

APPENDIX

A Surface Second Harmonic Generation Investigation of Volatile Organic Compound Adsorption on a Liquid Mercury Surface

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Independent trials of SHG adsorption and desorption kinetics on the same liquid mercury surface, highlighting the reversibility of the VOCs adsorption for multiple cycles, are shown in figure A.1.

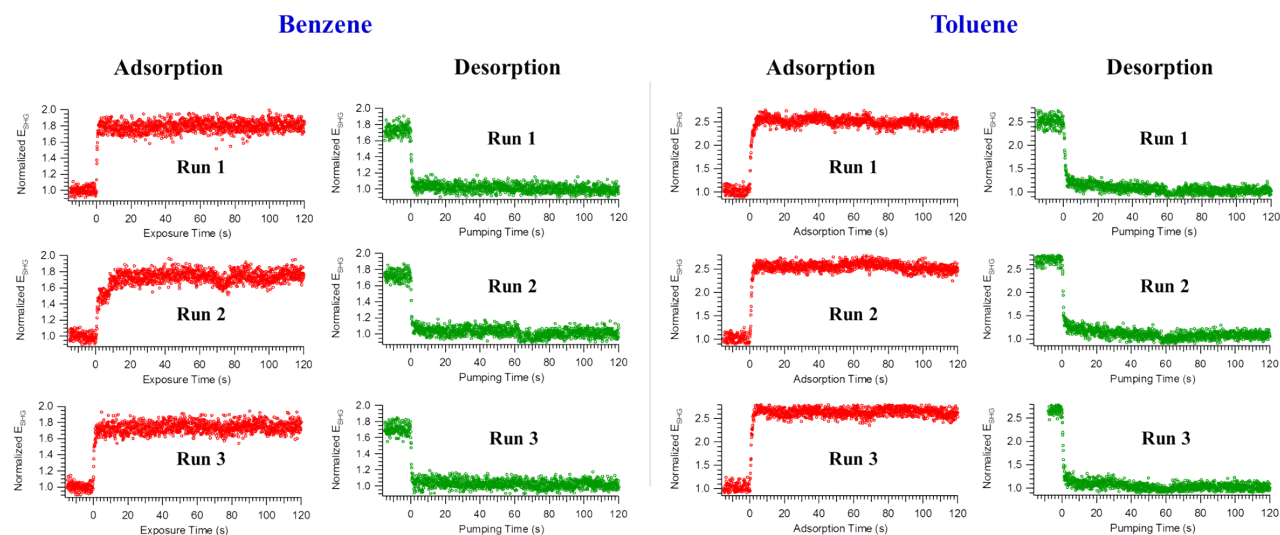


Figure A.1 Three independent cycles of the adsorption and desorption kinetics: Normalized SHG field for the kinetics of adsorption (red dots) and desorption (green dots) of benzene (left) and toluene (right) as a function of exposure time and pumping time.

Experimental trials of the SHG adsorption study along with the corresponding fits using different isotherm models are shown in figure A.2. The corresponding isotherm equations¹ are:

Frumkin-Fowler-Guggenheim
$$K_{FG}P = \frac{\theta}{(1-\theta)} e^{-w\theta} \quad \text{Equation A.1}$$

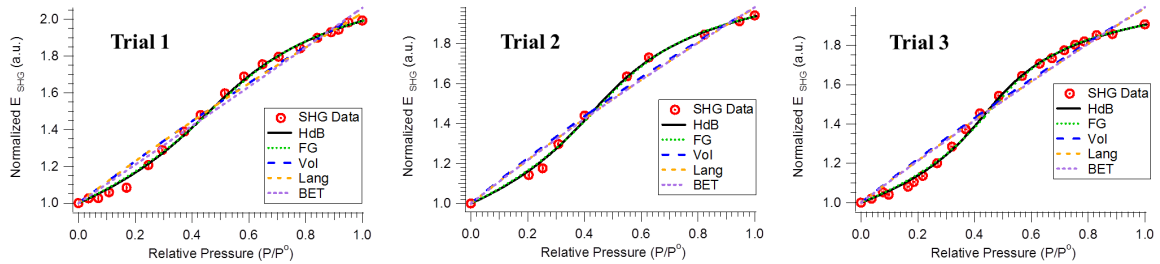
Hill-de-Boer
$$K_{HdB}P = \frac{\theta}{1-\theta} \exp\left[\frac{\theta}{1-\theta} - \frac{2\alpha\theta}{k_b T \beta}\right] \quad \text{Equation A.2}$$

Volmer
$$K_{Vol}P = \frac{\theta}{1-\theta} \exp\left[\frac{\theta}{1-\theta}\right] \quad \text{Equation A.3}$$

Langmuir
$$\theta = \frac{K_{Lang}P}{1 + K_{Lang}P} \quad \text{Equation A.4}$$

Brunauer–Emmett–Teller
$$\theta = \frac{1}{1-P} \left(\frac{K_{BET}P}{1-P} \right) \quad \text{Equation A.5}$$

Benzene:



Toluene:

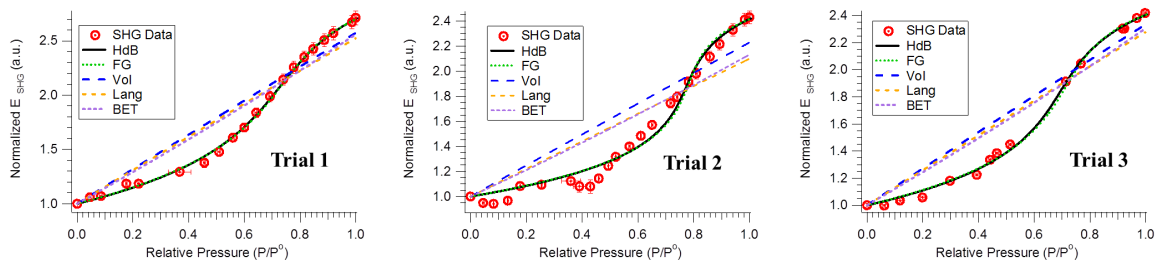


Figure A.2 Three different trials of adsorption isotherms for benzene (top) and toluene (bottom).

The experimental data is shown in red and the corresponding isotherm fits are depicted as solid or dashed lines.

References

- 1 Lyklema, J. *Fundamentals of Interface and Colloid Science*. Vol. 2: Solid-Liquid Interfaces 1.1-1.118 (Academic Press, 1995).