AN APPROACH TO THE DETERMINATION OF METALS IN THE EMISSIONS FROM E-CIGARETTES

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Talk Outline

1. Study objectives
2. The e-cigarette and potential sources of metals
3. Artificial enhancement of an e-liquid
4. Aerosol generation and analysis
5. Potential next steps

Study Objectives

1. To evaluate an approach for the artificial enhancement of the levels of metals in an e-liquid to aid development of metals in aerosol methodology.

2. To assess the efficiency of the transfer of metal from the e-liquid to the e-aerosol.

3. To inform of study design/next steps for a larger study

What could be the potential sources of metals in an e-cigarette aerosol ?

Ingoing ingredients

Base components
Flavours

Manufacturing processes

Device Components

Heaters
Battery connectors

Which metals to look for?

Metals associated with components used in your materials of construction plus any others regulatory bodies request.

Vaping device categories with testing challenges

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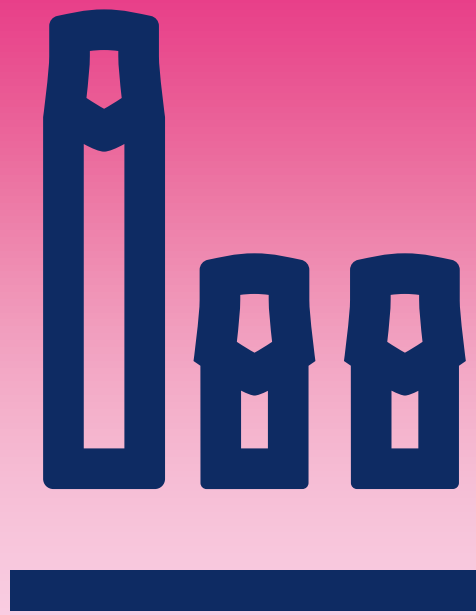
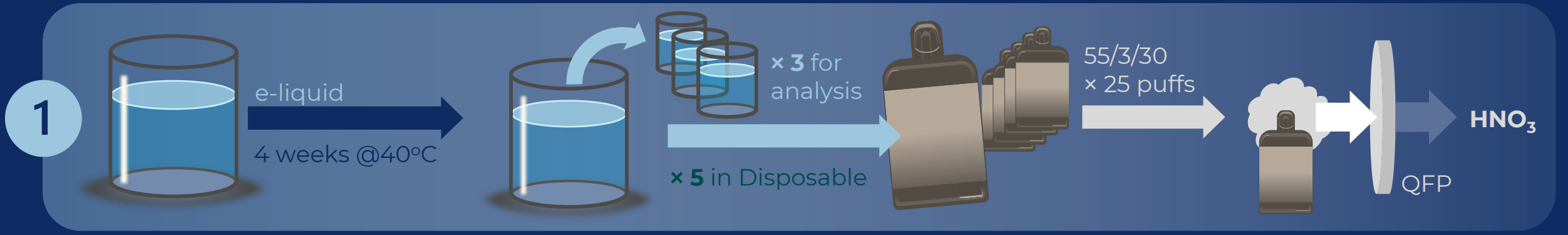
Pod



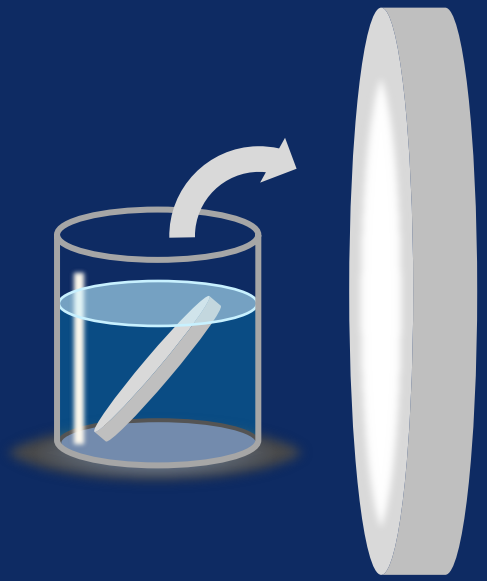
Disposable

Experimental Design

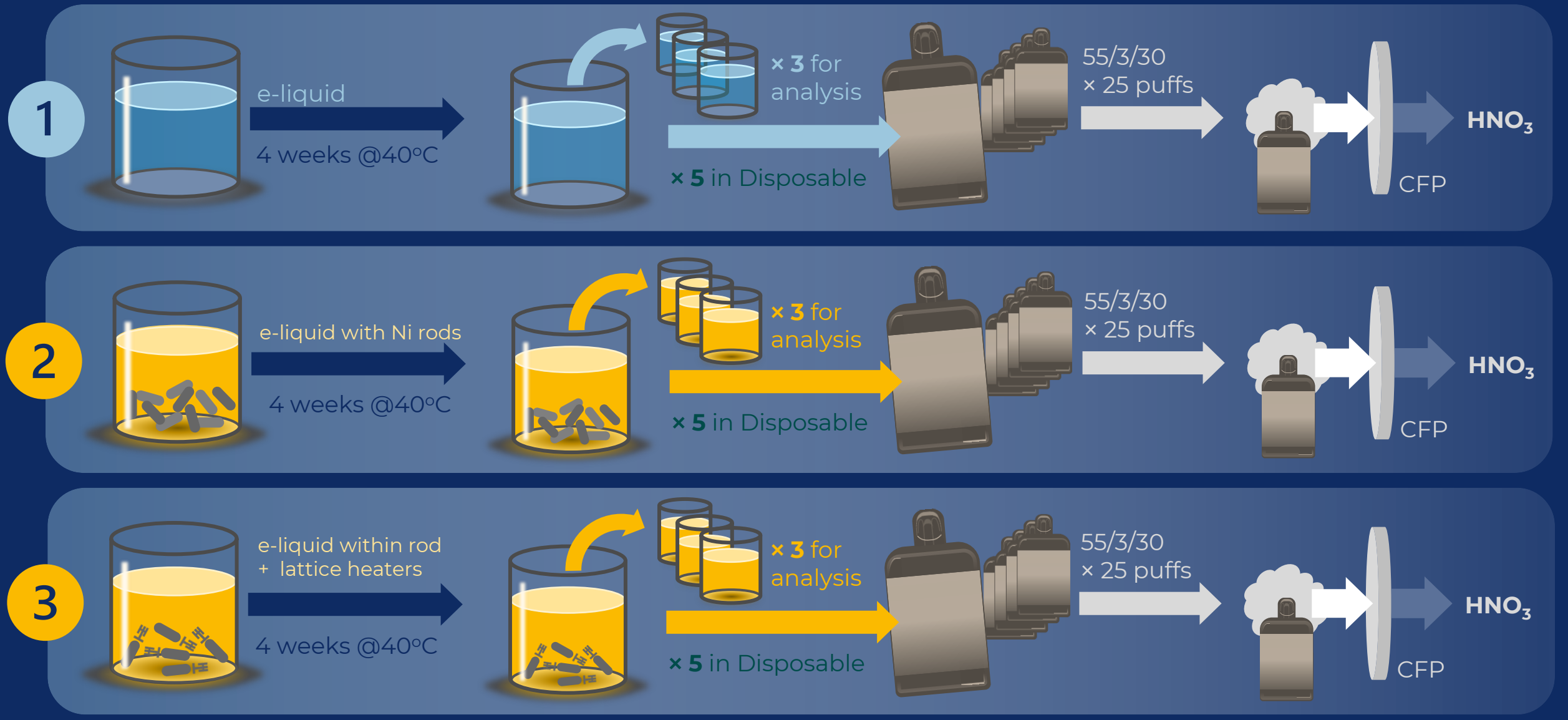


Pre-Cleaned Quartz Filter Pad

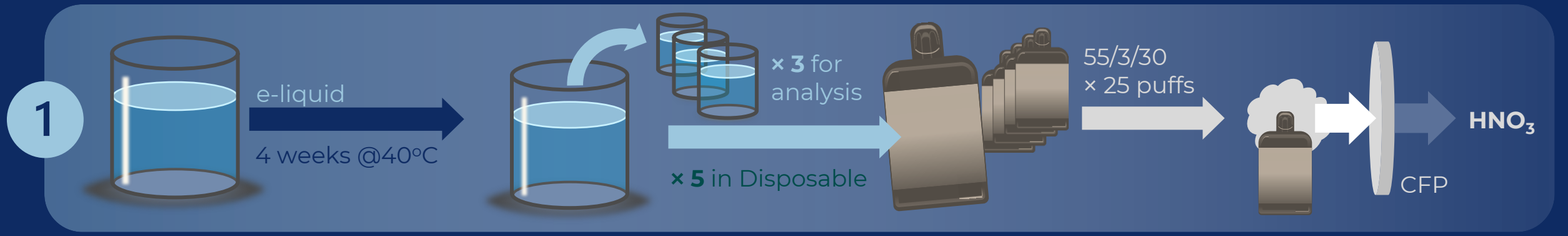
Standard quartz filter pad was “cleaned” with a process using deionised water and nitric acid to lower the background levels of metals



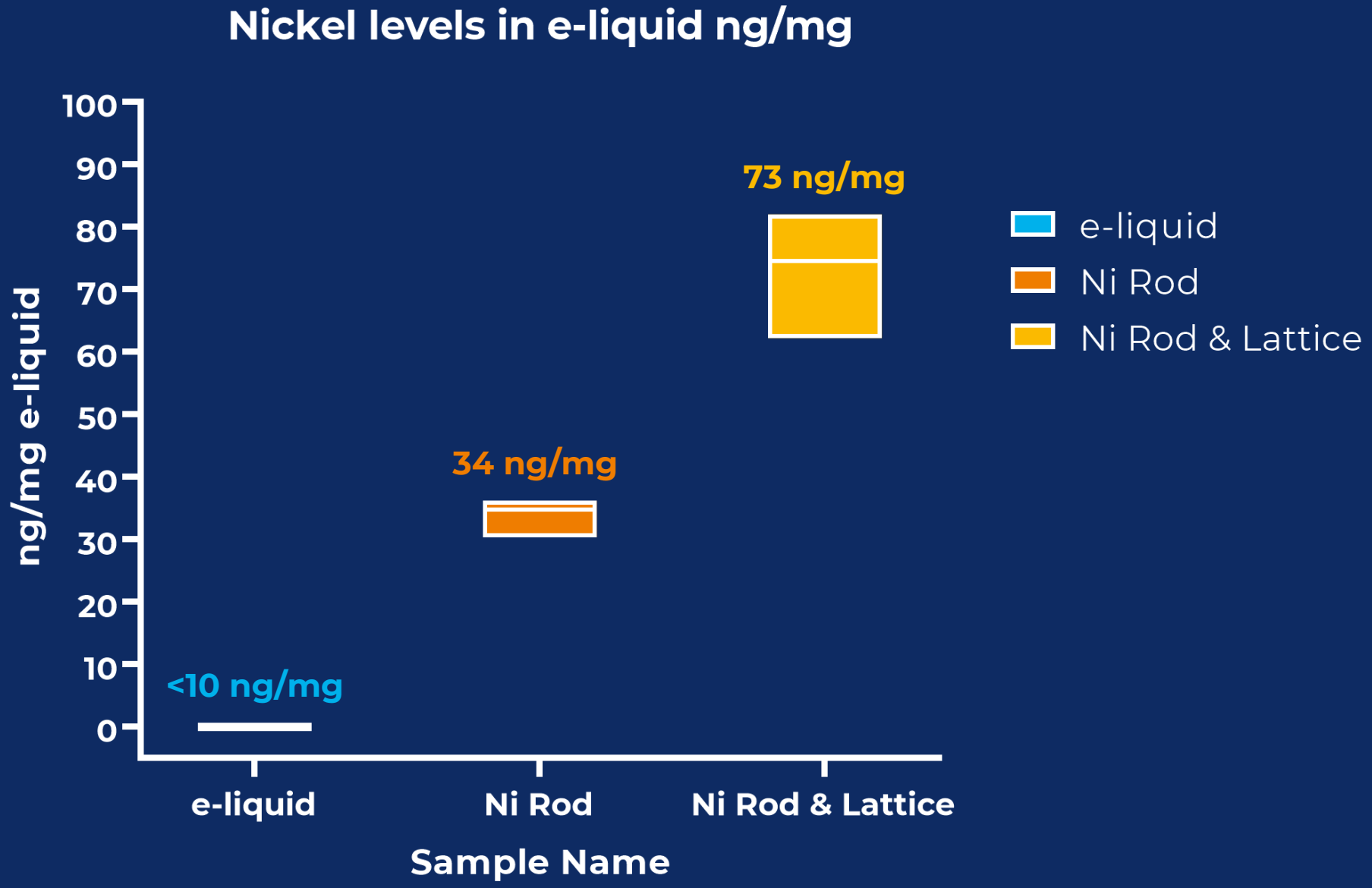
Experimental Design



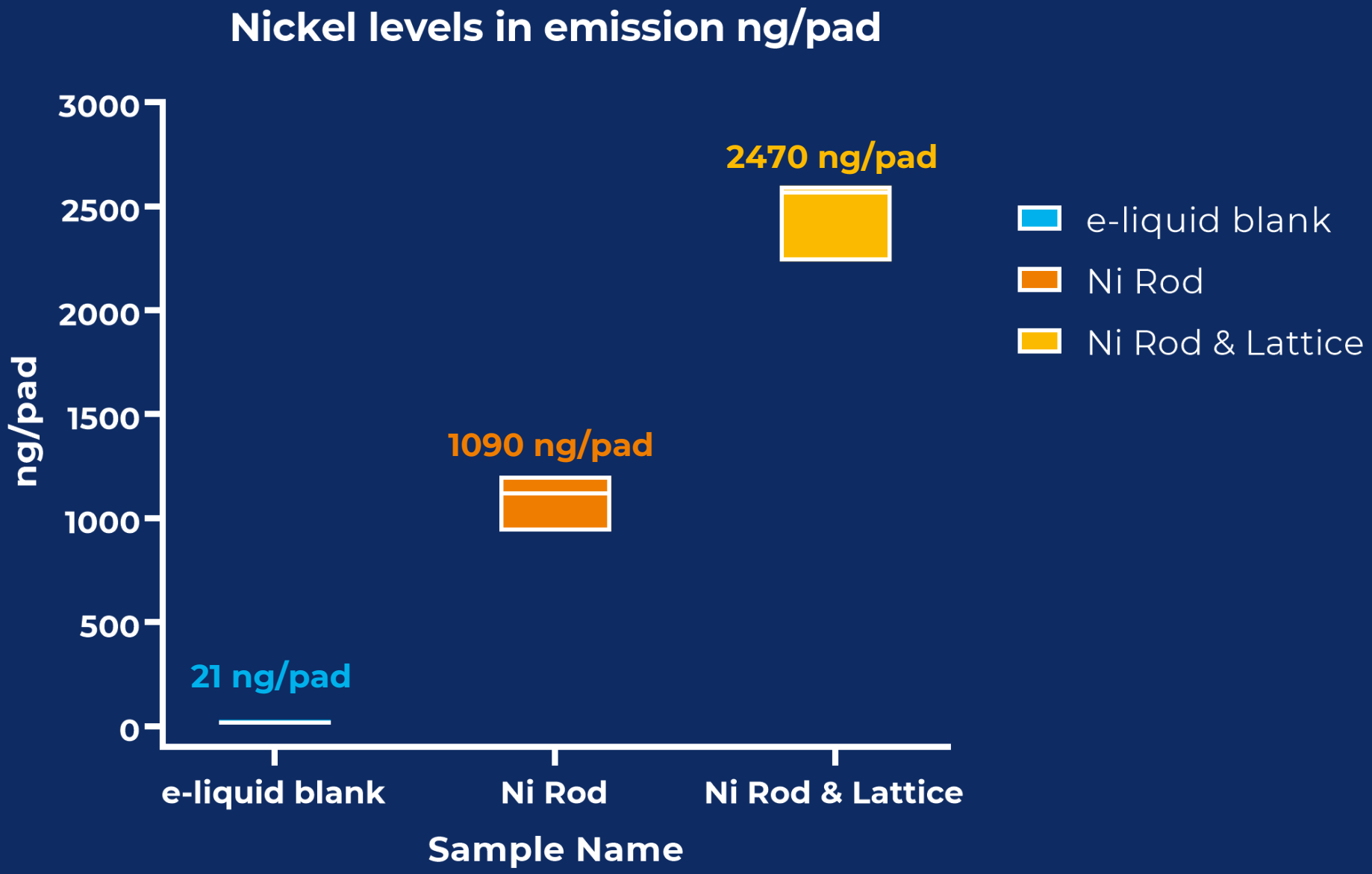
Liquid Results



Results e-liquid



Results emissions

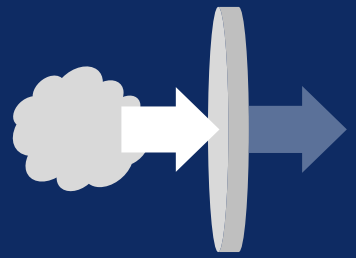


Transfer from e-liquid to e-aerosol

× 3 for analysis

34 ng/mg
Ni rods

216 mg aerosol
7340 ng Ni in theory on pad



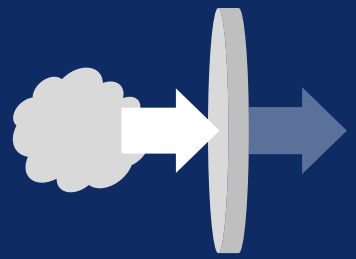
Mean measured Ni on pad
1090 ng (3SF)

Transfer 15%
Range 12-18% (n=5)

× 3 for analysis

73 ng/mg
Ni rods
with lattice

217 mg aerosol
15,800 ng Ni in theory on pad



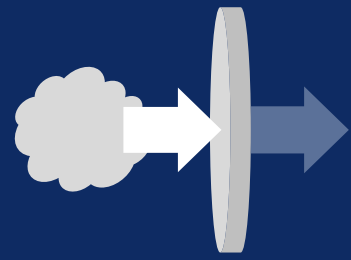
Mean measured Ni on pad
2470 ng (3SF)

Transfer 16%
Range 15-18% (n=5)

Summary

- Soaking nickel in an e-liquid and storing at elevated temperature has proved to be an effective method for enhancing the level of the metal in the e-liquid

- The transfer of nickel from the e-liquid to the CFP ranged from 12-18% irrespective of the starting level of nickel



- This was a small scale study on only one e-liquid and one metal but it does show that the methodology works

Potential Next Steps

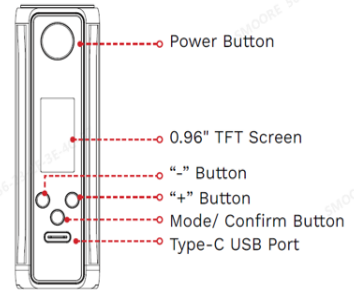
An understanding of the transfer rates of different metals could be an important consideration when designing studies where spiking of e-liquids with studied metals is likely to be a key experimental requirement.

- Will extend the range of metals and use the CORESTA reference device and reference e-liquid

Aspire Nautilus 3

Nautilus - BVC NS Atomizerheads 1.8 ohms

VAPORESSO TARGET 100 HEATER



CORESTA e-liquid Prototype B Tobacco e-liquid

(2023 Aerosol Proficiency Study: Reference Device)

Acknowledgements

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