



**CMA Testing
and Certification
Laboratories**
廠商會檢定中心

Test Report for Environmental Monitoring

Applicant : THE CHINESE UNIVERSITY OF HONG KONG - UNIVERSITY SAFETY OFFICE
Address : (Redacted for privacy reasons.)
Application Number : LY039722(1)
Report Number : AY0066303(7)
Report Issued Date : 19 Dec 2019
Measurement Details : Air sampling and swab sampling for 2-Chlorobenzalmalonitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Hydrogen Cyanide (HCN) and Nickel in surface dust.
Water sampling for 2-Chlorobenzalmalonitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Cyanide and Nickel.
Address of Venue : The Jockey Club Postgraduate Hall 1

For and on behalf of
CMA Industrial Development Foundation Limited

(Redacted for privacy reasons.)

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Appendix I – Photos of Sampling Points

1. Introduction and Project Description

CMA Testing was appointed to conduct on-site sampling, laboratory testing, in The Jockey Club Postgraduate Hall 1.

The on-site air samplings were conducted on 12 Dec 2019 to 16 Dec 2019. Nine (9) PTFE filters follow by Tenex absorption tubes for sampling of 2-Chlorobenzalmalononitrile (CS), Nine (9) Tenex absorption tubes for sampling of Alpha-Chloroacetophenone (CN), Nine (9) Glass fiber filters for sampling of Capsaicin and Dihydrocapsaicin (OC), Nine (9) soda lime absorption tubes for sampling of Hydrogen Cyanide (HCN), Nine (9) micro-cellulose membrane filters for collecting Nickel surface dust, and Nine (9) swab samples with plain sterile wooden applicator cotton tipped were collected on-site for laboratory analysis which was performed between 12 Dec 2019 and 18 Dec 2019.

The on-site water samplings were conducted on 12 Dec 2019 to 16 Dec 2019. Three (3) batch of water samples collected with 12 x 1L in glass bottle and 6 x 1L in plastic bottle of the water sample for analysis of 2-Chlorobenzalmalononitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin and Dihydrocapsaicin (OC), Cyanide and Nickel. The samples were delivered for laboratory analysis and performed between 12 Dec 2019 and 18 Dec 2019.

2. On-site Sampling and Test Methods

| On-site Air Sampling Items | Methods |
|--------------------------------------|---|
| 2-Chlorobenzalmalononitrile (CS) | Chemical residue in air was collected using personal sampling pump connected to PTFE filter follow by Tenex absorption tube. The equipment was placed at the specified location at a height of around 1.1 metre according to the NIOSH P&CAM method 304 for 90 mins continuously. |
| Alpha-Chloroacetophenone (CN) | CN in air was collected using personal sampling pump connected to Tenex absorption tube. The equipment was placed at the specified location at a height of around 1.1 metre according to the NIOSH P&CAM method 291 for 60 mins continuously. |
| Capsaicin & Dihydrocapsaicin (OC) | OC in air was collected using personal sampling pump connected to Glass fibre filter. The equipment was placed at the specified location at a height of around 1.1 metre according to the NIOSH method 5041 for 60 mins continuously. |
| Hydrogen Cyanide (HCN) | HCN in air was collected using personal sampling pump connected to soda lime absorption tube. The equipment was placed at the specified location at a height of around 1.1 metre according to the NIOSH method 36010 for 240 mins continuously. |
| Nickel Surface Dust | Nickel dust in the specify surface was collected by wiping on a filter paper (wipe technique) or sucking into a micro-cellulose membrane filter connected to personal sampling pump (micro-vacuum technique) on a template 10 cm x 10 cm area, according to the NIOSH 7300. |

| On-site Swab Sampling Items | Methods |
|--|--|
| 2-Chlorobenzalmalononitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Hydrogen Cyanide (HCN) , and Nickel Surface Dust | Swab samples were collected on-site with plain sterile wooden applicator cotton tipped for laboratory analysis, according to “Evaluation Guidelines for Surface Sampling Methods” of OSHA. |

| On-site Water Sampling Items | Methods |
|---|---|
| 2-Chlorobenzalmalononitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Cyanide, and Nickel | Water samples were collected on-site with glass and plastic bottles. Samples were refrigerated during delivery for laboratory analysis. |

| Test Items of Air & Swab Samples | Methods |
|-----------------------------------|---|
| 2-Chlorobenzalmalononitrile (CS) | The filter and absorption tubes were extracted by solvent and measured its chemical concentration using HPLC and GC/MS technique. |
| Alpha-Chloroacetophenone (CN) | The absorption tubes were extracted by solvent and measured its chemical concentration using GC/FID technique. |
| Capsaicin & Dihydrocapsaicin (OC) | The filters were extracted by solvent and measured its chemical concentration using HPLC technique. |
| Hydrogen Cyanide (HCN) | The absorption tubes were extracted by buffer solution and measured its chemical concentration using UV-visible spectrometer. |
| Nickel Surface Dust | The collected filters were digested by acid solution and measured its nickel concentration using ICP-OES. |

| Test Items of Water Samples | Methods |
|------------------------------------|-------------------------------|
| 2-Chlorobenzalmalononitrile (CS) | In house method TG-ENV-WW-122 |
| Alpha-Chloroacetophenone (CN) | In house method TG-ENV-WW-123 |
| Capsaicin & Dihydrocapsaicin (OC) | In house method TG-ENV-WW-124 |
| Cyanide | APHA 23ed 4500-CN E |
| Nickel | USEPA method 200.8 |

3. Environmental Monitoring Result

Air Sampling

| | | Date of IAQ Monitoring | 2-Chlorobenzalmononitrile (CS) (mg/m ³) | Alpha-Chloroacetophenone (CN) (mg/m ³) | Capsaicin (mg/m ³) | Dihydrocapsaicin (mg/m ³) | Hydrogen Cyanide (HCN) (mg/m ³) | Nickel Surface Dust (mg/m ³) |
|--------------|-----------|------------------------|--|---|-----------------------------------|--|--|---|
| <i>OSHA*</i> | | | <i>0.4</i> | <i>0.3</i> | | | <i>11.05</i> | <i>1</i> |
| Pt. 1 | Room B220 | 12 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 2 | Room C227 | 12 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 3 | Room A309 | 12 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 4 | Room C516 | 13 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 5 | Room B520 | 13 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 6 | Room A505 | 13 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 7 | Room A809 | 16 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 8 | Room B820 | 16 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |
| Pt. 9 | Room C806 | 16 Dec 2019 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.2 | <0.05 |

Note : < denotes less than

mg/m³ denotes milligram per cubic metre

All results are reported as 2-hour average.

* Occupational Safety and Health Administration of United States Department of Labor.

Swab Sampling

| | | Date of IAQ Monitoring | 2-Chlorobenzalmononitrile (CS) ($\mu\text{g} / 100\text{cm}^2$) | Alpha-Chloroacetophenone (CN) ($\mu\text{g} / 100\text{cm}^2$) | Capsaicin ($\mu\text{g} / 100\text{cm}^2$) | Dihydrocapsaicin ($\mu\text{g} / 100\text{cm}^2$) | Hydrogen Cyanide (HCN) ($\mu\text{g} / 100\text{cm}^2$) | Nickel Surface Dust ($\mu\text{g} / 100\text{cm}^2$) |
|-------|-----------|------------------------|--|---|---|--|--|---|
| Pt. 1 | Room B220 | 12 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 2 | Room C227 | 12 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 3 | Room A309 | 12 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 4 | Room C516 | 13 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 5 | Room B520 | 13 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 6 | Room A505 | 13 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 7 | Room A809 | 16 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 8 | Room B820 | 16 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Pt. 9 | Room C806 | 16 Dec 2019 | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |

Note : < denotes less than
 $\mu\text{g}/100\text{cm}^2$ denotes microgram per 100 square centimetres
 Swab samplings were conducted at locations nearby windows in the premises.

Water Sampling

| | | Date of Water Sampling | 2-Chlorobenzalmononitrile (CS) (µg / L) | Alpha-Chloroacetophenone (CN) (µg / L) | Capsaicin and Dihydrocapsaicin (mg / L) | Cyanide (mg / L) | Nickel (µg / L) |
|-------|-----------------|------------------------|--|---|--|---------------------|--------------------|
| WHO | | | | | | 0.07^ | 70* |
| Pt. 1 | 2/F Pantry | 12 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |
| Pt. 2 | 2/F Shower Room | 12 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |
| Pt. 3 | 5/F Pantry | 13 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |
| Pt. 4 | 5/F Shower Room | 13 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |
| Pt. 5 | 8/F Pantry | 16 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |
| Pt. 6 | 8/F Shower Room | 16 Dec 2019 | < 1 | < 1 | < 0.2 | < 0.02 | < 1 |

Note : < denotes less than

mg/L denotes milligram per litre

µg/L denotes microgram per litre

^ World Health Organization – Guidelines for Drinking Water Quality, 3rd edition

* World Health Organization – Guidelines for Drinking Water Quality, 4th edition

4. Conclusion

The results of on-site air sampling, swab sampling and water sampling showed the concentration levels of tested pollutants (Air & Swab Samples: 2-Chlorobenzalmalononitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Hydrogen Cyanide (HCN), and Nickel Surface Dust; Water Samples: 2-Chlorobenzalmalononitrile (CS), Alpha-Chloroacetophenone (CN), Capsaicin & Dihydrocapsaicin (OC), Cyanide, and Nickel) were below reporting limit and hence they were not detectable in the air, sampled surfaces and water sources.

***** End of Report *****

Appendix I - Photo of Sampling Points



Point 1 (Air Sampling)



Point 2 (Air Sampling)



Point 3 (Air Sampling)



Point 4 (Air Sampling)



Point 5 (Air Sampling)



Point 6 (Air Sampling)



Point 7 (Air Sampling)



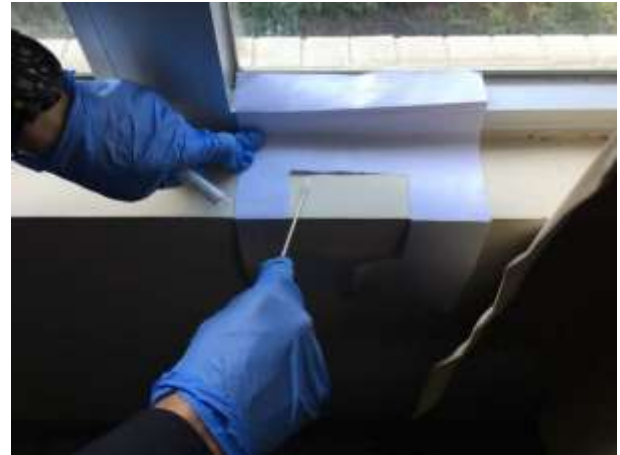
Point 8 (Air Sampling)



Point 9 (Air Sampling)



Point 1 (Swab Sampling)



Point 2 (Swab Sampling)



Point 3 (Swab Sampling)



Point 4 (Swab Sampling)



Point 5 (Swab Sampling)



Point 6 (Swab Sampling)



Point 7 (Swab Sampling)



Point 8 (Swab Sampling)



Point 9 (Swab Sampling)



Point 1 (Water Sampling)



Point 2 (Water Sampling)



Point 3 (Water Sampling)



Point 4 (Water Sampling)



Point 5 (Water Sampling)



Point 6 (Water Sampling)