Saliva pH after exposure to e-cigarette aerosols in a glassmouth with and without stirring of the saliva during exposure

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Outline for presentation

- Objectives for research
- Experimental details
- Experimental results
- Conclusions

Objectives for research

- Main objective was to determine if stirring of artificial saliva in glassmouth changed final saliva pH and nicotine absorption versus not stirring the saliva
- Another objective was to check results on e-liquid pH versus those reported recently in the literature

Experimental details – 1

- L&ALLC Model IIIb µ-processor-controlled, constant-vacuum, square-wave e-cigarette puffing system; puffing regimen of 55/3/30
- Flow control by Swagelok SS-4MG-SL 10-turn metering valve acting as critical flow orifice
- Flow checked with Sigma-Aldrich 20414 500-mL bubble meter with Cerulean SC#59138 Restrictor 10CSM (calibrated)(1 kPa)

Experimental details – 2

- pH-Instrumentation – Hach H260G meter with Data Logger software and HI 1053B (conical) pH electrode
- Saliva exposure conducted in glassmouth (Honeycutt, 1985) modified with depression (≈10 mL) for saliva and top port for pH probe, 50 puffs/run
- Stirring accomplished with magnetic stir bar driven by Arduino-controlled stepper motor with a platform containing cross-shaped stir bar

Glassmouth and stirrer assembly

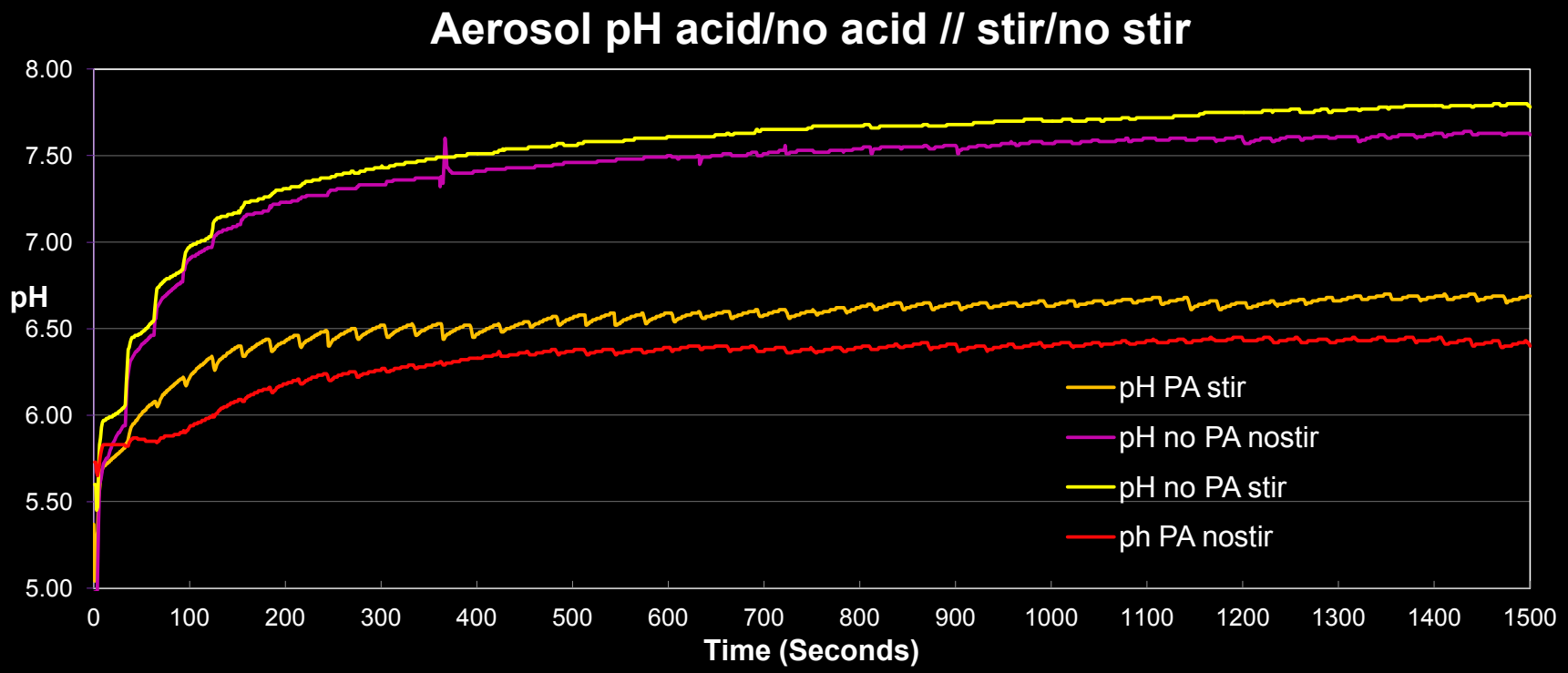
Experimental details – 3

- Experimental e-liquid formulations
  - Equimolar propionic acid (PA) or ammonium carbonate (AC) added to 50 mg/mL nicotine in PG
  - About 3.09 mmoles of PA or AC per 10 mL of e-liquid
- Apparent pH-values (HI 1083B microelectrode with IQ150 pH meter; Pagano *et al*., 2016)
  - PA1, 6.61; PA2, 6.77; AC1, 9.28; and AC2, 9.29
  - V2 Red 2.4, 7.03; V2 Green 2.4, 8.49
  - 50 mg/mL nicotine in PG, 9.19

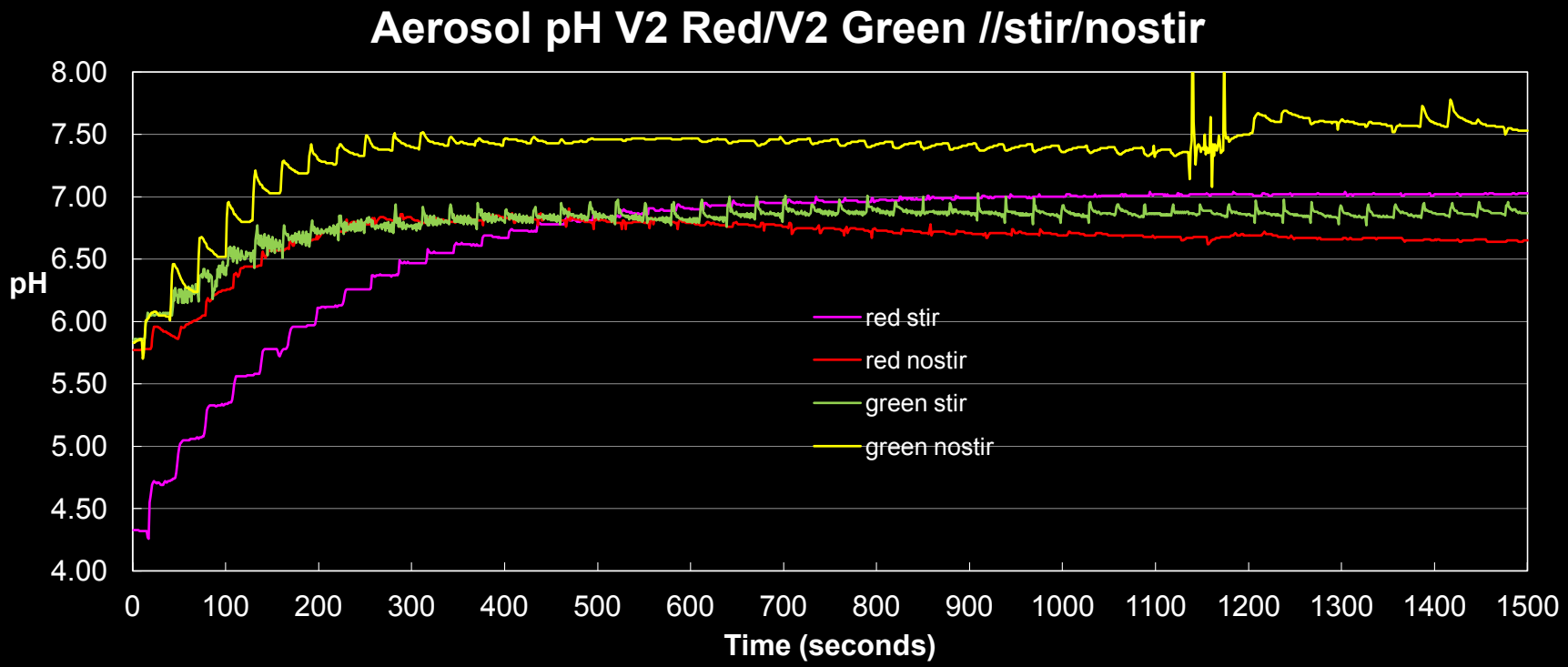
Experimental details – 4

- HPLC estimation of nicotine in saliva
  - Instrumentation
    - Waters 680 gradient controller with 3 Waters 510 pumps
    - Rheodyne 7725i valve-in-loop injector (10 µL)
    - YMC Triart C18 column (250 /4.6/5) with Triart C18 guard column
    - Waters 486 tunable absorbance detector at 259 nm
    - HP 3396 series II recording integrator
  - Conditions
    - Mobile phase – 60/40 water/MeOH, add 0.1% trifluoroacetic acid (Pankow *et al*., 2017)
    - Flow rate – 1 mL/minute

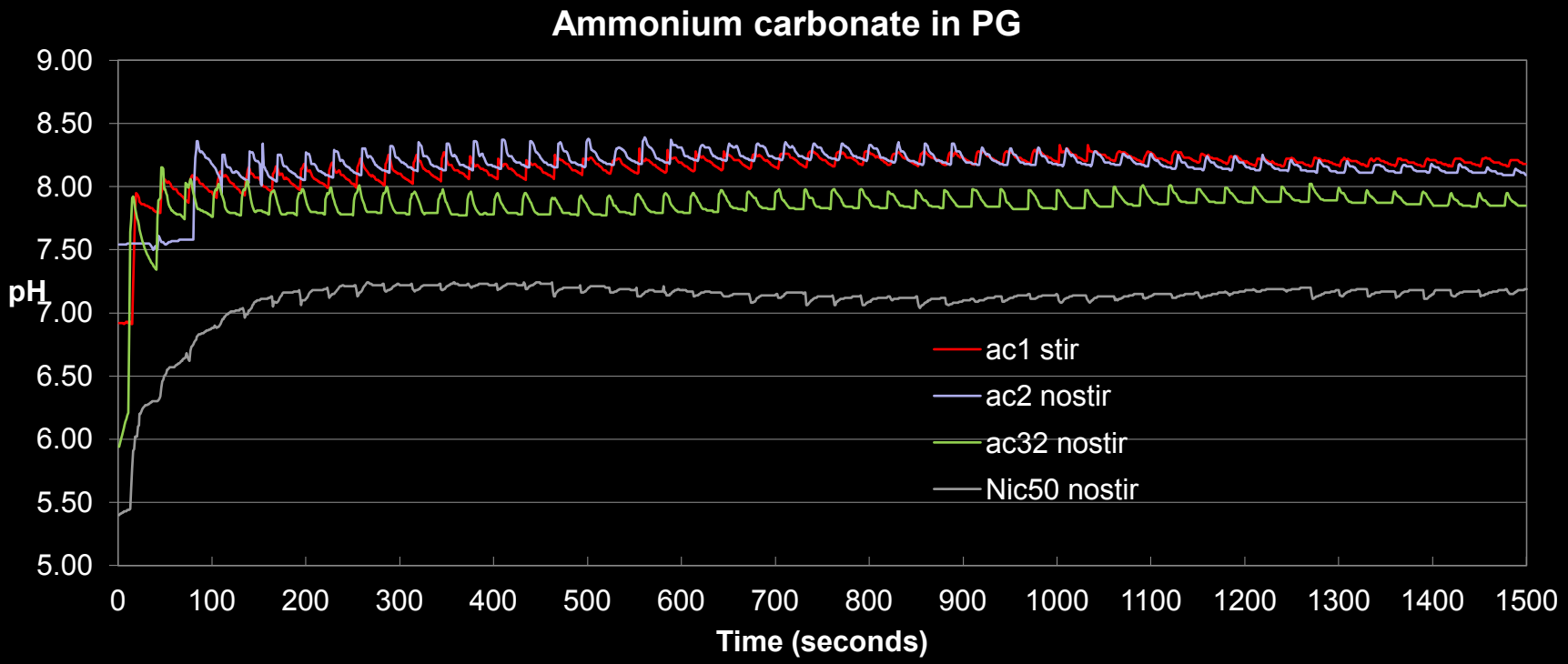
Experimental results – 1 PA/no PA // Stir/no stir



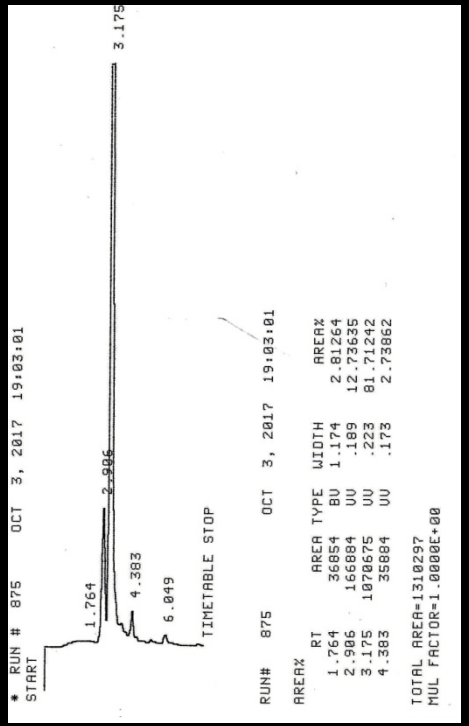
Experimental results – 2 Red/Green // Stir/no stir



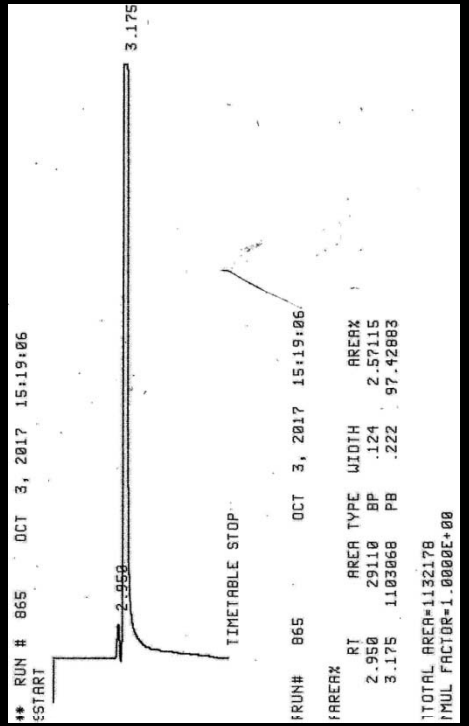
Experimental results – 3 $(NH_4)_2CO_3$ in PG



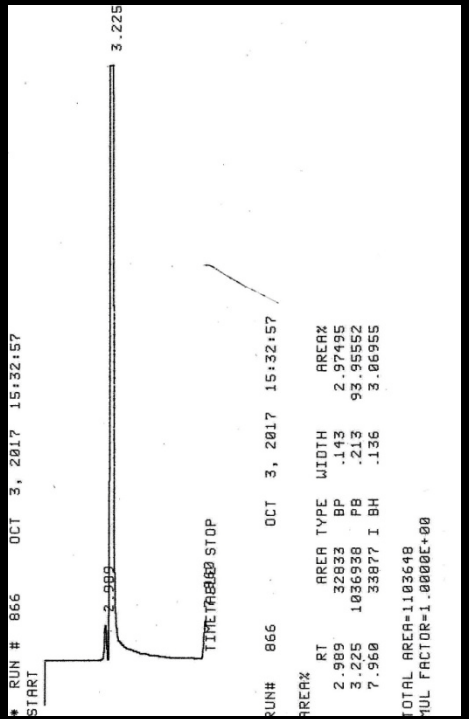
Experimental results – 4 Nicotine in saliva by LC



V2 Red 2.4, NS 1.07



AC1, NS 1.10



AC2, Stir 1.03

Conclusions

- Stirring versus not stirring the saliva during aerosol collection seems to have little effect as measured by
  - pH-value of salivas after exposure
  - pH-values of the aerosols during exposure of salivas
  - Nicotine content of salivas after exposure
- Our instrumentation permits assessment of the aerosol without need for trapping in water or on filtration media