Effect of pH and Storage Temperature on e-Liquid Metal Concentrations

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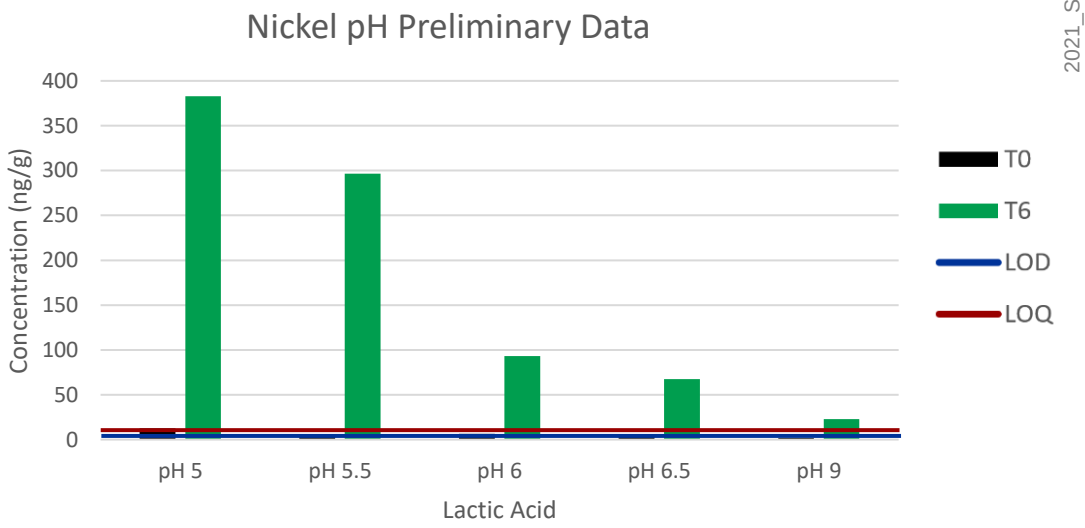
Introduction

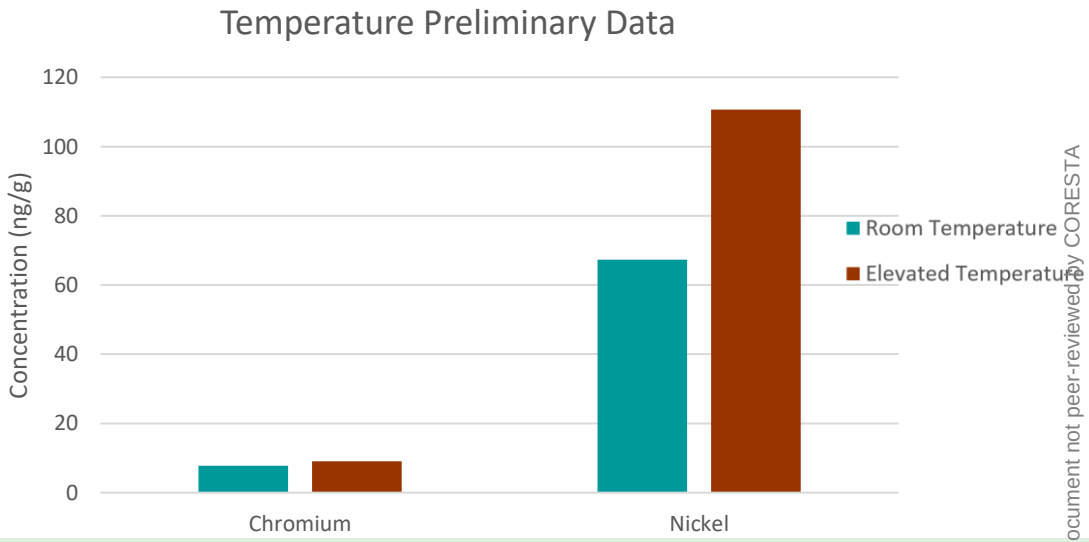
- E-liquids are available in a variety of nicotine formats and concentrations
  - Nicotine freebase and nicotine salt
- pH of the e-liquid has been shown to have an effect on the corrosion rate of heater coils
- Objective: To observe a change in metal content of e-liquid samples at varying pH levels after being stored at an elevated temperature for seven (7) days

Preliminary Testing

- Pieces of Nichrome coil were stored in e-liquid with varying pHs
  - One set at room temperature
  - One set at an elevated temperature

- Results showed a relationship between pH levels and storage temperatures on e-liquids metal concentrations

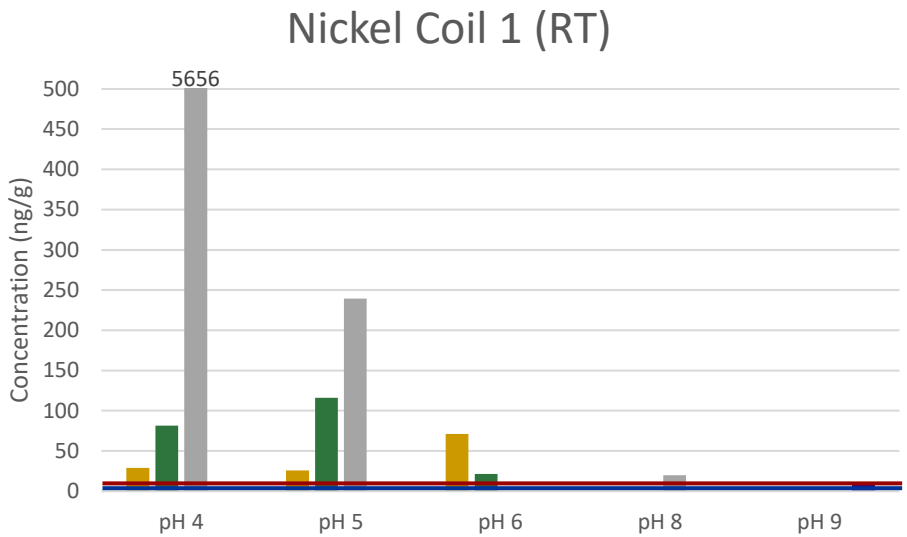


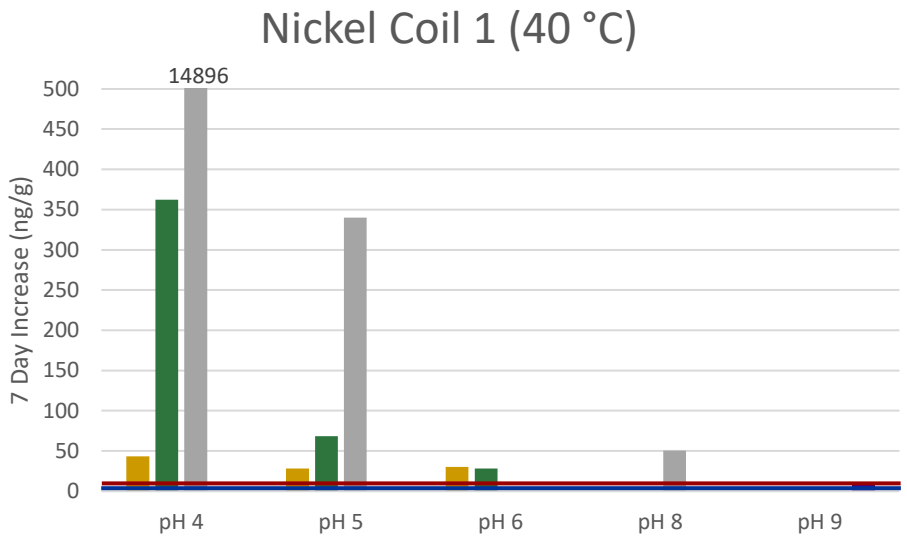


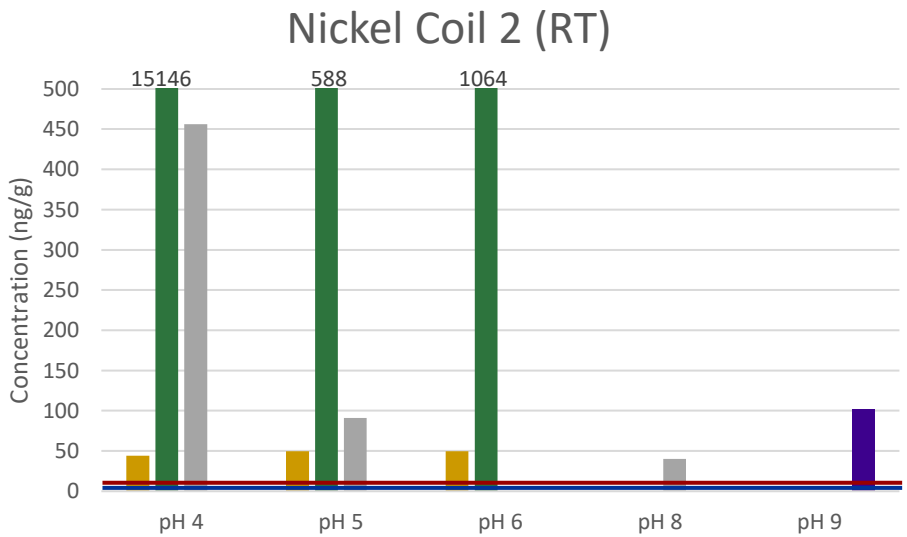
Study Design

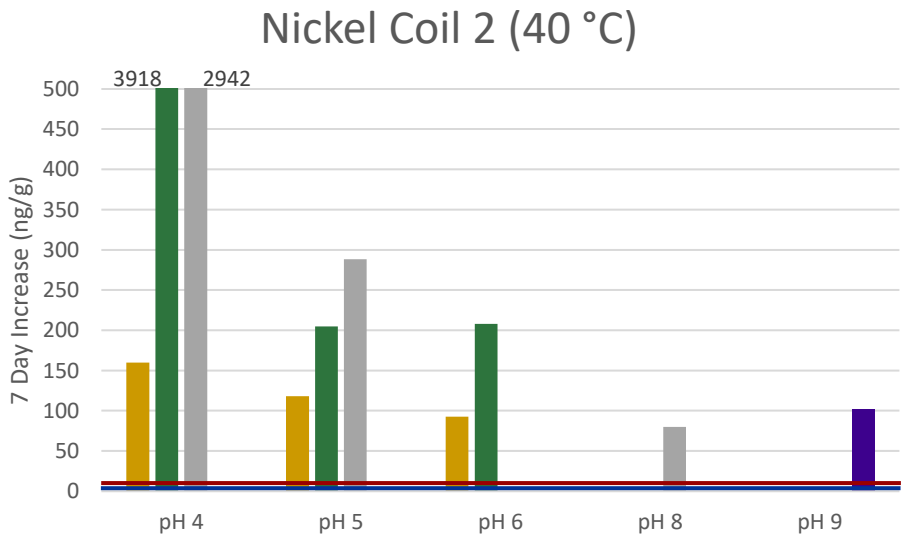
- Three (3) acids were used to make several variations of e-liquid at different pH levels in two (2) different types of pods at two (2) temperature conditions
  - **No Acid**: pH 9
  - **Benzoic Acid**: pH 4, 5, 6
  - **Lactic Acid**: pH 4, 5, 6
  - **Citric Acid**: pH 4, 5, 8
- Setup
  - E-liquid analyzed on **T0** and **T7 Days**
  - Stored at **room temperature** (approx. 20 °C) and **elevated temperature** (40 °C)
  - Coils: **nichrome** (Coil 1) and **kanthal** (Coil 2)
- All samples extracted in triplicate for all assays and metals assay reported on a per gram basis.

Results: Nickel

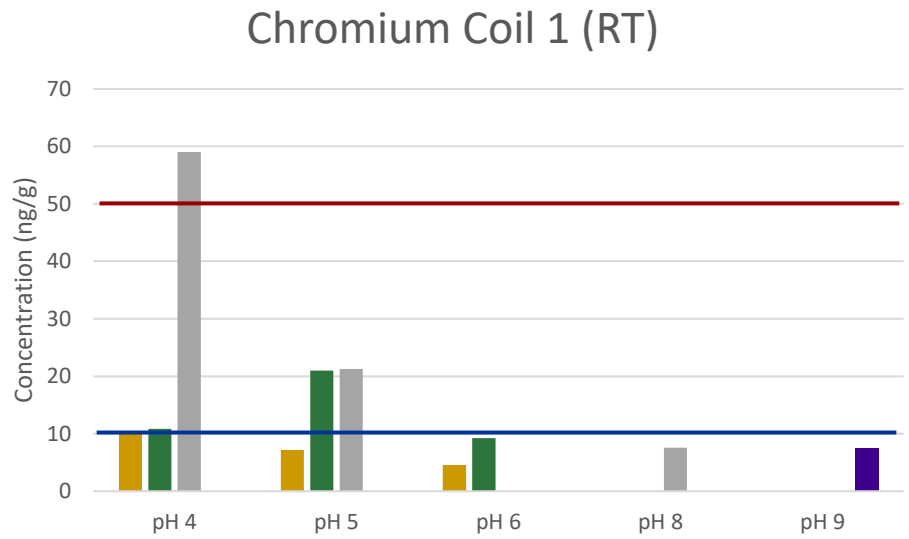


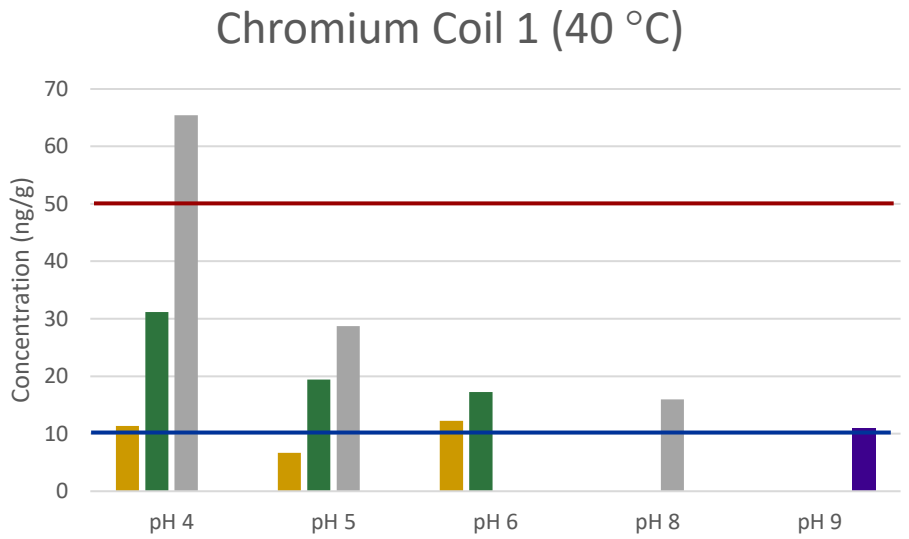


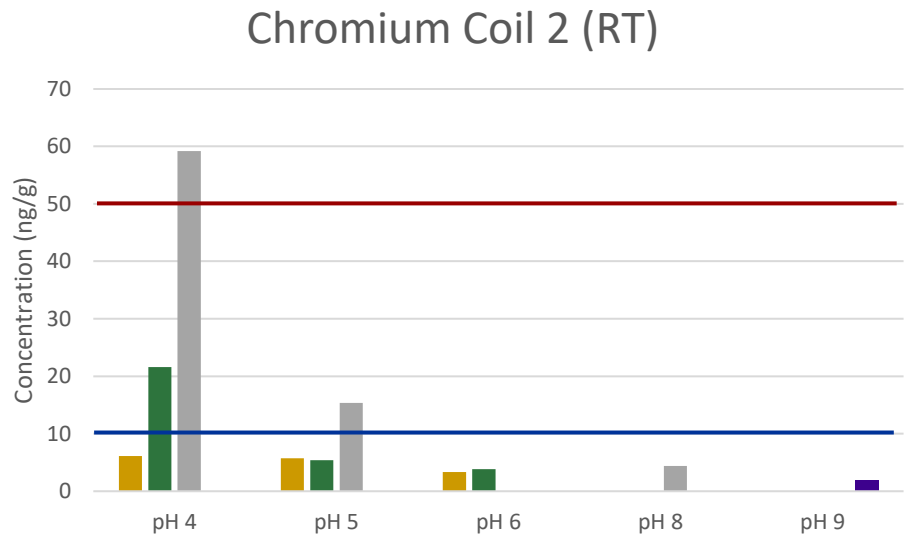


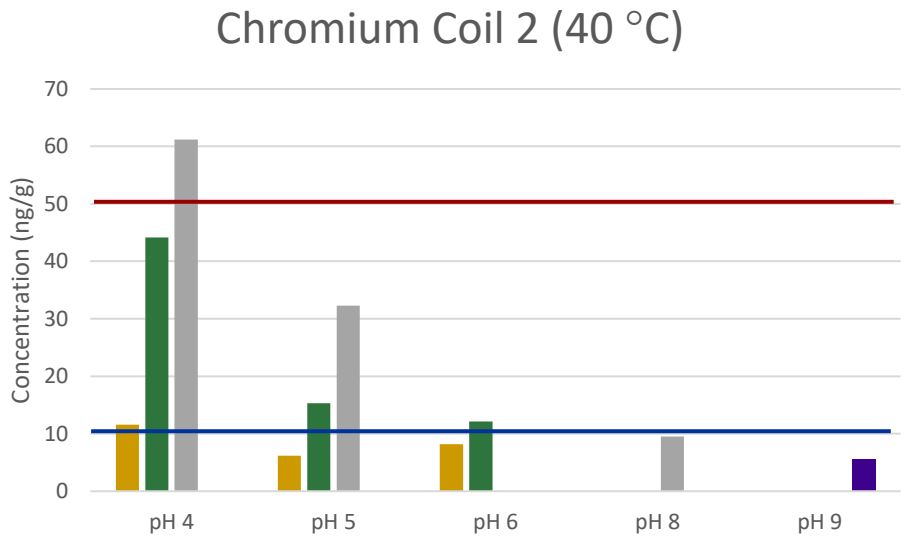


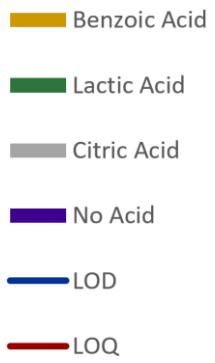
Results: Chromium



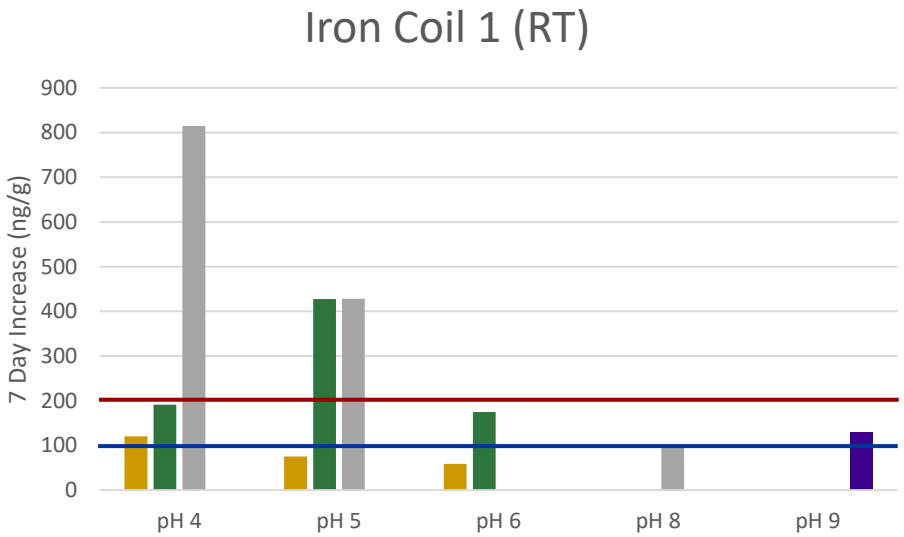


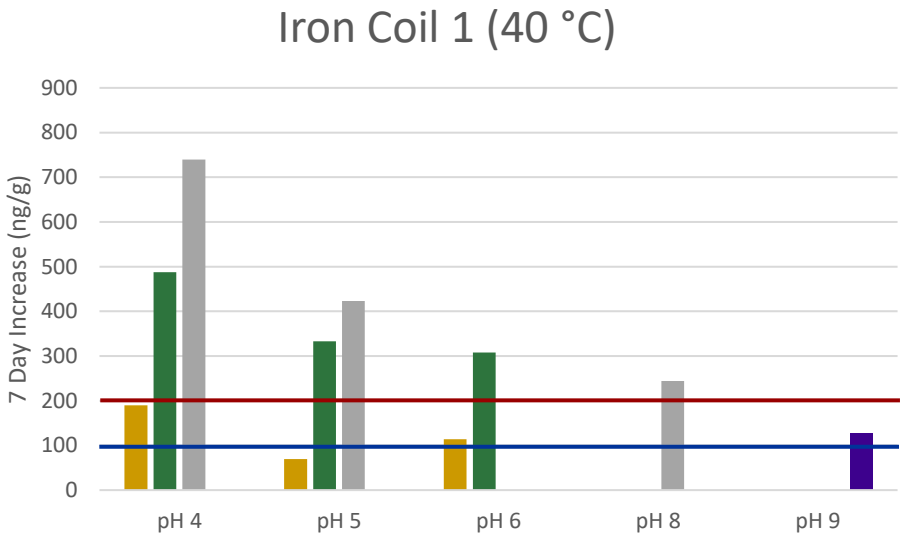


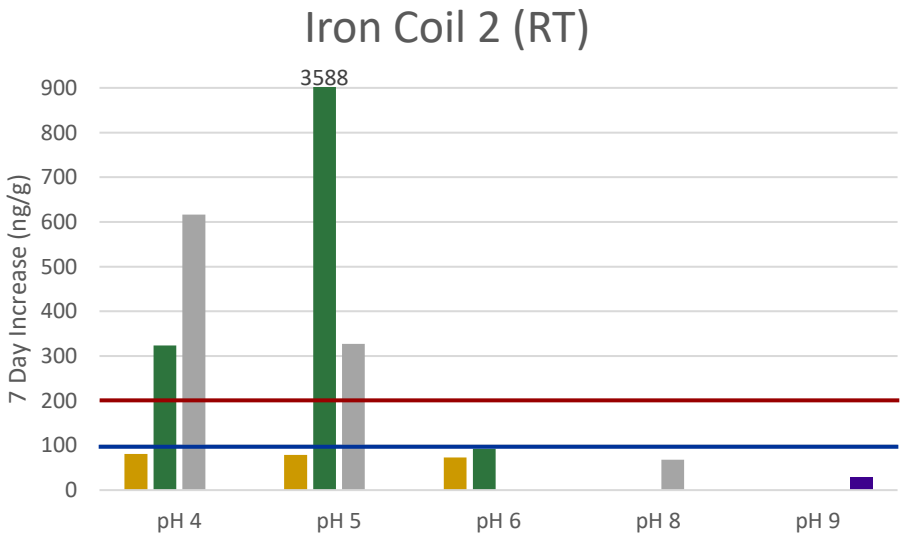


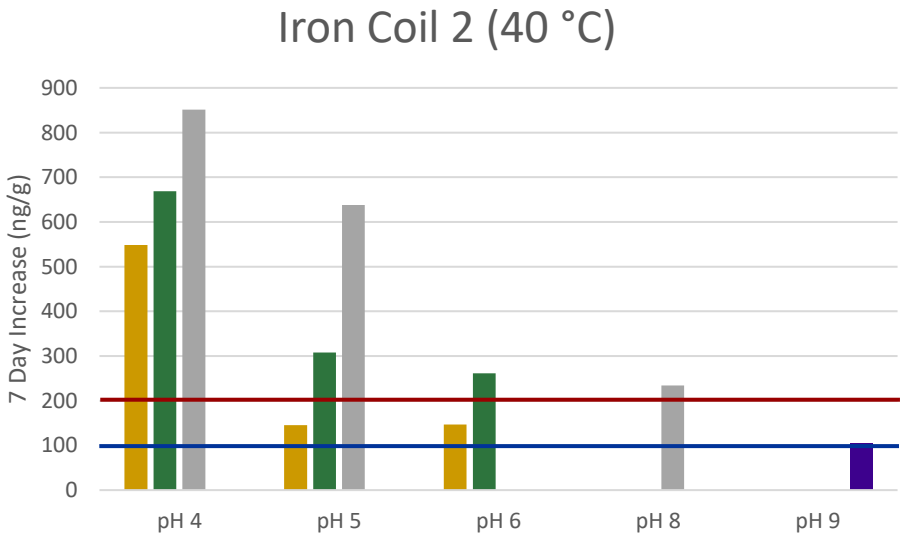


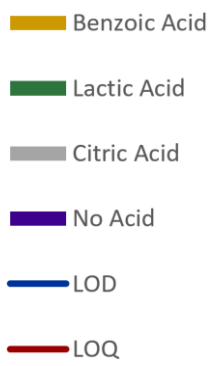
Results: Iron



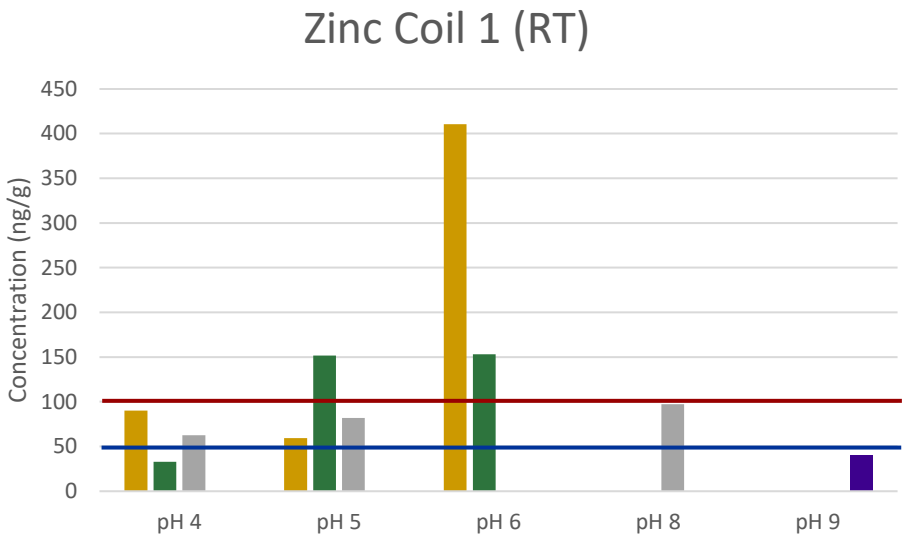


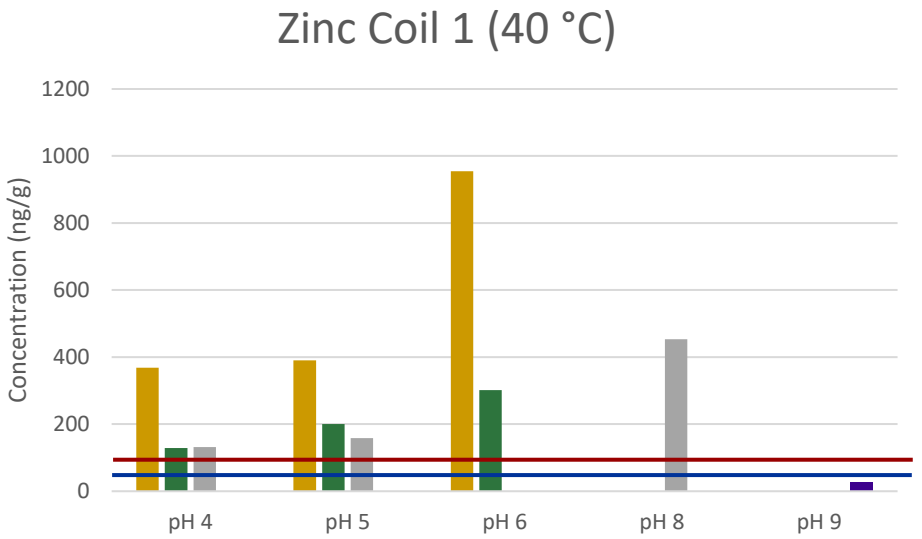


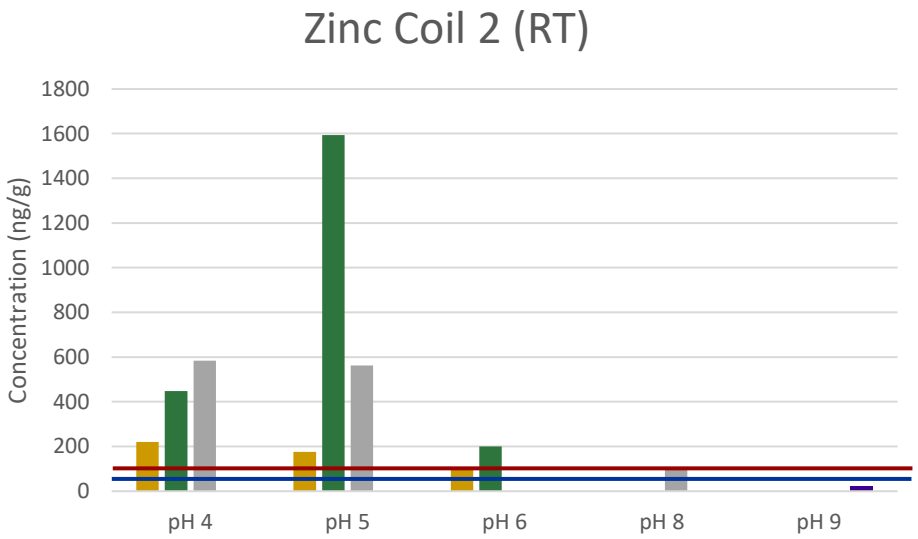


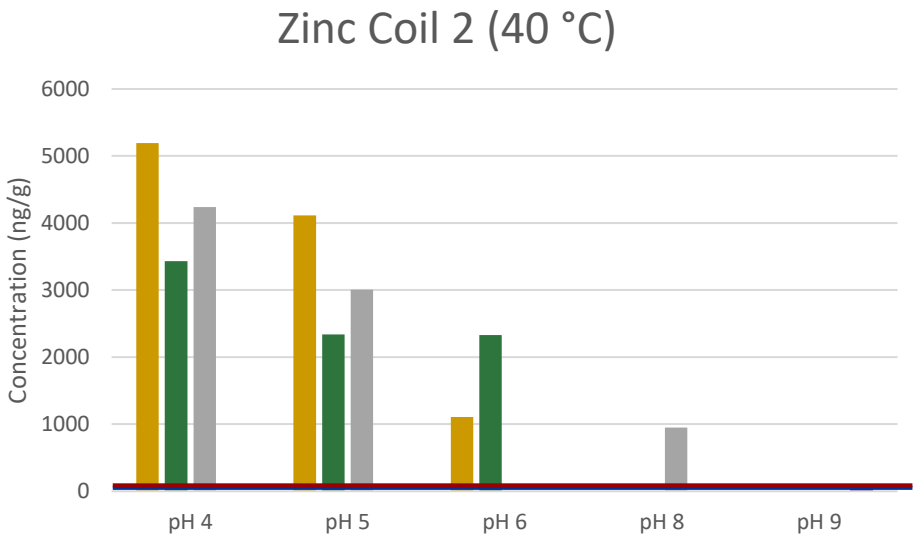


Results: Zinc

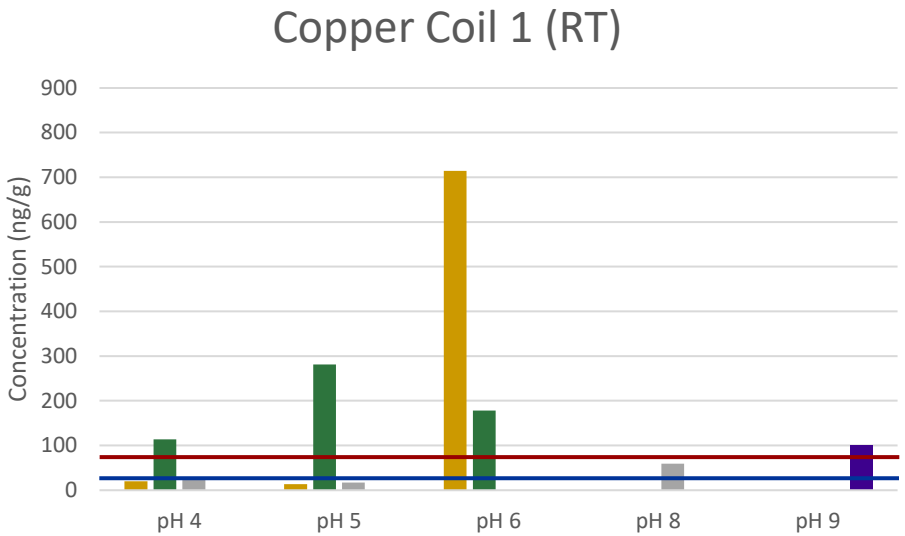


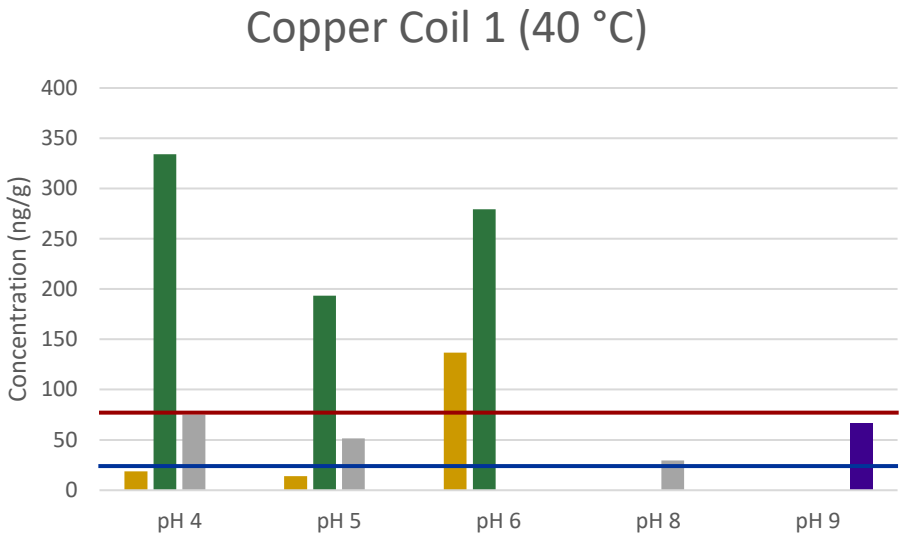


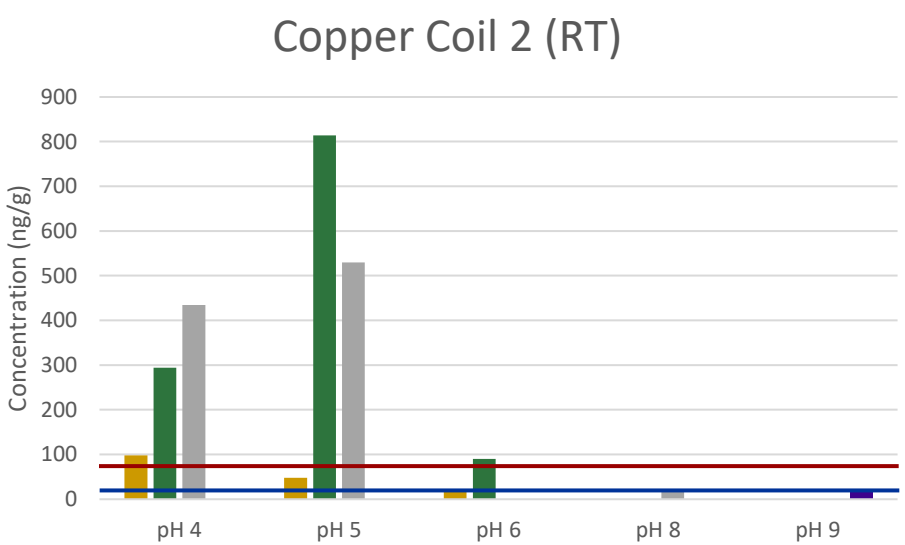


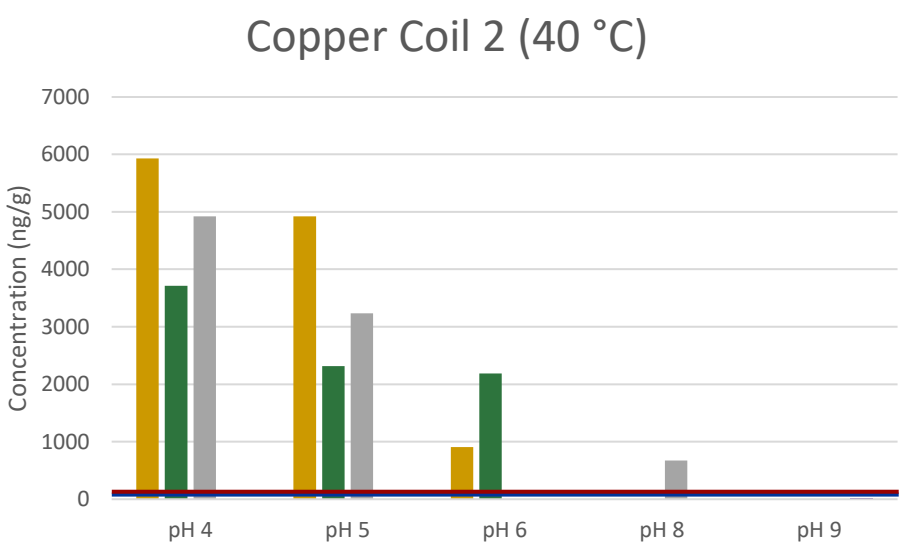


Results: Copper

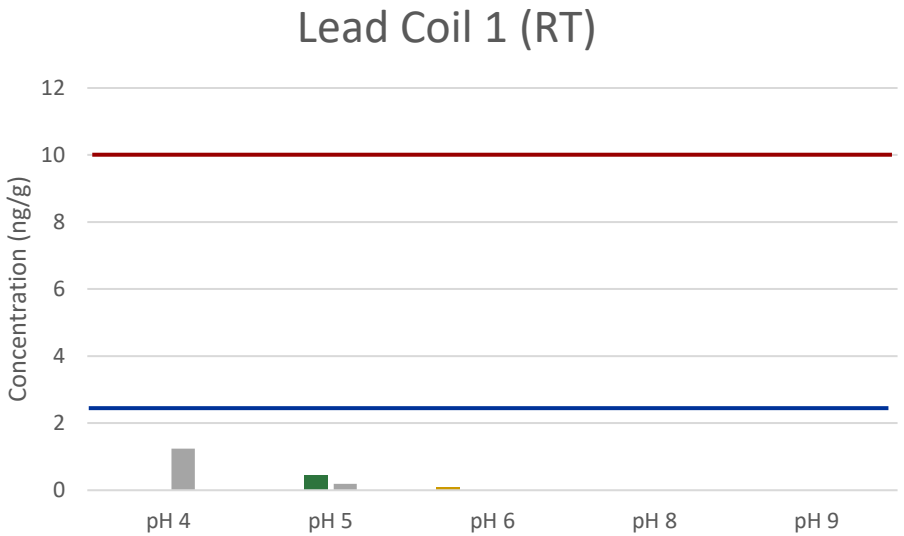


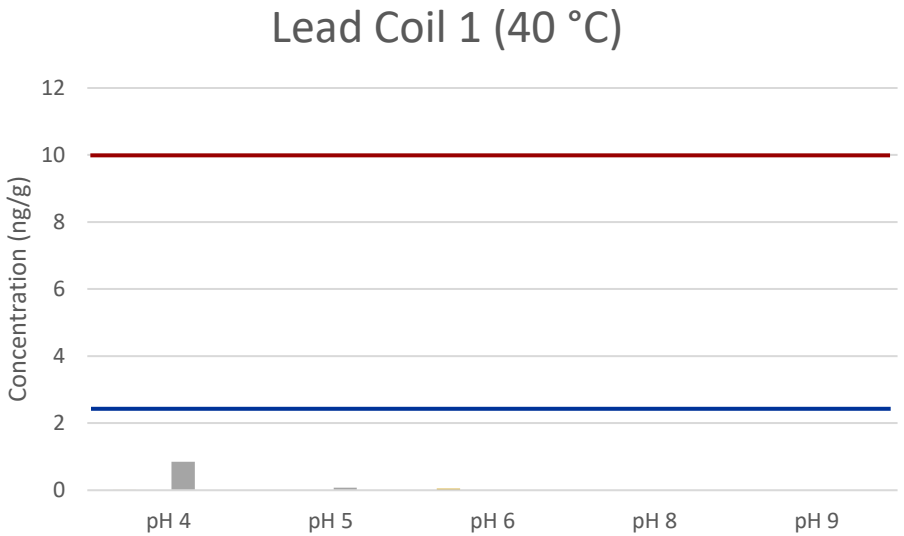


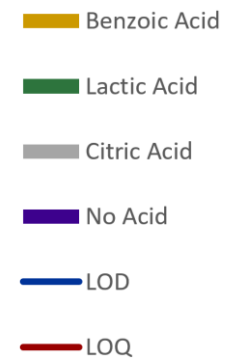


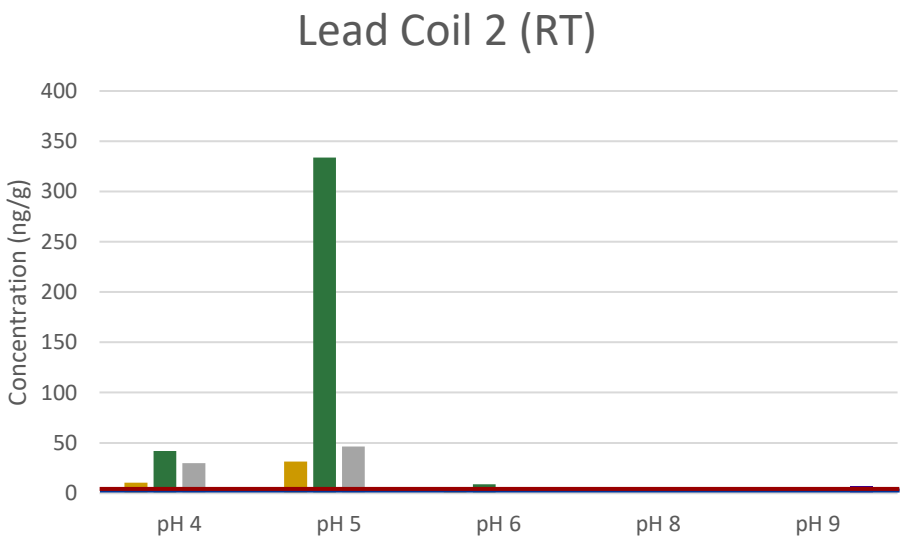


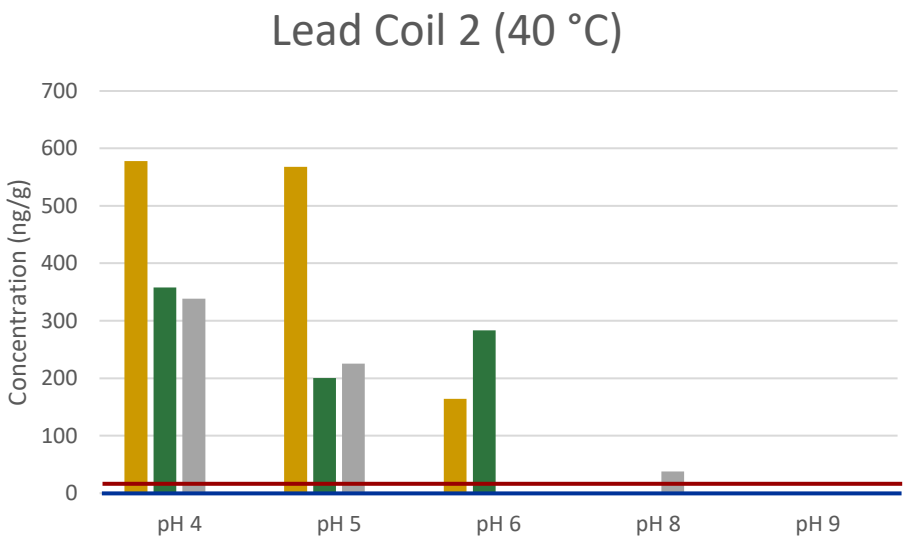
Results: Lead





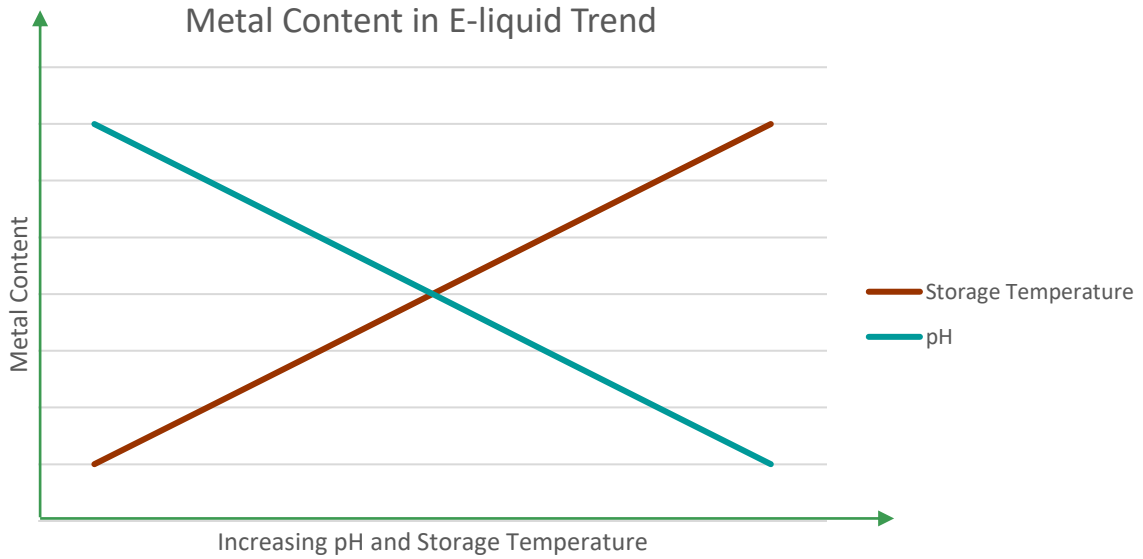






Conclusions

- Two trends are observed
  - Metals content has an inverse relationship with pH.
  - Metals content has a linear relationship with storage temperature.
  - This trend was not noticed for three of the metals analyzed.
- Notable trend
  - As acids groups used in the preparation of the e-liquid increased, select metal content also increased.



Thank you for coming by!

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