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Rapid Detection of Nicotine in E-Liquids

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Rapid Detection of Nicotine in E-Liquids

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Problem Statement

No field test exists for detection of nicotine in E-liquids. There exists a need for a device which is:

- Portable
- Rapid
- Accurate
- User-Friendly

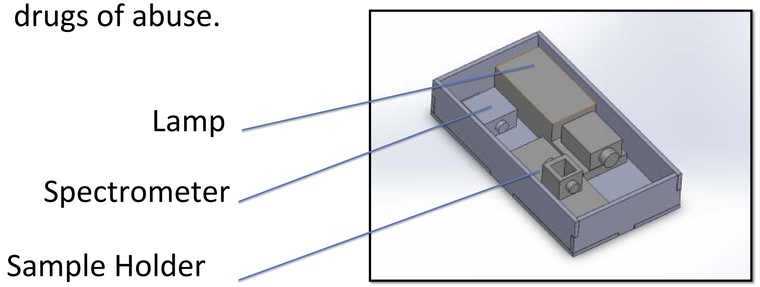
Law enforcement requires a field test due to issues such as e-liquid sales to minors and tax evasion by distributors.

Preliminary testing of bromocresol purple strips with commercial E-liquids

Methods

UV Visible Spectrophotometer

- Nicotine absorbs UV light over a specific wavelength.
- The novelty of the device is its portability and ease of use.
- Able to test for other drugs of abuse.



3D model of UV-Vis Device

Colorimetric Test Strip

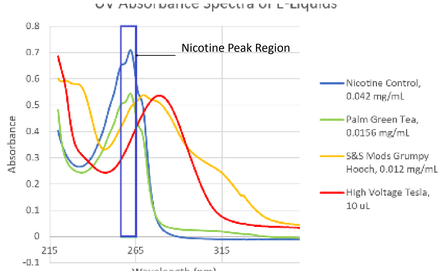
- Nicotine significantly increases the pH of E-liquids.
- Bromocresol Purple changes from yellow to purple in presence of nicotine.
- Bromocresol Purple is more accurate and visually apparent than commercial bromothymol strips.

Creation of test strips in bromocresol purple bath

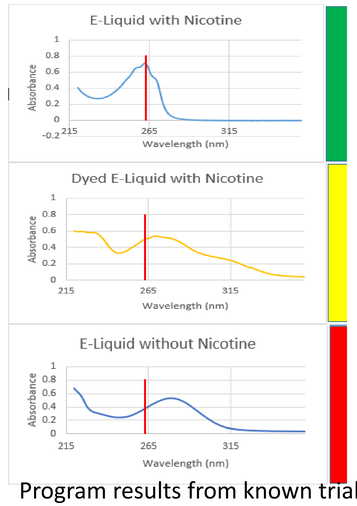
Results

UV Device

- Easy operation
- Accurate results
- Can detect multiple drugs of abuse
- Portable



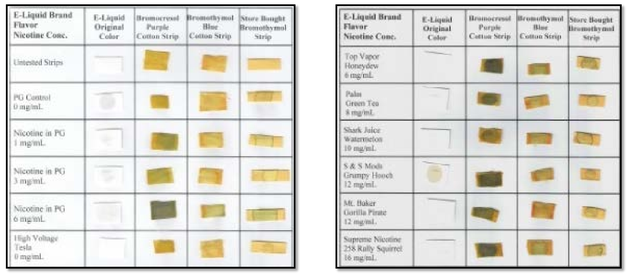
UV-Vis spectra of e-liquids



Program results from known trials

Test Strip

- Very cheap materials and easy production
- Simple procedure
- Qualitative results based on color change



E-Liquid Brand Flavor Nicotine Conc.	E-Liquid Original Color	Bromocresol Purple Cotton Strip	Bromothymol Blue Cotton Strip	Store Bought Bromothymol Strip
Untested Strips				
PG Control 0 mg/mL				
Nicotine in PG 1 mg/mL				
Nicotine in PG 3 mg/mL				
Nicotine in PG 6 mg/mL				
High Voltage Tesla 0 mg/mL				

E-Liquid Brand Flavor Nicotine Conc.	E-Liquid Original Color	Bromocresol Purple Cotton Strip	Bromothymol Blue Cotton Strip	Store Bought Bromothymol Strip
Top Vapor Honeydew 6 mg/mL				
Palm Green Tea 8 mg/mL				
Shark Juice Watermelon 10 mg/mL				
S & S Mods Grumpy Hooch 12 mg/mL				
Mt. Baker Gorilla Pirate 12 mg/mL				
Supreme Nicotine 258 Rally Squirrel 16 mg/mL				

Results of drop tests on manufactured bromocresol purple and bromothymol blue strips and store bought bromothymol blue strips