6.4 Paint And Varnish

6.4.1 Paint Manufacturing[1]

The manufacture of paint involves the dispersion of a colored oil or pigment in a vehicle, usually an oil or resin, followed by the addition of an organic solvent for viscosity adjustment. Only the physical processes of weighing, mixing, grinding, tinting, thinning, and packaging take place. No chemical reactions are involved.

These processes take place in large mixing tanks at approximately room temperature.

The primary factors affecting emissions from paint manufacture are care in handling dry pigments, types of solvents used, and mixing temperature. About 1 or 2 percent of the solvent is lost even under well-controlled conditions. Particulate emissions amount to 0.5 to 1.0 percent of the pigment handled.

Afterburners can reduce emitted volatile organic compounds (VOC) by 99 percent and particulates by about 90 percent. A water spray and oil filter system can reduce particulate emissions from paint blending by 90 percent.

6.4.2 Varnish Manufacturing[1-3,5]

The manufacture of varnish also involves the mixing and blending of various ingredients to produce a wide range of products. However in this case, chemical reactions are initiated by heating. Varnish is cooked in either open or enclosed gas-fired kettles for periods of 4 to 16 hours at temperatures of 93 to 340°C (200 to 650°F).

Varnish cooking emissions, largely in the form of volatile organic compounds, depend on the cooking temperatures and times, the solvent used, the degree of tank enclosure and the type of air pollution controls used. Emissions from varnish cooking range from 1 to 6 percent of the raw material.

To reduce organic compound emissions from the manufacture of paint and varnish, control techniques include condensers and/or adsorbers on solvent handling operations, and scrubbers and afterburners on cooking operations. Afterburners can reduce volatile organic compounds by 99 percent. Emission factors for paint and varnish are shown in Table 6.4-1.

Table 6.4-1 (Metric And English Units). UNCONTROLLED EMISSION FACTORS FOR PAINT AND VARNISH MANUFACTURING[a,b]

EMISSION FACTOR RATING: C

Type Of Product	Particulate		Nonmethane VOC[c]	
	kg/Mg Pigment	lb/ton Pigment	kg/Mg Of Product	lb/ton Of Product
Paint[d]	10	20	15	30
Varnish				
Bodying oil	—	—	20	40
Oleoresinous	—	—	75	150
Alkyd	—	—	80	160
Acrylic	—	—	10	20

[a] References 2,4-8.
[b] Afterburners can reduce VOC emissions by 99% and particulates by about 90%. A water spray and oil filter system can reduce particulates by about 90%.
[c] Expressed as undefined organic compounds whose composition depends upon the type of solvents used in the manufacture of paint and varnish.
[d] Reference 4. Particulate mater (0.5 - 1.0%) is emitted from pigment handling.

References For Section 6.4

1. *Air Pollutant Emission Factors*, APTD-0923, U. S. Environmental Protection Agency, Research Triangle Park, NC, April 1970.

2. R. L. Stenburg, "Controlling Atmospheric Emissions From Paint And Varnish Operations, Part I", *Paint And Varnish Production*, September 1959.

3. Private communication between Resources Research, Inc., Reston, VA, And National Paint, Varnish And Lacquer Association, Washington, DC, September 1969.

4. Unpublished engineering estimates based on plant visits in Washington, DC, Resources Research, Inc., Reston, VA, October 1969.

5. *Air Pollution Engineering Manual*, Second Edition, AP-40, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1973.

6. E. G. Lunche, *et al.*, "Distribution Survey Of Products Emitting Organic Vapors In Los Angeles County", *Chemical Engineering Progress*, *53*(8):371-376, August 1957.

7. Communication on emissions from paint and varnish operations between Resources Research, Inc., Reston, VA, and G. Sallee, Midwest Research Institute, Kansas City, MO, December 17, 1969.

8. Communication between Resources Research, Inc., Reston, VA, and Roger Higgins, Benjamin Moore Paint Company, June 25, 1968.