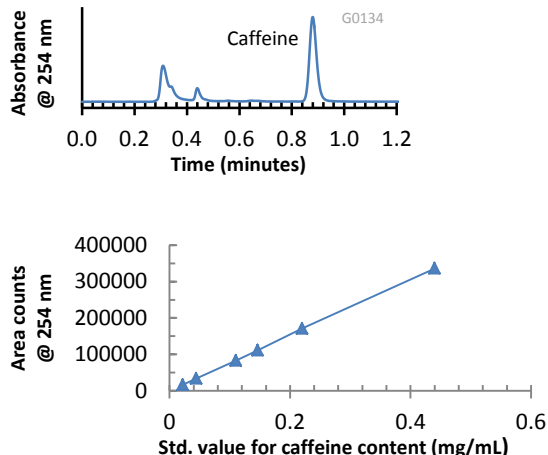


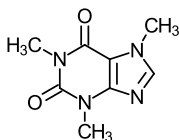
Determination of Caffeine in Soda Using HALO 5 C18



TEST CONDITIONS:

Column: HALO 5 C18, 3.0 x 50 mm, 5 µm with HALO 5 guard column
 Part Number: HALO 5 C18, 95813-402
 Part Number: Guard column: 95813-102
 Mobile Phase: 75/25: A/B
 A= 0.1% formic acid in water
 B= Methanol
 Flow Rate: 0.8 mL/min.
 Pressure: 120 Bar
 Temperature: 30°C
 Injection Volume: 1.0 µL
 Sample Solvent: (caffeine std.) mobile phase
 Detection: UV 254 nm, VWD
 Response Time: 0.02 sec.
 Date rate: 25 Hz
 Flow Cell: 2.5 µL semi-micro
 LC System: Shimadzu Prominence UFLC XR
 ECV: ~14 µL

STRUCTURE:



Caffeine

DISCUSSION:

A selection of sodas was purchased along with several energy drinks at a local grocery store. An approximate 10 mL sample from each soda was placed in a separate 20 mL scintillation vial and capped. The vials were shaken several times and then the cap was loosened and the vial sonicated for 10 minutes to remove CO₂. Then a 1 mL aliquot was placed into a 1.5 mL HPLC sample vial. A one microliter quantity was injected into the HPLC under conditions tabulated elsewhere on this page. A guard column was used to prevent the buildup of a brown material on the analytical column packing. The material was likely caramel coloring.

The chromatogram shown is from a regular cola drink.

A standard curve of peak area vs. caffeine concentration was made over the range of 0.11-0.44 mg/mL. These values were used to calculate the line fit of $Y=mX + b$. From the peak response the concentration of (mg of caffeine)/mL was calculated and then multiplied by the number of mL in the beverage can (usually 355 mL). Results are shown below.

| Sample | Caffeine tested mg/(355 mL) | Can value mg/(355 mL) |
|-----------------------------|--------------------------------|--------------------------|
| Store brand cola 1 | 12 | N/A |
| Cola 2 | 53 | 54 |
| Cola 3 | 43 | 43 |
| Cola 4 | 36 | 38 |
| Cola 5 | 38 | 38 |
| Store brand diet cola 1 | 12 | N/A |
| Diet cola 2 | 45 | 46 |
| Diet cola 3 | 34 | 34 |
| Diet cola 4 | 36 | 35 |
| Energy drink 1* | 160 | 160 |
| Energy drink 2** | 79 | 80 |
| Diet Energy drink** | 79 | 80 |
| Non-cola drink 1 | 53.3 | 54 |
| Non-cola drink 2 | 22 | 22 |
| Diet non-cola drink | 43 | 41 |
| Diet cola 1 non caffeinated | 0 | N/A |
| Diet cola 2 non-caffeinated | 0 | N/A |
| Diet cola 3 non-caffeinated | 0 | N/A |

355 mL = 12 oz.

*amount in 16 oz. (473 mL) cans

**amount in 8.4 oz (248 mL) cans