Small Business: Know the FACTS

How to Use an MSDS for Air Pollution Control Requirements

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Raw materials that a business might use to create a product may, in the process, create air pollution. Air pollution from a business may be regulated under one of the air pollution control requirements carried out and enforced by DNR's Bureau of Air Management (or Air Program). The Material Safety Data Sheet (MSDS), provided by each supplier or manufacturer, is a tool used to determine if raw materials may create air pollution. There is no consistent format for the MSDS, so this fact sheet will show you how to determine if materials used at your facility will create air pollution and, if so, in what quantities.

What Is in a MSDS?

The only thing consistent about the format of the MSDS is the sections of information. Every MSDS must cover:

- what the material is
- who makes/sells it
- where manufacturer and/or supplier are located
- why the material is hazardous
- how people might be exposed to the hazard
- what conditions could increase the hazard
- how to handle the material safely
- what protection to use when handling
- what to do when exposed
- how to respond to a spill or emergency

What Do I Need to Know?

MSDSs are not intended as guides for air pollution emissions calculations. If information from the MSDS is used for emissions calculations, multiple steps could be necessary to determine required data. More appropriate for this purpose is the *Certified Product Data Sheet* that should be available from the material's supplier or manufacturer. If a Certified Product Data Sheet is not available, data from the MSDS must be used instead.

For air pollution control requirements, only the information about *what the material is and why it's hazardous* is needed from the MSDS. This information is found in the **Hazardous Ingredients/Identity** section and the **Physical/ Chemical Characteristics** section of the MSDS.

Hazardous Ingredients/Identity

This section includes a list of the material's hazardous components, their Chemical Abstract System (CAS) numbers, and the percentage contained within the material by. Many MSDS provide a range within which each component may be found. If your MSDS provides ranges, you should contact the supplier to obtain the precise values. It is important to know the exact amount of each hazardous component in each material used at your facility. This data is used to determine if you meet air pollution requirements. If the supplier or manufacturer will not provide exact values for each component for your emissions calculations, the highest value in the range should be used.

You must calculate specific hazardous air pollutant emission rates for:

- any air pollution permit applications
- the state hazardous air pollutant rule
- reporting on your annual air emissions inventory

Physical/Chemical Characteristics

This section contains information about the material which can be useful for air pollution control requirements. The key pieces of information are:

- specific gravity
- solids content (in weight percent)
- VOC content (in weight % or pounds/gallon, if provided)
- density of the material (in pounds per gallon)

These data provide enough information to calculate volatile organic compound (VOC) or particulate matter (PM) emissions or, when combined with hazardous component content values, emissions of the hazardous components.

Example Calculations

VOC Emissions

The data needed for VOC emissions calculations are:

- density or specific gravity
- VOC content or solids content (in weight percent or pounds per gallon)
- the amount of the material used over a certain period of time.

The MSDS or supplier information may provide the density of the coating. If not, you must first do an initial calculation. Using the specific gravity, which is a comparison of the density of the material to water's density, multiply the specific gravity by the density of water:

Specific Gravity (sg) = 0.84
Density = **specific gravity x density of water**
= 0.84 x 8.34 lbs/gal = 7.00 pounds per gallon

Next, figure the VOC content. If it is provided in pounds per gallon on the MSDS, then you can directly calculate the emissions. If not, you may need to do one or more other calculations first. If the VOC content is provided in volume percent, but not in weight percent, you need to use the solids content (in % by weight or wt) in the first calculation:

Solids content = 60% by wt.
VOC content = **1 – (solids content % by weight/100)**
= 1 - (60/100) = 0.40 x 100 = 40% by wt

You need to end with VOC content in pounds per gallon to calculate emissions. To do so, multiply the VOC content in weight percent by the density of the material (step 1).

VOC content = **(VOC % by weight/100) x density**
= (40 /100) x 7.00 lb/gal = 2.80 pounds per gallon

If you have additional materials, repeat these calculations for each, depending on data provided in the MSDS.

To calculate the emissions, multiply the VOC content by the number of gallons used. If you used 50 gallons in a month of just the one material, the emissions would be:

VOC emissions = **material used X VOC content**
= 50 gal/mo x 2.8 lb VOC/gal
= 140 pounds VOC per month

If you have additional materials, you must calculate the VOC emissions for each and add them together.

#1 = 50 gal/mo x 2.8 lb VOC/gal = 140 lb/mo
#2 = 75 gal/mo x 3.6 lb VOC/gal = 270 lb/mo
#3 = 15 gal/mo x 5.4 lb VOC/gal = 81 lb/mo
TOTAL VOC emissions = 140 + 270 + 81 = 491 lb VOC/mo

PM Emissions

- Calculation of PM emissions is similar to VOCs. You need:
- density or specific gravity
- solids content (in weight percent or pounds per gallon)
- amount of material used

It is not likely that you will be provided the solids content in pounds per gallon, but that is the value you need to complete the emissions calculation.

1) The density calculation is the same as shown in step 0 for VOC emissions.

2) Next, figure the solids content. You want to end up with solids content in pounds per gallon to calculate emissions. So you multiply the solids content in weight percent by the density of the material. We'll use 60% by weight again:

Solids Content = **(solids % by weight /100) x density** = (60/100) x 7.00 lb/gal = 4.20 pounds per gallon

3) Calculating the PM emissions is then the same as the VOC process. Multiply the solids content by the amount of material used:

PM Emissions = **material used x PM content**
= 50 gal/mo x 4.2 lb PM/gal
= 210 pounds PM per month

This data is needed for calculations for paints or coatings where there is a known percentage of the solids that are left on the part being painted. The fraction of solids left on the part compared to the total solids in the paint is called the transfer efficiency of the application method used.

The application method of electrostatic spray is known to have a transfer efficiency of 60%. Therefore, the true emission rate would be just the fraction of solids that does not stay on the part being painted:

True PM Emissions = **total solids emitted x (1 – {transfer efficiency/100})**
= 210 lb PM/mo x (1- [60/100])
= 84 lb PM/mo

Hazardous Air Pollutant Emissions (HAP)

The (HAP) emission calculation is very similar to the others. Before you begin the calculations, be sure to identify only those that are regulated by DNR or the US Environmental Protection Agency (EPA) as HAPs. Then, perform calculations only for those components that are regulated. Online you can find a HAP list, organized by CAS # so that you can match them with the compounds listed on your MSDS. The CAS# is the ideal match as compounds commonly have multiple common that can make it confusing. <http://www.epa.gov/ttn/atw/orig189.html> .

1) Again, the density calculation is the same as used for VOC emissions above.
2) Using the example of the range of 10-25% by weight of n-Butyl Alcohol, without a precise value from the manufacturer or supplier you have to use the high end of the range.
3) Calculating the emissions is the same as above:

HAP Content = **(HAP % by wt. /100) x density**
= (25/100) x 7.00 lb/gal = 1.75 lb HAP/gal

HAP Emissions = **material used x HAP content**
= 50 gal/mo x 1.75 lb HAP/gal
= 87.5 lb HAP/mo

The Small Business Environmental Assistance Program has designed a spreadsheet in MS Excel that can assist you with these calculations. You just need to collect the data from your MSDS and enter it into the spreadsheet. Go to http://dnr.wi.gov/topic/SmallBusiness/documents/air/EmissionsWorksheet.xls for this spreadsheet.