

# 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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# VOC Emission Calculations

## What do I need?

- 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 ACGIH TLV 125 PPM STEL OSHA PEL 100 PPM OSHA PEL 125 PPM STEL	71 mm
16	1330-20-7	Xylene	ACGIH TLV 100 PPM ACGIH TLV 150 PPM STEL OSHA PEL 100 PPM OSHA PEL 150 PPM STEL	59 mm
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

<b>PRODUCT WEIGHT</b>	12.19 lb/gal	1460 g/l
<b>SPECIFIC GRAVITY</b>	1.47	
<b>BOILING POINT</b>	277 - 292 °F	136 - 144 °C
<b>MELTING POINT</b>	Not Available	
<b>VOLATILE VOLUME</b>	20%	
<b>EVAPORATION RATE</b>	Slower than ether	
<b>VAPOR DENSITY</b>	Heavier than air	
<b>SOLUBILITY IN WATER</b>	N/A	
<b>VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)</b>		
	2.11 lb/gal	253 g/l
	2.11 lb/gal	253 g/l

Less Water and Federally Exempt Solvents  
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	
	Volatiles Weight 50.67%	Less Water and Federally Exempt Solvents

$$6.55 \times (50.67/100) = 3.32 \text{ lbs VOC/gallon}$$



# 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 PRESSURE:**

**EVAPORATION:** Not determined

**SPECIFIC GRAVITY:** 0.75 - 0.79

**VAPOR DENSITY:** Not determined

**OTHER PROPERTIES:**

**FREEZING POINT:**

**PERCENT VOLATILE:**

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

$$0.79 \times 8.34 = 6.59 \text{ lbs/gallon}$$



# Calculating HAP/TAP Emissions...

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9	14807-98-6	Talc	ACGIH TLV OSHA PEL	2 mg/m3 as Resp Dust 2 mg/m3 as Resp Dust
31	13463-67-7	Titanium Dioxide	ACGIH TLV OSHA PEL OSHA PEL	10 mg/m3 as Dust 10 mg/m3 Total Dust 5 mg/m3 Respirable Fraction





# Calculating HAP/TAP Emissions...

Amount of Coating Used – 4,000 gallons

Product Weight– 12.19 lbs/gallon

Ethylbenzene – 3%

Xylene Content – 15%

$4,000 \text{ gallons} \times 12.19 \text{ lbs/gallon} \times (3/100)$

= 1,463 lbs of Ethylbenzene

= 0.73 tons of Ethylbenzene

$4,000 \text{ gallons} \times 12.19 \text{ lbs/gallon} \times (15/100)$

= 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

$$4.22 \times (1 - 0.98) = 0.08 \text{ tons of VOC}$$

$$0.73 \times (1 - 0.98) = 0.01 \text{ tons of Ethylbenzene}$$

$$3.66 \times (1 - 0.98) = 0.07 \text{ tons of Xylene}$$



# MCAQ Spreadsheets for VOC Sources

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



# Questions?

