



Benzopyrene Study

**PART 1: HERO WIPE'S EFFECTIVENESS OF REMOVING POLYCYCLIC AROMATIC HYDROCARBON
(BENZOPYRENE): WIPE SAMPLE LOT NO. M1704250023**

A. PURPOSE:

Preliminary study on Hero Wipes to establish baseline data using Hero Wipe samples spiked with a Benzopyrene solution. The experimental conditions are controlled where the volume and analyte concentration are known and the analyte is directly added to the surface of the Hero Wipes and determined by HPLC.

B. DATA

▪ Blank

| Benzopyrene | Blank % Benzopyrene |
|-------------|---------------------|
| 1 | 0 % interference |
| 2 | 0 % interference |
| 3 | 0 % interference |
| Average | 0% interference |

▪ Benzopyrene spiked into Hero Wipes

| Benzopyrene | Removal of Benzopyrene from wipe | % Recovery |
|-------------|----------------------------------|------------|
| 1 | 1.19% | 79.28% |
| 2 | 1.28% | 85.61% |
| 3 | 1.29% | 85.92% |
| Average | 1.25% | 83.60% |

C. OBSERVATIONS AND CONCLUSION:

1. On ideal controlled conditions, the Hero Wipe meet the recovery study, where:
 - An average of 84% is recovered from the Benzopyrene spiked wipe.
2. The Hero Wipe did not show any interference on HPLC analysis
3. The results of the wipes' performance under controlled conditions, meets the desired effectiveness.
4. The actual efficacy of the wipe to remove contaminants off of a substrate simulating the human skin will be tested using similar method.

D. ATTACHMENT

- HPLC

PART 2. HERO WIPES' EFFECTIVENESS OF REMOVING POLYAROMATIC HYDROCARBON, BENZOPYRENE, FROM A SIMULATED SKIN SUBSTRATE

I. PURPOSE OF PART 2 BENZOPYRENE ON DIAMOND WIPE HERO WIPE STUDY

- Hero Wipes will be evaluated for its effectiveness of removing benzopyrene. The study will consist of spiking a known volume and concentration of benzopyrene on a substrate simulating the porous surface of the skin and performing recovery studies using the wipes. The study will be performed once with substrate spiked with a low concentration of benzopyrene and a second time with substrate spiked with high concentration of benzopyrene.

II. STUDY INFORMATION:

- a. A third-party laboratory was contracted to conduct the investigation into the Hero Wipes' effectiveness of removing benzopyrene. The laboratory determined the percent recovery of the benzopyrene contaminant using a Hero Wipe to remove and clean the benzopyrene contaminant off of the simulated substrate and measuring the amount of benzopyrene removed from the wipes. The investigation utilizes:
 - Control samples: A known volume and concentration of benzopyrene is pipetted equally onto 3 individual pieces of Hero Wipes [Refer to Part 1 of the report].
 - Test samples: A low concentration of benzopyrene is spiked onto the simulated substrate, dried and wiped off using an individual Hero Wipe. This is repeated three times, each time the wipe is collected into a 500-mL amber bottle. This is repeated again using high concentration of benzopyrene.
- b. The material used for the simulated skin substrate was a 6" x 10" textured board that closely models the ridges and lines seen on the surface of the skin.
- c. The benzopyrene solution was transferred onto different the simulated substrate. The substrate was left to air-dry for at least 30 minutes. One Hero Wipe is used to wipe the surface of each simulated substrate. Each wipe is reverse-folded at each turn of the wipe where the contaminated surface of the wipe is folded onto itself to avoid the contaminant returning to board.
- d. The spiking and drying of the board following wiping is repeated three separate times for each benzopyrene concentration. The efficacy target for the removal of benzopyrene by the wipe is >60% recovery.
- e. The percent recovery of benzopyrene will be analyzed using HPLC.

III. DATA AND RESULT:

| BLANK WIPE | LOT A-1 | LOT A-1 | LOT A-1 |
|---|----------------|----------------|----------------|
| Peak area (% at benzopyrene retention time) | 0 | 0 | 0 |
| Interference to Benzopyrene | None (pass) | None (pass) | None (pass) |

PART 2-1 LOW CONCENTRATION BENZOPYRENE SURFACE WIPE-OFF

| RESULT | LOT # M1705030022 | LOT # M1705030023 | LOT # M1705030024 |
|----------------------|--------------------------|--------------------------|--------------------------|
| % Recovery [>60%] | 64.68% (pass) | 70.41% (pass) | 78.00% (pass) |
| RSD triplicate [<5%] | 2.413% | 3.281% | 2.255% |

PART 2-2 HIGH CONCENTRATION BENZOPYRENE SURFACE WIPE-OFF

| Lot # | LOT # M1705030025 | LOT # M1705030026 | LOT #M1705030027 |
|----------------------|-------------------|-------------------|------------------|
| % Recovery [>60%] | 90.93% (pass) | 81.14% (pass) | 76.19% (pass) |
| RSD triplicate [<5%] | 2.911% | 2.657% | 0.727% |

IV. CONCLUSION AND OBSERVATION

- a. The removal of polycyclic aromatic hydrocarbon, benzopyrene, using Hero Wipe passed the efficacy target >60% removal from the simulated skin substrate.
- b. The wiping of the simulated substrate followed an arbitrary pattern, the cleaning and wiping off contaminants from the skin in the actual use is uncontrolled and random. The data gathered showed a more realistic evaluation of its use as compared to controlled conditions in Part 1.
- c. Based on the Part 1 controlled condition, the baseline study showed more than 84% recovery of high concentration benzopyrene.
- d. In conclusion, Hero Wipes can remove greater than 84% benzopyrene in a controlled condition and up to 82.75% from the simulated skin substrate for the high concentration benzopyrene.
- e. In conclusion, the Hero Wipe can remove 71.03% low concentration benzopyrene from the simulated surface.
- f. Benzopyrene is a polyaromatic hydrocarbon. Over time at diluted conditions, it may begin to form isomeric compounds.

V. ATTACHMENT

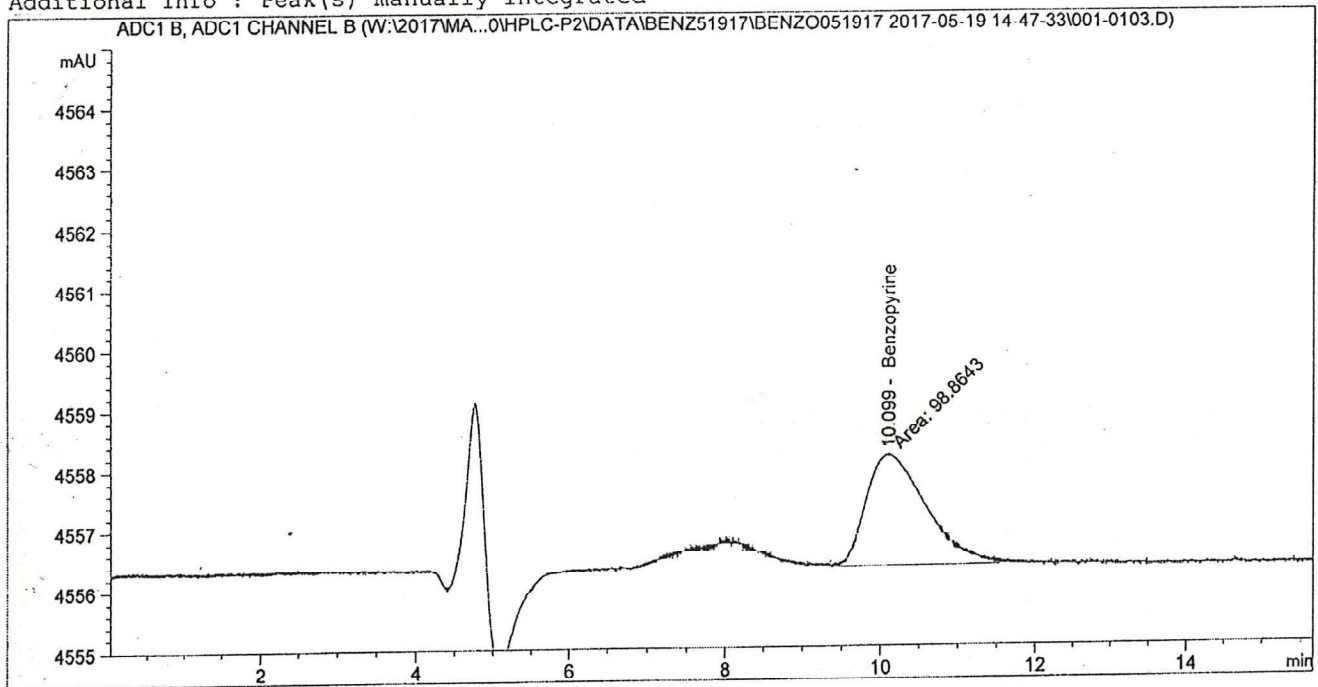
- HPLC

Sample Name: std benzo

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Acq. Operator   : Teena Samaranyake           Seq. Line :    1
Acq. Instrument : HPLC-P2 6.16 I0753         Location  :    -
Injection Date  : 5/19/2017 3:41:03 PM      Inj       :    3
Acq. Method    : Z:\HPLC-P2\DATA\BENZ51917\BENZO051917 2017-05-19 14-47-33\BENZO-SPIKED.M
Last changed   : 5/19/2017 12:25:29 PM by Teena Samaranyake
Analysis Method : C:\CHEM32\2\METHODS\BENZO-SPIKED.M
Last changed   : 5/22/2017 3:52:11 PM by Teena Samaranyake
                (modified after loading)
Additional Info : Peak(s) manually integrated
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                          Area Percent Report
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Sorted By           :      Signal
Calib. Data Modified :      5/22/2017 3:52:53 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Use Multiplier & Dilution Factor with ISTDs

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Signal 1: ADC1 B, ADC1 CHANNEL B

| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Area % | Name |
|----------|---------------|------|-------------|--------------|----------|-------------|
| 1 | 10.099 | MM | 0.8783 | 98.86430 | 100.0000 | Benzopyrine |
| Totals : | | | | 98.86430 | | |

Handwritten signature and date:
 5/23/17

*** End of Report ***

