

4.10 Commercial/Consumer Solvent Use

4.10.1 General¹⁻²

Commercial and consumer use of various products containing volatile organic compounds (VOC) contributes to formation of tropospheric ozone. The organics in these products may be released through immediate evaporation of an aerosol spray, evaporation after application, and direct release in the gaseous phase. Organics may act either as a carrier for the active product ingredients or as active ingredients themselves. Commercial and consumer products that release VOCs include aerosols, household products, toiletries, rubbing compounds, windshield washing fluids, polishes and waxes, nonindustrial adhesives, space deodorants, moth control applications, and laundry detergents and treatments.

4.10.2 Emissions

Major volatile organic constituents of these products which are released to the atmosphere include special naphthas, alcohols, and various chloro- and fluorocarbons. Although methane is not included in these products, 31 percent of the VOCs released in the use of these products is considered nonreactive under EPA policy.^{3,4}

National emissions and per capita emission factors for commercial and consumer solvent use are presented in Table 4.10-1. Per capita emission factors can be applied to area source inventories by multiplying the factors by inventory area population. Note that adjustment to exclude the nonreactive emission fraction cited above should be applied to total emissions or to the composite factor. Care is advised in making adjustments, in that substitution of compounds within the commercial/consumer products market may alter the nonreactive fraction of compounds.

Table 4.10-1 (Metric And English Units). EVAPORATIVE EMISSIONS FROM COMMERCIAL/CONSUMER SOLVENT USE

EMISSION FACTOR RATING: C

| Use | Nonmethane VOC ^a | | | | | |
|--------------------|-----------------------------|-------------------------|-----------------------------|-------|--------------------|-------------------------|
| | National Emissions | | Per Capita Emission Factors | | | |
| | 10 ³ Mg/yr | 10 ³ tons/yr | kg/yr | lb/yr | g/day ^b | 10 ⁻³ lb/day |
| Aerosol products | 342 | 376 | 1.6 | 3.5 | 4.4 | 9.6 |
| Household products | 183 | 201 | 0.86 | 1.9 | 2.4 | 5.2 |
| Toiletries | 132 | 145 | 0.64 | 1.4 | 1.8 | 3.8 |
| Rubbing compounds | 62 | 68 | 0.29 | 0.64 | 0.80 | 1.8 |
| Windshield washing | 61 | 67 | 0.29 | 0.63 | 0.77 | 1.7 |
| Polishes and waxes | 48 | 53 | 0.22 | 0.49 | 0.59 | 1.3 |

Table 4.10-1 (cont.).

| Nonmethane VOC ^a | | | | | | |
|-----------------------------|-----------------------|-------------------------|-----------------------------|-------|--------------------|-------------------------|
| Use | National Emissions | | Per Capita Emission Factors | | | |
| | 10 ³ Mg/yr | 10 ³ tons/yr | kg/yr | lb/yr | g/day ^b | 10 ⁻³ lb/day |
| Nonindustrial adhesives | 29 | 32 | 0.13 | 0.29 | 0.36 | 0.79 |
| Space deodorant | 18 | 20 | 0.09 | 0.19 | 0.24 | 0.52 |
| Moth control | 16 | 18 | 0.07 | 0.15 | 0.19 | 0.41 |
| Laundry detergent | 4 | 4 | 0.02 | 0.04 | 0.05 | 0.10 |
| Total ^c | 895 | 984 | 4.2 | 9.2 | 11.6 | 25.2 |

^a References 1-2.

^b Calculated by dividing kg/yr (lb/yr) by 365 and converting to appropriate units.

^c Totals may not be additive because of rounding.

References For Section 4.10

1. W. H. Lamason, *Technical Discussion Of Per Capita Emission Factors For Several Area Sources Of Volatile Organic Compounds*, Monitoring And Data Analysis Division, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 15, 1981. Unpublished.
2. *End Use Of Solvents Containing Volatile Organic Compounds*, EPA-450/3-79-032, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1979.
3. *Final Emission Inventory Requirements For 1982 Ozone State Implementation Plans*, EPA-450/4-80-016, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 1980.
4. *Procedures For The Preparation Of Emission Inventories For Volatile Organic Compounds, Volume I, Second Edition*, EPA-450/2-77-028, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1980.