**VOC exposures in Michigan nail salons**

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**Supplemental Table S1.** Summary of consumer nail products.

|  |  |  |  |
| --- | --- | --- | --- |
| Sample ID | Manufacturer | Product type | Use type |
| NP-1 | Essie LLC, New York, NY 10017 | Nail polish | OTC\* |
| NP-2 | Essie LLC, New York, NY 10017 | Nail polish | OTC |
| NP-3 | Essie LLC, New York, NY 10017 | Nail polish | OTC |
| NP-4 | OPI Products Inc, N. Hollywood, CA 91605 | Nail polish | OTC |
| NP-5 | OPI Products Inc, N. Hollywood, CA 91605 | Nail polish | OTC |
| NP-6 | OPI Products Inc, N. Hollywood, CA 91605 | Nail polish | OTC |
| NP-7 | OPI Products Inc, N. Hollywood, CA 91605 | Base coat | OTC |
| NP-8 | OPI Products Inc, N. Hollywood, CA 91605 | Top coat | OTC |
| NP-9 | Essie LLC, New York, NY 10017 | Top coat | OTC |
| NP-10 | Cutex Brands, Festus, MO, 63028 | Remover | OTC |
| NP-11 | Creative Nail Design, Inc, Vista, CA, 92081 | Base coat | Professional |
| NP-12 | The Nail Superstore, Franklin Park, IL, 60131 | Base coat | Professional |
| NP-13 | The Nail Superstore, Franklin Park, IL, 60131 | Monomer | Professional |
| NP-14 | The Nail Superstore, Franklin Park, IL, 60131 | Nail powder | Professional |
| NP-15 | The Nail Superstore, Franklin Park, IL, 60131 | Base coat | Professional |
| NP-16 | The Nail Superstore, Franklin Park, IL, 60131 | Base coat | Professional |
| NP-17 | The Nail Superstore, Franklin Park, IL, 60131 | Monomer | Professional |
| NP-18 | American International Industries, Los Angeles, CA, 90040 | Base coat | OTC |
| NP-19 | China glaze, N. Hollywood, CA 91605 | Nail polish | OTC |
| NP-20 | Cheri Nail Products, LA, CA, 90012 | Nail polish | OTC |
| NP-21 | American woman Inc., NM, 87059 | Nail polish | OTC |
| NP-22 | Creative Nail Design, Inc, Vista, CA, 92081 | Nail polish | Professional |
| NP-23 | Cheri Nail Products, LA, CA, 90012 | Nail polish | OTC |
| NP-24 | Startlight Nail Supply, Inc, Los Angeles, CA, 90012 | Nail polish | OTC |
| NP-25 | Creative Nail Design, Inc, Vista, CA, 92081 | Monomer | Professional |
| NP-26 | Hand & Nail Harmony, Los Angeles, CA, 92802 | Nail polish | Professional |
| NP-27 | Hand & Nail Harmony, Brea, CA, 92821 | Cuticle oil | Professional |
| NP-28 | Creative Nail Design, Inc, Vista, CA, 92081 | Top coat | Professional |
| NP-29 | Creative Nail Design, Inc, Vista, CA, 92081 | Base coat | Professional |
| NP-30 | Creative Nail Design, Inc, Vista, CA, 92081 | Nail powder | Professional |
| NP-31 | Mia Secret, Los Angeles, CA, 91745 | Monomer | Professional |
| NP-32 | OPI Products Inc, N. Hollywood, CA 91605 | Monomer | Professional |
| NP-33 | Mineral Fusion Natural Brands LLC, Denver, CO, 80223 | Top coat | OTC |
| NP-34 | Mineral Fusion Natural Brands LLC, Denver, CO, 80223 | Nail polish | OTC |
| NP-35 | Coty US LLC, New York, NY, 10118 | Nail polish | OTC |

Note: \*OTC stands for over-the-counter, which means the nail products can be purchased in retail.

**Supplemental Table S2.** A list of target compounds by GC/MS.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | VOC | CAS No. | Target ion | Qualifier ion | MDL (µg/m3) | DF- in (%) | DF-  out (%) |  | No | VOC | CAS No. | Target ion | Qualifier ion | MDL (µg/m3) | DF- in (%) | DF-  out (%) |
| 1 | Fluorobenzene | 462-06-6 | 96 | 70 | IS\* | 0 | 0 |  | 51 | 1,2-Dibromoethane | 106-93-4 | 107 | 109, 27 | 1.50 | 0 | 0 |
| 2 | 1,2-Dichloroethylene (trans,E) | 156-60-5 | 61 | 96 | 5.00 | 0 | 0 |  | 52 | Tetrachloroethene | 127-18-4 | 166 | 129 | 0.05 | 6 | 0 |
| 3 | Methylene chloride | 75-09-2 | 84 | 49 | 0.75 | 0 | 0 |  | 53 | 1,1,1,2-Tetrachloroethane | 630-20-6 | 131 | 117, 95 | 0.50 | 0 | 0 |
| 4 | hexane | 110-54-3 | 57 | 86 | 0.19 | 0 | 71 |  | 54 | Chlorobenzene | 108-90-7 | 112 | 77 | 0.18 | 0 | 0 |
| 5 | Methyl t-butyl ether | 1634-04-4 | 73 | 57 | 5.00 | 0 | 0 |  | 55 | Ethylbenzene | 100-41-4 | 91 | 106 | 0.03 | 0 | 91 |
| 6 | 1,1-Dichloroethane | 75-34-3 | 63 | 83 | 5.00 | 0 | 0 |  | 56 | p,m-Xylene | 106-42-3, 108-38-3 | 91 | 106 | 0.12 | 3 | 100 |
| 7 | Propanenitrile | 107-12-0 | 54 | 55 | 5.00 | 0 | 0 |  | 57 | Bromoform | 75-25-2 | 173 | 252 | 2.50 | 0 | 0 |
| 8 | butanal | 123-72-8 | 44 | 43,72 | 5.00 | 0 | 0 |  | 58 | n-Nonane | 111-84-2 | 43 | 41 | 0.05 | 0 | 3 |
| 9 | 2-Butanone | 78-93-3 | 43 | 72, 57 | 0.25 | 9 | 0 |  | 59 | heptanal | 111-71-7 | 70 | 44, 55 | 0.26 | 0 | 0 |
| 10 | Methacrylonitrile | 126-98-7 | 41 | 67 | 5.00 | 0 | 0 |  | 60 | Styrene | 100-42-5 | 104 | 78 | 0.03 | 0 | 0 |
| 11 | 1,2-Dichloroethylene (Cis, Z) | 156-59-2 | 61 | 96 | 2.50 | 0 | 0 |  | 61 | 1,1,2,2-Tetrachloroethane | 79-34-5 | 83 | 131, 168 | 0.02 | 0 | 0 |
| 12 | Bromochloromethane | 74-97-5 | 130 | 130 | 2.50 | 0 | 0 |  | 62 | o-Xylene | 95-47-6 | 91 | 106 | 0.09 | 0 | 68 |
| 13 | Chloroform | 67-66-3 | 83 | 47 | 0.25 | 0 | 6 |  | 63 | 1,2,3-Trichloropropane | 96-18-4 | 75 | 110 | 0.02 | 0 | 0 |
| 14 | Ethyl acetate | 141-78-6 | 43 | 45 | 0.50 | 100 | 3 |  | 64 | 1,4-Dichlor-2-butene | 110-57-6 | 75 | 89, 124 | 2.50 | 0 | 0 |
| 15 | 2,2-Dichloropropane | 594-20-7 | 77 | 97, 41 | 5.00 | 0 | 0 |  | 65 | Isopropylbenzene | 98-82-8 | 105 | 120 | 0.10 | 0 | 0 |
| 16 | Methyl acrylate | 96-33-3 | 55 | 85,27 | 2.50 | 6 | 0 |  | 66 | a-Pinene (1R)-(+) | 7785-70-8 | 93 | 77, 105 | 0.15 | 0 | 29 |
| 17 | Tetrahydrofuran | 109-99-9 | 42 | 72 | 0.25 | 0 | 0 |  | 67 | Bromobenzene | 108-86-1 | 77 | 156 | 0.20 | 0 | 0 |
| 18 | 1,2-Dichloroethane | 107-06-2 | 62 | 49, 98 | 0.75 | 0 | 0 |  | 68 | n-Propylbenzene | 103-65-1 | 91 | 120 | 0.15 | 0 | 0 |
| 19 | 1,1,1-Trichloroethane | 71-55-6 | 97 | 61, 117 | 2.50 | 0 | 0 |  | 69 | 2-Chlorotoluene | 95-49-8 | 91 | 126 | 0.20 | 0 | 0 |
| 20 | Butyl chloride | 109-69-3 | 56 | 41,27 | 2.50 | 0 | 0 |  | 70 | 4-Chlorotoluene | 106-43-4 | 91 | 126 | 0.17 | 0 | 0 |
| 21 | 1,1-Dichloropropene | 563-58-6 | 75 | 110 | 2.50 | 0 | 0 |  | 71 | 4-ethyl toluene | 622-96-8 | 105 | 120 | 0.30 | 0 | 12 |
| 22 | Chloroacetonitrile | 107-14-2 | 75 | 48 | 2.50 | 0 | 0 |  | 72 | 1,3,5-Trimethylbenzene | 108-67-8 | 105 | 120 | 0.06 | 0 | 24 |
| 23 | Isopropyl acetate | 108-21-4 | 43 | 61, 87 | 5.00 | 65 | 0 |  | 73 | Pentachloroethane | 76-01-7 | 167 | 117 | 2.50 | 0 | 0 |
| 24 | Carbontetrachloride | 56-23-5 | 117 | 82 | 2.50 | 0 | 12 |  | 74 | n-Decane | 124-18-5 | 57 | 43 | 0.01 | 0 | 3 |
| 25 | Benzene | 71-43-2 | 78 | 50 | 0.08 | 15 | 100 |  | 75 | Octanal | 124-13-0 | 43 | 57, 84 | 0.30 | 0 | 0 |
| 26 | pentanal | 110-62-3 | 57 | 43,58 | 0.17 | 0 | 0 |  | 76 | tert-Butylbenzene | 98-06-6 | 119 | 91, 134 | 0.09 | 0 | 0 |
| 27 | 2-nitropropane | 79-46-9 | 43 | 41,27 | 0.50 | 0 | 0 |  | 77 | 1,2,4-Trimethylbenzene | 95-63-6 | 105 | 120 | 0.02 | 0 | 74 |
| 28 | Dibromomethane | 74-95-3 | 174 | 93 | 2.50 | 0 | 0 |  | 78 | sec-Butylbenzene | 135-98-8 | 105 | 134 | 0.03 | 0 | 0 |
| 29 | n-Heptane | 142-82-5 | 43 | 71 | 0.24 | 88 | 35 |  | 79 | 1,3-Dichlorobenzene | 106-46-7 | 146 | 111, 75 | 0.50 | 0 | 0 |
| 30 | 1,2-Dichloropropane | 78-87-5 | 63 | 76, 41 | 2.50 | 0 | 0 |  | 80 | 1,4-Dichlorobenzene | 541-73-1 | 146 | 111, 75 | 0.06 | 0 | 0 |
| 31 | Trichloroethylene | 79-01-6 | 130 | 95 | 0.25 | 0 | 0 |  | 81 | p-Isopropyltoluene | 99-87-6 | 119 | 134 | 0.03 | 0 | 0 |
| 32 | Bromodichloromethane | 75-27-4 | 83 | 129 | 2.50 | 0 | 0 |  | 82 | Limonene (R)-(+) | 5989-27-5 | 68 | 93, 136 | 0.19 | 37 | 24 |
| 33 | 1,4-Dixoane | 123-91-1 | 88 | 28, 58, 43 | 0.06 | 0 | 0 |  | 83 | o-Cresol | 95-48-7 | 108 | 79,90 | 2.50 | 0 | 0 |
| 34 | Methyl methacrylate | 80-62-6 | 41 | 69, 100 | 2.50 | 85 | 0 |  | 84 | 1,2-Dichlorobenzene-d4 | 2199-69-1 | 150 | 115 | IS\* | 0 | 0 |
| 35 | n-propyl acetate | 109-60-4 | 43 | 61, 73 | 5.00 | 75 | 0 |  | 85 | 1,2-Dichlorobenzene | 95-50-1 | 146 | 111,75 | 0.06 | 0 | 0 |
| 36 | Methyl cyclohexane | 108-87-2 | 83 | 55 | 2.50 | 0 | 3 |  | 86 | m-Cresol | 106-44-5 | 107 | 77 | 2.50 | 0 | 0 |
| 37 | 1,1-Dichloro-2-propanone | 513-88-2 | 43 | 83 | 0.02 | 0 | 0 |  | 87 | n-Butylbenzene | 104-51-8 | 91 | 134 | 0.06 | 0 | 0 |
| 38 | 1,3-Dichloropropene (Cis, Z) | 10061-01-5 | 75 | 110 | 0.50 | 0 | 0 |  | 88 | n-Undecane | 1120-21-4 | 57 | 43 | 0.11 | 0 | 0 |
| 39 | 1,3-Dichloropropene (trans, E) | 10061-02-6 | 75 | 110, 49 | 0.50 | 0 | 0 |  | 89 | 1,2-Dibromo-3-chloropropane | 96-12-8 | 157 | 75 | 0.50 | 0 | 0 |
| 40 | 1,1,2-Trichloroethane | 79-00-5 | 97 | 83, 61 | 0.50 | 0 | 0 |  | 90 | Hexachloroethane | 67-72-1 | 166 | 201, 117 | 0.50 | 0 | 0 |
| 41 | Toluene | 108-88-3 | 91 | 92 | 0.07 | 93 | 100 |  | 91 | Nitrobenzene | 98-95-3 | 123 | 77,51 | 0.50 | 0 | 0 |
| 42 | 1,3-Dichloropropane | 142-28-9 | 76 | 41 | 0.02 | 0 | 0 |  | 92 | n-Dodecane | 112-40-3 | 57 | 43 | 0.10 | 0 | 0 |
| 43 | Ethyl methacrylate | 97-63-2 | 69 | 41, 99, 114 | 0.50 | 16 | 0 |  | 93 | 1,2,4-Trichlorobenzene | 120-82-1 | 180 | 145, 109 | 0.05 | 0 | 0 |
| 44 | Methyl isobutyl ketone | 108-10-1 | 43 | 58, 85, 100 | 0.08 | 0 | 0 |  | 94 | Naphthalene | 91-20-3 | 128 | 102 | 0.04 | 4 | 47 |
| 45 | p-Bromofluorobenzene | 460-00-4 | 174 | 95 | IS\* | 0 | 0 |  | 95 | Hexachlorobutadiene | 87-68-3 | 225 | 260, 190 | 0.12 | 0 | 0 |
| 46 | 2-Hexanone | 591-78-6 | 43 | 58, 71, | 0.50 | 0 | 0 |  | 96 | 1,2,3-Trichlorobenzene | 87-61-6 | 180 | 145 | 0.06 | 0 | 0 |
| 47 | Dibromochloromethane | 124-48-1 | 129 | 127 | 0.50 | 0 | 0 |  | 97 | n-Tridecane | 629-50-5 | 57 | 43 | 0.10 | 0 | 0 |
| 48 | n-Octane | 111-65-9 | 43 | 85 | 0.05 | 0 | 0 |  | 98 | n-Tetradecane | 629-59-4 | 57 | 43 | 0.13 | 0 | 0 |
| 49 | Hexanal | 66-25-1 | 56 | 44, 41 | 0.17 | 0 | 0 |  | 99 | n-Pentadecane | 629-62-9 | 57 | 43 | 0.08 | 0 | 0 |
| 50 | n-Butyl acetate | 123-86-4 | 43 | 56, 73 | 5.00 | 100 | 0 |  | 100 | n-Hexadecane | 544-76-3 | 57 | 43 | 0.13 | 0 | 0 |

Note: \*IS stands for internal standard. Indoor detection frequency include personal and area samples.

**Supplemental Table S3.** Headspace VOC concentrations (mean±sd, unit: g/m3) in each nail product.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample ID | Ethanol | Isopropyl alcohol | Ethyl acetate | n-Propyl acetate | Iso-propyl acetate | Butyl acetate | EMA | Heptane | Toluene | Acetone | Limonene |
| NP-1 |  | 29.2±0.8 | 236.7±1.4 | 52.5±2.0 |  | 49.5±0.5 |  |  |  |  |  |
| NP-2 |  | 6.6±0.2 | 89.5±1.8 | 38.8±1.1 |  | 38.2±0.3 |  |  |  |  |  |
| NP-3 |  | 24.3±0.2 | 206.8±1.1 | 58.4±0.7 |  | 47.1±0.1 |  |  |  |  |  |
| NP-4 |  | 4.9±0.1 | 33.9±0.2 | 13.0±0.0 |  | 25.3±0.2 |  |  |  |  |  |
| NP-5 |  | 7.0±0.1 | 51.9±0.1 | 13.4±0.4 |  | 16.3±0.6 |  |  |  |  |  |
| NP-6 |  | 25.0±0.0 | 230.4±0.0 | 53.5±0.2 |  | 41.3±0.5 |  |  |  |  |  |
| NP-7 | 26.8±0.1 | 1.6±0.0 | 71.4±0.7 |  |  | 5.9±0.1 |  | 23.2±1.4 |  |  |  |
| NP-8 |  | 7.9±0.0 | 21.6±0.1 |  |  | 18.1±0.1 |  |  |  |  |  |
| NP-9 | 37.6±3.4 |  | 169.8±11.6 |  |  | 14.7±0.4 |  |  |  |  |  |
| NP-10 |  |  |  |  |  |  |  |  |  | 413.5±4.4 |  |
| NP-11 | 16.2±0.1 |  |  |  |  |  |  |  |  |  |  |
| NP-12 |  | 92.3±4.5 | 63.5±4.3 |  |  | 52.2±2.3 |  |  |  |  |  |
| NP-13 |  |  |  |  |  |  | 43.0±1.4 |  |  |  |  |
| NP-14 |  |  |  |  |  |  | 0.4±0.0 |  |  |  |  |
| NP-15 |  |  |  |  |  |  |  |  |  |  |  |
| NP-16 |  |  |  |  |  |  |  |  |  |  |  |
| NP-17 |  |  |  |  |  |  | 2.0±0.1 |  |  |  |  |
| NP-18 |  |  |  |  |  |  |  |  |  |  |  |
| NP-19 |  | 14.4±0.0 | 130.7±0.6 | 30.7±0.0 |  | 62.3±0.6 |  |  |  |  |  |
| NP-20 |  | 5.4±1.4 | 52.3±10.4 |  | 13.1±3.6 | 15.0±5.3 |  |  | 15.1±5.5 |  |  |
| NP-21 | 5.3±0.2 | 2.5±0.0 | 116.1±0.8 |  | 25.5±0.1 | 47.1±0.1 |  |  |  |  |  |
| NP-22 | 5.5±0.9 | 6.6±1.4 | 2.9±0.6 |  | 22.7±4.4 | 20.8±1.4 |  |  | 12.9±2.1 | 3.2±0.6 |  |
| NP-23 |  | 2.7±0.1 | 65.5±1.4 |  | 8.6±1.8 | 40.6±6.6 |  |  | 15.2±3.5 |  |  |
| NP-24 |  | 8.3±0.5 | 61.0±0.5 |  | 19.6±0.3 | 9.4±0.4 |  |  | 19.6±0.6 |  |  |
| NP-25 |  |  |  |  |  |  | 27.2±0.3 |  |  |  |  |
| NP-26 |  | 9.7±0.0 | 116.5±2.7 | 6.0±0.5 | 1.4±0.1 | 18.3±0.1 |  |  |  |  |  |
| NP-27 |  |  |  |  |  |  |  |  |  |  | 0.1±0.0 |
| NP-28 |  |  |  |  |  |  |  |  |  |  |  |
| NP-29 |  |  |  |  |  |  |  |  |  |  |  |
| NP-30 |  |  |  |  |  |  | 1.6±0.2 |  |  |  |  |
| NP-31 |  |  |  |  |  |  | 78.6±1.0 |  |  |  |  |
| NP-32 |  |  | 6.2±0.2 |  |  |  | 77.9±2.4 |  |  |  |  |
| NP-33 |  | 27.2±0.3 | 142.3±0.5 |  | 13.9±0.2 | 108.0±0.0 |  |  |  |  |  |
| NP-34 |  | 9.6±0.1 | 27.1±0.8 |  | 8.9±0.1 | 63.1±0.6 |  |  |  |  |  |
| NP-35 | 34.9±1.8 | 12.4±0.3 | 281.0±2.0 |  | 3.3±0.2 | 42.9±0.7 |  |  |  |  |  |

**Supplemental Table S4.** Headspace VOC concentrations (mean±sd, unit: g/m3) in major types of nail products.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Product type | Ethyl acetate | n-Propyl acetate | Iso-propyl acetate | Butyl acetate | EMA | Heptane | Toluene |
| Nail polish | 113±84 | 18±22 | 7±9 | 36±17 |  |  | 4±7 |
| Base coat | 67±4 |  |  | 29±23 |  | 12±12 |  |
| Top coat | 111±64 |  | 5±7 | 47±43 |  |  |  |
| Monomer | 1±2 |  |  |  | 46±30 |  |  |

**Supplemental Table S5.** Major VOCs quantified in nail salons in the U.S. from the literature (all concentrations are in µg/m3).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| VOC | McNary & Jackson (2007)1 | | | Quach et al. (2011)2 | | Alaves et al. (2013)3 | Goldin et al. (2014)4 | Garcia et al. (2015)5 | This study | |
| Northern, central, and southern California | | | Alameda County, CA | | Salt Lake City, UT | Boston, MA | San Francisco, CA | Eastern Michigan | |
| 30 nail salons | | | 20 nail salons | 3 nail salons | 12 nail salons | 21 nail salons | 11 nail salons | 17 nail salons, repeated visit | |
| Personal air: nail tech | Personal air: client | Area air | Personal air | Area air | Area air | Area air | Personal air | Personal air | Area air |
| GC/HPLC | | | GC-MS | | GC/HPLC | PID | GC/MS/FID | GC-MS/Photoelectric sensor | |
| Median | Median | Median | Mean (Range) | Mean (Range) | Mean (Range) | Median (Range) | Mean (Range) | Mean (Range) | Mean (Range) |
| Ethyl acetate |  |  |  | 1908 (72-19800) | 324 (72-540) | 1332 (180-7200) |  |  | 1903 (171-9652) | 1258 (84-6904) |
| Isopropyl acetate |  |  |  | 167 (84-627) |  |  |  |  | 29 (<5-163) | 17 (<5-96) |
| n-Propyl acetate |  |  |  |  |  |  |  |  | 62 (<5-289) | 43 (<5-242) |
| n-Butyl acetate |  |  |  |  | 143 (48-285) |  |  |  | 628 (60-4498) | 320 (19-3289) |
| Methyl methacrylate |  |  |  |  | 164 (41-245) | 3558 (ND-16769) |  | 4499 (82-27812) | 4820 (<2.5-35847) | 3502 (<2.5-34175) |
| Toluene | 754 | 377 | 377 | 566 (75-3770) | 151 (38-226) | 369 (53-1169) |  | 377 (151-603) | 107 (<0.1-646) | 93 (<0.1-318) |
| Formaldehyde | 25 | 26 | 25 |  |  | 21 (11-39) |  |  |  | 10.5 (<6-40) |
| TVOC |  |  |  |  |  |  | 18096\* (230-143260) | 4147\* (1244-15080) | 7834 (571-48413) | 5453 (371-43094) |

\* TVOC was quantified as toluene equivalent.

**Supplemental Table S6.** Spearman rank correlation coefficients of indoor area VOCs concentrations (n=31). 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | EA | | IPA | NPA | NBA | MMA | EMA | Heptane | Benzene | Toluene | DL | FA | TVOC | CO2 | ACR | Occu--ancy | Services |
|  | EA |  | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| IPA |  | **0.47\*\*** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NPA |  | **0.66\*\*** | **0.62\*\*** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NBA |  | **0.75\*\*** | **0.56\*\*** | **0.60\*\*** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| MMA |  | **0.79\*\*** | **0.50\*\*** | **0.73\*\*** | **0.50\*\*** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| EMA |  | -0.14 | -0.15 | -0.33 | -0.11 | -0.30 | 1.00 |  |  |  |  |  |  |  |  |  |  |
| Heptane |  | 0.07 | 0.08 | -0.15 | 0.13 | -0.03 | -0.16 | 1.00 |  |  |  |  |  |  |  |  |  |
| Benzene |  | -0.17 | 0.06 | -0.01 | -0.13 | -0.15 | 0.16 | -0.14 | 1.00 |  |  |  |  |  |  |  |  |
| Toluene |  | 0.04 | 0.12 | -0.07 | 0.24 | -0.01 | 0.04 | 0.29 | 0.00 | 1.00 |  |  |  |  |  |  |  |
| DL |  | **0.38\*** | **0.46\*\*** | **0.45\*** | **0.38\*** | 0.35 | -0.07 | -0.15 | 0.07 | -0.14 | 1.00 |  |  |  |  |  |  |
| FA |  | -0.16 | 0.17 | 0.01 | -0.05 | -0.09 | -0.24 | 0.32 | **0.42\*** | 0.12 | -0.10 | 1.00 |  |  |  |  |  |
| TVOC |  | **0.95\*\*** | **0.53\*\*** | **0.72\*\*** | **0.68\*\*** | **0.90\*\*** | -0.13 | 0.09 | -0.17 | 0.08 | **0.42\*** | -0.14 | 1.00 |  |  |  |  |
|  | CO2 |  | **0.45\*\*** | 0.17 | **0.63\*\*** | **0.42\*** | **0.56\*\*** | -0.06 | **-0.42\*** | 0.03 | -0.20 | 0.30 | **-0.37\*** | **0.56\*\*** | 1.00 |  |  |  |
|  | ACR |  | 0.07 | -0.01 | 0.02 | 0.15 | 0.11 | -0.21 | 0.27 | -0.26 | 0.03 | -0.20 | 0.02 | -0.04 | **-0.37\*** | 1.00 |  |  |
|  | Occupancy |  | **0.47\*\*** | 0.16 | **0.53\*\*** | **0.49\*\*** | **0.71\*\*** | -0.23 | -0.23 | -0.18 | -0.21 | 0.22 | -0.21 | **0.59\*\*** | **0.66\*\*** | 0.07 | 1.00 |  |
|  | Services |  | **0.38\*** | 0.04 | **0.47\*\*** | **0.37\*** | **0.61\*\*** | -0.14 | -0.40\* | -0.21 | -0.26 | 0.22 | -0.41\* | **0.49\*\*** | **0.75\*\*** | 0.01 | **0.93\*\*** | 1.00 |

\*\*: Correlation is significant at the 0.01 level (2-tailed).

\*: Correlation is significant at the 0.05 level (2-tailed).

1: Three nail salons with open doors in either winter or fall season are not included in the correlation analysis.

EA: ethyl acetate; IPA: isopropyl acetate; NPA: n-propyl acetate; NBA: n-butyl acetate; MMA: methyl methacrylate; EMA: ethyl methacrylate; DL: d-limonene; FA: formaldehyde; ACR: air change rate.

**Supplemental Table S7.** Statistics of VOC concentrations measured in personal and area samples (n=34) by season in nail salons

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VOC | Personal | | Area | |
| ANOVA | K-W | ANOVA | K-W |
| Ethyl acetate | 0.900 | 0.796 | 0.910 | 0.796 |
| Isopropyl acetate | 0.680 | 0.727 | 0.467 | 0.181 |
| n-Propyl acetate | 0.668 | 0.500 | 0.554 | 0.834 |
| n-Butyl acetate | 0.355 | 0.667 | 0.657 | 0.877 |
| Methyl methacrylate | 0.744 | 0.743 | 0.581 | 0.523 |
| Ethyl methacrylate | 0.433 | 0.635 | 0.310 | 0.378 |
| Heptane | 0.529 | 0.418 | 0.429 | 0.459 |
| Benzene | 0.575 | 0.437 | 0.321 | 0.310 |
| Toluene | 0.260 | 0.438 | 0.480 | 0.438 |
| d-Limonene | 0.241 | 0.224 | 0.304 | 0.085 |
| Formaldehyde | --- | --- | **0.042** | 0.067 |
| TVOC | 0.852 | 0.904 | 0.688 | 0.617 |

Bold values are statistically significant (P<0.05).

**Supplemental Table S8.** Statistics of personal and area VOC concentrations in nail salons by location in the fall and winter seasons.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Ann Arbor (µg/m3) | |  | Detroit (µg/m3) | |  | Dearborn (µg/m3) | |  | Location: AA, Detroit, and Dearborn | | | | |
| Personal (n=26) | Area  (n=26) |  | Personal (n=4) | Area (n=4) |  | Personal (n=4) | Area  (n=4) |  | Personal | |  | Area | |
| Temp (℃) | 19 ± 3 | |  | 18 ± 1 | |  | 19 ± 2 | |  |  |
| RH (%) | 51 ± 15 | |  | 31 ± 3 | |  | 52 ± 3 | |  |  |
| Avg. AER (h-1) | 4 ± 1 | |  | 3± 0.4 | |  | 1± 0.4 | |  |  |
| VOC | Mean | Mean |  | Mean | Mean |  | Mean | Mean |  | ANOVA | K-W |  | ANOVA | K-W |
| Ethyl acetate | 1181 | 832 |  | 4021 | 3083 |  | 4479 | 2201 |  | **0.001** | **0.011** |  | **0.002** | **0.021** |
| Isopropyl acetate | 21 | 15 |  | 20 | 20 |  | 94 | 32 |  | **0.000** | 0.168 |  | 0.266 | 0.162 |
| n-propyl acetate | 42 | 30 |  | 108 | 107 |  | 142 | 68 |  | **0.012** | 0.141 |  | **0.011** | **0.044** |
| n-butyl acetate | 516 | 298 |  | 819 | 495 |  | 1166 | 286 |  | 0.380 | 0.068 |  | 0.820 | 0.074 |
| MMA | 2053 | 1656 |  | 15301 | 13135 |  | 12322 | 5867 |  | **0.000** | **0.005** |  | **0.002** | **0.008** |
| EMA | 97 | 83 |  | 0.5 | 0.5 |  | 0.5 | 0.5 |  | 0.783 | 0.420 |  | 0.714 | 0.341 |
| Heptane | 80 | 65 |  | 112 | 97 |  | 88 | 80 |  | 0.537 | 0.806 |  | 0.392 | 0.548 |
| Benzene | 5 | 4 |  | 0.1 | 0.1 |  | 0.1 | 0.1 |  | 0.385 | 0.341 |  | 0.534 | 0.510 |
| Toluene | 108 | 97 |  | 169 | 139 |  | 35 | 20 |  | 0.320 | 0.161 |  | 0.263 | 0.089 |
| d-Limonene | 17 | 13 |  | 22 | 14 |  | 110 | 35 |  | **0.009** | 0.533 |  | 0.597 | 0.511 |
| Formaldehyde | N/A | 11 |  | N/A | 13 |  | N/A | 6 |  | N/A | N/A |  | 0.545 | 0.514 |
| TVOC | 4184 | 3138 |  | 20850 | 17347 |  | 18544 | 8612 |  | **0.001** | **0.005** |  | **0.002** | **0.011** |

Bold values are statistically significant (P<0.05).

**Supplemental Table S9.** Source apportionment in each nail salon by season and location.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Sample type | Season | Percentage (%) by concentration | | | | | | | |  | Standardized Coefficient (%) | | | | R2 | Adjusted R2 | P-value | Sum-Coef |
| EA | IPA | NPA | NBA | Heptane | Toluene | EMA | TVOC |  | Polish | Top coat | Base coat | Monomer |
| NS-1 | Personal | Fall | 68.8 | 0.1 | 3.7 | 25.2 | 2.2 | 0 | 0 | 100.0 |  | 60 | 0 | 43 | 5 | 0.999 | 0.997 | **0.000** | 1.078 |
| NS-2 | Personal | Fall | 43.2 | 1.3 | 1.3 | 29.5 | 4.9 | 19.8 | 0.1 | 100.0 |  | 0 | 90 | 0 | 0 | 0.817 | 0.781 | **0.005** | 0.904 |
| NS-3 | Personal | Fall | 62.6 | 0.3 | 5.1 | 21.3 | 6.9 | 3.7 | 0 | 100.0 |  | 40 | 0 | 61 | 1 | 0.990 | 0.981 | **0.002** | 1.014 |
| NS-4 | Personal | Fall | 61.2 | 0.5 | 2.7 | 22.8 | 0 | 12.7 | 0 | 100.0 |  | 65 | 18 | 16 | 0 | 0.953 | 0.860 | 0.091 | 0.988 |
| NS-6 | Personal | Fall | 46.4 | 4.0 | 2.8 | 21.0 | 13.9 | 11.8 | 0 | 100.0 |  | 0 | 0 | 97 | 0 | 0.949 | 0.939 | **0.000** | 0.974 |
| NS-8 | Personal | Fall | 42.0 | 0.8 | 0.8 | 24.8 | 19.4 | 12.1 | 0.1 | 100.0 |  | 0 | 0 | 94 | 0 | 0.879 | 0.854 | **0.002** | 0.937 |
| NS-9 | Personal | Fall | 61.8 | 0.2 | 1.5 | 10.3 | 3.5 | 4.9 | 17.7 | 100.0 |  | 50 | 0 | 52 | 36 | 0.936 | 0.872 | **0.027** | 1.379 |
| NS-10 | Personal | Fall | 62.2 | 1.0 | 0.2 | 20.5 | 5.0 | 7.9 | 3.1 | 100.0 |  | 43 | 0 | 59 | 7 | 0.975 | 0.950 | **0.007** | 1.083 |
| NS-12 | Personal | Fall | 42.4 | 2.7 | 4.3 | 25.7 | 12.6 | 12.1 | 0.1 | 100.0 |  | 0 | 18 | 78 | 0 | 0.921 | 0.882 | **0.006** | 0.963 |
| NS-14 | Personal | Fall | 65.2 | 2.4 | 2.5 | 20.3 | 5.8 | 3.7 | 0 | 100.0 |  | 45 | 0 | 57 | 2 | 0.989 | 0.979 | **0.002** | 1.033 |
| NS-15 | Personal | Fall | 62.7 | 2.6 | 10.4 | 16.8 | 4.2 | 3.4 | 0 | 100.0 |  | 71 | 0 | 29 | 1 | 0.966 | 0.093 | **0.010** | 1.005 |
| NS-19 | Personal | Fall | 41.4 | 0.9 | 0.9 | 26.9 | 9.9 | 20.0 | 0.1 | 100.0 |  | 6 | 51 | 39 | 0 | 0.790 | 0.685 | **0.044** | 0.951 |
| NS-24 | Personal | Fall | 59.3 | 3.2 | 0.7 | 19.8 | 0 | 17.0 | 0.1 | 100.0 |  | 77 | 4 | 15 | 0 | 0.908 | 0.817 | **0.046** | 0.960 |
| NS-25 | Personal | Fall | 82.8 | 0.2 | 2.0 | 14.0 | 0.4 | 0.6 | 0 | 100.0 |  | 63 | 0 | 38 | 9 | 0.958 | 0.915 | **0.015** | 1.102 |
| NS-27 | Personal | Fall | 55.6 | 0.1 | 0.6 | 27.8 | 4.7 | 11.2 | 0 | 100.0 |  | 0 | 79 | 20 | 0 | 0.961 | 0.942 | **0.002** | 0.984 |
| NS-28 | Personal | Fall | 81.6 | 1.6 | 3.1 | 11.6 | 1.5 | 0.6 | 0 | 100.0 |  | 62 | 0 | 38 | 8 | 0.943 | 0.886 | **0.023** | 1.085 |
| NS-30 | Personal | Fall | 85.7 | 5.1 | 1.5 | 6.1 | 1.6 | 0 | 0 | 100.0 |  | 63 | 0 | 36 | 9 | 0.902 | 0.804 | **0.050** | 1.071 |
| NS-1 | Personal | Winter | 57.1 | 2.0 | 3.9 | 27.6 | 5.4 | 4.0 | 0 | 100.0 |  | 16 | 53 | 31 | 0 | 0.995 | 0.991 | **0.001** | 1.005 |
| NS-2 | Personal | Winter | 44.7 | 1.2 | 1.1 | 39.6 | 5.4 | 7.9 | 0.1 | 100.0 |  | 0 | 93 | 0 | 0 | 0.870 | 0.844 | **0.002** | 0.933 |
| NS-3 | Personal | Winter | 45.3 | 1.0 | 0.4 | 50.6 | 1.5 | 1.2 | 0 | 100.0 |  | 0 | 89 | 0 | 0 | 0.787 | 0.744 | **0.008** | 0.887 |
| NS-4 | Personal | Winter | 59.8 | 0.2 | 2.7 | 33.3 | 0 | 3.0 | 0.9 | 100.0 |  | 0 | 100 | 0 | 0 | 0.989 | 0.987 | **0.000** | 0.995 |
| NS-6 | Personal | Winter | 40.1 | 1.2 | 1.4 | 25.4 | 16.3 | 15.5 | 0 | 100.0 |  | 0 | 0 | 92 | 0 | 0.843 | 0.812 | **0.004** | 0.918 |
| NS-8 | Personal | Winter | 56.8 | 2.7 | 0.5 | 23.0 | 12.7 | 4.2 | 0.1 | 100.0 |  | 0 | 0 | 100 | 0 | 0.995 | 0.994 | **0.000** | 0.998 |
| NS-9 | Personal | Winter | 40.3 | 3.2 | 1.5 | 31.6 | 11.9 | 1.9 | 9.5 | 100.0 |  | 0 | 46 | 51 | 11 | 0.898 | 0.797 | **0.053** | 1.089 |
| NS-10 | Personal | Winter | 55.3 | 0.3 | 0.1 | 6.3 | 2.5 | 0.9 | 34.5 | 100.0 |  | 43 | 0 | 50 | 67 | 0.940 | 0.880 | **0.025** | 1.595 |
| NS-12 | Personal | Winter | 78.5 | 1.4 | 3.1 | 7.9 | 3.1 | 6.0 | 0 | 100.0 |  | 57 | 0 | 41 | 6 | 0.905 | 0.810 | **0.048** | 1.042 |
| NS-14 | Personal | Winter | 65.9 | 0.3 | 2.7 | 23.2 | 4.1 | 3.8 | 0 | 100.0 |  | 50 | 0 | 51 | 3 | 0.994 | 0.988 | **0.001** | 1.049 |
| NS-15 | Personal | Winter | 72.0 | 1.4 | 2.6 | 10.7 | 10.0 | 3.2 | 0.1 | 100.0 |  | 23 | 0 | 75 | 3 | 0.930 | 0.861 | **0.031** | 1.010 |
| NS-19 | Personal | Winter | 68.1 | 1.3 | 1.9 | 14.1 | 6.0 | 8.6 | 0.1 | 100.0 |  | 43 | 0 | 56 | 2 | 0.942 | 0.884 | **0.023** | 1.010 |
| NS-24 | Personal | Winter | 50.0 | 2.1 | 3.5 | 28.7 | 0.1 | 15.5 | 0.1 | 100.0 |  | 23 | 73 | 0 | 0 | 0.916 | 0.875 | **0.007** | 0.959 |
| NS-25 | Personal | Winter | 85.7 | 0.3 | 2.6 | 9.5 | 1.6 | 0.2 | 0 | 100.0 |  | 58 | 0 | 41 | 9 | 0.930 | 0.860 | **0.031** | 1.089 |
| NS-27 | Personal | Winter | 65.6 | 1.6 | 3.7 | 13.7 | 7.5 | 8.0 | 0 | 100.0 |  | 38 | 0 | 60 | 1 | 0.942 | 0.884 | **0.023** | 0.990 |
| NS-28 | Personal | Winter | 69.2 | 0.8 | 2.5 | 25.9 | 1.2 | 0.5 | 0 | 100.0 |  | 63 | 0 | 40 | 6 | 0.999 | 0.999 | **0.000** | 1.082 |
| NS-30 | Personal | Winter | 61.0 | 0.3 | 0.3 | 33.1 | 2.9 | 2.5 | 0 | 100.0 |  | 0 | 93 | 7 | 0 | 0.992 | 0.988 | **0.000** | 0.998 |
| AVE |  |  |  |  |  |  |  |  |  |  |  | 31 | 24 | 43 | 6 |  |  |  | 1.034 |
| SD |  |  |  |  |  |  |  |  |  |  |  | 27 | 36 | 29 | 13 |  |  |  |  |
| Normalized AVE |  |  |  |  |  |  |  |  |  |  |  | 30 | 23 | 42 | 5 |  |  |  | 1.000 |

**Supplemental Table S9.** Source apportionment in each nail salon by season and location (continued).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Sample type | Season | Percentage (%) by concentration | | | | | | | |  | Standardized Coefficient (%) | | | | R2 | Adjusted R2 | P-value | Sum-Coef |
| EA | IPA | NPA | NBA | Heptane | Toluene | EMA | TVOC |  | Polish | Top coat | Base coat | Monomer |
| NS-1 | Area | Fall | 64.7 | 0.3 | 1.3 | 29.5 | 4.1 | 0 | 0 | 100.0 |  | 0 | 70 | 31 | 0 | 0.999 | 0.999 | **0.000** | 1.004 |
| NS-2 | Area | Fall | 40.6 | 1.5 | 1.5 | 14.9 | 2.7 | 38.6 | 0.2 | 100.0 |  | 64 | 0 | 0 | 0 | 0.410 | 0.293 | 0.121 | 0.641 |
| NS-3 | Area | Fall | 86.7 | 0.3 | 3.7 | 4.0 | 5.3 | 0 | 0 | 100.0 |  | 45 | 0 | 52 | 8 | 0.886 | 0.772 | 0.063 | 1.055 |
| NS-4 | Area | Fall | 54.5 | 0.7 | 3.8 | 28.9 | 0 | 12.1 | 0 | 100.0 |  | 23 | 75 | 0 | 0 | 0.954 | 0.931 | **0.002** | 0.979 |
| NS-6 | Area | Fall | 24.1 | 0.7 | 0.7 | 7.2 | 16.0 | 51.2 | 0.1 | 100.0 |  | 0 | 0 | 18 | 0 | 0.031 | -0.163 | 0.706 | 0.176 |
| NS-8 | Area | Fall | 30.7 | 1.8 | 1.8 | 13.7 | 36.8 | 15.0 | 0.2 | 100.0 |  | 0 | 0 | 63 | 0 | 0.390 | 0.268 | 0.134 | 0.625 |
| NS-9 | Area | Fall | 50.6 | 0.4 | 0.4 | 10.1 | 4.5 | 13.1 | 20.8 | 100.0 |  | 43 | 0 | 54 | 44 | 0.871 | 0.741 | 0.076 | 1.406 |
| NS-10 | Area | Fall | 60.7 | 0.4 | 0.4 | 17.5 | 8.6 | 5.9 | 6.5 | 100.0 |  | 20 | 0 | 82 | 12 | 0.975 | 0.949 | **0.007** | 1.140 |
| NS-12 | Area | Fall | 69.9 | 1.5 | 1.0 | 16.8 | 6.2 | 4.6 | 0 | 100.0 |  | 39 | 0 | 61 | 4 | 0.970 | 0.939 | **0.009** | 1.041 |
| NS-14 | Area | Fall | 81.1 | 1.2 | 1.9 | 6.0 | 6.2 | 3.5 | 0 | 100.0 |  | 40 | 0 | 57 | 7 | 0.895 | 0.790 | **0.056** | 1.037 |
| NS-15 | Area | Fall | 43.1 | 2.3 | 19.5 | 23.3 | 5.6 | 6.1 | 0.1 | 100.0 |  | 94 | 0 | 0 | 0 | 0.884 | 0.861 | **0.002** | 0.940 |
| NS-19 | Area | Fall | 64.4 | 0.9 | 0.9 | 17.2 | 7.5 | 8.9 | 0.1 | 100.0 |  | 32 | 0 | 68 | 1 | 0.959 | 0.918 | **0.014** | 0.995 |
| NS-24 | Area | Fall | 75.8 | 0.8 | 0.8 | 7.2 | 0 | 15.2 | 0.1 | 100.0 |  | 69 | 0 | 26 | 6 | 0.857 | 0.714 | 0.088 | 1.005 |
| NS-25 | Area | Fall | 85.4 | 0.4 | 3.0 | 9.8 | 0.4 | 1.0 | 0 | 100.0 |  | 64 | 0 | 36 | 9 | 0.932 | 0.863 | **0.030** | 1.093 |
| NS-27 | Area | Fall | 59.8 | 0.2 | 1.0 | 25.9 | 4.6 | 8.6 | 0 | 100.0 |  | 14 | 50 | 35 | 0 | 0.980 | 0.959 | **0.005** | 0.997 |
| NS-28 | Area | Fall | 82.5 | 0.8 | 3.0 | 11.0 | 2.0 | 0.8 | 0 | 100.0 |  | 59 | 0 | 41 | 8 | 0.938 | 0.877 | **0.025** | 1.085 |
| NS-30 | Area | Fall | 76.8 | 5.3 | 2.5 | 10.0 | 5.4 | 0 | 0 | 100.0 |  | 50 | 0 | 49 | 6 | 0.926 | 0.853 | **0.033** | 1.048 |
| NS-1 | Area | Winter | 62.1 | 1.7 | 4.1 | 20.4 | 6.4 | 5.3 | 0 | 100.0 |  | 44 | 0 | 66 | 0 | 0.988 | 0.976 | **0.002** | 1.100 |
| NS-2 | Area | Winter | 46.7 | 1.6 | 1.2 | 33.9 | 6.8 | 9.7 | 0.2 | 100.0 |  | 0 | 95 | 2 | 0 | 0.922 | 0.882 | **0.006** | 0.960 |
| NS-3 | Area | Winter | 46.6 | 1.4 | 0.5 | 47.0 | 1.6 | 3.0 | 0 | 100.0 |  | 0 | 91 | 0 | 0 | 0.833 | 0.800 | **0.004** | 0.913 |
| NS-4 | Area | Winter | 86.4 | 0.4 | 2.7 | 8.3 | 0 | 0.6 | 1.7 | 100.0 |  | 65 | 0 | 35 | 12 | 0.923 | 0.846 | **0.035** | 1.118 |
| NS-6 | Area | Winter | 60.6 | 1.4 | 1.9 | 9.7 | 20.9 | 5.5 | 0.1 | 100.0 |  | 0 | 0 | 95 | 0 | 0.894 | 0.872 | **0.001** | 0.945 |
| NS-8 | Area | Winter | 63.7 | 2.1 | 0.7 | 12.9 | 15.3 | 5.2 | 0.1 | 100.0 |  | 0 | 0 | 97 | 0 | 0.943 | 0.931 | **0.000** | 0.971 |
| NS-9 | Area | Winter | 55.3 | 3.4 | 1.3 | 25.7 | 9.3 | 2.7 | 2.4 | 100.0 |  | 0 | 37 | 63 | 0 | 0.999 | 0.998 | **0.000** | 1.004 |
| NS-10 | Area | Winter | 37.5 | 0.3 | 0.2 | 4.1 | 3.7 | 6.7 | 47.5 | 100.0 |  | 23 | 0 | 41 | 93 | 0.940 | 0.880 | **0.025** | 1.570 |
| NS-12 | Area | Winter | 52.0 | 1.8 | 2.8 | 25.0 | 4.2 | 14.1 | 0 | 100.0 |  | 0 | 87 | 10 | 0 | 0.938 | 0.907 | **0.004** | 0.970 |
| NS-14 | Area | Winter | 86.1 | 0.3 | 2.6 | 5.7 | 3.4 | 1.8 | 0 | 100.0 |  | 51 | 0 | 47 | 9 | 0.899 | 0.799 | **0.052** | 1.066 |
| NS-15 | Area | Winter | 64.9 | 1.2 | 3.8 | 17.4 | 8.7 | 3.9 | 0.1 | 100.0 |  | 30 | 0 | 70 | 1 | 0.976 | 0.952 | **0.006** | 1.009 |
| NS-19 | Area | Winter | 71.6 | 1.0 | 1.4 | 11.5 | 6.2 | 8.3 | 0.1 | 100.0 |  | 41 | 0 | 58 | 4 | 0.923 | 0.846 | **0.035** | 1.015 |
| NS-24 | Area | Winter | 22.5 | 1.7 | 2.4 | 3.2 | 0 | 6.7 | 63.5 | 100.0 |  | 31 | 0 | 0 | 104 | 0.981 | 0.972 | **0.000** | 1.344 |
| NS-25 | Area | Winter | 88.6 | 0.7 | 2.4 | 6.5 | 1.5 | 0.4 | 0 | 100.0 |  | 58 | 0 | 40 | 10 | 0.909 | 0.819 | **0.045** | 1.084 |
| NS-27 | Area | Winter | 61.9 | 1.6 | 5.2 | 10.0 | 10.0 | 11.4 | 0 | 100.0 |  | 29 | 0 | 66 | 0 | 0.891 | 0.836 | **0.012** | 0.953 |
| NS-28 | Area | Winter | 85.1 | 0.4 | 2.4 | 9.6 | 1.7 | 0.8 | 0 | 100.0 |  | 58 | 0 | 42 | 9 | 0.930 | 0.860 | **0.031** | 1.088 |
| NS-30 | Area | Winter | 65.9 | 0.8 | 0.8 | 17.4 | 13.3 | 1.8 | 0.1 | 100.0 |  | 0 | 0 | 99 | 0 | 0.979 | 0.968 | **0.000** | 0.993 |
| AVE |  |  |  |  |  |  |  |  |  |  |  | 32 | 15 | 44 | 10 |  |  |  | 1.011 |
| SD |  |  |  |  |  |  |  |  |  |  |  | 26 | 31 | 29 | 23 |  |  |  |  |
| Normalized AVE |  |  |  |  |  |  |  |  |  |  |  | 32 | 15 | 44 | 10 |  |  |  | 1.000 |



**Supplemental Figure S1.** Locations of nail salons in this study.







**Supplemental Figure S2.** Correlations between P/A ratio and distance between personal and area samples for (a) ethyl acetate, (b) n-butyl acetate, and (c) TVOC across all nail salons in two seasons (n=34).

 

**Supplemental Figure S3.** Concentrations of ethyl acetate, MMA, n-butyl acetate, and TVOC in each nail salon for (a) personal air in fall, (b) personal air in winter, (c) area air in fall, and (d) area air in winter.

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