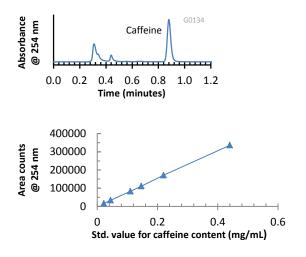
# HALO: | Fused-Core® Particle Technology

Application Note: 145-F

## 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 CO<sub>2</sub>. 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.

Cola 2     53     54       Cola 3     43     43       Cola 4     36     38       Cola 5     38     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 1*     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A			
Store brand cola 1     12     N/A       Cola 2     53     54       Cola 3     43     43       Cola 4     36     38       Cola 5     38     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 1     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet non-cola drink 4     43     41       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A		Caffeine tested	Can value
Cola 2     53     54       Cola 3     43     43       Cola 4     36     38       Cola 5     38     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 1     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A	Sample	mg/(355 mL)	mg/(355 mL)
Cola 3     43     43       Cola 4     36     38       Cola 5     38     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 1*     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A	Store brand cola 1	12	N/A
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 1     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A	Cola 2	53	54
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 cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A	Cola 3	43	43
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 cola drink 1     53.3     54       Non-cola drink 1     53.3     54       Non-cola drink 2     22     22       Diet cola 1 non caffeinated     0     N/A       Diet cola 2 non-caffeinated     0     N/A	Cola 4	36	38
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 2**     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	Cola 5	38	38
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	Store brand diet cola 1	12	N/A
Diet cola 4     36     35       Energy drink 1*     160     160       Energy drink 2**     79     80       Diet Energy drink 2**     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 2	45	46
Energy drink 1*160160Energy drink 2**7980Diet Energy drink**7980Non-cola drink 153.354Non-cola drink 22222Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Diet cola 3	34	34
Energy drink 2**7980Diet Energy drink**7980Non-cola drink 153.354Non-cola drink 22222Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Diet cola 4	36	35
Diet Energy drink**7980Non-cola drink 153.354Non-cola drink 22222Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Energy drink 1*	160	160
Non-cola drink 153.354Non-cola drink 22222Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Energy drink 2**	79	80
Non-cola drink 22222Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Diet Energy drink**	79	80
Diet non-cola drink4341Diet cola 1 non caffeinated0N/ADiet cola 2 non-caffeinated0N/A	Non-cola drink 1	53.3	54
Diet cola 1 non caffeinated 0 N/A   Diet cola 2 non-caffeinated 0 N/A	Non-cola drink 2	22	22
Diet cola 2 non-caffeinated 0 N/A	Diet non-cola drink	43	41
	Diet cola 1 non caffeinated	0	N/A
Diet cola 3 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



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