

Cold Solvent Parts Washer PTE Template

Equipment: One Parts Washer with a secondary reservoir and a surface opening 2 inches in diameter that contains mineral spirits. This blend of mineral spirits does not contain HAPs.

Calculations:

Parts Washer:

For VOC calculations: $q = A[pa \cdot Mw/RT][Di/(Z2-Z1)] \ln[1/(1-Y_{ci})][EM]$

$$Pa = (\text{atmospheric pressure}) = 760 \text{ mmHg} = 100 \times 10^3 \text{ N/m}^2$$

$$R = (\text{Ideal Gas Constant}) = 8.314 \times 10^3 \text{ J/kmol}^\circ\text{K}$$

$$T = (\text{liquid temperature}) = 293.15^\circ\text{K}$$

$$Z2 - Z1 = \text{empty vapor space above the liquid level in the tank} = 0.001\text{m}$$

$$EM = 1.1 = 10\% \text{ increase of the emissions to include working losses (i.e. slashing, etc)}$$

$$Mw = \text{molecular weight} = 99 \text{ kg/kmol}$$

$$Di = \text{Diffusivity of component through air} = 0.62 \times 10^{-5} \text{ m}^2/\text{s for mineral spirits}$$

$$Y_{ci} = \text{volatile fraction of components in air} = \text{vapor pressure} / 760 \text{ mmHg}$$
$$= 0.6 \text{ mmHg} / 760 \text{ mmHg}$$
$$= 0.000789$$

$$A = \text{surface area} = \Pi \times \text{radius}^2 = 3.14 \times (1\text{in})^2 = 3.14\text{in}^2$$

$$3.14\text{in}^2 (1\text{ft}^2/12\text{in}^2) = 0.02 \text{ ft}^2 \text{ for a secondary reservoir}$$

PTE for VOC:

Parts Washer:

$$q = (0.02 \text{ ft}^2 \text{ surface area})(1 \text{ m}^2/10.76 \text{ ft}^2)[(100 \times 10^3 \text{ N/m}^2) \cdot (99 \text{ kg/kmol}) / (8.314 \times 10^3 \text{ J/kmol}^\circ\text{K})(293.15 \text{ K})][(0.62 \times 10^{-5} \text{ m}^2/\text{s}) / (0.001 \text{ m})] \ln[1/(1 - 0.000789)][(3600 \text{ s/hr})(2.2046 \text{ lb/kg})(8760 \text{ hr/yr}) / (2000 \text{ lb/ton})][1.1] = 0.0014 \text{ tpy}$$

Total = 0.0014