VOC Emission Calculation Examples

Mecklenburg County
Land Use and Environmental Services Agency
Air Quality Division

Helping you breathe easy... for life
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(704) 336-5430 • FAX (704) 336-4391
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VOC Emission Calculations

<u>What do I need?</u>

- Material Safety Data Sheet (MSDS), Product Safety Data Sheet (PSDS), or Manufacturer's Product Specification Sheet (MPSS)
- Amount of Product Used
- Control Efficiency

What Am I looking for on the MSDS?

MATERIAL SAFETY DATA SHEET

B58W610
19 00

DATE OF PREPARATION
Jun 29, 2011

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER
B58W610
PRODUCT NAME
MACROPOXY® 646 Fast Cure Epoxy Coating (Part A), Mill White
MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N W
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	www sherwin-williams com
Regulatory Information	(216) 566-2902 www paintdocs com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300

*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
3	100-41-4	Ethylbenzene		
		ACGIH TLV	100 PPM	7 1 mm
		ACGIH TLV	125 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	125 PPM STEL	
15	1330-20-7	Xylene		
		ACGIH TLV	100 PPM	5 9 mm
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
11	68410-23-1	Polyamide		
		ACGIH TLV	Not Available	
		OSHA PEL	Not Available	
9	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp Dust	
		OSHA PEL	2 mg/m3 as Resp Dust	
31	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

What Am I looking for on the MSDS?

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	12 19 lb/gal	1460 g/l
SPECIFIC GRAVITY	1 47	
BOILING POINT	277 - 292 °F	136 - 144 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	29%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N A	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

2 11 lb/gal	253 g/l	Less Water and Federally Exempt Solvents
2 11 lb/gal	253 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known

INCOMPATIBILITY

None known

HAZARDOUS DECOMPOSITION PRODUCTS

By fire Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

Calculating VOC Emissions using Mass Balance

Amount of Coating Used – 4,000 gallons

VOC Content – 2.11 lbs/gallon

4,000 gallons x 2.11 lbs/gallon = 8,440 lbs of VOC

= 4.22 tons of VOC

What if only weight % is listed???

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	6.55 lb/gal	784 g/l
SPECIFIC GRAVITY	0.79	
BOILING POINT	<0 - 395 °F	<-18 - 201 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	90%	
EVAPORATION RATE	Faster than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
pH	7 0	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

Volatile Weight 50 67% Less Water and Federally Exempt Solvents

6.55 x (50.67/100) = 3.32 lbs VOC/gallon

What if the density isn't listed???

9. PHYSICAL AND CHEMICAL PROPERTIES

SOLUBILITY IN WATER:	Not soluble in water.		
APPEARANCE AND ODOR:	Clear colorless liquid, mild odor.		
pH of 5% SOLUTION:	N/A	**VAPOR DENSITY:**	Not determined
VAPOR PRESSURE:		**OTHER PROPERTIES:**	
EVAPORATION:	Not determined	**FREEZING POINT:**	
SPECIFIC GRAVITY:	0.75 - 0.79	**PERCENT VOLATILE:**	

Use the product's specific gravity and the density of water (8.34 lb/gal) to get the product's density:

0.79 x 8.34 = 6.59 lbs/gallon

Calculating HAP/TAP Emissions…

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Calculating HAP/TAP Emissions…

Amount of Coating Used – 4,000 gallons
Product Weight– 12.19 lbs/gallon
Ethylbenzene – 3%
Xylene Content – 15%

4,000 gallons x 12.19 lbs/gallon x (3/100)
= 1,463 lbs of Ethylbenzene
= 0.73 tons of Ethylbenzene

4,000 gallons x 12.19 lbs/gallon x (15/100)
= 7,314 lbs of Xylene
= 3.66 tons of Xylene

Controlling VOC Emissions

Types of Control Devices

- Incinerators
  - Regenerative - > 95-98% control efficiency
  - Recuperative – > 98% control efficiency
  - Thermal - > 98% control efficiency

Also consider coating transfer efficiency.

% of Total Emission by Coating Step for Different Coating Methods			
Coating Method	Application	Pre-Dry	Oven
Spray coating	30 – 50%	10-30%	20-40%
Dip coating	5-10%	10-30%	50-70%
Flow coating	30-50%	20-40%	10-30%
Roller coating	0-5%	10-20%	60-80%

**Unless spray-gun efficiency data is available*

Calculating Controlled Emissions

The facility's coating line is routed to a thermal oxidizer with a 98% control efficiency.

VOC Uncontrolled Emissions – 4.22 tons

Ethylbenzene Uncontrolled Emissions – 0.73 tons

Xylene Uncontrolled Emissions – 3.66 tons

4.22 x (1 - 0.98) = 0.08 tons of VOC

0.73 x (1 - 0.98) = 0.01 tons of Ethlybenzene

3.66 x (1 - 0.98) = 0.07 tons of Xylene

MCAQ Spreadsheets for VOC Sources

- VOC and Air Toxics from Coatings
- Gasoline Terminals
- Stage 1 Gasoline Dispensing

Questions?