Safe Harbor Assessment of Methanol in Wood Care/Teak Oil

Given information

According to the Safety Data Sheet provided by Rust-oleum Corporation

$$Specific\ gravity\ of\ coating\ solution = 0.862$$

$$Volitile\ organic\ compounds\ in\ coating\ solution = \rho_{volitiles} = \frac{450g}{L}$$

$$wt\%methanol\ of\ solution \leq 1\%$$

Provided by part manufacturer

$$Average\ stain\ volume\ used\ per\ part = \frac{0.312\text{mL}}{part}$$

Calculations

1. *Component density of methanol in coating, assuming upper limit*

$$Specific\ gravity\ of\ coating\ solution = \frac{\rho_{coating}}{\rho_{water}} = 0.862$$

$$\rho_{water} = 100\frac{g}{L}$$

$$\rho_{coating} = \rho_{water} * 0.862 = 100\frac{g}{L} * 0.862$$

$$\rho_{coating} = 862\frac{g}{L}$$

The SDS reports a maximum methanol concentration of 1wt% of the total solution

$$\rho_{Methanol} = \frac{wt\%\ methanol}{100} * \rho_{coating}$$

$$\rho_{Methanol} = \frac{1}{100} * 862\frac{g}{L}$$

$$\rho_{Methanol} = \frac{8.62g}{L}$$

2. *Mass of methanol POC per part*

$$Average\ stain\ volume\ used\ per\ part = \frac{0.312mL}{part} = \frac{0.000312L}{part}$$

$$m_{methanol} = V_{coating} * \rho_{methanol} = \frac{0.000312L}{part} * \frac{8.62g}{L} = \frac{0.00269g}{part}$$

$$m_{methanol} = \frac{0.00269g}{part} = \frac{2.69mg}{part}$$

3. *Harmonizing the California Code of Regulations "safe harbor" into comparable units*

Methanol is limited under MADL standards to acceptable exposures under 47,000 µg/day (inhalation) or 23,000 µg/day (oral).

Inhalation limit

$$\frac{47{,}000\mu g}{day} * \frac{1g}{1 * 10^6\ \mu g} = \frac{0.047g}{day} = 47mg$$

Oral limit

$$\frac{23{,}000\mu g}{day} * \frac{1g}{1 * 10^6\ \mu g} = \frac{0.023g}{day} = 23mg$$

Conclusion

The theoretical maximum methanol exposure to a consumer from a single part (≈2.7mg) falls well within the acceptable "safe harbor" exposure limits set forth under the California Code of Regulations (<47mg inhalation, <23mg oral). The de facto consumer exposure is expected to be well below the theoretical maximum exposure, as much of the methanol will have volatilized during the curing of the varnish and shipping of the part long before reaching the consumer.