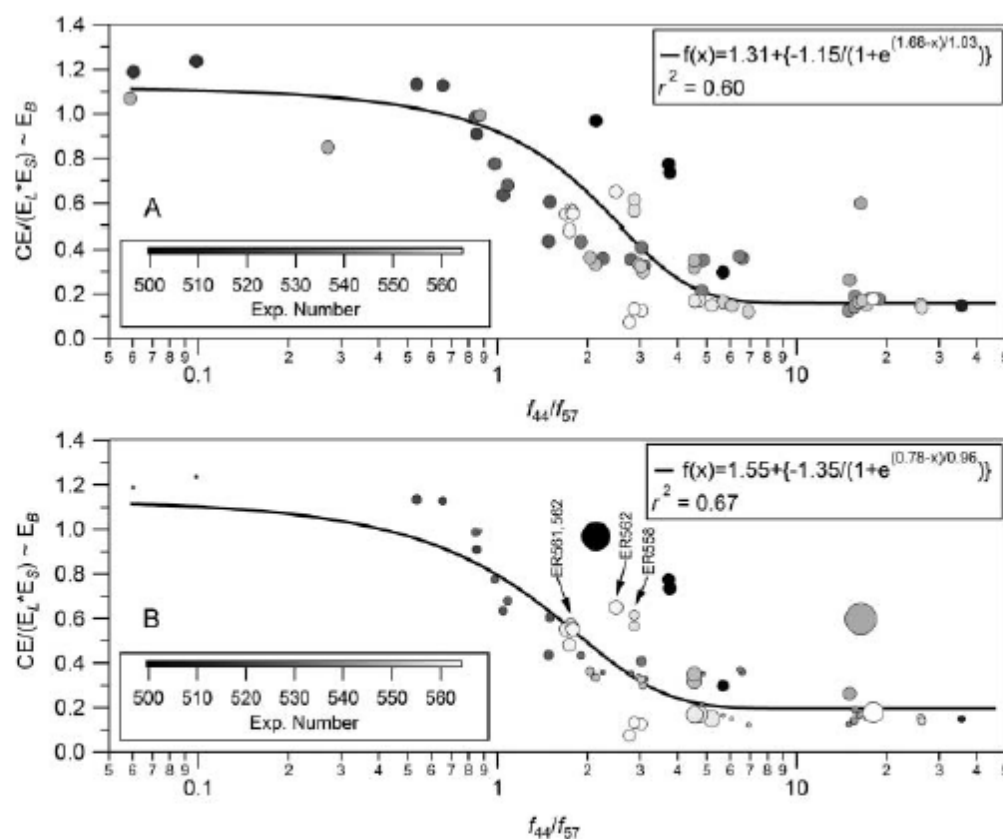
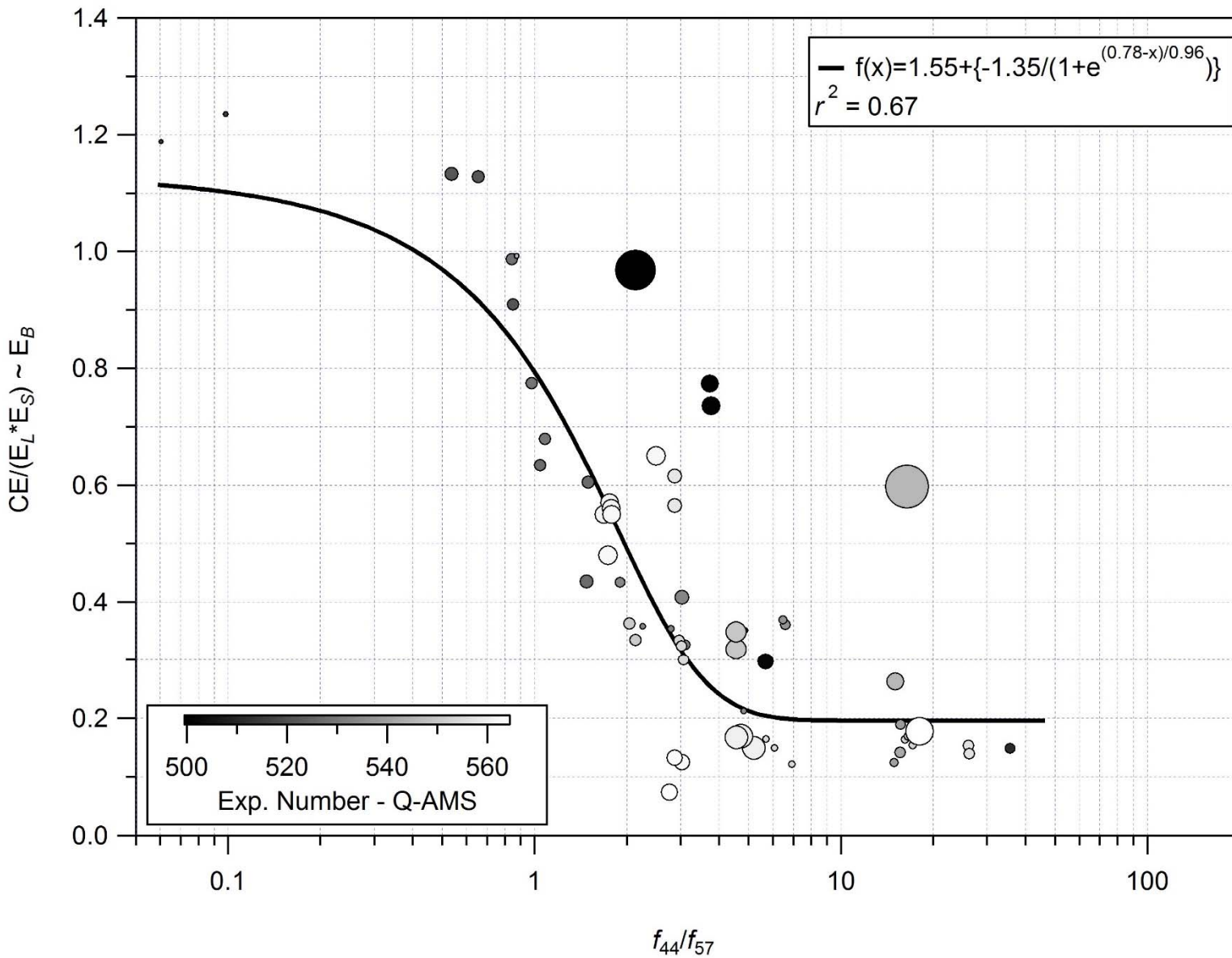
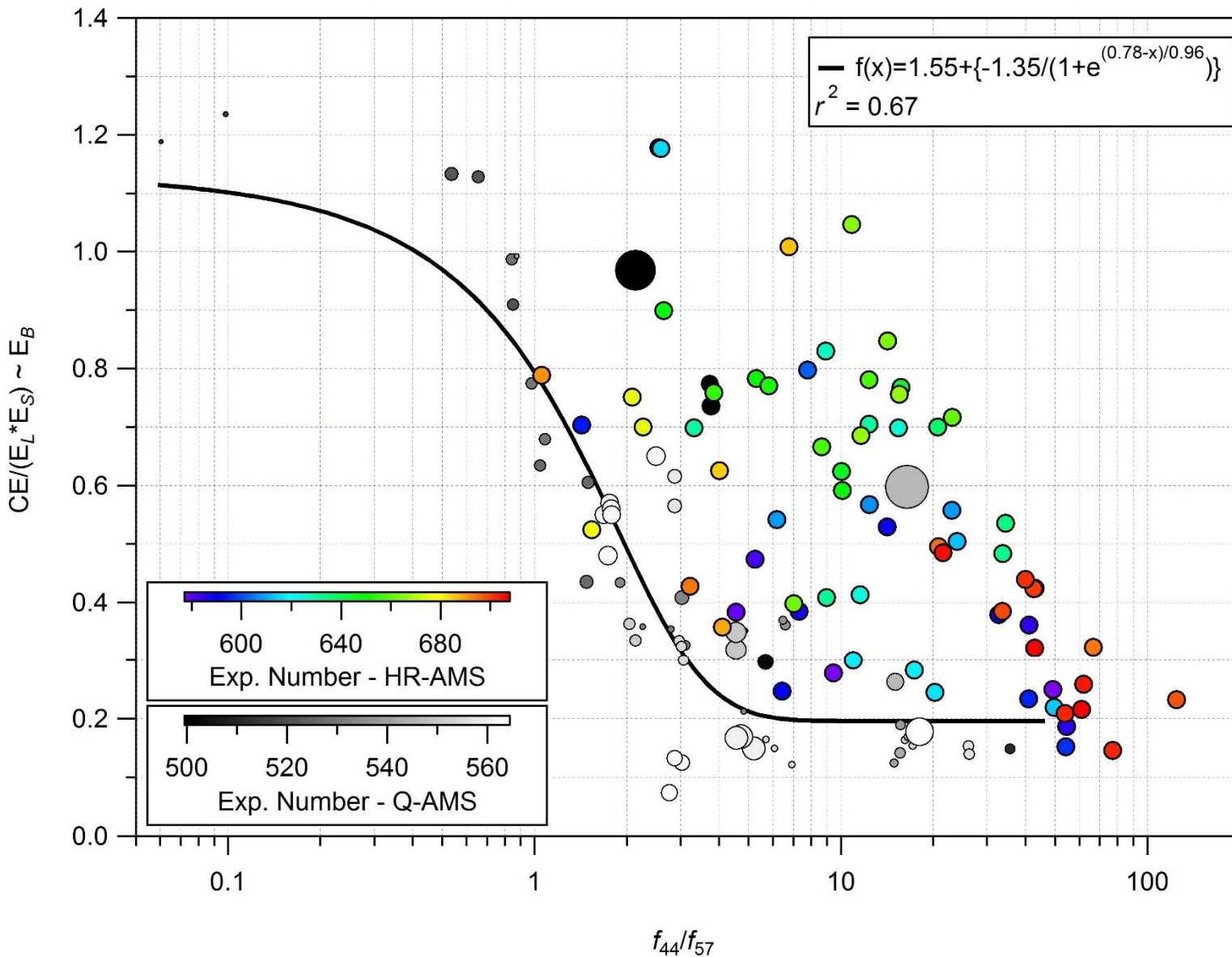


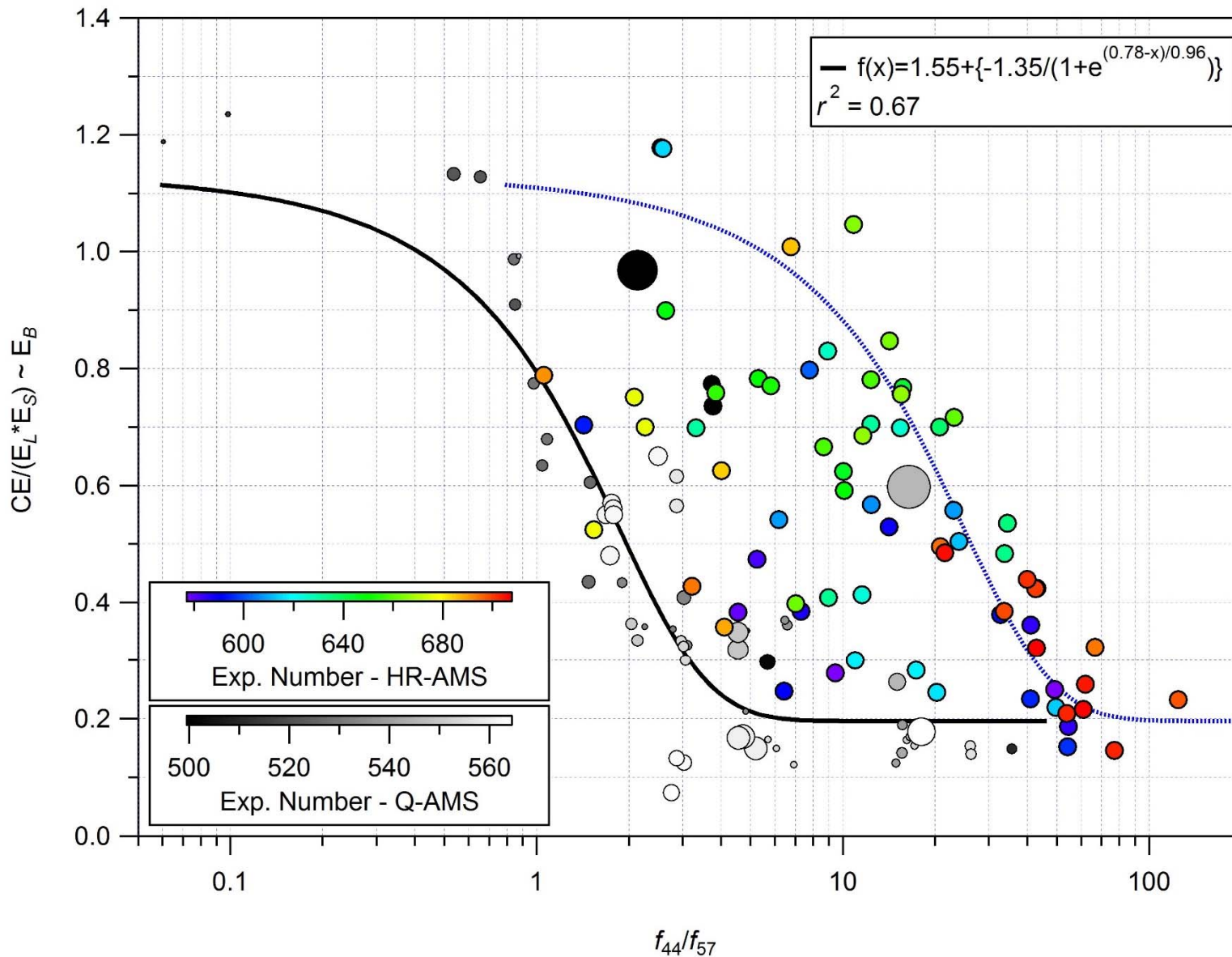
FIG. 6. Estimated E_B values as a function of the f_{44}/f_{57} ratio. Data in (a) are shown without correcting for the overestimated E_L contribution to ER588, ER561, and ER562. This overestimation has been removed from the data presented in (b) (indicated by arrows), which has decreased the CE for each of these reactions to a point where they are much more consistent with the majority of remaining aerosols. A sigmoid regression curve has been added to each plot to show the overall data trend. Additionally, marker size in (b) indicates the relative contribution of nitrate to OA mass (f_{NO_3} , range: 0–40%) for each aerosol type.



- Reproduction of Docherty et al. (2012) Figure 6b
- CE of chamber-generated SOA assessed with Q-AMS
- Data point size indicates fraction of NO_3 (f_{NO_3})
- Higher CE may be a function of higher f_{NO_3}



- Preliminary, additional CE measurements using procedure of Docherty et al. (2012) with HR-AMS
- Higher scatter in CE as a function of f_{44}/f_{57} of unknown origin
- Scatter due to drift in f_{44} or CE dimension?



- However, overall trend in preliminary HR-AMS CE as a function of f_{44}/f_{57} is similar to original trend identified in Q-AMS studies
- Blue line is duplicate of original sigmoidal regression line used to guide the eye and is not a regression of preliminary data

Implications:

- CE trend for chamber-generated SOA is consistent over long term
- Appears to be a function of OA oxidation
- The trend is apparently not observed for ambient OA
 - Consistent CE=0.5 for ambient OA
 - Due to ambient OA a mixture of OA with different CE averaging to CE=0.5?

Still to be done:

- Finalize preliminary data to rule out instrument/user errors
- Light scattering unit to tease out CE vs RIE issues
- Visually determine phase of chamber-generated SOA